

The Deputy Secretary of Energy

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September 16, 1993

Mr. Brian Burke
Senior Policy Analyst
Domestic Policy Council
Room 210, OEOB
Washington, D.C. 20500

Dear Mr. Burke:

In preparation for the September 20, 1993, Interagency Deputies Meeting to discuss the Department of Energy Domestic Gas and Oil Initiative, enclosed is a draft summary of the policy proposals currently under consideration.

This summary gives you an overview of the progress we have made in the development of the Initiative. I anticipate serious in-depth discussions on these proposals at the meeting and look forward to working with you.

As a reminder, the meeting will be held from 2:00 - 4:00 p.m. in the Department of Energy Forrestal Building, 1000 Independence Avenue, SW, Room 8E-089. If you need any additional information, please call Melissa Tell at (202) 586-1596.

Sincerely,

A handwritten signature in black ink that reads "Bill White". The signature is written in a cursive, flowing style.

Bill White

Enclosure



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DOMESTIC GAS AND OIL INITIATIVE
Revised September 16, 1993

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DOMESTIC GAS AND OIL INITIATIVE

I. INTRODUCTION

Earlier this year Secretary Hazel R. O'Leary announced that the Administration would develop a "plan that will lead to expanded opportunities for domestic gas and oil producers." The Secretary noted that "the end goal of this project will be to develop new and expanded opportunities for jobs in the domestic gas and oil industries, while fostering a climate which will increase production from domestic resource bases and reduce our reliance on foreign oil."

A viable and productive domestic gas and oil industry is essential to our shared national goals of increased economic and national security and environmental preservation. Even with the aggressive increases in energy efficiency and new sources of supply -- increases we fully intend to achieve -- a sound economic future requires an investment in the domestic gas and oil industry. By learning to use our gas and oil resources productively and wisely, we will preserve capabilities and opportunities that are vital to our economic future and our leadership role around the world.

This document summarizes the content of a Domestic Gas and Oil Initiative. The purpose of this Initiative is to develop an effective approach for maintaining the viability of the American gas and oil industry without compromising our environmental quality or economic efficiency. The two key overarching goals of the Initiative are the creation of high-technology jobs and long-term economic opportunity and a reduction of the trend towards high imports. The Initiative was developed by working with stakeholders and various Federal agencies with significant energy responsibilities.

The Initiative has four major elements:

- (1) to increase gas and oil production and environmental protection through the advancement and dissemination of technology;
- (2) to stimulate markets for natural gas;
- (3) to develop an integrated policy for slowing the trend towards greater oil imports; and
- (4) to improve communication and government decisionmaking.

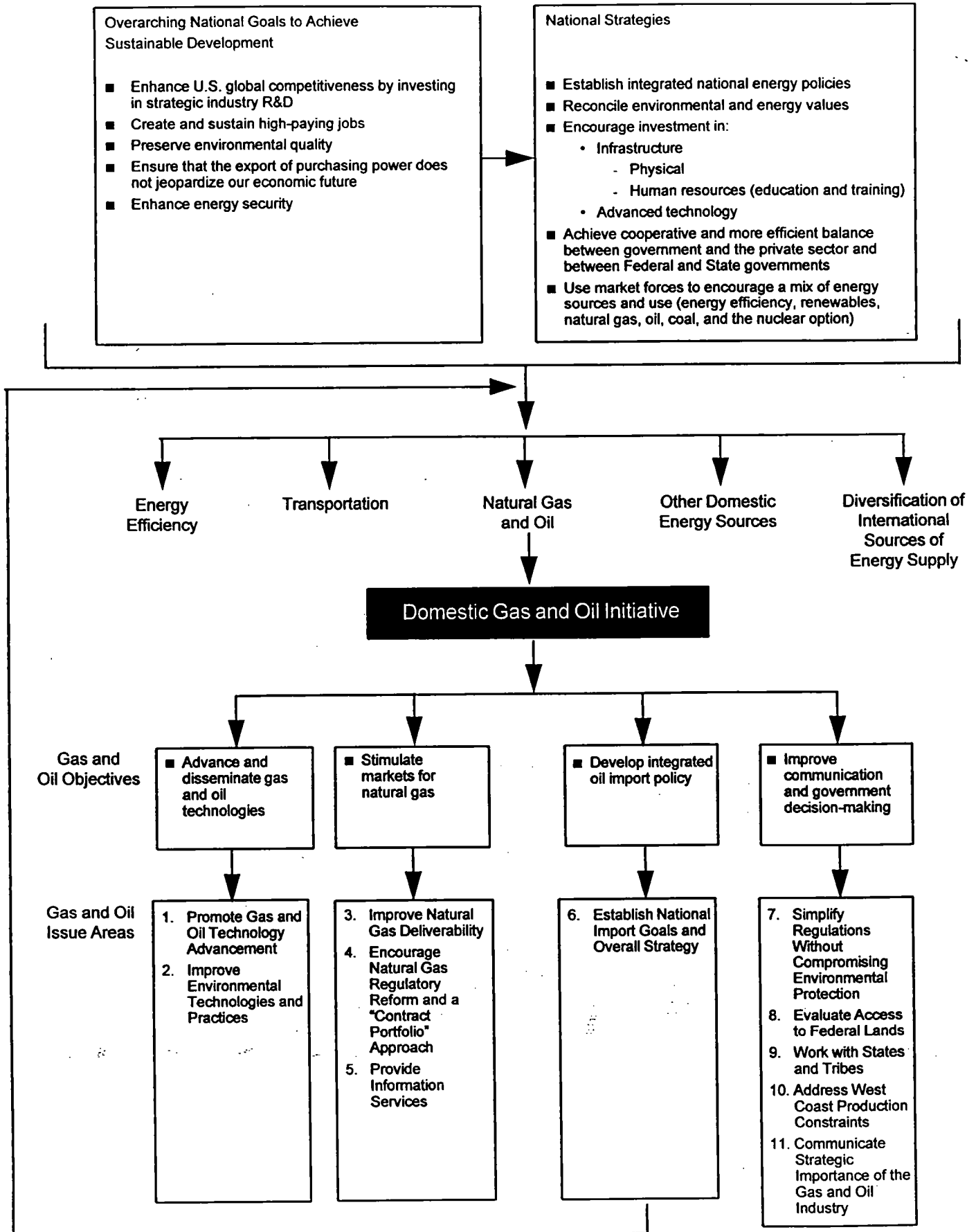
Figure 1 summarizes the objectives and elements of the Initiative.

This initiative focuses primarily on issues concerning the domestic production of gas and oil. Other efforts are underway at DOE to increase energy efficiency in buildings, industry and the transportation sectors, as well as to increase renewable and other domestic energy sources and to diversify our sources of international energy supplies.

Figure 1

9/16/93

Domestic Gas and Oil Initiative Roadmap



In assembling the Initiative, the Department has sought to achieve its objectives without sacrificing other paramount national interests, such as deficit reduction, economic stimulus and environmental protection. Wherever possible, the strategies seek to take advantage of market forces. In establishing the new gas and oil policies, the government also seeks to achieve a cooperative and efficient balance between the public and private sectors, and between Federal and State governments.

II. THE NEED FOR ACTION

A. The Worldwide and Domestic Importance of Gas and Oil

Natural gas and oil will remain critical elements of every nation's economic picture for the foreseeable future. In 1990, United States consumers spent over \$300 billion on gas and oil--5.5 percent of GDP.¹ Gas and oil supply 99.9 percent of transportation fuel needs (almost entirely oil); 75 percent of industrial needs;² 61 percent of residential and commercial needs and 13 percent of electric utility needs.³

In the rest of the world, natural gas and oil are equally important, or, in some cases, even more important commodities, as in the United States. Worldwide gas and oil consumption represents 61% of total energy consumed as of 1991.⁴ In view of the wide distribution of offshore reserves and the developing world's enormous appetite for energy, gas and oil are likely to play an ever-increasing economic role. In addition, global warming concerns may cause an even larger shift towards gas, and possibly oil, than might otherwise occur.

By any standard, the domestic gas and oil industry remains an important source of capital formation, technological development, and employment in the American economy. In 1990 the industry invested \$21.0 billion⁵ in infrastructure. The gas and oil industry, including the associated service industries, account for nearly 380,000

¹Source: Energy Information Administration; The Annual Energy Review 1992. U.S. Department of Energy, Table 3.8, page 85.

²Includes non-utility electric generation, independent power producers, feedstocks and other industry users.

³Source: Energy Information Administration; The Annual Energy Review 1992. U.S. Department of Energy, Table 3.7, p. 83.]

⁴Energy Information Administration, International Energy Annual, 1991, Table ES2, page XVI.

⁵Source: Survey of Oil and Gas Expenditures 1990, American Petroleum Institute, November 1991, Table II, page 2.

American jobs. Though this represents a relatively small fraction of the total U.S. work force, Figure 2 demonstrates that these jobs pay wages 30 percent above that of the average American worker, thus representing the sort of high-skill, high-value jobs America needs.⁶ Identification of hydrocarbon deposits far underground requires much training and application of advanced technologies.

B. The Nation's Increasing Dependence on Imported Oil

At times oil imports alone have accounted for well over half of the U.S. trade deficit. Since 1986, oil imports have risen by more than 25 percent, with projections indicating that we will cross the 50 percent import threshold in 1995 or 1996.⁷ This trend is shown in Figure 3. In 1992, petroleum provided 41 percent of the energy consumed in the United States and the nation imported 41 percent of its net petroleum supply.⁸

As we approach the twentieth anniversary of the OPEC embargo, which staggered U.S. financial markets, destabilized economic growth, and sent motorists scurrying to join long gas lines, the U.S. remains vulnerable to the disruption of its oil supply. Today, the developed world is just as dependent on open access to the Persian Gulf, the locus of most of the world's known oil reserves, as it was two decades ago.

Most of our economic competitors strongly encourage petroleum conservation -- often through imposition of high consumption taxes -- in part to reduce their vulnerability to supply interruptions. Americans have preferred to find other strategies to address this problem, including world leadership in the maintenance of strategic petroleum stockpiles and the pursuit of energy conservation through various public policies. As a complement to these efforts, it should be our policy to strengthen exploration and production of domestic gas and oil resources in a cost-effective, pro-competitive manner.

Our nation's huge expenditures on oil imports are a major part of our negative balance of trade. Between 1980 and 1992, the U.S. paid foreigners \$742 billion (1987 dollars) to purchase imported crude oil and petroleum products.⁹ The potential effect of these imports is to transfer American wealth and purchasing power to foreigners at a time

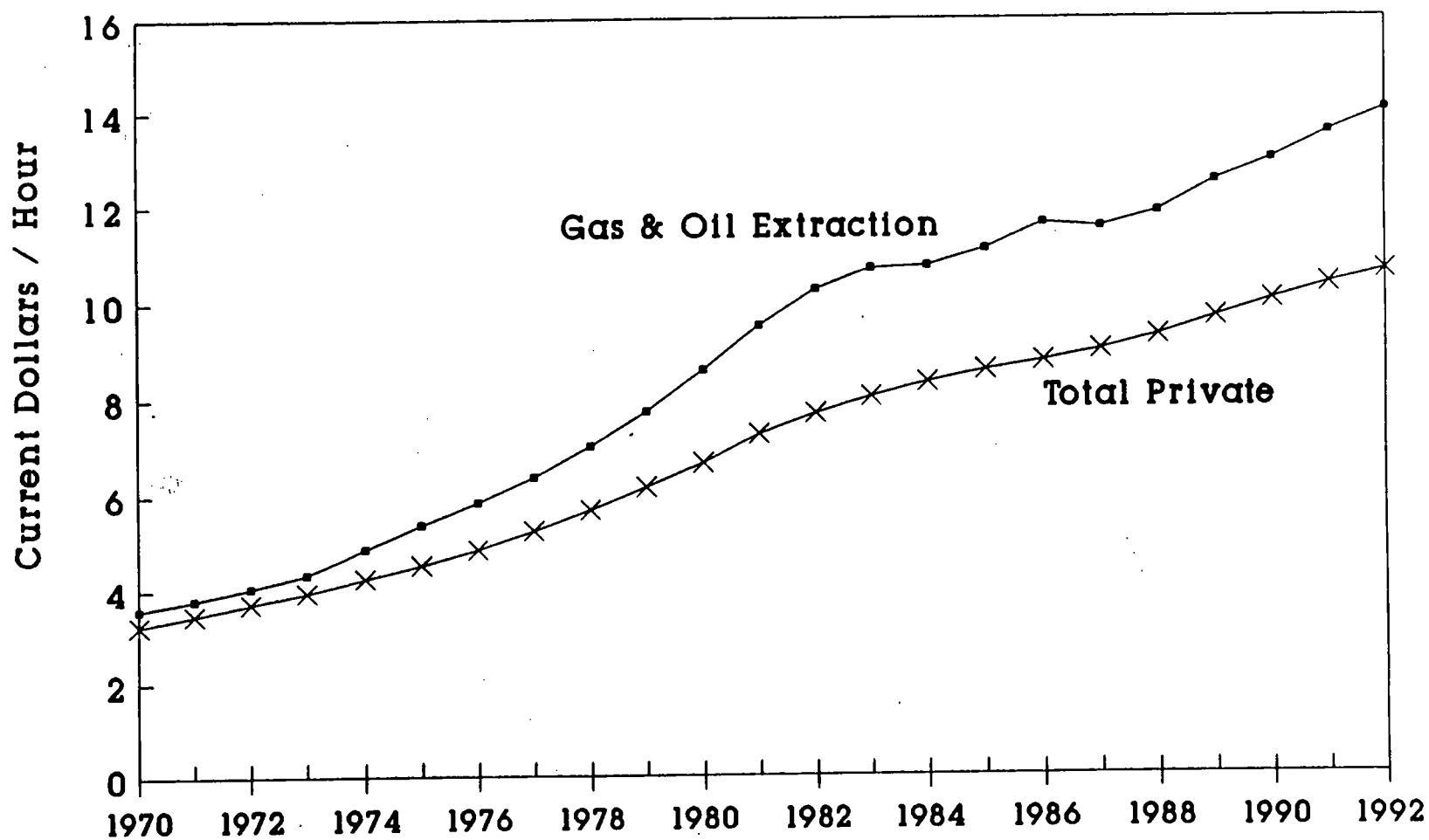
⁶Source: Bureau of Labor Statistics, Department of Labor; Current Employment Statistics Survey.

⁷ Energy Information Administration: Annual Energy Outlook 1993, Table A1, page 81.

⁸Energy Information Administration; Annual Energy Review 1992, Table 1.3 and Table 5.1.

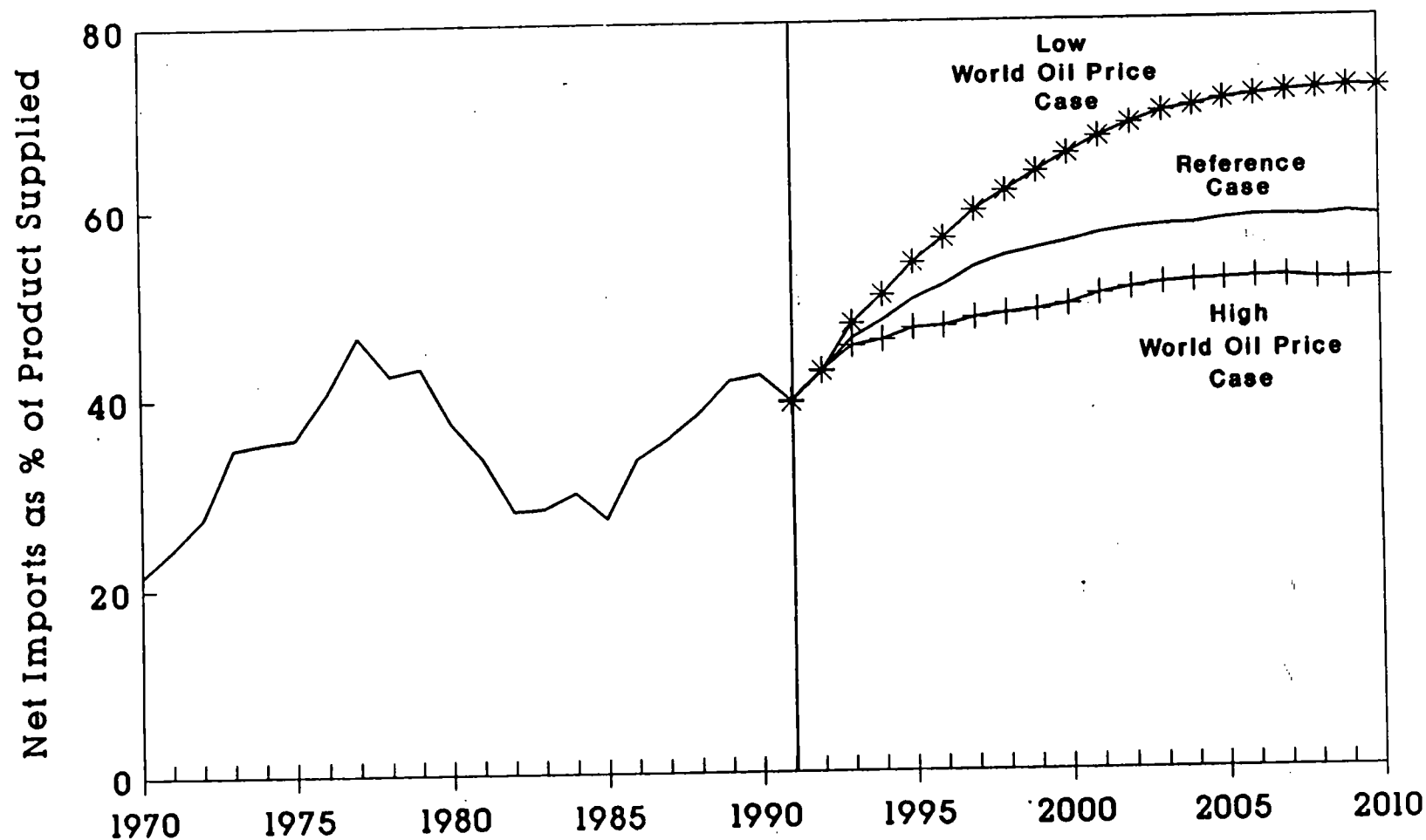
⁹Energy Information Administration; Annual Energy Review 1992, Table 3.3, p. 75.

**Figure 2. Average Hourly Earnings for
the Gas & Oil Extraction Industry**



Source: Energy Information Administration

**Figure 3. U.S. Dependence on Petroleum
Net Imports**



Source: Energy Information Administration

when public and private investment needs in the U.S. are substantial and growing. Savings from energy efficiency and the cost-effective substitution of domestic supply for oil imports represent a prospective fiscal stimulus and an investment in our future.

The U.S. Office of Technology Assessment has estimated that U.S. imports could rise to levels as high as 70 percent by the year 2000.¹⁰ Without action, we face significantly higher levels of importation that will undoubtedly compound and intensify the problems with oil imports the U.S. has experienced to date.

C. Maintaining Our Lead in Gas and Oil Exploration and Extraction Technologies Will Benefit the Nation

Preserving Gas and Oil Jobs for Long-term Economic Opportunity

The American people have given this Administration the pre-eminent task of redirecting public resources to help create high-wage jobs and a secure economic future for American citizens. The American public and their government increasingly understand that the citizens of this country compete internationally for jobs, for investment, and for economic growth. Success in that competition will depend, in part, on an explicit strategy that emphasizes improvement in American technology and competitiveness.

The U.S. gas and oil industry is in transition. Most major oil companies have shifted their exploration operations abroad. Independent producers play an increasing role in finding and extracting domestic gas and oil. Natural gas is an abundant and underutilized domestic resource which can be substituted for oil and has many environmental and economic benefits. Furthermore, the U.S. has large remaining resources of oil, but they require advanced, relatively high-cost technologies to locate and extract.

It is beyond question that natural gas and petroleum will remain critical materials in the world economy for the foreseeable future. Increasing scarcity anywhere in the world will increase the value of exploration and production skills that reduce the cost, or increase the availability of, natural gas and petroleum.

The gas and oil industry relies upon advanced technology, in which American firms traditionally have led the world. Modern gas and oil exploration and production represent the quintessential "high tech" industry. It is instructive to note that, when oil

¹⁰United States Congress, Office of Technology Assessment. U.S. Oil Import Vulnerability. October 1991, page 3.

fires in Kuwait required unique firefighting skills, U.S.-based experts made important contributions to ending this economic and environmental nightmare.

As in many other industries, worldwide competition in extraction and exploration is fierce and increasing. If domestic producers are to continue to provide a substantial portion of U.S. oil needs, and compete in world oil markets, new and advanced technologies must be developed and widely applied. New technologies will also be vital in developing our abundant domestic natural gas resources to meet the widely-expected increased levels of demand.

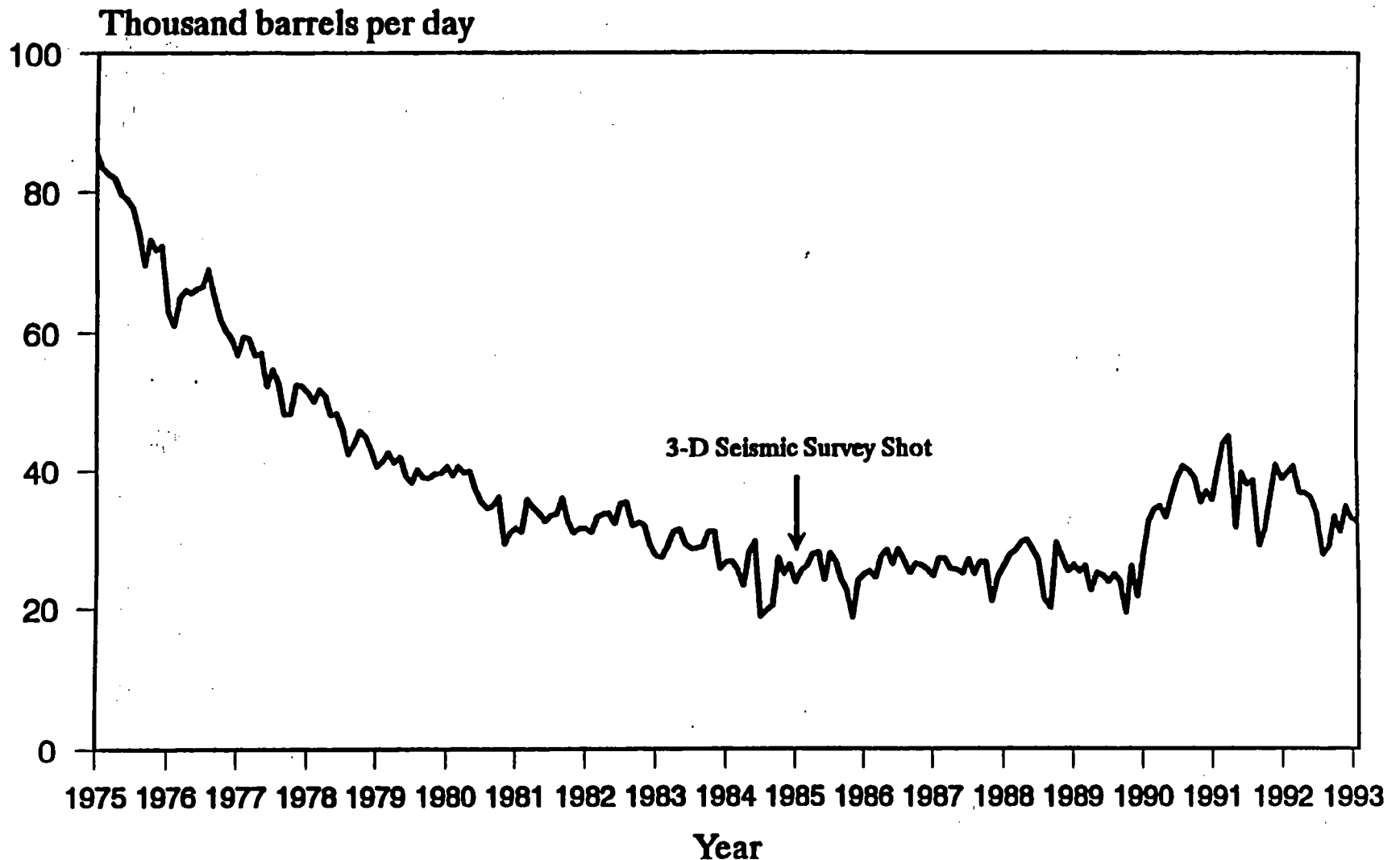
In the long run, increased productivity of the American oil and gas industry can have significant job creation effects. First, by keeping U.S. technologies "on the cutting edge," we ensure that they are the technologies of choice worldwide, thereby maintaining and expanding technology export opportunities and export-related jobs. Second, increased productivity can make more of a domestic energy resource economically available, ultimately allowing expanded domestic production and increased employment.

Revolutionary technologies that use state-of-the-art computer mapping of the subsurface for exploration and production are being developed in the gas and oil industry today. A case in point is known as three dimensional (3-D) seismic surveying. This procedure can provide high-resolution images of subsurface gas and oil deposits, thus enabling more efficient exploration and development. Success using this approach has been documented by several oil companies. An example is in the Bay Marchand field in Louisiana (See Figure 4). Prior to 3-D utilization, production in this field had declined to 18,700 barrels per day in November 1985. Using 3-D technology, the decline in production was reversed and output more than doubled, rising to 45,200 barrels per day in April 1991. Other case studies suggest that, where new undrilled reservoir prospects lie adjacent to producing fields, the discovery success rate can be improved by as much as 50 percent through use of 3-D technology.

While these computer mapping technologies are not fully tested, independent producers, integrated major producers, and the gas and oil service industry believe they hold great promise for expanding production from our domestic resources. Furthermore, these technologies have great potential for developing gas and oil resources abroad, thus representing a significant export opportunity and allowing a diversification of international supply.

American industrial competitiveness will depend on improvements in productivity and technology equal to or better than that of other nations. The gas and oil industries are poised to research and adopt new methods of exploration and extraction that will allow us to expand our economically recoverable domestic resource base without compromising environmental quality. Increased reliability of underground mapping means fewer dry holes and increased reserves. If we develop and deploy these new

**Figure 4. Bay Marchand Field
Monthly Average Production History
1975-Early 1993**



Source: Dwight's Energydata, Inc. via Energy Information Administration.

procedures in a domestically-based industry, the U.S. will lay claim not only to increased energy production, but also technologies that can be marketed to our trading partners abroad. If we fail, the U.S. will likely be purchasing these technologies from other nations who recognized their strategic and economic value and had the courage to act.

Preserving Worldwide Environmental Quality

As we move toward the twenty-first century, the nation must reduce our dependence on fossil fuels, minimize wastes, preserve our water resources, and protect sensitive environments. This Administration will assert world leadership on such issues. The policies that encourage gas and oil exploration and production will be pursued with these environmental goals in mind and with the understanding that energy and environmental objectives are compatible. In doing so, the U.S. will be setting a standard for environmental sensitivity in the gas and oil industries that will demonstrate leadership and serve as a basis for environmental standards in other parts of the world.

III. THE DOMESTIC GAS AND OIL INITIATIVE

As mentioned in the introduction, the Domestic Gas and Oil Initiative has four principle objectives:

- Objective 1. Increase gas and oil production and environmental protection through the advancement and dissemination of technology;
- Objective 2. Stimulate markets for natural gas;
- Objective 3. Develop an integrated policy for changing the trend in oil imports; and
- Objective 4. Improve communication and government decisionmaking.

In the remainder of this section, each of these objectives is discussed and described. Substantial additional background discussion is available in a series of Options Papers, which will be made available on September 20, 1993.

Objective 1. Advancement and Dissemination of Gas and Oil Technologies

As the previous section explains, the gas and oil industry is poised to realize enormous benefits from advanced exploration and production techniques presently under development. To take maximum advantage of these opportunities, the Administration proposes to enhance joint government/industry/university research and development efforts on advanced computing problems related to exploration and production. These efforts will build on the longstanding leadership of the United

States in developing and marketing new computer technologies and applications, and would help to maintain a strong U.S. position in this critical, high-wage field. Public/private R&D partnerships are particularly important, as industry has generally reduced funding for long-range R&D in recent years.

The initiative also proposes to accelerate and expand upon the current DOE oil R&D program to increase advanced oil recovery capabilities and reduce the rate of reservoir abandonment. This will be accomplished through accelerating field demonstrations; conducting in-depth evaluations of selected past and ongoing industry projects to pinpoint important unsolved problems; disseminating more complete information on technology developments; conducting field-based reservoir characterization and innovative recovery process experiments; and expanding supporting research to address industry-identified needs.

Advanced computing technologies are revolutionizing the search for gas and oil. In some areas, for example, advanced computing technologies have allowed for the direct detection of natural gas through the analysis of seismic data.

American national defense labs—specifically Los Alamos, Sandia, and Livermore—historically have been responsible for the development of cutting-edge computer technologies. American taxpayers have invested countless billions of dollars on computers and scientists who have developed world-class modeling capabilities. These scientists and facilities can and do model complex subsurface conditions for both underground nuclear testing and some current oil and gas projects.

These efforts will be redirected and expanded in FY-95, to a total federal commitment of \$50 million, in addition to substantial funds from private enterprises.

Domestic gas and oil producers face increasing costs of compliance with environmental regulations. To help reduce these costs through technology, the DOE, with the assistance of the EPA, would establish an industry-focused environmental research advisory board. The express purposes of the Board will be to advise the government on R&D issues. The Initiative will also create an environmental technology demonstration and technical assistance program and develop specific studies and demonstrations, such as an examination of the feasibility of significantly increasing the amount of lubricating oil that is recycled in the United States; and exploring the Federal role in oil spill clean-up R&D.

The Administration also proposes to stimulate development of a nationwide technology transfer network and assistance program. Technology transfer efforts will be especially important in encouraging the 8,000 independent operators in the U.S. to adopt innovative exploration and production methods. Two-thirds of these independents have fewer than 20 employees and obviously cannot individually finance

large, long-term R&D programs.¹¹ Due to the increased upfront costs associated with new technologies such as advanced computing, some independents have formed associations that reduce the costs of gaining access to new technologies. By familiarizing individual firms and these associations with new technologies developed by both industry and government, technology transfer efforts can make a critical contribution to increasing domestic production and sustaining the viability of the domestic industry.

New technologies can also be promoted through targeted tax changes to encourage research and development expenditures in the gas and oil industry. Tax policy should encourage new expenditures associated with geophysical and environmental research. Of particular interest should be the use of advanced computing techniques.

By encouraging the use of the most advanced technologies for gas and oil production and environmental compliance, the proposed initiatives will help boost high-technology, create high-wage employment in the United States, and reduce the transfer of American savings and purchasing power abroad. Ultimately, investments in technology should be investments in people; only superior knowledge and skills of American workers will keep them at the forefront of international competition.

Objective 2. Stimulate Markets for Natural Gas

As the President has stated, the substitution of domestically produced natural gas for energy purchased in the form of imported oil provides unqualified benefits to the nation. Substitution of domestic gas for imported oil helps the environment and helps keep jobs at home.

The remaining resource base for natural gas appears to be more abundant and cost-effective to tap than the remaining resource base for domestic oil. Independent studies indicate that the size of the gas resource base promises the availability of natural gas for several decades without opening up new exploration provinces (Table 1). Figure 5 indicates that since 1987, gas and oil exploratory drilling yields have nearly doubled. Most of this increase in productivity represents the discovery of new gas reserves.¹²

This element of the Initiative intends to stimulate domestic natural gas use everywhere it is a cost-effective, environmentally compatible fuel source. The policies of the federal government should strengthen natural gas distribution capabilities;

¹¹Source: Department, of Commerce, Bureau of the Census, 1987 Census of Mineral Industries, MIC 87-1-13A, Table 1, page 13A-5.

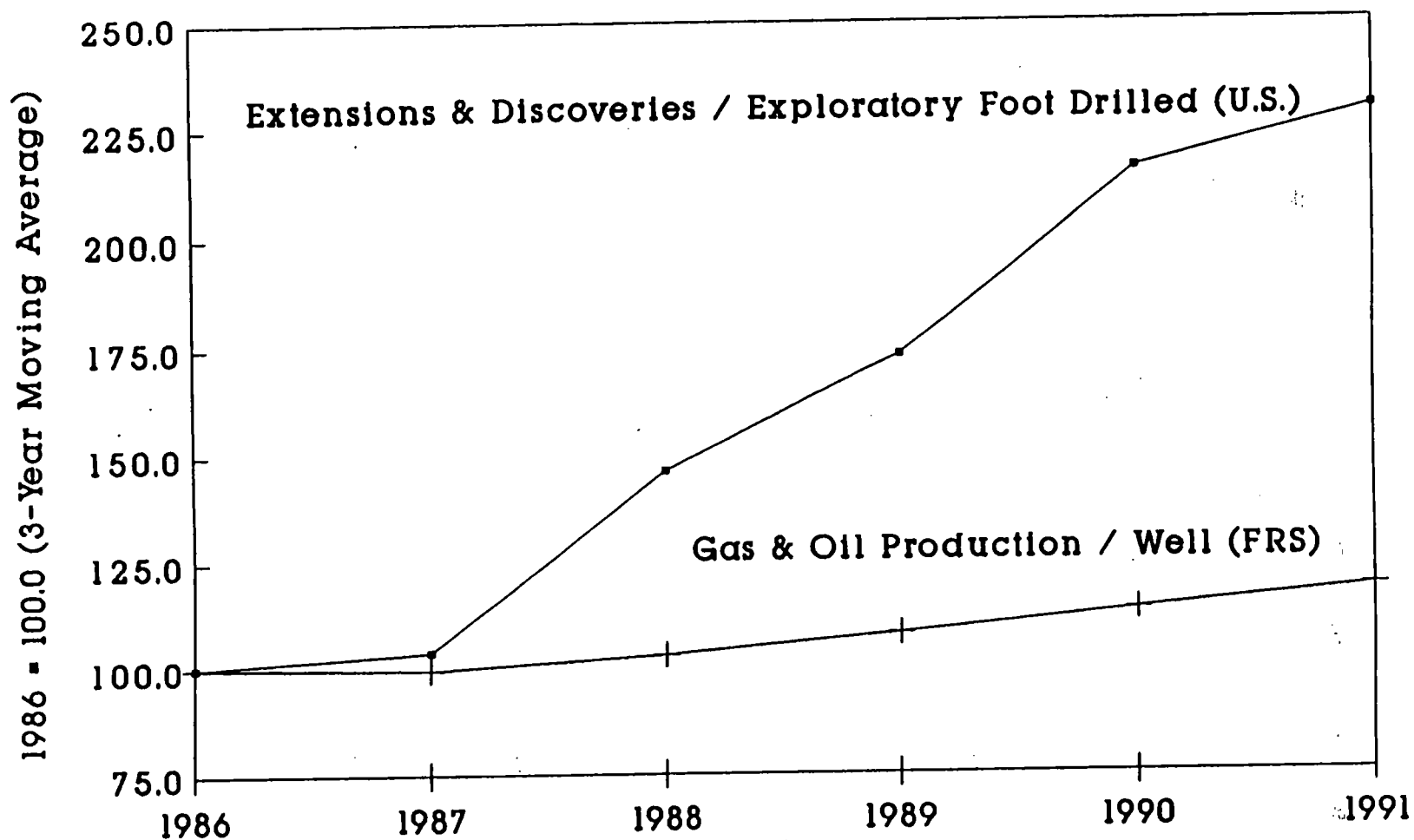
¹²Energy Information Administration; U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 1991, Figures 10 and 11, page 18..

**Table 1. Recoverable Resources in the Lower-48 States
Comparison to Other Estimates
(Trillion Cubic Feet)**

	National Petroleum Council	Potential Gas Committee	Gas Research Institute	Energy Information Administration
	1992	1990	1992	1990
Proved Reserves	160	160	160	160
Conventional Resources				
Reserve Appreciation	203	170	150	265
New Fields	413	491	394	327
Total Conventional Resources	616	661	554	592
Nonconventional Resources				
Coalbed Methane	98	88	110	90
Shales	57	--	123	30
Tight Gas	349	--	238	383
Other	15	--	32	--
Total Nonconventional Resources	519	88	503	503
Total Assessed Resource	1,295	749	1,047	1,095
Total Resource	1,295	909	1,207	1,255
Adjust to 1/1/91	--	--	--	35
Total Adjusted Resource	1,295	909	1,207	1,220

Source: National Petroleum Council, The Potential for Natural Gas in the United States, December 1992, Volume II - Source and Supply, page 37.

Figure 5. Indexes of Gas & Oil Productivity



Source: Energy Information Administration

support continuing gas regulatory reforms; encourage regulators to permit companies to enter into a variety of contracting arrangements that facilitate lower-cost or lower-risk deliveries, such as longer-term contracts and hedging; and provide better information services. In addition, the Administration has demonstrated a commitment to alternative-fuel vehicles through programs such as the Clean Cities Program and the Federal Fleet Conversion Task Force.

All these efforts will be implemented to the greatest feasible extent using market-oriented mechanisms, in cooperation with the elements of the natural gas industry that most aggressively produce and market gas. These measures are expected to boost the consumption of this low cost, clean burning, relatively plentiful domestic fuel.

Improving natural gas deliverability

Efficient delivery of natural gas from the wellhead to the burner tip is dependent on a well-functioning physical infrastructure for gathering, transporting, storing, and distributing gas, and on an accurate and timely information infrastructure for monitoring natural gas supply and demand. To improve the physical infrastructure, the Administration will work to remove barriers to environmentally sound construction of additional pipeline and storage facilities; increase access to existing facilities; and accelerate the development and use of advanced technologies in natural gas storage and distribution. The Administration will promote policies and encourage public and private action to improve real-time capabilities for monitoring and modeling natural gas availability and flows, and match gas storage to end-user requirements. Such efforts will be especially important in enabling greater use of natural gas in electric power generation.

A reliable, properly functioning, competitive gas market requires distribution and information systems that will meet the demands of the market. Competition will improve when timely and accurate information is readily available to allow buyers, sellers, and transporters to make better-informed choices.

Encouraging natural gas regulatory reform and removing barriers to new contracting and hedging mechanisms

Federal and State regulators should continue to promote a competitive, customer-oriented industry structure. Changes under way in the private sector and market structuring by the Federal Energy Regulatory Commission (FERC) are already reducing the costs of information and transactions in natural gas markets. DOE will work cooperatively with the FERC on initiatives that will seek to expedite pipeline construction, allow gas fired electric generation to compete for market share, and encourage effective marketing of pipeline facilities. The proposed initiatives will build on these changes, with emphasis on an approach that encourages a flexible portfolio of contracts for gas purchasers, including longer-term contracts.

At the State level, changes in regulations governing the distribution of natural gas and electricity can also lead to improved efficiency in energy use. DOE supports State efforts to revise electricity, gas, environmental, and energy conservation pricing policies and regulations so as to better reflect true economic costs which will lead to greater economic value and a cleaner environment. Recognizing the States' jurisdictional authority in this area, we seek a cooperative effort between State utility regulators and energy offices and DOE to help foster regulatory reforms that will: (1) improve access to gas distribution facilities; (2) encourage efficient pricing for electricity and gas; (3) encourage the removal of fuel-specific subsidies that work against energy efficiency goals; (4) encourage cost-cutting by distributors; and (5) boost the use of natural gas transportation.

In addition to these Federal and State regulatory reform initiatives, the Administration is pursuing two coordinated efforts whose net effect will, we believe, accelerate the use of natural gas in transportation markets: (1) The Federal Fleet Conversion Task Force, a program designed to convert public and private fleets to alternative fuels, including natural gas, over the next few years; and (2) The Clean Cities Program, a coordinated effort for development of infrastructure for alternative fuel vehicles in communities. Efforts such as these will have a major impact on reducing imports, creating jobs and opening new markets for alternative motor vehicle fuels such as natural gas.

Providing information services

To facilitate all elements of this Initiative, and as a final implementation measure aimed at this objective, the Department will improve its ability to develop, collect, and disseminate information on natural gas deliverability and storage. To complement the proposed initiatives to improve natural gas deliverability and encourage regulatory reform, the DOE will enhance the capability of the Energy Information Administration (EIA) to collect these data, and will develop an Energy and Resources Mapping and Information System. EIA will work with other agencies and the private sector to provide a coordinating function and to avoid duplication while executing this task.

Objective 3. Develop An Integrated Oil Import Policy

The Domestic Gas and Oil Initiative begins a process for developing an integrated strategy for changing the trend towards increased oil imports. Two alternative approaches for developing this strategy are being considered:

- o In the first approach, the process would analyze the impacts of different levels of oil imports on our energy use and balance of trade; analyze the implications of setting a goal for a maximum acceptable dependence on imported oil, and set such a threshold; and further define the set of actions or policies, that the Federal government would adopt if the threshold were met.

- o In the second, the process would develop a strategy for holding net imports of petroleum consumed in the United States below 50 percent in any consecutive 12 month period.

The Department of Energy advocates the second alternative.

Establishing national import goals and overall strategies

To address issues common to both approaches, the Administration will establish an interdepartmental working group, coordinated by the National Economic Council and the National Security Council, with the Department of Energy as the lead agency. This working group would analyze costs and benefits, examine approaches and develop recommendations. Policies for reducing the growth of imports would be integrated with other U.S. trade, fiscal, economic and environmental policies, including:

- o Promoting and encouraging energy efficiency;
- o Transportation initiatives and programs;
- o Development of renewable and other energy sources and fuels;
- o Diversification of international sources of energy supply, along with maintenance of a Strategic Petroleum Reserve.

Under the second approach, the Department will also hold public meetings for the purpose of developing legislation that addresses appropriate policies and procedures to invoke when the U.S. reaches the point of greater than 50% reliance on imported oil. The policies and procedures the Department proposes to review and consider include:

- (a) Making "automatic" a required finding under Section 232 of the Trade Expansion Act that authorizes the President to order an oil import tariff or other measures appropriate to safeguard national security. Under present law, the President has this authority, but only following an assessment by the Secretary of Commerce concerning the effect of importation on national security.
- (b) Expansion of the Strategic Petroleum Reserve to 1 billion barrels, funded by the imposition of a fee on imported petroleum products.
- (c) Acceleration of the Federal energy efficiency and alternative fuels activities, such as the Federal Fleet Conversion Task Force.

These and other proposals will be examined, taking note of past policymaking activities as well as our present increased dependence and the strategic importance of oil and gas technologies.

Objective 4: Improve Communication and Government Decisionmaking, Including Issues of Access to Public Lands

The Report of the National Performance Review issues a challenge to Federal agencies to find new ways of problem-solving that emphasize collaboration, empowerment, and greater efficiency. The National Performance Review calls on Federal and State agencies to eliminate "regulatory overkill" and work together with greater coordination and flexibility.

This component of the Initiative contains six specific action areas created in the spirit of these Administration priorities. The six action areas are:

- DOI proposed a regional approach to considering this issue.*
- (1) Create a working group between the Department of Energy and the Department of Interior;
 - (2) Streamline and simplify multi-jurisdictional, multi-layer, and overly complex regulatory processes, with no compromise in regulatory protection of the environment and the public interest ("eliminating regulatory overkill," in the words of the National Performance Review);
 - (3) Work more closely and cooperatively with States and Tribes on gas and oil supply issues;
 - (4) Examine the costs and benefits of removing constraints on West Coast gas and oil production;
 - (5) Improve the level of public awareness of the strategic role of the gas and oil industry; and
 - (6) Begin a characterization and development plan for natural gas in the Naval Shale Reserves in Colorado and Utah.

"Eliminating Regulatory Overkill"

As in other industries, gas and oil producers have become subject to a vast number of overlapping, media-specific State and Federal environmental rules. As the Vice-President noted in the recent National Performance Review, these rules are usually created with the best of intentions. As the Vice-President further notes, it is time to "put aside our reverence for those good intentions" and focus on implementing regulatory protection with greater flexibility and efficiency.

Fortunately, a wealth of new regulatory solutions and processes are under development across the United States and around the world. Market-based and multi-media pollution control solutions are under development and in some cases a matter of law; Federal and State agencies are making increasing use of regulatory negotiations and formal collaborative processes; and agencies such as the Federal Energy Regulatory Commission are searching for self-enforcing, market-based processes that eliminate or reduce the need for formal hearings.

Encouraging progress has been made in this area in the gas and oil industry, but much more can be done. At Atlantic Richfield Corporation's Dauphin Island site in the Gulf of Mexico, early communication with State and local governments and the fishing community avoided unnecessary project delays and resulted in an environmentally superior and economically viable drilling project. In Pennsylvania, a collaborative process has been used to establish general permits for stripper oil and marginal gas wells. At the Yorktown refinery in Virginia, the cooperation of Amoco and the Environmental Protection Agency led to unprecedented new information concerning the structure and effects of environmental rules.

These efforts suggest great promise, but more action is needed. To accelerate progress, this Initiative proposes these action items:

- Work cooperatively with States through organizations such as the Interstate Oil and Gas Compact Commission to promote the streamlining and integration of State and Federal regulatory programs. The purpose of these concerted efforts will be to seek out and eliminate duplication in Federal and State regulatory programs, whether in the form of needless paperwork or duplicate permits or hearings. Wherever possible, one-stop permitting and market-based mechanisms will be encouraged.
- Enhance the capability of State and Federal governments to make better policy decisions through the establishment and promotion of improved tradeoffs. This enhancement is designed to dovetail with the streamlined interagency regulatory review process the Administration is proposing, which also seeks to minimize interagency rule conflicts and incorporate tradeoffs between regulatory impacts.
- Demonstrate the feasibility of alternative approaches to environmental regulation that more accurately balance costs and benefits, promote rather than stifle technological innovation, and allow for compliance flexibility.
- Promote dialogue and build partnerships of industry groups, States, the public, and other interested parties dedicated to resolving disputes and

balancing the energy, economic, and environmental objectives necessary for sustainable development.

Re-Examine Access to Federal Lands

The Nation's public lands are one of its most precious resources, and it is entirely appropriate to safeguard and preserve these lands for future generations. However, with advanced technologies and careful extraction practices, it is no longer the case that our stewardship obligations are inconsistent with the extraction of subsurface resources.

Figure 6 shows the substantial percentage of gas and oil resources that underlie Federal lands and waters. Federal lands comprise some 727 million acres of property onshore, nearly one-third the entire land area of the United States.¹³ Approximately 41 percent of these lands are currently inaccessible to the gas and oil industry for exploration or production. Today, large portions of the Outer Continental Shelf (OCS) are restricted from gas and oil development under executive and legislative moratoria.

The Department of Energy has joined the Department of the Interior in establishing a Federal Lands Energy Task Force. The express purpose of the Task Force will be to ensure that national energy strategies are appropriately considered in leasing decisions related to Federal lands. A description of the scope of this process will be developed in a Memorandum of Understanding between the Departments. This Task Force shall ensure energy and environmental inputs in the review of the prior Administration's Five-Year Leasing Plan. That review should be completed by October 1, 1994.

The U.S. leads the world in the development of environmentally effective technologies for exploration and development of gas and oil in frontier areas. We should retain this leadership not only for ourselves, but for the planet we share. This base of knowledge contributes to the tools available internationally for environmentally responsible gas and oil development, as other nations push offshore and into the Arctic.

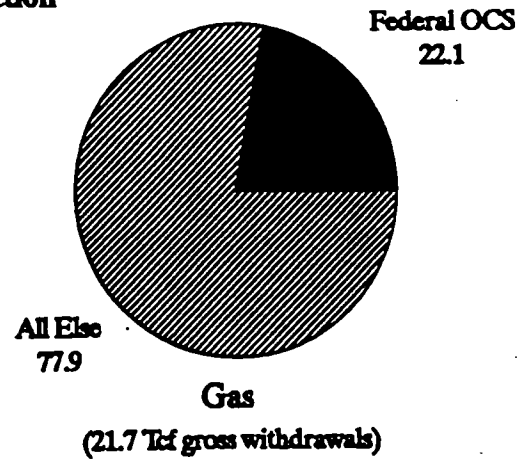
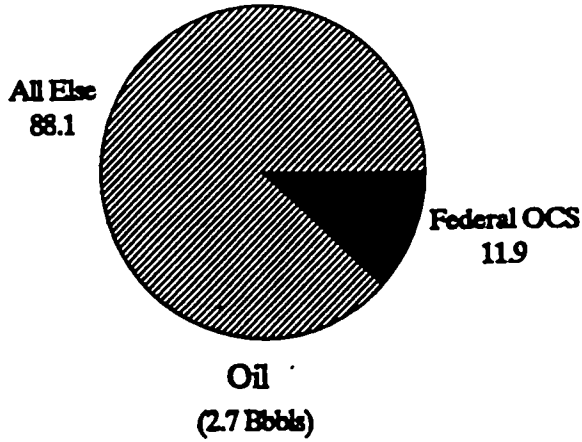
Collaboration with States and Tribes

The States bear a primary responsibility for regulating the gas and oil industry in the areas of resource conservation, environmental protection, and the use of natural gas. Ongoing federal interactions with State organizations, such as the Interstate Oil and

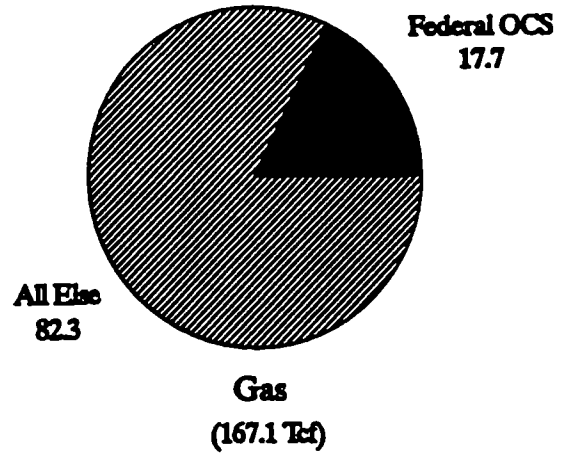
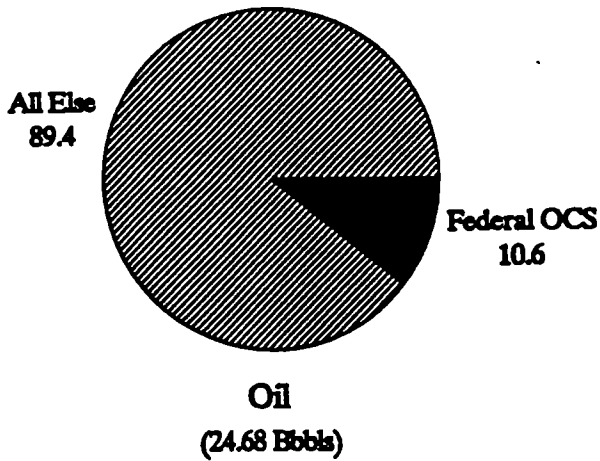
¹³Estimates of Undiscovered Conventional Resources of Oil and Gas for Federal Lands, and for Indian and Native Lands of the Continental United States, G. L. Dolton, R. F. Mast, R. A. Crovelli, U.S. Geological Survey Open-File Report 90-705, 1990. Table 2, page 10-12.

Figure 6. Federal Waters and Lands
(Percent of U. S. Total)

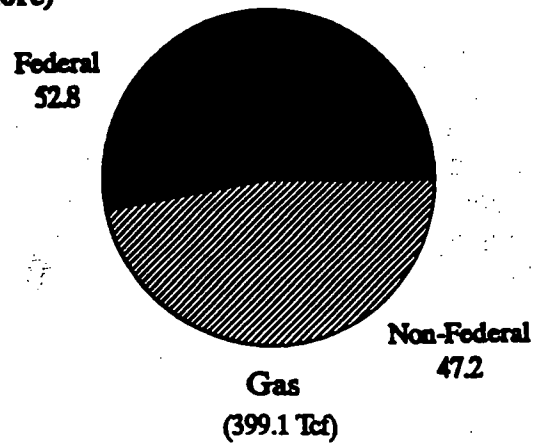
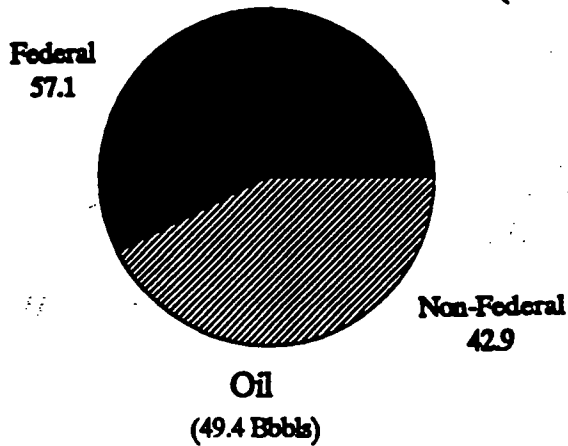
1991 Federal OCS Production



1991 Federal OCS Proved Reserves



Undiscovered Recoverable Oil and Gas Resources
(On- and Offshore)



Sources: Energy Information Administration and U. S. Department of Interior.

Gas Compact Commission, the Ground Water Protection Council, the Energy Council, the National Governors' Association, and the National Association of Regulatory Utility Commissioners should be strengthened. The Federal government will work cooperatively with individual States to identify and resolve key issues constraining gas and oil supply at the State and regional levels.

As part of this Initiative, the Department will also forge new partnerships with Tribes to increase domestic gas and oil production on tribal lands. These partnerships will strive to recognize the importance of economic development, environmental preservation, and cultural sensitivity to tribal affairs.

Addressing West Coast Production Constraints

Crude oil production from the Alaskan North Slope (ANS) is likely to decline, leaving the West Coast once again a significant importer before the year 2000. To address this problem the Administration proposes removing many of the barriers that inhibit development of California and Alaskan resources by:

- Encouraging oil pipeline access for non-integrated producers in California. Most, if not all, of these large pipelines should operate as common carriers by virtue of their settlements in long-standing lawsuits, or their use of rights-of-way granted under the Mineral Leasing Act. Free and open access to transportation assets in the State will help to increase production.
- Stimulating investment in California refineries to permit the processing of greater proportions of heavy indigenous crudes. The marginal barrel of oil produced in California today is a heavy crude that requires extensive refinery processing to satisfy the State's high demand for light, low-sulfur transportation fuels. Declining Alaska North Slope supply will make room in refinery "upgrading" units that can process California heavy crude oil.

Better Understanding and Communication of the Strategic Value of the Gas and Oil Industry to the Nation

Public perceptions of the gas and oil industry have not kept pace with its changes during the last decade in which the industry has been devastated by recession. Further, the gas and oil industry has evolved into a business of high-tech, skilled, and educated professionals and is a far cry from the rough-and-tumble image formed many years ago. The government will play a role in increasing awareness of the strategic importance of this industry in the United States economy through public information programs and outreach activities.

To help increase the public's awareness of the strategic role of the gas and oil industry, the Department of Energy proposes to do a joint study with the Department

of Labor on the maturing of the work force in the domestic industry, and the relatively few young people entering the industry from college or graduate school. Educated young people are the life blood of any business. Universities responsible for the education of young petroleum engineers, geologists, geophysicists, landmen, and chemical engineers oriented to refining have sharply cut back their programs for lack of interest. This trend cannot continue for decades--if we are to maintain a viable industry. The Department of Energy and Department of Labor should use the resources of the National Petroleum Council to study this problem, and possible long-term remedies including scholarships and work force planning strategies.

IV. SUMMARY AND CONCLUSION

During his campaign, President Clinton stated that: "A primary goal of the Clinton/Gore National Energy Policy will be reducing the amount of foreign oil consumed in America." The achievement of this ambitious goal will require a coordinated strategy that includes more than policies involving only gas and oil supplies. We must continue to improve our energy efficiency, increase our use of renewable energy resources, diversify our international sources of supply, and develop new methods of production that promise to reduce costs, pollution and energy use simultaneously.

This coordinated strategy, in turn, must reconcile conflicts between the need for energy supply and environmental preservation. Confrontation predicated on the erroneous belief that these two goals are incompatible has led to much delay, litigation, and frustration, and has threatened to lock up valuable resources that could benefit the nation. While the nation must protect the environmental heritage we hand down to future generations, these values can be made compatible with careful resource development.

Of equal importance, it is time to acknowledge the fact that the exploration and extraction of fuels has become an economically strategic industry. American competitiveness depends on the skills and productivity of American workers. We cannot maintain our present technological and skill-base edge in the international energy markets without a viable domestic gas and oil industry in which to train and deploy workers. Similarly, we cannot increase our technological edge, nor exercise world environmental leadership, if we no longer invest in R&D and produce domestic energy resources in an environmentally sound manner.

This Initiative's focus on natural gas and oil strategies, is not an attempt to divert attention from the complete energy picture. This Administration is active on many energy and environment initiatives, including the Council on Sustainable Development, the Climate Change Initiative, the Federal Fleet Conversion Task Force, the Clean Cities Program, and other measures that seek to harmonize our energy policy. In addition, the Energy Policy Act represents a bipartisan effort to weave a number of

diverse energy supply and demand components into a complete policy fabric. To safeguard our security, improve our technology and skill base, and exercise environmental leadership, domestic gas and oil must remain a part of this fabric and a full-fledged contributor to the nation's economic future.

U.S. DEPARTMENT OF ENERGY NATURAL GAS AND OIL INITIATIVE:

Interagency Deputies Meeting

September 20, 1993

DOE Forrestal Building, Room 8E-089

2:00 - 4:00 p.m.

LIST OF ATTENDEES

Agriculture

Roger Conway
Director, Office of Energy

Commerce

Jonathan Silver
Assistant Deputy Secretary

DOD

Michael Sohn
Special Scientific Advisor to the
Assistant to the Secretary of Defense
for Atomic Energy

EPA

Karl Hausker
Deputy Assistant Administrator For Policy,
Planning and Evaluation

FERC

Elizabeth Moler
Chair

Susan Tomansky
General Counsel

Jim Hoecker
Commissioner

Don Santa
Commissioner

DOI

Robert Armstrong
Assistant Secretary
Land and Minerals Management

Denise Meredith
Deputy Director, Bureau of Land
Management

Tom Fry
Director, Minerals Management Service

OMB

T.J. Glauthier
Associate Director
Natural Resources, Energy and Science

Kathy Peroff
Deputy Associate Director
Natural Resources, Energy and Science

State Department

Richard Hecklinger
Deputy Assistant Secretary for Economic and
Business Affairs

Treasury

Alicia Munnell
Assistant Secretary for Economic Policy

U.S. Trade Representative

Don Eiss
Deputy Assistant Trade Representative

WHITE HOUSE

Bill Burton
Staff and Policy Director
To the Chief of Staff

Katie McGinty
Director of the White House Office of
Environmental Policy

Marc Chupka
Associate Director for Air, Energy and
Transportation
Office of Environmental Policy

Heather Ross
Special Assistant to the President
for Economic Policy

Brian Burke
Senior Policy Analyst
Domestic Policy Council

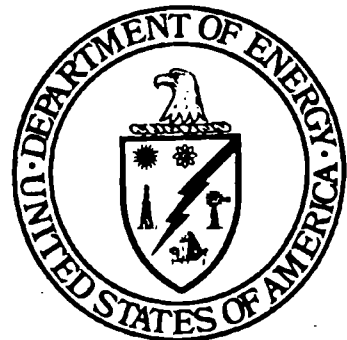
Mark Mazur
Senior Economist
Council of Economic Advisors

DRAFT

the Domestic Gas & Oil Initiative

U.S. Department of Energy
Washington, DC 20585

September 1993



DOMESTIC GAS AND OIL INITIATIVE

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9/17/93

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DOMESTIC GAS AND OIL INITIATIVE
Draft: September 17, 1993

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DOMESTIC GAS AND OIL INITIATIVE

I. INTRODUCTION

Earlier this year Secretary Hazel R. O'Leary announced that the Administration would develop a "plan that will lead to expanded opportunities for domestic gas and oil producers." The Secretary noted that "the end goal of this project will be to develop new and expanded opportunities for jobs in the domestic gas and oil industries, while fostering a climate which will increase production from domestic resource bases and reduce our reliance on foreign oil."

A viable and productive domestic gas and oil industry is essential to our shared national goals of increased economic and national security and environmental preservation. Even with the aggressive increases in energy efficiency and new sources of supply -- increases we fully intend to achieve -- a sound economic future requires an investment in the domestic gas and oil industry. By learning to use our gas and oil resources productively and wisely, we will preserve capabilities and opportunities that are vital to our economic future and our leadership role around the world.

This document summarizes the content of a Domestic Gas and Oil Initiative. The purpose of this Initiative is to develop an effective approach for maintaining the viability of the American gas and oil industry without compromising our environmental quality or economic efficiency. The two key overarching goals of the Initiative are the creation of high-technology jobs and long-term economic opportunity and a reduction of the trend towards high imports. The Initiative was developed by working with stakeholders and various Federal agencies with significant energy responsibilities.

The Initiative has four major elements:

- (1) to increase gas and oil production and environmental protection through the advancement and dissemination of technology;
- (2) to stimulate markets for natural gas;
- (3) to develop an integrated policy for slowing the trend towards greater oil imports; and
- (4) to improve communication and government decisionmaking.

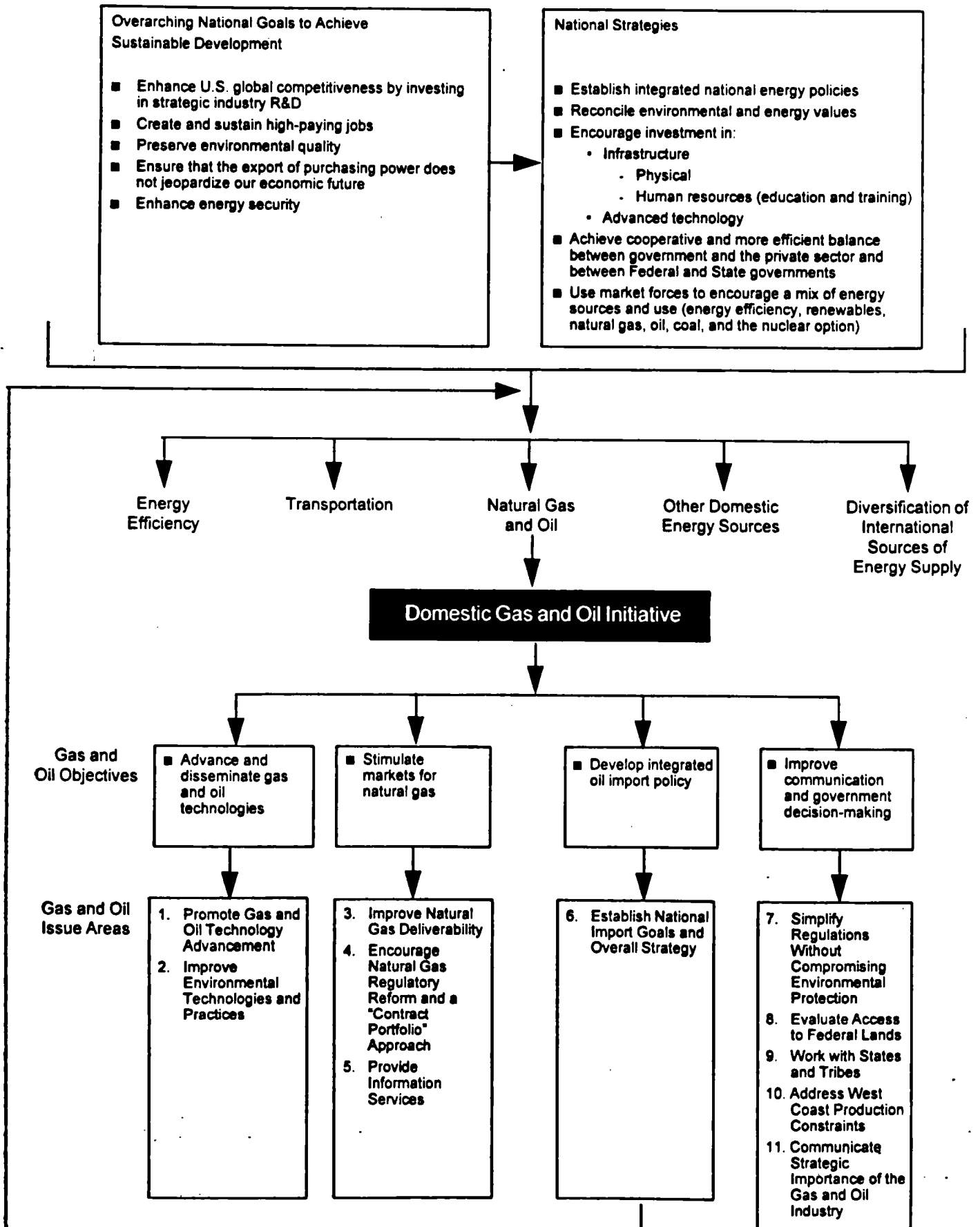
Figure 1 summarizes the objectives and elements of the Initiative.

This Initiative focuses primarily on issues concerning the domestic production of gas and oil. Other efforts are underway at DOE to increase energy efficiency in buildings, industry and the transportation sectors, as well as to increase renewable and other domestic energy sources and to diversify our sources of international energy supplies.

Figure 1

9/16/93

Domestic Gas and Oil Initiative Roadmap



In assembling the Initiative, the Department has sought to achieve its objectives without sacrificing other paramount national interests, such as deficit reduction, economic stimulus and environmental protection. Wherever possible, the strategies seek to take advantage of market forces. In establishing the new gas and oil policies, the government also seeks to achieve a cooperative and efficient balance between the public and private sectors, and between Federal and State governments.

II. THE NEED FOR ACTION

A. The Worldwide and Domestic Importance of Gas and Oil

Natural gas and oil will remain critical elements of every nation's economic picture for the foreseeable future. In 1990, United States consumers spent over \$300 billion on gas and oil--5.5 percent of GDP.¹ Gas and oil supply 99.9 percent of transportation fuel needs (almost entirely oil); 75 percent of industrial needs;² 61 percent of residential and commercial needs and 13 percent of electric utility needs.³

In the rest of the world, natural gas and oil are equally important, or, in some cases, even more important commodities, as in the United States. Worldwide gas and oil consumption represents 61% of total energy consumed as of 1991.⁴ In view of the wide distribution of offshore reserves and the developing world's enormous appetite for energy, gas and oil are likely to play an ever-increasing economic role. In addition, global warming concerns may cause an even larger shift towards gas, and possibly oil, than might otherwise occur.

By any standard, the domestic gas and oil industry remains an important source of capital formation, technological development, and employment in the American economy. In 1990 the industry invested \$21.0 billion⁵ in infrastructure. The gas and oil industry, including the associated service industries, account for nearly 380,000

¹Source: Energy Information Administration; The Annual Energy Review 1992. U.S. Department of Energy, Table 3.8, page 85.

²Includes non-utility electric generation, independent power producers, feedstocks and other industry users.

³Source: Energy Information Administration; The Annual Energy Review 1992. U.S. Department of Energy, Table 3.7, p. 83.]

⁴Energy Information Administration, International Energy Annual, 1991, Table ES2, page XVI.

⁵Source: Survey of Oil and Gas Expenditures 1990, American Petroleum Institute, November 1991, Table II, page 2.

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By any standard, the domestic gas and oil industry remains an important source of capital formation, technological development, and employment in the American economy. In 1990 the industry invested \$21.0 billion⁵ in infrastructure. The gas and oil industry, including the associated service industries, account for nearly 380,000 American jobs. Though this represents a relatively small fraction of the total U.S. work force, Figure 2 demonstrates that these jobs pay wages 30 percent above that of the average American worker, thus representing the sort of high-skill, high-value jobs

¹Source: Energy Information Administration; The Annual Energy Review 1992. U.S. Department of Energy, Table 3.8, page 85.

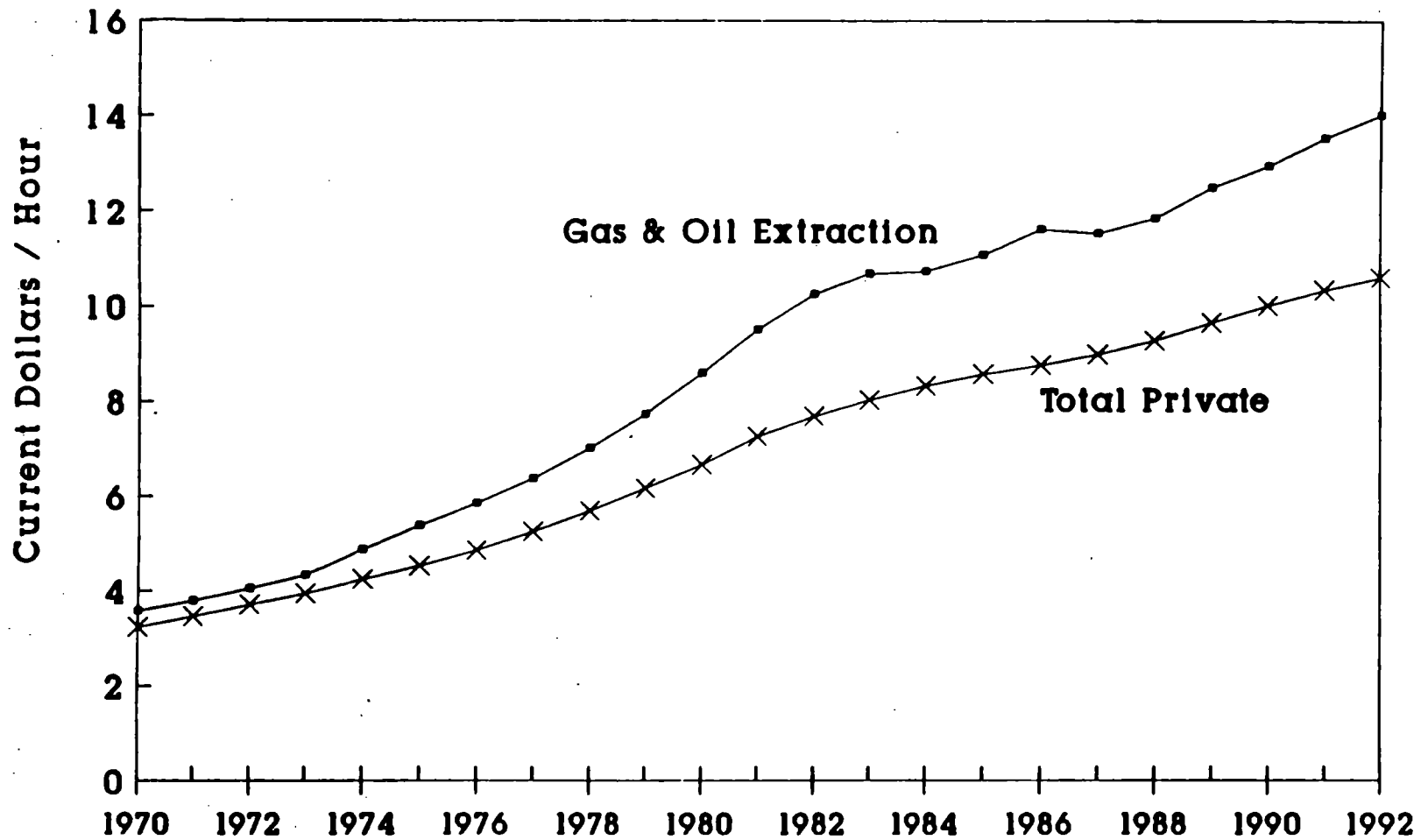
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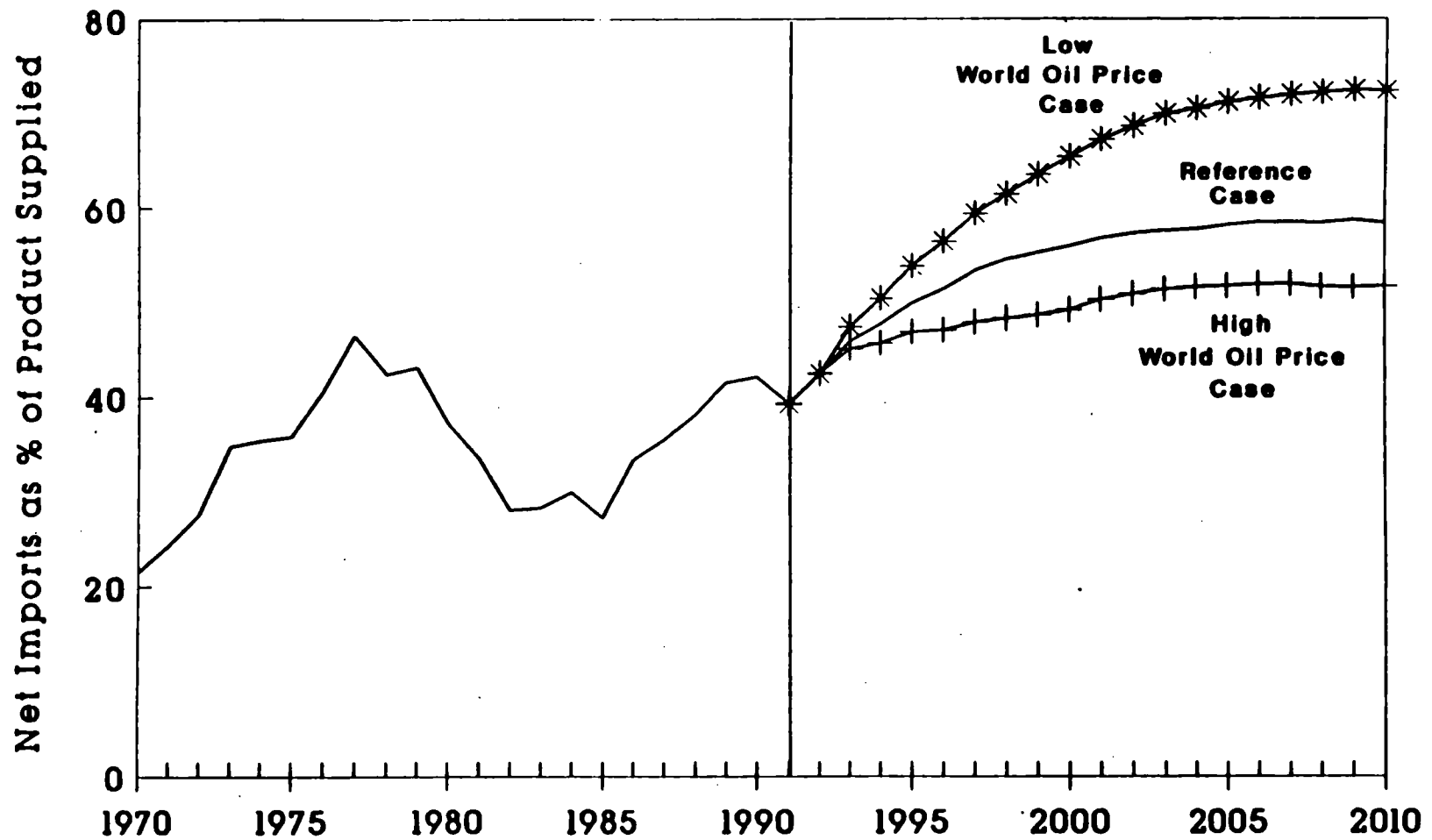
⁵Source: Survey of Oil and Gas Expenditures 1990, American Petroleum Institute, November 1991, Table II, page 2.

**Figure 2. Average Hourly Earnings for
the Gas & Oil Extraction Industry**



Source: Energy Information Administration

**Figure 3. U.S. Dependence on Petroleum
Net Imports**



Source: Energy Information Administration

America needs.⁶ Identification of hydrocarbon deposits far underground requires much training and application of advanced technologies.

B. The Nation's Increasing Dependence on Imported Oil

At times oil imports alone have accounted for well over half of the U.S. trade deficit. Since 1986, oil imports have risen by more than 25 percent, with projections indicating that we will cross the 50 percent import threshold in 1995 or 1996.⁷ This trend is shown in Figure 3. In 1992, petroleum provided 41 percent of the energy consumed in the United States and the nation imported 41 percent of its net petroleum supply.⁸

As we approach the twentieth anniversary of the OPEC embargo, which staggered U.S. financial markets, destabilized economic growth, and sent motorists scurrying to join long gas lines, the U.S. remains vulnerable to the disruption of its oil supply. Today, the developed world is just as dependent on open access to the Persian Gulf, the locus of most of the world's known oil reserves, as it was two decades ago.

Most of our economic competitors strongly encourage petroleum conservation -- often through imposition of high consumption taxes -- in part to reduce their vulnerability to supply interruptions. Americans have preferred to find other strategies to address this problem, including world leadership in the maintenance of strategic petroleum stockpiles and the pursuit of energy conservation through various public policies. As a complement to these efforts, it should be our policy to strengthen exploration and production of domestic gas and oil resources in a cost-effective, pro-competitive manner.

Our nation's huge expenditures on oil imports are a major part of our negative balance of trade. Between 1980 and 1992, the U.S. paid foreigners \$742 billion (1987 dollars) to purchase imported crude oil and petroleum products.⁹ The potential effect of these imports is to transfer American wealth and purchasing power to foreigners at a time when public and private investment needs in the U.S. are substantial and growing. Savings from energy efficiency and the cost-effective substitution of domestic supply for oil imports represent a prospective fiscal stimulus and an investment in our future.

⁶Source: Bureau of Labor Statistics, Department of Labor; Current Employment Statistics Survey.

⁷ Energy Information Administration; Annual Energy Outlook 1993, Table A1, page 81.

⁸Energy Information Administration; Annual Energy Review 1992, Table 1.3 and Table 5.1.

⁹Energy Information Administration; Annual Energy Review 1992, Table 3.3, p. 75.

The U.S. Office of Technology Assessment has estimated that U.S. imports could rise to levels as high as 70 percent by the year 2000.¹⁰ Without action, we face significantly higher levels of importation that will undoubtedly compound and intensify the problems with oil imports the U.S. has experienced to date.

C. Maintaining Our Lead In Gas and Oil Exploration and Extraction Technologies Will Benefit the Nation

Preserving Gas and Oil Jobs for Long-term Economic Opportunity

The American people have given this Administration the pre-eminent task of redirecting public resources to help create high-wage jobs and a secure economic future for American citizens. The American public and their government increasingly understand that the citizens of this country compete internationally for jobs, for investment, and for economic growth. Success in that competition will depend, in part, on an explicit strategy that emphasizes improvement in American technology and competitiveness.

The U.S. gas and oil industry is in transition. Most major oil companies have shifted their exploration operations abroad. Independent producers play an increasing role in finding and extracting domestic gas and oil. Natural gas is an abundant and underutilized domestic resource which can be substituted for oil and has many environmental and economic benefits. Furthermore, the U.S. has large remaining resources of oil, but they require advanced, relatively high-cost technologies to locate and extract.

It is beyond question that natural gas and petroleum will remain critical materials in the world economy for the foreseeable future. Increasing scarcity anywhere in the world will increase the value of exploration and production skills that reduce the cost, or increase the availability of, natural gas and petroleum.

The gas and oil industry relies upon advanced technology, in which American firms traditionally have led the world. Modern gas and oil exploration and production represent the quintessential "high tech" industry. It is instructive to note that, when oil fires in Kuwait required unique firefighting skills, U.S.-based experts made important contributions to ending this economic and environmental nightmare.

¹⁰United States Congress, Office of Technology Assessment. U.S. Oil Import Vulnerability. October 1991, page 3.

As in many other industries, worldwide competition in extraction and exploration is fierce and increasing. If domestic producers are to continue to provide a substantial portion of U.S. oil needs, and compete in world oil markets, new and advanced technologies must be developed and widely applied. New technologies will also be vital in developing our abundant domestic natural gas resources to meet the widely-expected increased levels of demand.

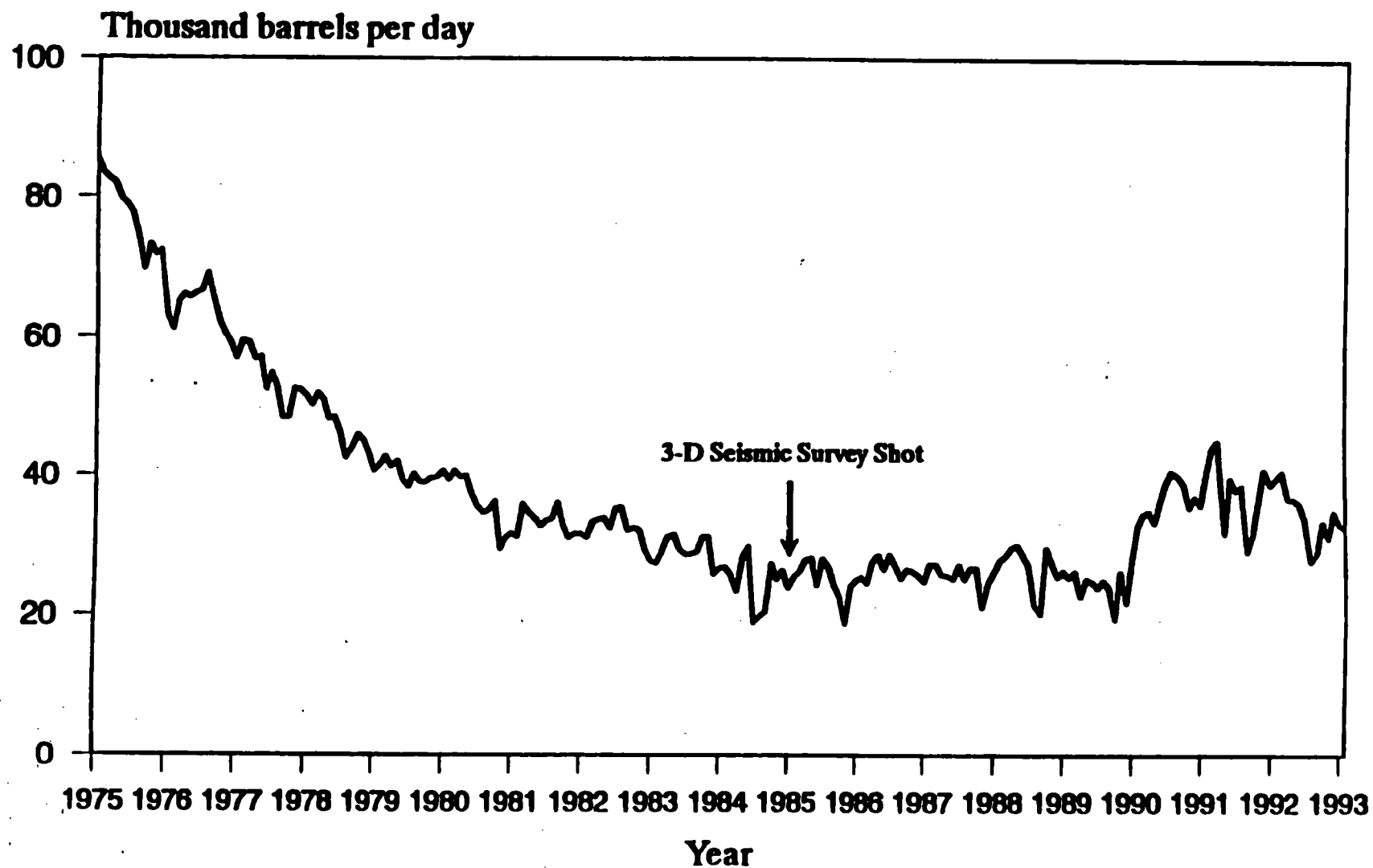
In the long run, increased productivity of the American oil and gas industry can have significant job creation effects. First, by keeping U.S. technologies "on the cutting edge," we ensure that they are the technologies of choice worldwide, thereby maintaining and expanding technology export opportunities and export-related jobs. Second, increased productivity can make more of a domestic energy resource economically available, ultimately allowing expanded domestic production and increased employment.

Revolutionary technologies that use state-of-the-art computer mapping of the subsurface for exploration and production are being developed in the gas and oil industry today. A case in point is known as three dimensional (3-D) seismic surveying. This procedure can provide high-resolution images of subsurface gas and oil deposits, thus enabling more efficient exploration and development. Success using this approach has been documented by several oil companies. An example is in the Bay Marchand field in Louisiana (See Figure 4). Prior to 3-D utilization, production in this field had declined to 18,700 barrels per day in November 1985. Using 3-D technology, the decline in production was reversed and output more than doubled, rising to 45,200 barrels per day in April 1991. Other case studies suggest that, where new undrilled reservoir prospects lie adjacent to producing fields, the discovery success rate can be improved by as much as 50 percent through use of 3-D technology.

While these computer mapping technologies are not fully tested, independent producers, integrated major producers, and the gas and oil service industry believe they hold great promise for expanding production from our domestic resources. Furthermore, these technologies have great potential for developing gas and oil resources abroad, thus representing a significant export opportunity and allowing a diversification of international supply.

American industrial competitiveness will depend on improvements in productivity and technology equal to or better than that of other nations. The gas and oil industries are poised to research and adopt new methods of exploration and extraction that will allow us to expand our economically recoverable domestic resource base without compromising environmental quality. Increased reliability of underground mapping means fewer dry holes and increased reserves. If we develop and deploy these new procedures in a domestically based industry, the U.S. will lay claim not only to increased energy production, but also technologies that can be marketed to our trading partners abroad. If we fail, the U.S. will likely be purchasing these

**Figure 4. Bay Marchand Field
Monthly Average Production History
1975-Early 1993**



technologies from other nations who recognized their strategic and economic value and had the courage to act.

Preserving Worldwide Environmental Quality

As we move toward the twenty-first century, the nation must reduce our dependence on fossil fuels, minimize wastes, preserve our water resources, and protect sensitive environments. This Administration will assert world leadership on such issues. The policies that encourage gas and oil exploration and production will be pursued with these environmental goals in mind and with the understanding that energy and environmental objectives are compatible. In doing so, the U.S. will be setting a standard for environmental sensitivity in the gas and oil industries that will demonstrate leadership and serve as a basis for environmental standards in other parts of the world.

III. THE DOMESTIC GAS AND OIL INITIATIVE

As mentioned in the introduction, the Domestic Gas and Oil Initiative has four principal objectives:

- Objective 1. Increase gas and oil production and environmental protection through the advancement and dissemination of technology;
- Objective 2. Stimulate markets for natural gas;
- Objective 3. Develop an integrated policy for changing the trend in oil imports; and
- Objective 4. Improve communication and government decisionmaking.

In the remainder of this section, each of these objectives is discussed and described. Substantial additional background discussion is available in a series of Options Papers, which will be made available on September 20, 1993.

Objective 1. Advancement and Dissemination of Gas and Oil Technologies

As the previous section explains, the gas and oil industry is poised to realize enormous benefits from advanced exploration and production techniques presently under development. To take maximum advantage of these opportunities, the Administration proposes to enhance joint government/industry/university research and development efforts on advanced computing problems related to exploration and production. These efforts will build on the longstanding leadership of the United States in developing and marketing new computer technologies and applications, and would help to maintain a strong U.S. position in this critical, high-wage field.

Public/private R&D partnerships are particularly important, as industry has generally reduced funding for long-range R&D in recent years.

The Initiative also proposes to accelerate and expand upon the current DOE oil R&D program to increase advanced oil recovery capabilities and reduce the rate of reservoir abandonment. This will be accomplished through accelerating field demonstrations; conducting in-depth evaluations of selected past and ongoing industry projects to pinpoint important unsolved problems; disseminating more complete information on technology developments; conducting field-based reservoir characterization and innovative recovery process experiments; and expanding supporting research to address industry-identified needs.

Advanced computing technologies are revolutionizing the search for gas and oil. In some areas, for example, advanced computing technologies have allowed for the direct detection of natural gas through the analysis of seismic data.

American national defense labs--specifically Los Alamos, Sandia, and Livermore--historically have been responsible for the development of cutting-edge computer technologies. American taxpayers have invested countless billions of dollars on computers and scientists who have developed world-class modeling capabilities. These scientists and facilities can and do model complex subsurface conditions for both underground nuclear testing and some current oil and gas projects.

These efforts will be redirected and expanded in FY-95, to a total federal commitment of \$50 million, in addition to substantial funds from private enterprises.

Domestic gas and oil producers face increasing costs of compliance with environmental regulations. To help reduce these costs through technology, DOE, with the assistance of the EPA, would establish an industry-focused environmental research advisory board. The express purposes of the Board will be to advise the government on R&D issues. The Initiative will also create an environmental technology demonstration and technical assistance program and develop specific studies and demonstrations, such as an examination of the feasibility of significantly increasing the amount of lubricating oil that is recycled in the United States; and exploring the Federal role in oil spill clean-up R&D.

The Administration also proposes to stimulate development of a nationwide technology transfer network and assistance program. Technology transfer efforts will be especially important in encouraging the 8,000 independent operators in the U.S. to adopt innovative exploration and production methods. Two-thirds of these independents have fewer than 20 employees and obviously cannot individually finance

large, long-term R&D programs.¹¹ Due to the increased upfront costs associated with new technologies such as advanced computing, some independents have formed associations that reduce the costs of gaining access to new technologies. By familiarizing individual firms and these associations with new technologies developed by both industry and government, technology transfer efforts can make a critical contribution to increasing domestic production and sustaining the viability of the domestic industry.

New technologies can also be promoted through targeted tax changes to encourage research and development expenditures in the gas and oil industry. Tax policy should encourage new expenditures associated with geophysical and environmental research. Of particular interest should be the use of advanced computing techniques.

By encouraging the use of the most advanced technologies for gas and oil production and environmental compliance, the proposed initiatives will help boost high technology, create high-wage employment in the United States, and reduce the transfer of American savings and purchasing power abroad. Ultimately, investments in technology should be investments in people; only superior knowledge and skills of American workers will keep them at the forefront of international competition.

Objective 2. Stimulate Markets for Natural Gas

As the President has stated, the substitution of domestically produced natural gas for energy purchased in the form of imported oil provides unqualified benefits to the nation. Substitution of domestic gas for imported oil helps the environment and helps keep jobs at home.

The remaining resource base for natural gas appears to be more abundant and cost-effective to tap than the remaining resource base for domestic oil. Independent studies indicate that the size of the gas resource base promises the availability of natural gas for several decades without opening up new exploration provinces (Table 1). Figure 5 indicates that since 1987, gas and oil exploratory drilling yields have nearly doubled. Most of this increase in productivity represents the discovery of new gas reserves.¹²

¹¹Source: Department of Commerce, Bureau of the Census, 1987 Census of Mineral Industries, MIC 87-1-13A, Table 1, page 13A-5.

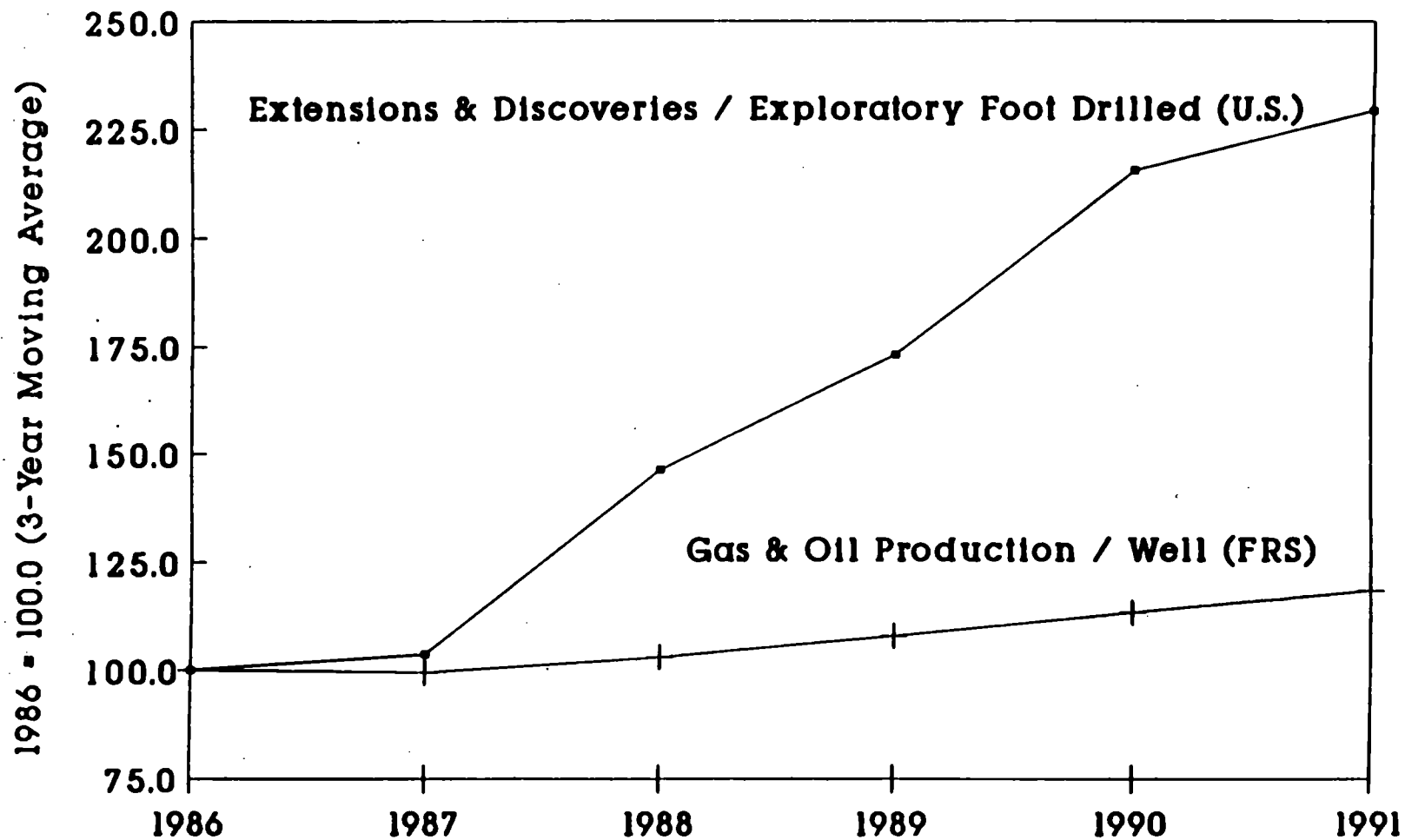
¹²Energy Information Administration; U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 1991, Figures 10 and 11, page 18..

**Table 1. Recoverable Resources in the Lower-48 States
Comparison to Other Estimates
(Trillion Cubic Feet)**

	National Petroleum Council 1992	Potential Gas Committee 1990	Gas Research Institute 1992	Energy Information Administration
Proved Reserves	160	160	160	160
Conventional Resources				
Reserve Appreciation	203	170	150	265
New Fields	413	491	394	327
Total Conventional Resources	616	661	554	592
Nonconventional Resources				
Coalbed Methane	98	88	110	90
Shales	57	--	123	30
Tight Gas	349	--	238	383
Other	15	--	32	--
Total Nonconventional Resources	519	88	503	503
Total Assessed Resource	1,295	749	1,047	1,095
Total Resource	1,295	909	1,207	1,255
Adjust to 1/1/91	--	--	--	35
Total Adjusted Resource	1,295	909	1,207	1,220

Source: National Petroleum Council, The Potential for Natural Gas in the United States, December 1992, Volume II
- Source and Supply, page 37.

Figure 5. Indexes of Gas & Oil Productivity



Source: Energy Information Administration

This element of the Initiative intends to stimulate domestic natural gas use everywhere it is a cost-effective, environmentally compatible fuel source. The policies of the federal government should strengthen natural gas distribution capabilities; support continuing gas regulatory reforms; encourage regulators to permit companies to enter into a variety of contracting arrangements that facilitate lower-cost or lower-risk deliveries, such as longer-term contracts and hedging; and provide better information services. In addition, the Administration has demonstrated a commitment to alternative-fuel vehicles through programs such as the Clean Cities Program and the Federal Fleet Conversion Task Force.

All of these efforts will be implemented to the greatest extent feasible using market-oriented mechanisms, in cooperation with the elements of the natural gas industry that most aggressively produce and market gas. These measures are expected to boost the consumption of this low-cost, clean-burning, relatively plentiful domestic fuel.

Improving natural gas deliverability. Efficient delivery of natural gas from the wellhead to the burner tip is dependent on a well functioning physical infrastructure for gathering, transporting, storing, and distributing gas, and on an accurate and timely information infrastructure for monitoring natural gas supply and demand. To improve the physical infrastructure, the Administration will work to remove barriers to environmentally sound construction of additional pipeline and storage facilities; increase access to existing facilities; and accelerate the development and use of advanced technologies in natural gas storage and distribution. The Administration will promote policies and encourage public and private action to improve real-time capabilities for monitoring and modeling natural gas availability and flows, and match gas storage to end-user requirements. Such efforts will be especially important in enabling greater use of natural gas in electric power generation.

A reliable, properly functioning, competitive gas market requires distribution and information systems that will meet the demands of the market. Competition will improve when timely and accurate information is readily available to allow buyers, sellers, and transporters to make better informed choices.

Encouraging natural gas regulatory reform and removing barriers to new contracting and hedging mechanisms. Federal and State regulators should continue to promote a competitive, customer-oriented industry structure. Changes under way in the private sector and market structuring by the Federal Energy Regulatory Commission (FERC) are already reducing the costs of information and transactions in natural gas markets. DOE will work cooperatively with the FERC on initiatives that will seek to expedite pipeline construction, allow gas fired electric generation to compete for market share, and encourage effective marketing of pipeline facilities. The proposed initiatives will build on these changes, with emphasis on an approach that encourages a flexible portfolio of contracts for gas purchasers, including longer-term contracts.

At the State level, changes in regulations governing the distribution of natural gas and electricity can also lead to improved efficiency in energy use. DOE supports State efforts to revise electricity, gas, environmental, and energy conservation pricing policies and regulations so as to better reflect true economic costs which will lead to greater economic value and a cleaner environment. Recognizing the States' jurisdictional authority in this area, we seek a cooperative effort between State utility regulators and energy offices and DOE to help foster regulatory reforms that will: (1) improve access to gas distribution facilities; (2) encourage efficient pricing for electricity and gas; (3) encourage the removal of fuel-specific subsidies that work against energy efficiency goals; (4) encourage cost-cutting by distributors; and (5) boost the use of natural gas transportation.

In addition to these Federal and State regulatory reform initiatives, the Administration is pursuing two coordinated efforts whose net effect will, we believe, accelerate the use of natural gas in transportation markets: (1) The Federal Fleet Conversion Task Force, a program designed to convert public and private fleets to alternative fuels, including natural gas, over the next few years; and (2) The Clean Cities Program, a coordinated effort for development of infrastructure for alternative fuel vehicles in communities. Efforts such as these will have a major impact on reducing imports, creating jobs and opening new markets for alternative motor vehicle fuels such as natural gas.

Providing information services. To facilitate all elements of this Initiative, and as a final implementation measure aimed at this objective, the Department will improve its ability to develop, collect, and disseminate information on natural gas deliverability and storage. To complement the proposed initiatives to improve natural gas deliverability and encourage regulatory reform, DOE will enhance the capability of the Energy Information Administration (EIA) to collect these data, and will develop an Energy and Resources Mapping and Information System. EIA will work with other agencies and the private sector to provide a coordinating function and to avoid duplication while executing this task.

Objective 3. Develop an Integrated Oil Import Policy

The Domestic Gas and Oil Initiative begins a process for developing an integrated strategy for changing the trend towards increased oil imports. Two alternative approaches for developing this strategy are being considered:

- In the first approach, the process would analyze the impacts of different levels of oil imports on our energy use and balance of trade; analyze the implications of setting a goal for a maximum acceptable dependence on imported oil, and set such a threshold; and further define the set of actions or policies that the Federal government would adopt if the threshold were met.

- In the second, the process would develop a strategy for holding net imports of petroleum consumed in the United States below 50 percent in any consecutive 12 month period.

The Department of Energy advocates the second alternative.

Establishing national import goals and overall strategies. To address issues common to both approaches, the Administration will establish an interdepartmental working group, coordinated by the National Economic Council and the National Security Council, with the Department of Energy as the lead agency. This working group would analyze costs and benefits, examine approaches and develop recommendations. Policies for reducing the growth of imports would be integrated with other U.S. trade, fiscal, economic and environmental policies, including:

- Promoting and encouraging energy efficiency;
- Transportation initiatives and programs;
- Development of renewable and other energy sources and fuels;
- Diversification of international sources of energy supply, along with maintenance of a Strategic Petroleum Reserve.

Under the second approach, the Department will also hold public meetings for the purpose of developing legislation that addresses appropriate policies and procedures to invoke when the U.S. reaches the point of greater than 50 percent reliance on imported oil. The policies and procedures the Department proposes to review and consider include:

- (a) Making "automatic" a required finding under Section 232 of the Trade Expansion Act that authorizes the President to order an oil import tariff or other measures appropriate to safeguard national security. Under present law, the President has this authority, but only following an assessment by the Secretary of Commerce concerning the effect of importation on national security.
- (b) Expansion of the Strategic Petroleum Reserve to 1 billion barrels, funded by the imposition of a fee on imported petroleum products.
- (c) Acceleration of the Federal energy efficiency and alternative fuels activities, such as the Federal Fleet Conversion Task Force.

These and other proposals will be examined, taking note of past policymaking activities as well as our present increased dependence and the strategic importance of gas and oil technologies.

Objective 4: Improve Communication and Government Decision-making, Including on Issues of Access to Public Lands

The Report of the National Performance Review issues a challenge to Federal agencies to find new ways of problem-solving that emphasize collaboration, empowerment, and greater efficiency. The National Performance Review calls on Federal and State agencies to eliminate "regulatory overkill" and work together with greater coordination and flexibility.

This component of the Initiative contains six specific action areas created in the spirit of these Administration priorities. The six action areas are:

- (1) Create a working group between the Department of Energy and the Department of Interior;
- (2) Streamline and simplify multi-jurisdictional, multi-layer, and overly complex regulatory processes, with no compromise in regulatory protection of the environment and the public interest ("eliminating regulatory overkill," in the words of the National Performance Review);
- (3) Work more closely and cooperatively with States and Tribes on gas and oil supply issues;
- (4) Examine the costs and benefits of removing constraints on West Coast gas and oil production;
- (5) Improve the level of public awareness of the strategic role of the gas and oil industry; and
- (6) Begin a characterization and development plan for natural gas in the Naval Shale Reserves in Colorado and Utah.

"Eliminating Regulatory Overkill." As in other industries, gas and oil producers have become subject to a vast number of overlapping, media-specific State and Federal environmental rules. As the Vice President noted in the recent National Performance Review, these rules are usually created with the best of intentions. As the Vice President further notes, it is time to "put aside our reverence for those good intentions" and focus on implementing regulatory protection with greater flexibility and efficiency.

Fortunately, a wealth of new regulatory solutions and processes are under development across the United States and around the world. Market-based and multi-media pollution control solutions are under development and in some cases a matter of law; Federal and State agencies are making increasing use of regulatory negotiations and formal collaborative processes; and agencies such as the Federal Energy Regulatory Commission are searching for self-enforcing, market-based processes that eliminate or reduce the need for formal hearings.

Encouraging progress has been made in this area in the gas and oil industry, but much more can be done. At Atlantic Richfield Corporation's Dauphin Island site in the Gulf of Mexico, early communication with State and local governments and the fishing community avoided unnecessary project delays and resulted in an environmentally superior and economically viable drilling project. In Pennsylvania, a collaborative process has been used to establish general permits for stripper oil and marginal gas wells. At the Yorktown refinery in Virginia, the cooperation of Amoco and the Environmental Protection Agency led to unprecedented new information concerning the structure and effects of environmental rules.

These efforts suggest great promise, but more action is needed. To accelerate progress, this Initiative proposes these action items:

- Work cooperatively with States through organizations such as the Interstate Oil and Gas Compact Commission to promote the streamlining and integration of State and Federal regulatory programs. The purpose of these concerted efforts will be to seek out and eliminate duplication in Federal and State regulatory programs, whether in the form of needless paperwork or duplicate permits or hearings. Wherever possible, one-stop permitting and market-based mechanisms will be encouraged.
- Enhance the capability of State and Federal governments to make better policy decisions through the establishment and promotion of improved tradeoffs. This enhancement is designed to dovetail with the streamlined interagency regulatory review process the Administration is proposing, which also seeks to minimize interagency rule conflicts and incorporate tradeoffs between regulatory impacts.

- Demonstrate the feasibility of alternative approaches to environmental regulation that more accurately balance costs and benefits, promote rather than stifle technological innovation, and allow for compliance flexibility.
- Promote dialogue and build partnerships of industry groups, States, the public, and other interested parties dedicated to resolving disputes and balancing the energy, economic, and environmental objectives necessary for sustainable development.

Re-Examine Access to Federal Lands. The Nation's public lands are one of its most precious resources, and it is entirely appropriate to safeguard and preserve these lands for future generations. However, with advanced technologies and careful extraction practices, it is no longer the case that our stewardship obligations are inconsistent with the extraction of subsurface resources.

Figure 6 shows the substantial percentage of gas and oil resources that underlie Federal lands and waters. Federal lands comprise some 727 million acres of property onshore, nearly one-third the entire land area of the United States.¹³ Approximately 41 percent of these lands are currently inaccessible to the gas and oil industry for exploration or production. Today, large portions of the Outer Continental Shelf (OCS) are restricted from gas and oil development under executive and legislative moratoria.

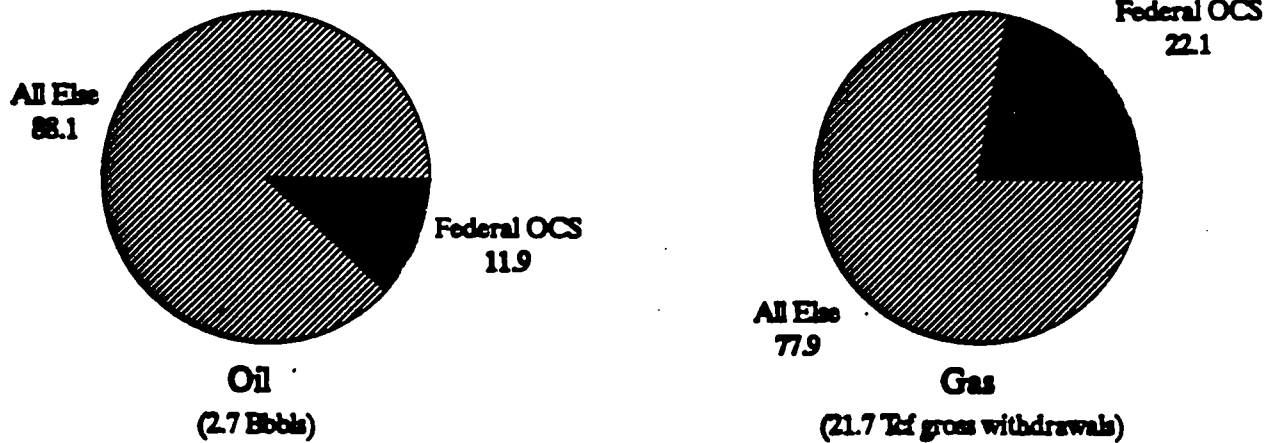
The Department of Energy has joined the Department of the Interior in establishing a Federal Lands Energy Task Force. The express purpose of the Task Force will be to ensure that national energy strategies are appropriately considered in leasing decisions related to Federal lands. A description of the scope of this process will be developed in a Memorandum of Understanding between the Departments. This Task Force shall ensure energy and environmental inputs in the review of the prior Administration's Five-Year Leasing Plan. That review should be completed by October 1, 1994.

The U.S. leads the world in the development of environmentally effective technologies for exploration and development of gas and oil in frontier areas. We should retain this leadership not only for ourselves, but for the planet we share. This base of knowledge contributes to the tools available internationally for environmentally responsible gas and oil development, as other nations push offshore and into the Arctic.

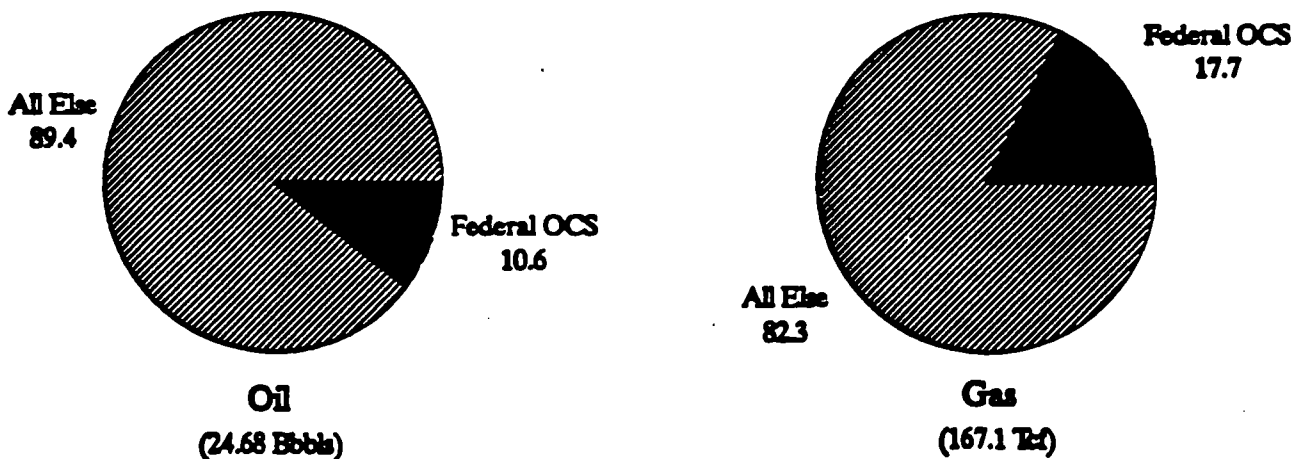
¹³Estimates of Undiscovered Conventional Resources of Oil and Gas for Federal Lands, and for Indian and Native Lands of the Continental United States, G. L. Dolton, R. F. Mast, R. A. Crovelli, U.S. Geological Survey Open-File Report 90-705, 1990. Table 2, page 10-12.

Figure 6. Federal Waters and Lands (Percent of U. S. Total)

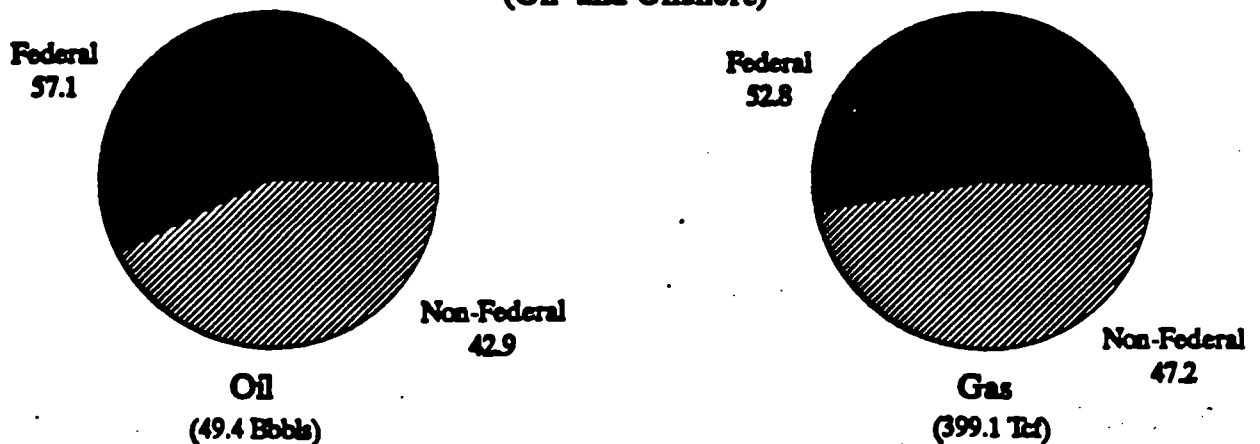
1991 Federal OCS Production



1991 Federal OCS Proved Reserves



Undiscovered Recoverable Oil and Gas Resources (On- and Offshore)



Collaboration with States and Tribes. The States bear a primary responsibility for regulating the gas and oil industry in the areas of resource conservation, environmental protection, and the use of natural gas. Ongoing federal interactions with State organizations, such as the Interstate Oil and Gas Compact Commission, the Ground Water Protection Council, the Energy Council, the National Governors' Association, and the National Association of Regulatory Utility Commissioners should be strengthened. The Federal government will work cooperatively with individual States to identify and resolve key issues constraining gas and oil supply at the State and regional levels.

As part of this Initiative, the Department will also forge new partnerships with Tribes to increase domestic gas and oil production on tribal lands. These partnerships will strive to recognize the importance of economic development, environmental preservation, and cultural sensitivity to tribal affairs.

Addressing West Coast Production Constraints. Crude oil production from the Alaskan North Slope (ANS) is likely to decline, leaving the West Coast once again a significant importer before the year 2000. To address this problem the Administration proposes removing many of the barriers that inhibit development of California and Alaskan resources by:

- Encouraging oil pipeline access for non-integrated producers in California. Most, if not all, of these large pipelines should operate as common carriers by virtue of their settlements in long-standing lawsuits, or their use of rights-of-way granted under the Mineral Leasing Act. Free and open access to transportation assets in the State will help to increase production.
- Stimulating investment in California refineries to permit the processing of greater proportions of heavy indigenous crudes. The marginal barrel of oil produced in California today is a heavy crude that requires extensive refinery processing to satisfy the State's high demand for light, low-sulfur transportation fuels. Declining Alaska North Slope supply will make room in refinery "upgrading" units that can process California heavy crude oil.

Better Understanding and Communication of the Strategic Value of the Gas and Oil Industry to the Nation. Public perceptions of the gas and oil industry have not kept pace with its changes during the last decade, in which the industry has been devastated by recession. Further, the gas and oil industry has evolved into a business of high-tech, skilled, and educated professionals and is a far cry from the rough-and-tumble image formed many years ago. The government will play a role in increasing awareness of the strategic importance of this industry in the United States economy through public information programs and outreach activities.

To help increase the public's awareness of the strategic role of the gas and oil industry, the Department of Energy proposes to do a joint study with the Department of Labor on the maturing of the work force in the domestic industry, and the relatively few young people entering the industry from college or graduate school. Educated young people are the life blood of any business. Universities responsible for the education of young petroleum engineers, geologists, geophysicists, landmen, and chemical engineers oriented to refining have sharply cut back their programs for lack of interest. This trend cannot continue for decades -- if we are to maintain a viable industry. The Department of Energy and Department of Labor should use the resources of the National Petroleum Council to study this problem, and possible long-term remedies including scholarships and work force planning strategies.

IV. SUMMARY AND CONCLUSION

During his campaign, President Clinton stated that: "A primary goal of the Clinton/Gore National Energy Policy will be reducing the amount of foreign oil consumed in America." The achievement of this ambitious goal will require a coordinated strategy that includes more than policies involving only gas and oil supplies. We must continue to improve our energy efficiency, increase our use of renewable energy resources, diversify our international sources of supply, and develop new methods of production that promise to reduce costs, pollution and energy use simultaneously.

This coordinated strategy, in turn, must reconcile conflicts between the need for energy supply and environmental preservation. Confrontation predicated on the erroneous belief that these two goals are incompatible has led to much delay, litigation, and frustration, and has threatened to lock up valuable resources that could benefit the nation. While the nation must protect the environmental heritage we hand down to future generations, these values can be made compatible with careful resource development.

Of equal importance, it is time to acknowledge the fact that the exploration and extraction of fuels has become an economically strategic industry. American competitiveness depends on the skills and productivity of American workers. We cannot maintain our present technological and skill-base edge in the international energy markets without a viable domestic gas and oil industry in which to train and deploy workers. Similarly, we cannot increase our technological edge, nor exercise world environmental leadership, if we no longer invest in R&D and produce domestic energy resources in an environmentally sound manner.

This Initiative's focus on natural gas and oil strategies is not an attempt to divert attention from the complete energy picture. This Administration is active on many energy and environment initiatives, including the Council on Sustainable Development, the Climate Change Initiative, the Federal Fleet Conversion Task Force, the Clean

Cities Program, and other measures that seek to harmonize our energy policy. In addition, the Energy Policy Act represents a bipartisan effort to weave a number of diverse energy supply and demand components into a complete policy fabric. To safeguard our security, improve our technology and skill base, and exercise environmental leadership, domestic gas and oil must remain a part of this fabric and a full-fledged contributor to the nation's economic future.

Objectives and Options

OVERVIEW OBJECTIVE I: ADVANCE AND DISSEMINATE GAS AND OIL TECHNOLOGIES

The gas and oil industries face serious challenges from both a resource and economics perspective as they continue to fulfill a vital role in the nation's energy future as we move into the 21st century. Our oil resources, which have provided vast quantities of low-cost, reliable energy to the nation for decades, have been heavily produced and are now in a state of decline. For domestic oil producers to continue to provide a substantial portion of our oil needs, and compete in world oil markets, new and advanced technologies must be developed and applied on a wide scale to improve the efficiency, minimize the environmental impact, and lower the cost of domestic oil production. Our natural gas resources, which have also provided enormous quantities of energy to the nation for decades, are more abundant; but new, more efficient, environmentally sensitive, and low-cost technologies are needed here as well to meet projected increased demand for natural gas at competitive prices.

Unfortunately, as the industry begins to address the need to develop the next generation of exploration and production technologies, its capacity to do so is rapidly diminishing. This is due to the move to overseas ventures by many of the largest oil producers, which have historically had extensive R&D operations; and to industry-wide cutbacks in R&D funding. Independent producers play a growing role in finding and producing domestic gas and oil but most do not have the financial resources to conduct the necessary R&D.

As in many other industries, worldwide competition in extraction and exploration is increasingly fierce. American industrial competitiveness will depend on productivity improvement and technological development equal to or better than that of other nations. The gas and oil industries are poised to research and adopt new methods of exploration and extraction that will allow us to expand our domestic natural resource base without compromising environmental quality.

What role can the government play in supporting the gas and oil industries in their drive to develop and apply a new generation of technologies to the business of producing energy for the nation? There are two areas in which the government can provide real support for the industry. They are:

- Government-sponsored R&D programs that address exploration, production, and gas use concerns, and promote gas and oil technology advancement. This industry-focused research and development must respond to, and complement, the R&D initiatives and needs of the industry.
- Government-sponsored R&D programs that focus on new technologies needed to meet environmental standards in an efficient, low-cost manner.

Both of these R&D areas will be supported by comprehensive technology transfer programs that ensure that the technologies and information developed in these initiatives reach operators, regulators, researchers, and other interested parties quickly and comprehensively.

1. **Government-sponsored gas and oil R&D Initiatives.** The Department of Energy has ongoing R&D programs for gas and oil. These industry-focused programs have been changing in recent years to reflect the changing needs of the industry. The new initiatives presented here build on the foundation already established by those programs and place increased emphasis on specific R&D issues beyond the capabilities of the current programs. The primary focus of these new initiatives is on new technologies to fill pressing needs for more sophisticated methods to address: a) exploring for new, smaller, and more-difficult-to-find fields that constitute the bulk of our remaining petroleum resources, b) the need for better methods to interpret geologic data to determine resource potential, fluid flow characteristics, and production potential, and c) producing the large quantities of oil left in the ground after conventional production methods are completed, using enhanced oil recovery technologies.
2. **Government-sponsored R&D Initiatives focused on developing new environmental technologies.** Perhaps the single greatest cost to the industry is that associated with complying with established or new environmental regulations governing all aspects of the industry. This initiative will provide support to operators in developing new technologies to comply with these regulations in more efficient, cost-effective ways by establishing an industry-based environmental research advisory board to advise government on R&D issues; implementing an environmental technology demonstration and technical assistance program; exploring the need for additional government involvement in oil spill R&D work; and studying the feasibility of an extensive effort to recycle significant portions of the vast quantities of lubricating oil used in the United States.

To be successful in both of these areas, technologies and information must not only be developed and/or identified, they must be disseminated to industry, regulators, and the research community. To achieve this, the government is developing a comprehensive technology transfer program to make sure that information is available and provided to those who need it in a way they can use it.

In order to speed technology transfer and application, two limited tax incentives will be provided to increase the economic attractiveness of advanced exploration and reservoir characterization technologies and more cost-efficient environmental compliance technologies. These actions will enhance the effectiveness of the R&D programs.

Issue Area 1.0

Promote Gas and Oil Technology Advancement

Option 1.1

Undertake Advanced Computational Technology Initiative

This option would make use of the unique expertise and facilities at the National Laboratories in geophysics, computational sciences, and related areas to address the needs of the gas and oil industry in two-dimensional (2D) and three-dimensional (3D) seismic acquisition, processing, and interpretation. This initiative would be an alliance among the Department of Energy (DOE), the domestic petroleum industry, and the National Laboratories with the objective of substantially reducing finding and development costs within 10 years.

At a conference in June 1993, technology managers from the gas and oil industry discussed seismic needs in the context of "Key Computational Grand Challenge Problems" faced by the industry today. Resolving many of these problems will require not only today's, but tomorrow's, technologies. Included are computational techniques, computer hardware and software, and communication technologies. The National Laboratories, in support of other DOE programs, have developed advanced technologies and expertise needed to address these problems. A seismic initiative will not only benefit the U.S. oil and gas industry, but will also contribute to the dual-use objectives of the National Laboratories.

Implementation

- The first phase (FY1994) of the initiative would be organized under an expansion of the existing Petroleum Technology Partnership, currently operated for DOE's Office of Fossil Energy (FE) by Sandia and Los Alamos National Laboratories, with other National Laboratories being added to the partnership as appropriate. FY1994 funding would be contributed by the Offices of Defense Programs (DP), FE, Energy Research (ER), and Energy Efficiency (EE). The management structure of the partnership would reflect the expanded laboratory and headquarters roles.
- Consistent with the partnership model:
 - The initiative will be guided by petroleum industry representatives through an industry group that would review and prioritize all proposals. This group would have balanced representation from major and independent producers as well as service companies.
 - Industry will provide substantial cost-sharing (50%) to leverage DOE funds.

- Phase two of the initiative (FY1995) would be an industry-led consortium structured to expand and amplify the capabilities demonstrated in the first phase. The structure would in large part be determined by the industry consortium, but might incorporate a modified National Laboratory Partnership on U.S. car concepts.
 - Industry would propose a structure to DOE by the third quarter, FY1994.
 - The National Laboratories would perform 80% of the proposed work under the new structure.
 - Industry would provide a minimum of 50% cost sharing to leverage DOE funds.

Measures of Success [to be determined]

The contribution of the initiative toward gas and oil recovery will be modeled as part of a package of R&D that improves exploration success.

- **Acquisition measure:** Reduced cost/seismic line shot
- **Processing and Interpretation measures (using a certain price of oil):**
 - Average reservoir size without 3D
 - Average reservoir size with 3D
 - Cost of dry hole and acreage
 - Cost of completed well and acreage
 - Cost of installed field infrastructure (reduced number of wells for exploration)
 - Cost of workstation
 - Payback without 3D
 - Payback with 3D

Public and Private Costs

In FY1994, FE, ER, EE, and DP will allocate \$4 million for the initiative and expect industry to match with an equal amount. FY1995 funding is expected to increase to \$50 million from various DOE offices, with matching funds from industry.

Political Sensitivity/Affected Stakeholders

The initiative is generally supported by the National Laboratories. Service companies and major producers fear competition from the National Laboratories as a result of this program, but are willing to help identify and prioritize research needs. Independents are skeptical that they will receive cost-effective exploration and production technologies and computer assistance from the Laboratories in the near-term. Other laboratories, universities, and research organizations will want to know how they can participate in this research and obtain some of the Federal dollars.

Status of Analysis

It is probably not possible to isolate the recovery impact of a National Laboratory initiative on seismic data processing by itself. Therefore, it will be described as contributing to an overall program of R&D on improving exploration costs and success whose benefits can be analyzed.

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Issue Area 1.0

Promote Gas and Oil Technology Advancement

Option 1.2

Develop Natural Gas Advanced Rock Drilling Systems

Under this option, a comprehensive advanced drilling system development program would be initiated to ensure future supplies of natural gas to the consumer at a reasonable price. Learning how to drill medium- to hard-rock gas formations at current gas prices offers one of the most significant technological challenges for domestic gas producing and drilling industries. The proposed development of advanced underbalanced air drilling and high-efficiency drilling rig retrofit systems will result in cheaper, more cost-effective development of gas supplies.

This initiative will allow full testing in targeted, representative gas reservoirs of prototype and modified prototype measurement-while-drilling, steerable, air-motor and air-percussion drilling systems, using affordable near-bit sensors as appropriate to expected drilling situations. Development and application testing will be undertaken of modified slim-hole and high-pressure jet-assisted drilling for increased penetration rates and reduced well costs in low-yield, underproduced basins.

Implementation

- Initiate cost-shared development with industry of improved, underbalanced and slim-hole drilling systems, and drilling rig retrofit equipment for improved rig efficiency.
- Complete development of prototype steerable air-percussion drilling systems suitable for directional and horizontal drilling applications.
- Initiate cost-shared field tests of the advanced drilling systems in target reservoirs representative of eight identified, underproduced gas basins.

Measures of Success/Public and Private Costs

		<u>Year</u>
•	Change in gas production:	.1 - .4 Tcf/yr 2010
•	Economic cost/benefit:	
-	Direct jobs: (worker/yr)	920 - 3,360 2010
-	Indirect jobs: (worker/yr)	1,840 - 7,320 2010
-	GDP:	\$243-\$969 million/yr 2010
•	Federal outlays:	\$30 million 1995-2000
•	Federal revenues (20% GDP):	\$50-195 million/yr 2010
•	State revenues:	\$24-97 million/yr 2010
•	Cost effectiveness:	\$.05 - \$.01/Mcf
•	Environmental costs/benefits:	Not applicable
•	Administration complexity:	Normal R&D
•	Technological advancement:	Substantial

Political Sensitivity/Affected Stakeholders

International Association of Drilling Contractors, Independent Petroleum Producers of America, Natural Gas Supply Association, American Gas Association, the Drilling and Completion Engineering Associations, the Gas Research Institute, and natural gas producers and service industries are likely to place high priority on this option.

Status of Analysis

A Natural Gas Strategic Plan and Multi-Year Crosscut Plan are near completion. These plans will include the issues, strategy, and resource requirements to attain objectives and goals of the advanced drilling program efforts. Additional year targets will be developed and refined based on these plans.

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Issue Area 1.0

Promote Gas and Oil Technology Advancement

Option 1.3

Develop a Commercialization Strategy for Natural Gas Technologies

Under this option, the Department of Energy (DOE) would develop department-wide policy guidelines and commercialization strategy for natural gas technologies for use in all sectors of the gas system, including resource and extraction (exploration and production), delivery and storage, and end-use, as well as environmental technologies. After policy guidelines and a commercialization strategy are developed, objectives and strategies outlined for specific technology groups would then be communicated to the program offices in Fossil Energy and Energy Efficiency for incorporation into the annual budgeting cycles.

Market introduction of new technologies (post-demonstration phase) is often impeded by the high cost of initial units and the reluctance of the marketplace to accept risk associated with a new product. To date, commercialization or market entry support has been primarily the role of private industry, but the gas industry is actively encouraging the Department to support market introduction of natural gas technologies.

Increasingly, foreign vendors are subsidized by their governments. If markets are lost to foreign competition, this negatively impacts both U.S. jobs and trade deficit. Where government is a major funder of R&D efforts and where the benefits flow across society, industry believes that government should also participate in market introductions.

The issue is what role DOE should play in mitigating the risks associated with commercialization of gas technologies. Does DOE want to help drive the market or let it take its own course? Further, what types of programs should DOE develop to assist industry in commercializing new technologies?

Implementation

Industry is encouraging government participation through public-private partnerships that will be structured to provide a combination of technical, financial, and informational marketing assistance.

This initiative would not require any new legislation or regulations, since legislative authority already exists for Federal assistance with technology deployment under the Renewable Energy and Energy Efficiency Technology Act of 1989 (non-gas technology areas) and the Energy Policy Act of 1992 (EPACT).

Implementation would include three initial phases:

- Phase I: Background
 - Conduct a DOE-wide literature search to capture previous analyses and studies completed on this issue.
 - Review existing legislative authority for commercialization support by government--both gas and non-gas technologies.
 - Define the term "commercialization" in conjunction with other DOE offices and the natural gas industry.
 - Meet with external stakeholders who represent different segments of the industry to identify their needs and concerns.
- Phase II: Definition
 - Define the criteria that should be used to qualify gas equipment, products, processes, and methods ("technologies") for Federal assistance in connection with commercialization. Criteria should include such factors as giving higher priority to domestic firms that employ domestic labor.
 - Determine the impacts of specific technologies on the users (taxpayers, ratepayers, or public assistance recipients), manufacturers, sponsors, and other business or social groups. Consider impacts on a regional and national basis.
 - Investigate where certain "commercialized" technologies are on the cost curve and where they need to be in order to compete.
- Phase III: Analysis

Consider alternative government actions to overcome market barriers; these could be different for each type of technology and would include:

 - Direct government purchases.
 - Price supports and purchase guarantees.
 - Tax credits or write-offs.
 - Loan guarantees with Federal/State/local government and LDCs.
 - Product and manufacturing process development and field test assistance.
 - Work with agencies and industry to establish strategic partnerships to commercialize gas equipment, products, processes, and methods (e.g., cost-sharing, CRADAs, joint ventures, MOUs, SBIR grants, consortia.)
 - Work with information clearinghouses such as the National Appropriate Technology Assistance Service.
 - Develop international centers to export U.S. technology, in coordination with the Agency for International Development, Department of Commerce, and the new IEA Gas Technology Information Center, co-

sponsored by Denmark and the U.S. (e.g., International Centre for Gas Technology in Moscow jointly with AID.)

- New awards/prize program for innovations in natural gas technology.
- Federal facility/laboratory showcase of prototype technology.
- User facilities at DOE laboratories for natural gas products.

Measures of Success

Because this is still a developing strategy without specific implementation steps, it is premature to develop many of the measures of success.

Public and Private Costs

Private Costs: Unknown

DOE Costs: Table I provides three examples of areas requested by the industry.

Table I (Not Inclusive):

Gas Industry Recommendations for DOE Funding (\$ Millions)

	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>FY 98</u>	<u>FY 99</u>
Heating/Cooling*	2.4	2.3	2.3	-	-
Phosphoric Acid Fuel Cells	10	10	10	7	2
Natural Gas Vehicles (NGVs)	18	20	20	23	20
<u>Total</u>	<u>30.4</u>	<u>32.3</u>	<u>32.3</u>	<u>30.0</u>	<u>22.0</u>

* Funding is for the York heat pump; industry will co-fund a similar amount of \$7.0 million over three years.

Political Sensitivity/Affected Stakeholders

The gas industry, including the Gas Research Institute and the American Gas Association, has specifically requested commercialization funding for phosphoric acid fuel cells, heating and cooling equipment, and natural gas vehicles. The industry has not requested that the Department help commercialize supply, storage, transmission, or environmental technologies. Although this initiative is supported by the natural gas industry, particularly the utilization technology manufacturers, DOE could still be

perceived as "subsidizing" one technology, one manufacturer, or one type of energy source over another.

Additional sensitivities come from the Office of Management and Budget and Congress, which are concerned about the Federal government supporting demonstrations and commercialization of technologies. They are also concerned about government interference with the market and spending taxpayer funds to assist the private sector in selling products.

Status of Analysis

A literature search of past work efforts and studies is ongoing now. The DOE-wide literature search will cover the period 1980 to 1993. Analysis would be initiated after completion of the search and the definition phases.

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Issue Area 1.0

Promote Gas and Oil Technology Advancement

Option 1.4

Stimulate Development of a Nationwide, Regionally Based Gas and Oil Technology Transfer Network and Assistance Program

This option will stimulate development of a comprehensive, nationwide technology transfer network and assistance program. The program will build on the strong core of oil- and gas-related technology transfer mechanisms already in place, including formal and informal efforts by industry, service companies, consultants, the Department of Energy (DOE) and National Laboratories, other government and State agencies, and universities. It will encourage closer integration and coordination among existing technology transfer mechanisms and information networks, and further the development of new initiatives to meet client needs not adequately served under existing programs.

DOE will provide initial funding, on a cost-shared basis, for a focused and aggressive program to increase the availability and application of current information and technology within the domestic oil and gas industry. The program will also increase communication and interaction between the industry and the financial and environmental communities. Emphasis will be placed on such key areas as exploration, production, processing, and gas utilization technologies, and environmental compliance and mitigation approaches. Increased technology transfer will accelerate the market penetration of R&D products and enhance the relevance of DOE and non-DOE funded research, contributing to reduced dependence on oil imports.

Particular attention will be given to the coordination of existing technology transfer mechanisms at the regional and local level with respect to meeting the needs of smaller independent oil and gas producers. For example, technology transfer will be essential in disseminating the results of research initiatives proposed under Option 1.7, which address the practical problems of these producers in reducing the costs of day-to-day operations. Technology transfer also will be central to the environmental technology demonstration and technical assistance program proposed under Option 2.1. Again, the information and technology needs of smaller independent producers will be a major focus of this program, with particular emphasis on reducing the costs of day-to-day operations.

To the greatest extent possible, DOE will involve service companies, consultants, universities, the State Geological Surveys, other State agencies, professional societies, and existing consortia and industry associations in these programs, in order to take full advantage of existing networks and to encourage the formation of new

networks. By enhancing the exchange of information between researchers and users, increased technology transfer will accelerate the conversion of research results into useful commercial products and facilitate their deployment. It will also equip users to better communicate research needs, fostering the development of effective and relevant research products.

This is an industry-driven, cost-shared program. A very important measure of success will be the industry's willingness to financially support it on a cost-shared basis initially, and to fully fund specific portions in the long term. A Federal funding level of \$22 million per year for the next five years would allow implementation of an initial five-year program. After this time, Federal funding would continue at a significantly lower level to maintain the program. Various technology transfer mechanisms would be evaluated for effectiveness in meeting client needs. Successful mechanisms would be improved, and unsuccessful ones replaced. Ultimately successful mechanisms would be continued over the long term with an increasingly greater percentage of cost sharing.

Implementation

- On a cost-shared basis with industry, promote the establishment of a national organization which will further oil- and gas-related technology transfer by providing a centralized point of contact on a regional basis.
 - Effort would focus on building on existing mechanisms and information networks to exhaust their potential and to enhance their reach.
- DOE would work with the national organization and other information agents to:
 - Identify client needs for technology and information that are not being served by existing mechanisms.
 - Ensure maximum benefit from current DOE and non-DOE technology transfer activities and add enhancements to better serve client needs.
 - Develop technology transfer mechanisms to meet high-priority client needs not covered by current technology transfer programs.
 - Aggressively solicit input from producers, particularly small independents, on research priorities.
- DOE would promote greater understanding of the gas and oil industry by other stakeholders such as the financial and environment community, as well as the general public (see Option 11.1).

Measures of Success *

	<u>2010</u>	<u>2020</u>
• Change in oil production:	197 thousand barrels/day	104 thousand barrels/day
• Change in gas production:	1.2 billion cubic feet/day	624 million cubic feet/day
• Economic costs/benefits:		
- Direct and Indirect jobs	23,640 jobs/year	12,480 jobs/year
- GDP:	\$2.9 billion	\$1.7 billion
- Balance of payments (oil)	\$2 billion/year	\$1.3 billion/year
• Federal outlays:	FY1995-2010: \$160 million	FY2010-2020: \$100 million
• Federal revenues:	NA	NA
• State revenues:	\$210 million/year	\$126 million/year
• Cost effectiveness:	\$0.06/barrel	\$0.004/barrel
• Environmental cost/benefits:	NA	NA
• Administrative complexity/Improvements:	Not applicable	
• Technological advancement:	As producer input improves relevance of research conducted, nature and direction of technology developed will increase in value.	

- * Gas production is estimated to equal oil production on a barrel-equivalent basis.

Affected Stakeholders

Independent producers, integrated producers, service companies, contractors, consultants, universities, State Geological Surveys, private research labs, professional societies, industry associations, technology transfer organizations, financial institutions, State energy agencies, State regulatory and environmental agencies, environmental organizations, the general public, the U.S. Congress, other Federal agencies, other DOE programs.

Political Sensitivity

There is strong support for a coordinated national technology transfer effort, as indicated in reports by the Interstate Oil and Gas Compact Commission (IOGCC). Comments on the DOE Oil Technology Transfer Strategy received from the industry and other stakeholders indicate strong support for an integrated network which focuses on small independents at the local level. The entire spectrum of producers, service companies, consultants, State agencies and researchers would be affected by this effort, as well as existing technology transfer organizations. Primary beneficiaries of the program would be independent oil and gas producers. The option may be viewed negatively by major companies that still perform in-house research and do not need technology transfer. Careful implementation will be required to avoid alienating service companies and consultants that may see this program as competition. A particular sensitivity is the use of "field agents," which should be avoided because such agents would be in direct competition with consultants.

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Issue Area 1.0

Promote Gas and Oil Technology Advancement

Option 1.5

Fund Expanded Industry-Driven RD&D for Advanced Oil Recovery Technologies

Under this option, the existing program of cost-shared field demonstrations and supporting research would be expanded for a six-year period to increase advanced oil recovery capabilities and reduce the rate of reservoir abandonment. The abandonment rate of the remaining oil in place has nearly tripled since the early 1980s. If this high abandonment rate continues, a significant portion of the target resource will be lost prior to the availability and economic feasibility of improved recovery methods.

Currently, demonstration projects are selected in one new geologic class per year, with funding for support research at or below historical levels. The program would be expanded in four ways:

- Field demonstrations would be expanded to address two classes per year. The demonstrations would increase the penetration of currently available improved technologies by providing data needed for technology transfer and reducing the risks of applying advanced technologies in the field.
- In-depth evaluations of past or ongoing projects would be done to significantly increase information transfer on the most effective techniques for use under specific conditions, and to define technological challenges for each class not currently being addressed.
- Field-based reservoir characterization and innovative recovery process experiments would be conducted, starting with the highest priority classes. These experiments would refine advanced technologies previously tested mostly in the laboratory, providing information on how they perform in the field and accelerating their acceptance and application by industry.
- Supporting research would be expanded to address industry-identified needs. To support the field demonstrations and field-based R&D experiments, the laboratory component of the program would be expanded, making new tools, techniques, and scientific understanding available sooner. To address the enormous quantity of remaining oil that no currently defined technology can cost-effectively recover, disciplinary fundamental research would also be expanded.

Implementation

- Initiate field demonstrations and technology transfer in classes IV and V in FY95, classes VI and VII in FY96, and evaluate whether to continue with the smaller classes.
- Determine priorities and appropriate funding levels for classes V, VI, and VII relative to remaining oil, production potential, and risks of reservoir abandonment.
- Work with industry to target and conduct a series of in-depth comparative project analyses for each high priority class (starting with the largest classes), to define: (1) What among currently available technologies is cost-effective under specific conditions; (2) major subclasses of interest and their unique characteristics; (3) promising technologies whose widespread applicability can be furthered by R&D; and (4) information needs and technological problems whose solution should be a high priority for supporting R&D.
- Develop technology transfer packages for specific reservoir types and currently available technologies that are found to be reliably cost-effective (included in Option 1-4).
- Conduct additional applied laboratory research to improve tools, techniques, and scientific understanding, in order to make the field work more effective in light of industry's economic and operational constraints.
- Structure a field approach to reservoir characterization and extraction process experimentation that builds on understanding of comparable reservoir groups and leverages research dollars. These experiments would be designed to move promising advanced technologies from the laboratory to the field. Implement these experiments beginning with classes I and II and continue directly comparable evaluations to determine which innovative technologies have the most potential.
- Conduct expanded disciplinary fundamental research, including innovative and novel approaches, to address the enormous quantity of remaining oil that no currently defined technology can cost-effectively recover.

Measures of Success

	Year:	<u>2010</u>	<u>2020</u>
•	Change in oil production:	180,000 b/d	360,000 b/d
•	Cumulative reserve additions (barrels of oil)	1.1 billion	2.9 billion
•	Economic costs/benefits (impacts on other industries included)		
-	Direct jobs:	3,600/year	7,200/year
-	Indirect jobs:	7,200/year	14,400/year
-	Cost savings to industry:	NA	NA
-	GDP:	\$1.7 billion/yr	\$3.9 billion/yr
-	Balance of payments:	\$1.9 billion/yr	\$4.4 billion/yr
•	Federal revenues @ 20% GDP:	\$340 million/yr	\$780 million/yr
•	State revenues:	\$95 million/yr	\$200 million/yr
•	Federal outlays (FY1995-FY2000):	\$134,000,000	
•	Cost effectiveness:	\$0.05/barrel	
•	Environmental costs/benefits:	NA	NA
•	Technological advancement:	Substantial	

Public and Private Costs

This option would be funded from the Department of Energy budget with cost-sharing from industry. Industry cost-sharing targets would be high (50% or higher) for field demonstration projects, with smaller cost-sharing targets for other work.

Total funding for this six-year option is \$134 million and can be summarized as follows:

- Accelerated class demonstration work will require accelerated funding. Higher funding levels in FY1995 and FY96 would be offset by lower funding levels in FY1997 through FY2000.
\$0 million
- Diagnostic evaluation work will require new funding at about \$200,000 per analysis.
\$16 million
- The intensive, field-based experiments (starting with classes I and II) will require new funding.
\$60 million
- The expanded supporting research work will require higher funding levels than the proposed FY95 target level, which includes other National Laboratory and technology transfer activities.
\$ 58 million

Political Sensitivity/Affected Stakeholders

The current program has received good industry support in terms of proposals received and cost-sharing (over 50%). The first two rounds of solicitations attracted 79 proposals with work totaling over \$700 million. Of these, 25 projects were selected, resulting in funding of cost-shared work totaling over \$200 million. Although the program has received good funding support from Congress, it has been constrained to one class in FY1994. A wide spectrum of producers, State agencies, consultants, service companies, and researchers would be involved in this expanded program.

Status of Analysis

Once screened, this option will be further refined as required.

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Issue Area 1.0

Promote Gas and Oil Technology Advancement

Option 1.6

Conduct Advanced Geological Basin Analysis to Target Exploration for Bypassed Oil and Gas

Under this option, vigorous geologic analysis would be conducted of oil-bearing basins, in order to open up new paths for oil discovery and associated gas discovery. In mature regions, yet-to-be-discovered oil reservoirs tend to be relatively small and hidden in the folds and planes of the earth's strata. The most effective way to find more of these reservoirs is through geologic analysis which extrapolates patterns and similarities from one geologically comparable basin to another.

This analysis is not a small effort. It will require pulling together and integrating the skills of teams of geologists, engineers, and other geoscientists, who each tend to specialize in a handful of basins. However, the net result of such analysis and cross-fertilization should be the identification of a significant percentage of the remaining plays and exploration prospects in the basins intensively analyzed. The analysis should also lead to the development and enunciation of new concepts of petrogeologic understanding. Such advances in understanding have historically led to successful oil findings in areas once believed to be barren. In addition, this kind of analysis is critical for providing guidance and direction for cost-effective deployment of high-resolution 3-D seismic advances in exploration.

Implementation

- Assemble exploration geologists from industry, States, U.S. Geological Survey, and other sources. The team would:
 - Identify 30 of the nation's 150 or so oil-bearing basins which best represent the distinguishable range of basins.
 - Categorize and systematize the full range of geologic and reservoir-related characteristics of these oil-bearing basins. The goal of this effort would be to detect both obvious and subtle similarities of the basins, and to use this information to identify high potential prospect areas in these and other basins. As part of this effort, old geologic and geophysical basin data made available for public use by private operators would be assessed and utilized to the fullest possible extent.

- Provide incentives to companies providing data and labor inputs to the effort, such as a 6- to 12-month lead in the use of basin results before they are made available to the general public. Also, provide cost-share grants to firms to perform extrapolation analysis to non-core basins with bypassed oil potentials, with the provision that the results be made public within a select time after work initiation.
- As a secondary check on eventual exhaustion of basin potentials, develop basic estimates of probable, ultimate oil generation within the given basins, aiding resolution of the always-overhanging question: "How much oil can we ultimately expect to find in a given basin?"

Measures of Success

Target: Incremental discoveries of 100 million barrels/year for 10 years after basin analysis during FY1995-FY1999 period. Trends of the last 20 years suggest annual finds in previously explored areas are on the downward track, with normal finds averaging 500 million barrels/year in the 1990s and 400 million barrels/year in the 2000s.

	<u>2000</u>	<u>2010</u>	<u>2020</u>
• Change in oil discoveries:	100 million barrels	10 million barrels	0
• Change in oil production:	37,000 barrels/day	165,000 b/day	97,000 b/day
• Change in gas production:	90 mmcf/day	420 mmcf/day	245 mmcf/day
• Economic costs/benefits (impacts on other industries included):			
- Direct jobs:	2200 ¹	4700	1900
- Indirect jobs:	6600	14,100	5700
- Cost savings to industry:	Not applicable		
- GDP:	\$0.32 billion	\$1.86 billion	\$1.24 billion
- Balance of Payments:	\$0.30 billion	\$1.60 billion	\$1.05 billion
• Federal Revenues @ 20% GDP:	\$65 million	\$370 million	\$250 million
• State Revenues @ 5% of BOE value:	\$20 million	\$115 million	\$70 million
• Federal outlays (FY1995-2000):	\$24,500,000		
• Cost Effectiveness:	\$.025/barrel		

¹ Job ratio/production unit doubled to reflect exploration emphasis in 2000-2009

Public and Private Costs

Preliminary estimates over five years:

Basin identification	1/2 year	\$ 500,000	Department of Energy (DOE)
30 basin analyses	2 years	\$ 300,000 per basin per year	2/3 DOE 1/3 Other Federal, State or industry
All (high potential) basin extrapolation (100 basins)	2 1/2 years	\$ 200,000 per basin	1/2 DOE 1/2 Cost-shared
30 basin maximum oil determination	2 1/2 years	\$ 100,000 per basin	2/3 DOE 1/2 State
TOTAL five-year initiative		\$ 24,500,000 <u>\$ 17,000,000</u> \$ 41,500,000	DOE State, industry, other Federal

Political Sensitivity/Affected Stakeholders

Independents and exploration and production departments of majors should welcome this initiative. May assist in retention of greater interest in U.S. resources on the part of the majors. States should support finding of more oil and subsequent tax income and job creation/maintenance. Universities and State Geological Surveys will like this initiative.

Status of Analysis

Once screened, this option analysis will be further refined as required by DOE's Office of Fossil Energy.

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Issue Area 1.0

Promote Gas and Oil Technology Advancement

Option 1.7

Target a Research Program Specifically at the Everyday Problems of Small Gas and Oil Producers

This option would add a component to the oil research program of the Department of Energy (DOE) which specifically addresses the technical needs of smaller independent oil and gas producers. These operators are generally less technically sophisticated than larger companies and sometimes operate with methods handed down over many years. Many simple, everyday technical problems, often associated with the operation of marginal wells, could benefit from a disciplined scientific approach using expertise currently available within the industry, DOE, the National Laboratories, and other research organizations and inventors. For example, introducing some basic computer analysis or simple scientific or engineering analysis to independents has allowed them to solve problems at a lower cost.

This program would be designed not to compete with service companies and consultants but rather to use them to commercialize and disseminate the products. In particular, it will encourage procedure/product field demonstration and marketing/manufacturing links with product innovators/researchers and target operators.

Implementation

The effort will be a joint program of DOE's Office of Fossil Energy (FE) and Office of Energy Efficiency (EE), and will be designed to assemble and/or develop improved operating procedures, equipment modifications, and new equipment, and to foster necessary demonstration and other marketing of cost-saving and regulation-meeting products to small oil and gas operators. It will be a five-year effort and will call for the following concurrent and coordinated effects:

- Draw insight into regional and more universal areas of marginal well operation having measurable improvement potentials from focus groups of stripper well operators, service companies, and technical consultants; develop market and technical assessments and regional technology transfer center reports (see Option 1.4).
- For a three-year period, expand EE's Energy-Related Invention Program of small research grants (\$100,000 or less) directed to innovations for small oil and gas operations from 7 to 10 grants per year to 25 to 30 grants per year.

- Based on need assessment, initiate two-year, targeted material laboratory and competitive private R&D efforts directed to needed innovations, i.e. automated trouble-shooting systems for beam pump operation.
- Provide cost-shared grants for regional and wider field-demonstrations, illustrating the value of dollar-saving and/or production-enhancing improvements in operations. Target recipients will be service company/manufacturer/researcher/operator teams. Minimum-size demonstration will target an increase in stripper production from 50- to 100-barrels/day, within logical area groups of low-producing wells. (Single well demonstrations will not be covered.)
- Develop and distribute regional manuals for optimum stripper well operation.

Measures of Success

Target: Five-year life extension of 20% of the 600,000 stripper well universe. Allowing for realistic technology transfer pace, maximum input would take 5 to 7 years with peak production in 2010.

		<u>Year*</u>
• Change in oil and gas production:	Oil - 70,000 b/d	2010
	Gas - 320,000 Mcf/d	2010
• Economic costs/benefits: (Impacts on other industries included):		
- Direct jobs:	2,500/year	2010
- Indirect jobs:	5,000/year	2010
- Cost savings to industry:	Not applicable	
- GDP:	\$885 million/year	2010
- Balance of payments:	\$745 million/year	2010
• Federal outlays (FY1995-FY2000):	\$39,000,000	
• Federal revenues @ 20% of GDP:	\$180 million/year	
• State revenues @ 5% of GDP:	\$ 59 million/year	
• Cost effectiveness:	\$0.17/barrel equivalent	

* Negligible impacts projected for decades of 2000 and 2020.

Public and Private Costs

Costs would be from the Department of Energy's budget, with cost-sharing from industry.

	FY95	FY96	FY97	FY98	FY99	Total
Schedule (\$million)	8.6	13.4	7	5	5	39

Political Sensitivity/Affected Stakeholders

Independent producers should favor this approach. Aggressive service companies and consultants will see business opportunity. Success will lead to better market for declining properties which will be attractive to larger operators.

Status of Analysis

Once screened, this option will be further analyzed as required by the Office of Fossil Energy's oil RD&D program.

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Issue Area 1.0

Promote Gas and Oil Technology Advancement

Option 1.8

Promote Expenditures on Advanced Computational Techniques and New Technologies Used in Exploration through Tax Credits

This option would stimulate the development of advanced computational techniques (e.g., three-dimensional seismic mapping), and new technologies used in exploring for new gas and oil reserves. The tax code would be modified to establish a 15% tax credit for these new exploratory technologies.

Since the vast majority of oil and gas fields yet to be found in the U.S. will be small and/or subtle traps, finding costs are rising and such small fields are typically economically marginal. This incentive would encourage the development of new technologies needed to improve exploration techniques and efficiencies to find the remaining reserves at the lowest cost.

Implementation

This option would require legislation to change the Federal tax code.

Measures of Success

	<u>2010</u>	<u>2020</u>
• Change in oil and gas production (boe/d):	9,000	33,000
• Economic costs/benefits:		
- Direct jobs:	180	660
- Indirect jobs:	360	1,320
- Cost savings to industry:	\$14 million	\$30 million
- GDP:	\$67 million	\$280 million
- Balance of payments:	\$70 million lower	\$300 million lower
• Federal outlays: Not applicable		
• Federal revenues:	Loss \$14 million; gain \$13 million from new income tax revenues (20% of GDP)	Loss \$30 million; gain \$56 million from new income tax revenues (20% of GDP)
• State revenues:	Gain \$3 million (5% of GDP)	Gain \$14 million (5% of GDP)
• Impacts on other industries:		
- Increased petroleum industry activity will benefit related industries - e.g.; more metal used for well casings, drill bits, etc.		
• Cost effectiveness: 0.75 \$/bbl. of reserve additions		
• Environmental costs/benefits: Not applicable		
• Administrative complexity/improvements: Relatively minor effort by Internal Revenue Service required to promulgate regulations specifying how these costs should be treated as expenses.		
• Technological advancement: This incentive will indirectly stimulate the use of some new technologies associated with G&G activities due to more favorable treatment of expenses.		

Political Sensitivities/Affected Stakeholders

This option would be favored by explorationists (independent and majors) and producer States. Other States would probably be generally neutral, unless there is a major loss in Federal revenues associated with it. Taxpayers would be negatively affected by slightly lower tax receipts.

Passage of a new law would be required to establish this tax initiative.

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Issue Area 1.0

Promote Gas and Oil Technology Advancement

Option 1.9

Utilize the Naval Petroleum and Oil Shale Reserves (NPOSR) for Advanced Technology Testing, Evaluation and Training

The NPOSR sites offer opportunities for advanced technology testing, evaluation and training in new oil field and environmental technologies. NPOSR's Casper, Wyoming office is working closely with the Denver Regional Office of Energy Efficiency and Renewable Energy to establish an Advanced Technology Transfer and Training Center for the Rocky Mountain Region, and met August 26, 1993 to present the concept to stakeholders. Stakeholders include representatives from Wyoming State offices, local Casper officials, universities and a Colorado oil and gas industry association. This activity is strongly supported by the Independent Petroleum Association of America (IPAA), the Colorado Oil and Gas Association, and Wyoming State and local officials.

New applications that lead to increased production, lower operating costs and improved environmental compliance with lower costs can be tested at the Naval Petroleum Reserve No. 3 (NPR-3) in Wyoming, which is owned and operated by DOE. These applications would be those that could be used in mature, marginally profitable oil fields and then be transferred to the rest of industry, potentially increasing domestic oil production by prolonging the life of these oil fields. The Center would serve both industry and DOE laboratories and individual inventors through the Department's Energy Related Inventions Program (ERIP). In addition, it would serve the academic and other communities, such as Indian tribal councils, by providing hands-on training opportunities for students and others who need oilfield experience.

Implementation

Access to NPR-3 is assured since the Federal government owns the field and all equipment and facilities.

NPR-3 could be used as a pilot oil field for advancing technologies and inventions that could be quickly and economically utilized by the petroleum industry. Inventions supported by the ERIP and those developed by government and private laboratories could be field-tested easily and quickly using existing facilities and support staff at NPR-3.

Specifically:

- Naval Petroleum and Oil Shale Reserves-Colorado, Utah, Wyoming (NPOSR-CUW) in Casper, Wyoming has formed an Advanced Technology Task Force to investigate opportunities for testing various technologies and transfer that knowledge to the rest of industry.
- After the meeting on August 26th, NPOSR-CUW and the Denver Regional Office met to finalize plans to test four inventions in the ERIP program. Chicago Operations Office has committed \$50,000 to test these inventions at NPR-3. Also, a Focus Group was formed from the participants to work on a detailed proposal, discuss barriers to implementation, funding considerations, and to garner further support. The outside participants each indicated that they believed that their principals would strongly support the concept and be willing to work together with the Department on its implementation.
- Establish working relationships with DOE oil and gas research laboratories and headquarter organizations and determine the feasibility of joining the Laboratory/Industry partnership for pursuing crosswell seismic equipment and geomechanic instrument development. Also, identify and pursue opportunities for cooperative initiatives in oilfield advanced technology evaluation and field testing in partnership with FE and government laboratories and private industry.
- Identify and respond to DOE technology transfer opportunities. DOE could invest funds into NPR-3 and realize a return on those funds since all revenues from NPR-3 production are returned to the U.S. Treasury.
- Prepare a long range strategy for utilizing NPR-3 as a responsive field laboratory for testing new oil field and environmental technologies.
- Investigate the feasibility of oil shale technology.

Measures of Success

Opportunities for small businesses to test new ideas.

NPOSR-CUW would work closely with EE and laboratories to offer testing capabilities to small companies. For instance, CRADAs with small companies at national laboratories need field testing for proof of concept. The Center would offer simplified implementation of DOE test programs since the site is owned by DOE rather than the private sector.

General access to data from the tests.

Many researchers said that it is often difficult to obtain data on the results of their

tests, and they sometimes cannot publish those results because of the proprietary nature of private operations. Because NPR-3 is a government operation, data would be always available to the researcher.

Unique steamflood operations in a light-oil environment.

No other operating oilfield has a light oil steamflood working. All generators, wells, lines and water treatment facilities are in place.

Technical and support infrastructure in place.

Experienced engineering and geological staffs are in place and ready to support this effort. Financial and procurement functions are also available.

Costs offset immediately by revenues produced in research.

Any production associated with the testing and evaluation would produce immediate revenues for the government, which would be used to offset costs to the public.

Benefits to local and regional economy.

The Center would contribute to the economy of the local area by prolongation of the life of stripper fields and would provide new services for the oil and gas industry.

Public and Private Costs

No cost estimates for public participation in the testing of new technologies have been made.

Political Sensitivity/Affected Stakeholders

The meeting in Casper, Wyoming, on August 26, 1993, was hosted jointly by the Naval Petroleum and Oil Shale Reserves in Colorado, Utah and Wyoming (NPOSRCUW) and the Denver Regional Office. The meeting was attended by local and State officials of Wyoming, representatives from the offices of Senators Simpson and Wallop, a representative of Colorado oil and gas companies, and technology transfer officials.

It was clear from the meeting that Wyoming and the region would benefit from the idea because of the probable job and economic effects. Also, the public image of the Department would be enhanced by working with industry to improve and facilitate the transfer of new technology to small businesses. This project would support the technology transfer mission of the Department and offer any national or FE laboratory a means to help move technology from the laboratory to commercialization.

Preliminary discussions with other private industry representative indicate strong interest in using NPOSR as field testing and evaluation sites.

Status of Analysis

If a Technology Transfer and Training Center is located at NPR-3, NPOSR could partner with other DOE organizations, private industry and regional universities to assist the struggling domestic oil and gas stripper industry. (NPR-3 is the only government owned stripper field.) This activity is already supported by the Independent Petroleum Association of America (IPAA), Colorado Oil and Gas Association (COGA) and Wyoming officials. Through Intra-department cooperation, NPOSR is participating in DOE's Energy Related Inventions Program (ERIP) as a test bed for demonstrating and testing inventions that apply in the oil patch and other under utilized technologies applicable to stripper oil production and environmental protection. A Focus Group was formed at the August 26th meeting to jointly develop a proposal which would define the Center's mission, activities, and partners. The proposal is expected to be finished by early November 1993.

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Issue Area 2.0

Improve Environmental Technologies and Practices

Option 2.1

Improve Environmental Compliance Technologies and Practices

This option entails conducting an aggressive environmental technology development and demonstration program to enable the domestic oil and gas industry to more cost-effectively comply with rapidly evolving environmental regulatory requirements. A key objective would be to enhance the capability of oil and gas producers to reduce environmental compliance costs and liabilities, and to improve environmental performance. Small independent producers particularly need improved technologies and practices. Stripper wells and marginally economic oil and gas operations are very sensitive to increasing compliance costs. The costs of environmental compliance, excessive paperwork, and inconsistencies in rules and regulations are frequently cited by small independent producers as high priority concerns. At the same time, government and environmental groups are worried that oil and gas operations, if improperly conducted, can adversely affect the environment.

Implementation

The Department of Energy (DOE), in cooperation with the Environmental Protection Agency, the Department of the Interior, and others, would pursue the following activities as part of the overall Office of Fossil Energy Oil and Gas Research Programs:

- Develop a comprehensive strategy for improving environmental compliance technology and practices.
- Expand research to develop and field test more cost-effective environmental compliance technologies applicable to oil and gas exploration and production operations.
- Expand efforts to demonstrate lower-cost compliance technologies that can be used by small independent producers and service companies.
- Explore efforts to form "technology partnerships" between industry and the National Laboratories to address environmental issues specific to domestic oil and gas exploration and production operations.
- Support efforts by industry, government, and others to exchange technical information on the environmental aspects of oil and gas operations, especially new technologies and methods for environmental compliance and mitigation.

Implementation of this option would be closely coordinated with actions taken pursuant to technology transfer discussed in Option 1.4, and the demonstration of innovative, alternative approaches to regulatory compliance discussed in Option 7.5.

Measures of Success

Benefits for Combined Options

Benefits are shown only for oil and gas exploration and production, and are combined for Options 7.1 through 7.6, 2.1, and 2.3. They represent negative impacts that can be avoided. To avoid them, the Administration would need to initiate several, if not all, of these options simultaneously.

Cumulative Impact of Environmental Legislation/Regulation on U.S. Oil and Gas Exploration and Production

	<u>Year 2000</u>	<u>Year 2010</u>	<u>Year 2020</u>
Oil production rate (Bbls/d)	630,000 (17%)	380-460,000	(13%)330-550,000 (14%)
Gas production rate (Tcf/yr)	0.8 (5%)	2.0 (10%)	--
Cumulative oil production (billion Bbls)	1.0 (5%)	2.9-3.0 (9%)	4.1-5.0 (10%)
Cumulative gas production (Tcf)	--	17 (7%)	--
Cumulative oil reserve additions (billion Bbls)	3.5	4.2-4.8	5.4-7.1
Direct jobs (workers/yr)	8,560	25,864-27,464	6,600-11,000 (oil only)
Indirect jobs (workers/yr)	17,120	51,728-54,928	13,200-22,000 (oil only)
Federal revenues (\$ billion)(oil only)			
Annual	0.8-1.0	0.8-1.0	0.6-1.1
Cumulative	3.4-3.6	13-14	20-24
State revenues (\$ billion)	0.4	0.6-0.7	0.2-0.3 (oil only)
Cumulative costs to industry (\$ billion)	20.1	54.1-55.7	30.6-39 (oil only)
Gross domestic product (GDP) (\$ billion)	6.3	8.4-9.2	3.5-6.0 (oil only)
Balance of payments (oil only)			
Annual (\$ billion)	5.3	4.0-4.8	4.0-6.7

Source: DOE 1993 (COPM 6.5.1; 1993 EIA Annual Energy Outlook reference oil price forecast); NPC 1992. Difference between high cost and "balanced," more cost-effective environmental regulation. Numbers in parentheses indicate percentage change due to this initiative.

Additional Measures for Option 2.1

- **Public and private costs:** Potential cost savings to industry. Public benefits include improved environmental performance, the reduced potential for environmental damage, and the avoided premature abandonment of U.S. oil and gas resources.
- **Federal outlays:** FY 1995 through FY 2000: \$4 million per year with cost-sharing/co-funding by industry; 1 additional FTE.

Political Sensitivity/Affected Stakeholders

Positive response would be expected from oil and gas producers, environmental groups, private research organizations, National Laboratories, and service companies.

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Issue Area 2.0

Improve Environmental Technologies and Practices

Option 2.2

Accelerate Expensing for Capital Equipment Expenses Associated with Environmental Compliance

This option would permit faster tax recovery of costs associated with environmental compliance through modification of the tax code to permit expensing of environmental compliance costs in the year incurred. Currently, compliance costs must be capitalized and amortized over the life of a project.

New environmental compliance technologies are becoming available through public and private R&D that can raise the quality of environmental protection in oil and gas exploration and production, especially in highly sensitive settings. Concurrently, both States and the Federal government are refining their environmental regulations for oil and gas production. The application of new technologies, and compliance with the evolving regulations, however, can be so costly as to endanger the economic viability of producers operating near the margin. Easing the impact on after-tax cash flow can reduce the increased costs of environmental compliance, while encouraging full compliance with these environmental requirements.

Implementation

This option would require legislation to change the Federal tax code.

Measures of Success

	<u>2010</u>	<u>2020</u>
• Change in gas and oil prod. (boe/d ²)	14,000	27,000
• Change in gas and oil demand:	Not applicable	
• Economic costs/benefits		
- Direct jobs:	280	440
- Indirect jobs:	560	880
- Cost savings to industry:	\$26 million	\$26 million
- GDP:	\$105 million/year	\$187 million/year
- Balance of payments:	\$150 million/year lower	\$265 million/year lower
• Federal outlays:	NA	NA
• Federal revenues:	Loss \$26 million in tax incentives; gain \$21 million from new income tax revenues (20% of GDP)	Loss \$26 million in tax incentives; gain \$37 million from new income tax revenues (20% of GDP)
• State revenues:	Gain \$5 million (5% of GDP)	Gain \$9 million (5% of GDP)
• Cost effectiveness:	1.00 - 2.00 \$/bbl. of reserve additions	
• Impacts on other industries:	Increased petroleum industry activity will benefit related industries; e.g., more metal used for well casings, drill bits, etc.	
• Environmental costs/benefits:	This incentive will benefit the environment by making it easier/less expensive for operators to get into full and quick compliance with environmental regulations.	
• Administrative complexity/improvements:	A relatively minor effort by the IRS would be required to promulgate regulations specifying how these costs should be treated as expenses.	
• Technological advancement:	This incentive may indirectly stimulate the use of some new technologies due to its more favorable treatment of the associated expenses.	

Political Sensitivities/Affected Stakeholders

This option would be favorable to operators (independents and majors), especially those in environmentally sensitive areas, and manufacturers of environmental equipment. By encouraging a higher level of environmental protection, it could also be favored by environmental groups. Taxpayers would be negatively affected due to slightly lower tax receipts.

A new law would be required to promulgate this tax initiative.

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²All estimates of success/costs for this option are based on a low environmental cost scenario.

Issue Area 2.0

Improve Environmental Technologies and Practices

Option 2.3

Establish Environmental Research Advisory Committee(s)

This option entails improving coordination among industry, government, and others on environmental research and technology transfer activities related to oil and gas exploration and production. The Department of Energy (DOE) currently uses a variety of informal mechanisms to coordinate with others and obtain advice on environmental research and technology transfer activities conducted under Office of Fossil Energy oil and gas research programs. These entities include individual companies, trade associations such as the American Petroleum Institute, research organizations such as the Gas Research Institute, States, Federal agencies, academic institutions, and professional organizations. Some stakeholders have recommended that DOE establish more formal, less ad hoc, mechanisms, such as an environmental research advisory committee.

Since many DOE projects are highly leveraged, involving cost-sharing or co-funding by different government and industry organizations, it is often difficult to obtain a comprehensive perspective on oil and gas industry needs. This difficulty is compounded by the diversity of environmental, regional and regulatory topics, as well as scientific and technical disciplines addressed in DOE programs.

Implementation

The Department of Energy should investigate mechanisms to improve coordination on oil and gas environmental research and technology transfer activities. This may entail examining the feasibility of:

- Working cooperatively with non-profit organizations such as the Society of Petroleum Engineers and the Ground Water Protection Council to improve coordination and technology transfer on specific research topics. This would be similar to approaches taken by the American Petroleum Institute and the Gas Research Institute.
- Establishing national and regional oil and gas environmental research advisory committees. This would be similar to an approach taken by the Minerals Management Service through its national Scientific Committee of the Outer Continental Shelf Advisory Board and Regional Technical Working Groups.

- Establishing an Oil and Gas Environmental Research Advisory Committee, possibly as an adjunct to establishing a research committee under the National Petroleum Council.
- Enhancing industry and National Laboratories partnerships.

Measures of Success

Benefits for Combined Options

Benefits are shown only for oil and gas exploration and production, and are combined for Options 7.1 through 7.6, 2.1, and 2.3. They represent negative impacts that can be avoided. To avoid them, the Administration would need to initiate several, if not all, of these options simultaneously.

Cumulative Impact of Environmental Legislation/Regulation on U.S. Oil and Gas Exploration and Production

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Cumulative gas production (Tcf)	--	17 (7%)	--
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Indirect jobs (workers/yr)	17,120	51,728-54,928	13,200-22,000 (oil only)
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- Annual	0.8-1.0	0.8-1.0	0.6-1.1
- Cumulative	3.4-3.6	13-14	20-24
State revenues (\$ billion)	0.4	0.6-0.7	0.2-0.3 (oil only)
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Balance of payments (oil only)			
- Annual (\$ billion)	5.3	4.0-4.8	4.0-6.7

Source: DOE 1993 (COPM 6.5.1; 1993 EIA Annual Energy Outlook reference oil price forecast); NPC 1992. Difference between high cost and "balanced," more cost-effective environmental regulation. Numbers in parentheses indicate percentage change due to this initiative.

Additional Measures for Option 2.3

- **Public and private costs:** Improved coordination should result in better use of Federal tax dollars to meet DOE program and national energy policy objectives.
- **Federal outlays:** FY1995 through 2000 -- \$100,000 to \$200,000 per year depending on approach(es) taken.
- **Administrative complexity/improvements:** This option provides the potential for improved coordination, particularly on research related to onshore oil and gas operations.

Political Sensitivity/Affected Stakeholders

Industry, States, consultants, and researchers would be broadly supported. It must be consistent with the Federal Advisory Committee Act.

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Issue Area 2.0

Improve Environmental Technologies and Practices

Option 2.4

Explore DOE's Role in Oil Spill R&D

Under this option, the Department of Energy (DOE) would take a more active role in research and development efforts to improve technologies for preventing and managing oil spills. Much of the public opposition to crude oil exploration, development, and transportation stems from fear of offshore oil spills. The Oil Pollution Act of 1990 (OPA 90), passed largely in response to the *Exxon Valdez* spill, mandates that Federal agencies coordinate with industry and foreign nations on oil spill R&D. OPA 90 created the Interagency Coordinating Committee on Oil Pollution Research and identified DOE as a member. Funding for oil spill R&D has been limited, however, and DOE has not played a significant role.

DOE's National Laboratories have extensive capabilities applicable to oil spill prevention, response, and remediation. A 1991 survey of National Laboratory capabilities related to oil spill prevention and response found a strong showing in such areas as bioremediation, computer modeling, environmental monitoring, and oil characterization. Idaho National Laboratory, Oak Ridge National Laboratory, and Pacific Northwest Laboratory are each represented in several categories and others have expertise as well. This option would explore the potential for DOE's appropriate niche in oil spill R&D that will use the capability of the National Laboratories as well as coordinate with industry. This role would include assessing the dimensions of oil spill costs.

Excellent opportunities for coordination exist within the Federal Government. The Coast Guard, as the lead agency for the Interagency Coordinating Committee on Oil Pollution Research, and the Minerals Management Service (MMS) of the Department of the Interior have expressed support for DOE participating in this R&D area. The Interagency Committee would like to focus more money on promising areas with higher caliber research such as that frequently done by DOE's National Laboratories.

Implementation

DOE would augment the current state of oil spill R&D by funding research efforts with the goal of developing, distributing and exporting environmental technologies. To do this, DOE could:

- Refocus work of the National Laboratories on oil spill R&D.
- Jointly fund oil spill R&D with industry, States, and academic institutions such as it is currently doing with the Enhanced Oil Recovery program.

- Cooperate with the State of Alaska and foreign governments on joint research projects.
- Look for opportunities to demonstrate spill prevention in a showcase approach.

Measures of Success/Public and Private Costs

- **Change in oil and gas production:** Indirect, if improved oil spill prevention, response, and remediation capabilities reduce public opposition to development of domestic resources.
- **Change in oil and gas demand:** Not applicable
- **Economic costs/benefits**
 - **Direct and indirect jobs:** Some modest potential to create jobs in industries producing the technology.
 - **Costs or cost savings to industry:** Potential to provide substantial savings to industry as improved capabilities are reflected in lower insurance rates and reduced oil spill costs.
 - **GDP:** Not estimated
 - **Balance of payments:** Not applicable
 - **Impacts on other industries/manufacturing:** Opportunities for equipment manufacturers, response companies, and producers of remediation technologies in the demonstration and development stages.
- **Federal outlays (FY1994 to FY2000):** Being developed but not available until mid-October.
- **Federal revenues:** Not applicable
- **State revenues:** Not applicable
- **Cost effectiveness (\$/barrel):** Being developed but not available until mid-October.
- **Environmental costs/benefits:** Considerable potential for benefits due to more effective prevention, response, and remediation capabilities.
- **Administrative complexity/improvements:** Opportunity to refocus mission of DOE's National Laboratories.
- **Technological advancement:** Opportunity for significant advancement.

Affected Stakeholders

This option addresses the interests of a broad stakeholder group, including coastal States, environmental groups, the general public, coastal industries such as tourism and fishing, the oil and gas industry, Federal and State agencies, and international interests. The Interagency Coordinating Committee provides one mechanism for coordination.

Opportunities exist for DOE to build bridges to the environmental community by involving organizations such as the Natural Resources Defense Council, which has

actively monitored the status of oil spill prevention and cleanup in U.S. waters.

Political Sensitivity/Legislative Requirements

Spending caps contained in the Budget Enforcement Act of 1990 have imposed ceilings on agency budgets so that no "new" money is available to fund new OPA 90 R&D programs. Approvals from the Office of Management and Budget and Congress would be required to transfer R&D money from other areas to oil spill research.

Improved spill prevention, response, and remediation capabilities could generate substantial savings and reduction in environmental impacts while boosting the public's confidence in the ability of industry and government to avoid or effectively deal with spills.

Status of Analysis

Background research is under way.

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Issue Area 2.0

Improve Environmental Technologies and Practices

Option 2.5

Study Used Oil Recycling

Under this option, a study will be done to consider various policy alternatives for the Department of Energy (DOE) on the complex issue of recycling used lubricating oil. In the United States, an estimated 2.2 billion gallons of lubricating oil is used every year. Of this amount, although about 1.4 billion gallons is technically recyclable, only about 900 million gallons is actually reprocessed into fuel oil or rerefined into oil products. Potentially significant environmental problems result from "do-it-yourselfers" and small businesses improperly disposing of almost 400 million gallons of oil.

Through a long and tangled legislative, regulatory, and litigious history, the U.S. government has tried to allow oil recycling while, at the same time, considering whether to classify used oil as a hazardous waste. Even though last year the Environmental Protection Agency (EPA) classified used oil as nonhazardous, litigation continues. DOE has not actually been involved in the issue, although it expanded oil recycling technologies in the early 1980s.

The political battlelines are drawn between the reprocessors who recycle used oil by turning it into fuel oil, and the rerefiners and environmental groups who favor turning used oil into feedstocks. Rerefiners who have the facilities and methods for handling hazardous waste favor classifying oil as a hazardous waste, because they could then charge suppliers of used oil instead of paying them. Reprocessors would have greater difficulty with the hazardous classification. Because environmental groups are concerned about metals and other pollutants from burning used oil, they favor rerefining.

Congressman Torres of California has an Oil Recycling Credit bill that would require refineries to purchase recycling credits (one credit for every barrel of recycled oil) from qualified recyclers before producing lubricating oils. The objective is to raise the demand for recycled oil and hence the demand for used oil. Fourteen States have passed legislation setting up collection and used oil management programs. Currently six States list used oil as hazardous waste.

Although lubricating oil is not a fuel, it is, or can be, a joint product of the fuel-making process. Further, used lubricating oil can be recycled by burning it as fuel. The used oil issue is a legitimate DOE concern because of the environmental implications of oil production and use.

Implementation

A study will be conducted to examine DOE policy alternatives, such as (1) better collection of data, including used oil reprocessing, rerefining, and disposal statistics; estimates of damage from improper used oil disposal; and estimates of future oil recycling given current EPA rulings and projected oil prices; (2) consultation with States to develop model State legislation if further recycling incentives are needed; (3) research on how to remove or render harmless metals in used oil such as lead and cadmium; and (4) analysis of possible additional Federal regulatory or legislative action.

Measures of Success/Public and Private Costs

- **Change in oil and gas production:** Not estimated
- **Change in oil and gas demand:** Not estimated, but lubricating oil demand is likely to decrease slightly.
- **Economic costs/benefits**
 - **Direct and Indirect jobs:** Not estimated but positive.
 - **Costs or cost savings to industry:** Not estimated, but industry and consumers will share additional costs.
 - **GDP:** Not estimated, too slight to measure.
 - **Balance of payments:** Not estimated, too slight to measure.
 - **Impacts on other industries/manufacturing:** Not estimated
- **Federal outlays (in thousands):** FY94 \$100, FY95 \$100, FY96 \$50, FY97-2000 \$0.
- **Federal revenues:** Not estimated
- **State revenues:** Not estimated
- **Cost effectiveness:** Not estimated
- **Environmental costs/benefits:** Not estimated but potentially significant if improper oil disposal does cause environmental damage.
- **Administrative complexity/improvements:** Not estimated
- **Technological advancement:** Not estimated

Political Sensitivity

Interested parties include do-it-yourself oil changers, oil reprocessors, oil rerefiners, local governments, and environmental groups. Reprocessors will oppose options that raise the costs of handling used oil, rerefiners and environmental groups will oppose burning options, while do-it-yourselfers will oppose options that increase the inconvenience of changing their own oil. Local governments are likely to welcome Federal action that does not inconvenience them while increasing the amount of oil recycled. All factions will oppose options that raise the price of oil.

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OVERVIEW OBJECTIVE II: STIMULATE MARKETS FOR NATURAL GAS

Natural gas is an underutilized, clean-burning, domestically abundant energy resource capable of reducing our dependence on foreign oil and increasing jobs in this country. Efforts are proposed in the areas of deliverability/reliability, technological innovation, and Federal and State regulatory reform, which would increase the gas supply to end-users by 1.655 trillion cubic-feet (Tcf) per year, by the year 2000.

Deliverability/Reliability

Just as impediments and technological barriers to exploration and production exist, similar barriers exist that impede the efficient transportation of natural gas from the wellhead to the burner tip. These include all aspects of the gathering, pipeline transportation, storage, and distribution systems, as well as the information links that allow the flows of gas to be monitored.

Efficient delivery of natural gas from the wellhead to the burner tip is currently limited by an incomplete physical infrastructure for gathering, transporting, storing, and distributing gas, and by an incomplete information infrastructure for monitoring natural gas supply and demand. For example, the majority of the gas storage facilities are not operationally capable of dispatching gas storage to coordinate with electric load pattern requirements. The accurate and timely quality of natural gas deliverability data will play a significant role in the development of an efficient, national, competitive market for natural gas. Inadequate production and deliverability data may lead to inaccurate estimates of supply, causing mispricing in the market and poor policy decision making. This can cause economic inefficiency and misallocation of resources and result in an incapacity to report accurate production and deliverability data and an inability to collect royalty payments. The Oklahoma test case detailed in the National Gas Deliverability Task Force Report is a prime example of this.

The introduction of competitive forces into the natural gas market will greatly benefit the nation. However, a properly functioning, competitive gas market requires an information system and a transportation system that will meet the demands of the market. Competition will improve when timely and accurate information is readily available to allow buyers, sellers, and transporters to make informed choices. Only by addressing these issues can the natural gas industry gain the confidence of State regulators, industry, and residential customers in natural gas as a reliable fuel choice.

The Department of Energy (DOE) is mandated to develop, collect, and disseminate information on gas deliverability and storage. The DOE Office of Fossil Energy is proposing research on flow measurement and information retrieval in order to help bring about the transition to a more competitive market. Seven gas deliverability efforts are proposed, which will act to increase gas consumption by 310 billion cubic feet (Bcf) per year, by the year 2000. The combined cost of these efforts is \$3.4 million in FY1994.

Federal Regulatory Rate Reform

Federal regulators have made great strides in promoting a competitive, customer-oriented industry structure. However, a few impediments still exist at the Federal level that inhibit construction of new natural gas pipelines, limit the access of some natural-gas-fired electric generation to the electric power transmission grid, and discourage the effective marketing of natural gas pipeline facilities. Substantial cost savings can be realized by implementing a cooperative effort to plan the development of the alternative fuel infrastructure, by moving the Federal fleet to fuels such as natural gas.

Working cooperatively with the Federal Energy Regulatory Commission, the Environmental Protection Agency, the National Association of Regulatory Utility Commissioners, and State commissions will enable DOE to help increase the utilization of natural gas by .98 trillion cubic feet (Tcf) per year by the year 2000. This will also reduce pollution levels by 9.8 million tons of carbon dioxide and 2.67 million tons of carbon each year. The Federal outlay for the five proposed efforts will be \$575,000 in FY 1994, which will lead to an overall cost-effectiveness of \$.0002 per additional million cubic feet (Mcf), through the year 2000.

State Regulatory Rate Reform

DOE supports the tremendous strides State regulators have made in bringing about the transition to a more market oriented natural gas industry. Additional changes in regulations governing the distribution of natural gas and electricity may lead to even further gains in the efficient use of energy. Some State regulatory agencies report that competition in the form of increased access and easy entry into the business of providing gas and electricity will encourage the development of an energy conservation industry. States may find that revising electricity, gas, environmental, and energy conservation regulations, so that each bears closer resemblance to its true economic cost, will lead to greater economic activity and a cleaner State environment.

Given the States' jurisdictional authority in this area, a cooperative effort is sought between State utility regulators and energy offices and DOE that will help foster regulatory reforms. The thrust of this set of six State regulatory reform proposals is to improve access to gas distribution facilities, encourage efficient pricing for electricity and gas at the ultimate customer level, encourage the removal of fuel specific subsidies that work against overall energy efficiency goals, foster regulations that encourage cost-cutting by distributors, and boost the use of natural gas in vehicles.

A cooperative effort between DOE and members of the National Association of Regulatory Utility Commissioners, which provides States with the tools to initiate these reforms, will lead to increased natural gas utilization of .365 Tcf by the year 2000. This will also lead to pollution reductions of 3.61 million tons of carbon dioxide and .98 million tons of carbon. The Federal outlay for this set of efforts will be \$875,000 in FY1994, with a total cost-effectiveness of \$.0075 per additional Mcf, through the year 2000.

Issue Area 3.0

Improve Natural Gas Deliverability

Option 3.1

Upgrade State Production Data Collection and Reporting

The objective of this option is to create a single information collection point in each State and to achieve compatibility between States and the Federal government. More accurate gas production information would then reach the marketplace in a timely fashion and would also assist the Federal government in collecting the gas data to allow analysis of national trends.

Present methods for collecting data vary; reporting systems are not compatible either within States or across States; and the systems used are often outdated. This project would build upon a conceptual design being developed for a common gas production data collection and reporting system that will be usable by all State agencies and all States. The design is now partially funded by Department of Energy (DOE), and work is being performed by the University of Oklahoma. This option would be co-funded by the States and would assist States in implementing the system through acquisition of similar equipment and software.

Implementation

- Two or more States would join in cooperatively upgrading their gas production systems to conform with the University of Oklahoma model, with co-funding of hardware and software acquisition by DOE.
- Evaluation of the successful start-up of these initial systems would result in a plan for implementation of systems in all gas-producing States. Though not identical because of individual State needs, systems will be similar enough to assure complete compatibility among States.
- Availability of funding would determine how long it will take to achieve total State compatibility.

Measures of Success

- **Change in oil and gas production:** Increased accuracy in gas production data will lead to better long-range planning for gas use and further long-term contracting by gas users which will lead to increased gas production.
- **Change in oil and gas demand:** Increased accuracy in gas production data will lead to better long range planning for gas use and increased demand for natural gas in the mid- to long-term.
- **Economic costs/benefits:**
 - **Direct and Indirect Jobs:**
 - Direct: Increased employment is expected during the development and implementation of the new systems.
 - Indirect: Increased employment in analytical companies will also result from the increased accuracy and timeliness of gas production data.
 - **Costs or cost savings to industry:** Cost savings for industry from the reduced reporting burden will result from the single-State data collection system replacing the multiple system now in place.
 - **GDP:** To the extent that consumption of domestic natural gas offsets the use of imported oil, GDP will increase.
 - **Balance of payments:** This should improve as natural gas is used instead of imported oil.
 - **Impacts on other industries/manufacturing:** Reduced need for import of oil with greater reliance on natural gas in the electric generating industry and possible incremental increase in natural gas use in the transportation sector.
- **Federal outlays (FY 1994 to FY 2000):** Total Federal expenditures - approximately \$9 million (FY 1994: \$1,000,000; FY 1995: \$1,632,000; FY 1996: \$2,004,000; FY 1997: \$2,103,000; FY 1998: \$2,304,000). States share of costs is difficult to assess without input from States on the requirements to upgrade their systems.
- **Federal revenues:** Increases in Federal revenues generated by taxes paid by gas production companies is expected. Department of Interior is participating in the project in order to gain more accurate reporting of gas produced on Federal leases which could lead to increased royalty payments.
- **State revenues:** State revenues from gas produced within a State should increase as a result of the increased accuracy of the gas production data.
- **Cost effectiveness:** The combination of lower operating costs for State agencies and production companies due to the reduction in collection systems within States, with the increased revenues from the more accurate collection of royalties make this effort a highly cost-effective program.

- **Environmental costs/benefits:** More accurate monitoring of gas production in a specific State should allow the development of more responsible production schedules and a corresponding reduction in drilling wastes. There should be no environmental costs associated with the program since environmental costs are reduced as a result of increased use of natural gas.
- **Administrative complexity/improvements:** The very purpose of the program is to use a single collection point to reduce administrative complexity caused by multiple agencies within a State collecting gas production data.
- **Technological advancement:** While there is not expected to be any advancement in computer technology resulting from this project, improvements in the application software will be required for the project.

Affected Stakeholders

Multiple parties will benefit, including States that produce or consume natural gas produced in the U.S.; State tax, royalty, and conservation agencies; gas producers (who will have a reduced reporting burden); gas marketers (who will have increasingly accurate information); gas consumers (who can plan on gas use with greater accuracy and confidence); Federal agencies that conduct natural gas analysis; natural gas well owners (including the Federal government).

Political Sensitivity/Legislative Requirements

This project is developed from the recommendations of the Natural Gas Deliverability Task Force Report, a joint report of DOE and the Federal Energy Regulatory Commission. The Interstate Oil and Gas Compact Commission and the National Association of Regulatory Commissioners support this project and no political sensitivity is expected.

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Issue Area 3.0

Improve Natural Gas Deliverability

Option 3.2

Build a National Deliverability Capacity Model

This project would develop a model for estimating the capability of the United States to deliver natural gas to customers, linking wellhead productive capacity estimates with pipeline capacity on a State-to-State basis. A deliverability study by the Department of Energy (DOE) and the Federal Energy Regulatory Commission noted the need for such estimates. While there are procedures for separately estimating both wellhead and pipeline capacities, there is no system linking both.

The Energy Information Administration (EIA) has the capability to estimate natural gas wellhead productive capacity for the lower-48 States. Also, in support of the National Petroleum Council study, The Potential for Natural Gas in the United States, EIA developed a peak day pipeline network model to evaluate interregional flow capabilities, incorporating domestic supply, storage, imports, and exports. These two systems are envisioned as the foundation for a national deliverability model which will allow the evaluation of the overall natural gas delivery system, including wellhead and pipeline capacity constraints.

Implementation

- Develop a PC-based system for the analysis of domestic natural gas deliverability for use throughout DOE.
- Use this study to determine the current capability and the impact of projected changes in supply and demand patterns and planned pipeline expansion on the capability of the system.
- Present this evaluation in an annual EIA summary report on domestic natural gas deliverability capability.

Measures of Success

- **Change in oil and gas production:** Increased production resulting from greater demand for natural gas as a result of consumer confidence in reliability of natural gas.
- **Change in oil and gas demand:** Increased demand due to greater consumer confidence in deliverability capacity of natural gas system and the overall reliability of natural gas.

- **Economic costs/benefits**
 - **Direct and Indirect jobs:** Increased natural gas demand will increase employment in the production industry.
 - **Costs or cost savings to industry:** Industry will be able to reduce costs for obtaining information needed to develop fuel purchasing strategies.
 - **GDP:** GDP will increase to the extent that consumption of natural gas offsets the use of imported oil.
 - **Balance of payments:** These will be improved as natural gas is used instead of imported oil.
 - **Impacts on other industries/manufacturing:** Not applicable
- **Federal outlays**
 - FY1994 - \$200,000 for development and implementation
 - FY2000 - \$50,000 per year for maintenance
- **Federal revenues**
 - This system will be available to the public through a licensed vendor, either as part of ERMIS or as a separate service. Royalty fees, typically on the order of 10%, will be paid back to the Treasury on a per installation basis.
 - Potential for increased royalty payments also exists through increased offshore production of natural gas.
- **State revenues:** Increased income should come from additional natural gas production.
- **Cost effectiveness:** The deliverability capacity model will provide consistent and reliable information for use in DOE at a reasonable cost and will eliminate the need for proprietary network models from private companies.
- **Environmental costs/benefits:** Environmental costs will be reduced as a result of increased use of natural gas.
- **Administrative complexity/improvements:** The project will be accomplished in-house using data readily available or developed through contracting. There is no issue of administrative complexity in this project.
- **Technological advancement:** Not applicable

Affected Stakeholders

All segments of the industry from producers to consumers will benefit from the increased information about production and delivery of natural gas. Government decision-makers and analysts will have available and consistent information on which to base analyses and decisions.

Political Sensitivity/Legislative Requirements

None.

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Issue Area 3.0

Improve Natural Gas Deliverability

Option 3.3

Enhance Real-Time Monitoring and Automated Systems

This option would provide new and advanced technologies for use in the transportation of gas that will foster increased gas deliverability to customers, improved efficiency, reduced operating costs, and streamlined information gathering and dissemination on natural gas flow and pressure from critical locations at production and storage facilities, interstate and intrastate pipelines, local gas distribution companies, and major end-users of natural gas. Real-time communication between electric dispatch and gas control centers will be crucial to the future success of the natural gas market. The deliverability task force of the Department of Energy (DOE) and the Federal Energy Regulatory Commission (FERC) identified the need for such an information system for reliably and accurately reporting this data and information on a real-time basis.

The increased optimization of existing pipeline assets, as a competitive secondary transportation market develops, should reduce overall unit costs in the pipeline system, support greater price stability to residential customers, and promote increased gas use by the electric power generation community and other large industrial users. However, that may also reduce existing excess transportation capacity, which will in turn necessitate greater knowledge of gas flow and pressure, on an increasingly real-time basis. In particular, the goal is to reduce the reliance of the northeast U.S. on imported oil for power generation.

Implementation

- Facilitate the implementation of FERC Order No. 636 to develop a secondary market to provide for an efficient and competitive environment which will help reduce the overall cost to end-users of natural gas.
- Support the recommendations of the Natural Gas Council to develop a Gas Industry Standards Board to develop a single national standard for the reporting of gas transactions at all U.S. pipeline delivery points via electronic bulletin boards.
- Initiate a series of surveys to determine the level of communication technology, both hardware and software, that the gas industry would require to develop and demonstrate this project on a regional basis.

Measures of Success

- **Change in gas production:** More accurate and timely pipeline capacity information will lead to increased use of underutilized pipeline capacity. The increase in gas use will offset increased use of more expensive fossil fuels for power generation. This will promote an increase in gas production, through an increase in usage, by approximately 100 Bcf per year (17.8 million boe) in the year 2000.
- **Change in gas demand:** Same as production.
- **Economic costs/benefits**
 - **Direct and indirect jobs:** Approximately 1,000 direct jobs and 2,000 indirect jobs created by the year 2000.
 - **Costs savings to industry:** Approximately \$2.3 billion per year by the year 2000.
 - **GDP:** Approximately \$400 million.
 - **Balance of payments:** By backing out imported oil, the balance of payments deficit is reduced by approximately \$400 million by the year 2000.
 - **Impacts on other industries/manufacturing:** A cost savings of approximately \$.10 per Mcf for gas transportation for manufacturing industry is expected by the year 2000.
- **Federal outlays:**
 - FY1994: \$490,000 for feasibility study
 - FY1995 - 1997: A total Federal outlay of \$4.0 million will be needed for this development effort. Industry to contribute \$4.0 million to achieve a 50% cost-sharing ratio.
- **Federal revenues:** Federal revenues will increase from higher gas production on Federal leases.
- **State revenues:** State revenues should be increased by approximately \$13 million per year by the year 2000.
- **Cost effectiveness:** The reduction in the cost of transportation is equivalent to a \$.013 per Mcf cost savings through the year 2000.
- **Environmental costs/benefits:**

Year 2000: 1.0 million tons carbon dioxide; 0.27 million tons of carbon.

Environmental benefits also include the cost savings of not having to construct new pipeline facilities.
- **Administrative complexity/improvements:** Low administrative complexity. Real-time monitoring of current gas supplies will allow States in regions facing severe availability requirements due to seasonal demand or disaster conditions to locate sources of gas supplies that can be transported to that region.
- **Technological advancement:** Using existing computer technology, fiber optic technology, and gas flow management technology, existing pipeline networks will be integrated. Implementation and standardization of electronic bulletin

boards to define routes, suppliers, service options, and costs will facilitate and provide the large growth users (such as the power generation gas purchasers) the real-time information needed to make decisions that affect and reflect large swings in demand.

Political Sensitivity/Affected Stakeholders

Producers, major gas consumers such as electric utilities, independent power producers, local distribution companies, large industrial customers, and State regulators support real-time monitoring and automated systems. As pipelines are seeking to improve deliverability in order to facilitate market-growth, it is likely that the pipeline industry will support the project.

Status of Analysis

A cost/benefit analysis will be done on the total delivery system.

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Issue Area 3.0

Improve Natural Gas Deliverability

Option 3.4

Build System for Assessing Underground Storage Operations

This project would develop an information system for evaluating domestic storage capacity and deliverability on a site-specific basis, documenting and assessing new technologies for developing and managing storage as well as the role of storage in meeting variable demand patterns.

The Energy Information Administration (EIA) has been developing a natural gas data analysis system which provides general analytical capabilities for mapping, cross referencing of data, and data presentation. The system currently has extensive information on pipeline location (based on compressor station information), capacity, system information (pipeline interconnects), flow information by segment, and customer information by local distribution company. The system will be expanded to incorporate information on underground storage. The information will be presented in the least disaggregated form available.

Implementation

- Establish a database of site-specific information on storage facilities including geographical and geologic information, capacity, operational information (number of wells, peak day deliverability), ownership data, and withdrawal and injection information on a monthly basis.
- Merge the database into the EIA Energy and Natural Resource Information Mapping System (ENRIMS) to allow cross-referencing with pipeline connections, pipeline capacity, and market information.
- Develop a PC-based system for evaluating changes and efficiency gains from the development and use of storage in the national natural gas delivery system.

Measures of Success

- **Change in oil and gas production:** Increase production is expected from greater demand for natural gas as a result of consumer confidence in reliability.
- **Change in oil and gas demand:** Greater confidence in storage and deliverability capacity of natural gas system should increase demand.
- **Economic costs/benefits**
 - **Direct and Indirect jobs:** Rising natural gas demand will increase employment in the production industry.
 - **Costs or cost savings to industry:** This information will be available to both industry and government, it will reduce industry costs in obtaining information necessary to develop fuel purchasing strategies.
 - **GDP:** To the extent that consumption of natural gas offsets the use of imported oil, GDP will increase.
 - **Balance of payments:** This will be improved as natural gas is used instead of imported oil.
 - **Impacts on other industries/manufacturing:** Not applicable
- **Federal outlays**
 - FY1994 - \$200,000 for development and implementation
 - FY2000 - \$40,000 per year for maintenance
- **Federal revenues**
 - This information will be available to the public through a licensed vendor as part of ERMIS. Royalty fees, typically on the order of 10%, will be paid back to the Treasury on a per installation basis.
 - Potential for increased royalty payments also exists through the increased offshore production of natural gas.
- **State revenues:** Increased income should be derived from additional natural gas production.
- **Cost effectiveness:** The underground storage information system will provide consistent and reliable information for use in DOE at a reasonable cost.
- **Environmental costs/benefits:** Environmental costs will be reduced as a result of increased use of natural gas.
- **Administrative complexity/improvements:** The project will be accomplished in-house using data readily available or developed through contracting. There is no issue of administrative complexity in this project.
- **Technological advancement:** Not applicable

Affected Stakeholders

All segments of the industry from producers to consumers will benefit from the increased information about the capability of the natural gas system for producing, storing, and delivering natural gas. Government decision-makers and analysts will have available and consistent information on which to base analyses and decisions.

Political Sensitivity/Legislative Requirements

None.

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Issue Area 3.0

Improve Natural Gas Deliverability

Option 3.5

Match Gas Storage to End-User Requirements

Natural gas storage capacity must be increased to meet forecasted increases in gas utilization. Also, alternative storage methods need to be developed in areas where traditional storage is not feasible. This option will identify market areas where new and expanding natural gas capacity can meet increasing industrial and power generation demand. It will also establish proof-of-concept and subsequent field demonstrations of alternative storage methods and identify improvements in the system from the alternative storage reservoir to the burner tip.

Technological advancement in alternative storage methods and reduction of costs to an affordable level are challenges which must be met in order to establish confidence of the power generation market in gas deliverability. It is also a major requirement for non-utility generators to be able to capitalize their facilities.

Implementation

- Identify strategic market areas for new and growing natural gas capacity; identify, screen, and rank each possible underground reservoir for its potential and complete geologic modeling, engineering design, and cost-to-develop studies.
- Conduct a feasibility study of alternative gas storage methods such as tight and tight/fractured reservoirs; thin-bedded salt formations; and nonreservoir rock, chambers, and surface facilities.
- Conduct one or more field demonstrations near power generation facilities to increase the amount of gas dedicated to the power generation market.
- Milestones:
 - By the year 2000: One or more industry-financed alternative storage facilities would be under construction.
 - By the year 2005: One or more industry-financed alternative storage facilities would be in full scale operation.

Measures of Success

- **Change in oil and gas production:** The National Petroleum Council (NPC) report forecasted a 2 Tcf growth in gas demand by electric utilities between 1993 and 2010. Independent power producers already consume more than 0.5 Tcf gas annually. Currently, about 15-20% of the U.S. gas demand comes from storage operations. In order to establish confidence in long-term gas supply for power generation, up to 50% of the growth in gas demand for power generation must come from guaranteed storage sources. Therefore, a range of 20-50% of growth in gas demand from storage for electric utilities may be expected. Taking the middle-of-the-road position at a 35% growth from storage operations, an additional 0.7 Tcf working gas in storage may be required by 2010 for the electric generation market sector.
- **Change in oil and gas demand:** Not applicable
- **Economic costs/benefits**
 - **Direct jobs:** The 0.7 Tcf growth in demand for new storage for the power generation market by the year 2010 could result in 0.041 Tcf per year demand for new working storage capacity. This amount of gas would result in 374 jobs per year.
 - **Indirect jobs:** The number of indirect jobs would amount to 748, based on a 2:1 benefit ratio from direct jobs.
 - **Costs or cost savings in industry:** No answer at this time
 - **GDP:** The incremental 0.041 Tcf gas/year (6.8 billion barrels per year equivalent) in 2010 would result in a direct value to \$99 million benefit (6.8 billion x 29.10 x 0.5).
 - **Balance of payments:** More than 15-20% of the gas consumed in the U.S. comes from storage operations. The 0.041 Tcf per year increase in deliverability could be a direct offset to importation of the foreign gas supplies that theoretically would allocate 15-20% of imported gas into storage operations. Assuming 20% of the 0.041 Tcf per year will offset imports of natural gas, the estimated value is \$30 million per year.
 - **Impacts on other industries/manufacturing:** No answer at this time
 - **Federal outlays (FY1994 to FY2000):** A \$14.0 million Federal outlay for a \$28.0 million 50%-cost-sharing program through the year 2000 is required, beginning in the second year. A \$2.0 million feasibility study is to be initiated in the first year. To reach the stated deliverability goals, it is assumed that after demonstrations are performed in selected fields, industry will continue at its own expense to improve the efficiency of all target fields.

- **Federal revenues:** No answer at this time
- **State revenues:** No answer at this time
- **Cost effectiveness:** Not applicable
- **Environmental costs/benefits:** Not applicable
- **Administrative complexity/improvements:** Not applicable
- **Technological advancement:** Establishing confidence in gas deliverability is a major requirement for independent power producers to capitalize their facilities. The strategic geographic location and strategic identification of alternative storage methods beyond conventional oil reservoirs may be required to stimulate the development of independent power facilities. Advancement in the area of alternative storage methods and reduction of costs to an affordable level are the technological challenges ahead.

Political Sensitivity/Affected Stakeholders

Major gas consumers such as electric utilities, independent power producers, and industrial consumers will be in favor of the improved gas storage efficiency through the use of nearby storage reservoirs.

Status of Analysis

A cost-benefit analysis is to be done on the total gas storage programs.

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Issue Area 3.0

Improve Natural Gas Deliverability

Option 3.6

Demonstrate Storage Revitalization Technology

This option has a dual focus of helping to reduce reliance on imported oil by the power generation industry and lowering gas prices to end users through a net increase in storage deliverability.

To maintain the storage system capability and reduce overall storage costs, new and improved technologies and techniques must be developed. Deliverability (injection and withdrawal) in over 17,000 existing U.S. gas storage wells declines each year, and an estimated \$100 million (GRI report) is spent each year to revitalize their deliverability.) In addition, enhanced performance for new and existing storage fields, such as horizontal wells and over pressuring, must be developed and demonstrated to meet projected daily gas demands and to provide peak-day deliverability, especially for the industrial and power generation markets. These Department of Energy (DOE) storage technologies can build confidence in new and improved storage development strategies.

Implementation

- Conduct a gas storage revitalization project to evaluate new/improved techniques, e.g., propellant fracturing, chemical treatment, and hydraulic stimulation methods for existing wells. Multiple candidate wells will be selected for field verification tests.
- Through cooperative DOE/Industry agreements, develop a methodology to improve storage field technology through geologic modeling and reservoir simulation studies of selected storage fields. Field development strategies would be investigated, such as increasing injection/withdrawal rates using horizontal wells and optimizing surface facilities for reducing development costs.
- Milestone: By the year 2000, prepare new guidelines on gas storage revitalization technology and techniques for existing gas storage wells in order to reduce the annual decline in deliverability.

Measures of Success

- **Change in oil and gas production:** The Gas Research Institute estimates that deliverability from existing storage wells declines by 5% per year in existing fields. By developing new technology to revitalize deliverability from existing 4 Tcf working gas storage, daily production requirements would be offset by 40 billion cubic feet (Bcf) per year increase in deliverability assuming a 1% improvement (20% change) in storage deliverability from those existing fields.
- **Change in oil and gas demand:** No effect
- **Economic costs/benefits**
 - **Direct jobs:** Additional jobs would be created to develop and perform new technology applications on existing fields. The 40 Bcf per year increase in deliverability results in 364 jobs per year (40 Bcf per year equivalent to 18,263 boe per day).
 - **Indirect jobs:** The number of indirect jobs would amount to 728 jobs per year, based on a 2:1 benefit ratio from direct jobs.
 - **Costs or cost savings in industry:** The true savings resulting from the use of new or improved deliverability revitalization technology will represent some portion of what the industry spends to revitalize storage wells annually. The Gas Research Institute has estimated that the industry spends \$100 million per year trying to restore deliverability in existing fields. Assuming a 20% overall efficiency improvement in deliverability revitalization technology, annual savings in expenditures would be \$20 million.
 - **GDP:** The 40 Bcf per year restored deliverability from existing fields would result in \$97 million per year (6.7 million boe per year x \$29.10 x 0.5) gross domestic product.
 - **Balance of payments:** More than 15-20% of the gas consumed in the U.S. comes from storage operations. The 0.040 Tcf increase in deliverability could be a direct offset to importation of foreign gas supplies. The market value of 40 Bcf/year restored deliverability at \$3.68 per Mcf is \$147 million.
 - **Impacts on other industries/manufacturing:** The oil field service industry is the likely beneficiary of the development and use of revitalization technology.
- **Federal outlays (FY1994 to FY2000):** A \$15.0 million Federal outlay for a \$30.0 million project through the year 2000, assuming 50% cost sharing participation by industry. To reach the stated deliverability goals, it is assumed that following completion of co-funded demonstrations in selected fields, industry will continue at its own expense to improve the efficiency of all target fields.

- **Federal revenues:** No answer at this time
- **State revenues:** No answer at this time
- **Cost effectiveness:** No answer at this time
- **Environmental costs/benefits:** Not applicable
- **Administrative complexity/improvements:** Not applicable
- **Technological advancement:** Development of an appropriate technology to revitalize a portion of the more than 18,000 existing storage wells in this country is the goal of this effort.

Political Sensitivity/Affected Stakeholders

The storage industry (pipeline and LDC) will favor improved storage efficiency and reduced costs; gas consumers will benefit from lower cost gas.

Status of Analysis

A cost-benefit analysis will be done on the total gas storage program.

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Issue Area 3.0

Improve Natural Gas Deliverability

Option 3.7

Improve Storage Effectiveness for Problem Fields

Migration of injected gas out of storage reservoirs often occurs because the reservoir is not perfectly (geologically) sealed. In aquifer storage, gas is often trapped through the injection/withdrawal cycles, and deliverability often decreases because of the unfavorable mobility of water to gas. These and other problems associated with the operation and maintenance of natural gas storage must be addressed to reduce the cost of storage operations. The Department of Energy (DOE) storage program will develop and (through field verification tests) demonstrate new and improved technologies for detecting and inhibiting gas migration from the storage area, as well as develop methodologies to reduce other costs associated with managing underground gas storage fields.

Implementation

- Conduct gas migration study of problem fields followed by field verification tests to determine the effectiveness of horizontal wells, surfactant/foams, or other technologies to reduce the costs of gas migration.
- Perform a gas trapping study in aquifer storage fields.
- Implement field verification tests of methods to reduce gas migration and gas trapping.
- Milestone: By the year 2000, establish methods which have been verified by demonstration tests and used in problem fields to reduce gas migration and gas trapping problems.

Measures of Success

- **Change in oil and gas production:** The amount of cushion gas in aquifer storage is 0.8 Tcf. By developing methods to reduce the cushion gas requirements in aquifers by 10%, a 0.08 Tcf gas delivery increase per year is expected. In addition, improvements in gas deliverability from non-aquifer storage as a result of solving gas-migration-related problems could also amount to 0.03 Tcf per year. This assumes improving the effectiveness of 64 of the more than 320 storage fields at a rate of 0.5 Bcf per field. The total amount of gas deliverability improvement is estimated at 0.11 Tcf per year.

- **Change in oil and gas demand:** No answer at this time
- **Economic costs/benefits**
 - **Direct jobs:** The 0.11 Tcf per year increase in gas deliverability will result in 100 jobs per year (11 Bcf is equivalent to 5022 boe per day).
 - **Indirect jobs:** The number of indirect jobs is expected to be 200, based on a 2:1 benefit ratio from direct jobs.
 - **Costs or cost savings in industry:** The value of the gas migration losses (0.03 Tcf per year) in 2010 is \$110 million, assuming a \$3.68 per Mcf cost. The 0.080 Tcf per year reduction in cushion gas requirements represents a savings of \$294 million at \$3.68 per Mcf. The total savings is \$404 million.
 - **GDP:** The 0.11 Tcf gas per year (1.83 billion barrel equivalent) in 2010 would result in a direct value of \$26.6 billion ($1.83 \text{ billion} \times 29.10 \times 0.5$).
 - **Balance of payments:** More than 15-20% of the gas consumed in the U.S. comes from storage operations. The 0.11 Tcf per year increase in deliverability could be a direct offset to the importation of foreign gas supplies that theoretically would allocate 15-20% of imported gas into storage operations. Assuming that 20% of the imported gas would go directly into storage operations, a reduction in the balance of payments of \$40.5 million per year would be expected.
 - **Impacts on other industries/manufacturing:** No answer at this time
 - **Federal outlays (FY1994 to FY2000):** A \$15.0 million Federal outlay through the year 2000, for a \$30.0 million program with 50% industry cost-sharing. To reach the stated deliverability goals, it is assumed that after co-funded demonstrations are done in selected fields, industry will continue at its own expense to improve the efficiency of all target fields.
 - **Federal revenues:** No answer at this time
 - **State revenues:** No answer at this time
 - **Cost effectiveness:** Not applicable
 - **Environmental costs/benefits:** Not applicable
 - **Administrative complexity/improvements:** Not applicable
 - **Technological advancement:** Development of the appropriate technology to improve deliverability from problem fields.

Status of Analysis

A cost-benefit analysis will be done on the total gas storage program.

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.1

Reform Federal Rate Regulations

Option 4.1a

Ensure Robust Secondary Markets for Pipeline Capacity

This option seeks to facilitate a well-functioning secondary market for natural gas pipeline capacity, by removing rate ceilings on secondary transactions of pipeline capacity and allowing great latitude in these buy-sell transactions.

In 1992, the Federal Energy Regulatory Commission (FERC) issued Order No. 636 which, among other things, established a constrained secondary market for gas pipeline capacity. Concomitantly, FERC is overseeing the establishment of pipeline electric bulletin boards (EBBs) on which offers of and bids for capacity can be posted. While the existence of EBBs will facilitate trading, current regulations also lessen participants' incentives to fashion a well-functioning secondary market. Pipeline capacity will remain underutilized as long as: (1) holders of capacity, primarily local distribution companies (LDCs), are unable to realize the full benefits of releasing unneeded capacity, (2) both buyers and sellers face unnecessary restrictions on how and when trades occur, and (3) trades are subject to price ceilings that effectively limit the income LDCs and others can realize by selling capacity to those who need it more. In the case of LDCs, this additional income can be used to reduce rates for residential, commercial, and industrial ratepayers alike.

The Natural Gas Act (NGA) of 1938 mandates FERC's oversight to ensure that the terms and conditions for the initial sale of interstate transmission of natural gas are just and reasonable, but the NGA is silent on the terms and conditions for the resale of this capacity. No foundation has been provided that would suggest these latter transactions are subject to monopoly abuse.

A well-functioning secondary market would allow the buyer and seller of capacity to negotiate freely the price and terms of the exchange. Transactions would take place with substantially greater ease and speed, and would probably lead eventually to capacity being exchanged on an hourly basis.

Implementation

The Department of Energy would work with FERC on a rulemaking that would remove ceilings on secondary transactions of pipeline capacity and provide great latitude in the arrangement of these buy-sell transactions. All completed transactions, however, must be posted. It should be noted that this change can not go forward without the development of a mechanism (Electronic Bulletin Board and Electronic Data Interchange) that will make timely secondary market information available to all who use the pipeline system.

Measures of Success/Public and Private Costs

- **Change in gas production:**
 - 360 Bcf increase by the year 2000.
 - 480 Bcf increase by the year 2010.
- **Change in gas demand:** Same as production.
- **Economic costs/benefits:**
 - **Direct and indirect jobs:** 3,500 direct jobs and 7,000 indirect jobs by the year 2000. Approximately 4,700 direct jobs and 9,400 indirect jobs by the year 2010.
 - **Costs or cost savings to industry:** There will be some industry-related costs associated with developing the EBB/EDI software and related technology. Also, there will be minor transition costs borne by pipelines and FERC as the reforms are addressed at FERC. However, longer term costs are negligible.
 - **GDP:** Approximately \$460 million increase by the year 2000. Approximately \$880 million increase by the year 2010.
 - **Balance of payments:** Approximately \$460 million deficit reduction by the year 2000. Approximately \$880 million reduction by the year 2010.
 - **Impacts on other industries/manufacturing:** Positive.
- **Federal outlays (FY1994 - FY2000):**
 - 1994 - \$50,000
 - 1995 to 2000 - \$0
- **Federal revenues:** Increase
- **State revenues:** Increase of approximately \$23 million by the year 2000. Increase of approximately \$44 million by the year 2010.
- **Cost effectiveness:** \$.0001/Mcf
- **Environmental costs/benefits:** Reductions
 - Year 2000 - 3.6 million tons carbon dioxide, .98 million tons carbon
 - Year 2010 - 4.8 million tons carbon dioxide, 1.31 million tons carbon
- **Administrative complexity/improvements:** Moderate complexity - FERC must be convinced of importance of this reform. Rate regulation administration should be improved, since less will be subject to regulatory review.

- **Technological advancement:** The development and installation of the EBB will have a significant impact on the effectiveness of this reform.

Political Sensitivities/Affected Stakeholders

Natural gas producers, marketers, non-utility generators, pipelines, distributors, and industrial consumers welcome the proposed regulatory reforms. NARUC just passed a resolution recommending that FERC revisit the existing rules on pipeline capacity release. However, pipelines and producers do not agree on the format and data requirements of EBB/EDIs, which may slow the progress of a secondary market proposal.

Status of Analysis

Basic analysis of issue is complete. Gas producers, LDCs, State utility commissions and consumer groups have been contacted to assess the interest in these issues. FERC must be contacted next to determine the best way to affect these changes.

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.1

Reform Federal Rate Regulations

Option 4.1b

Encourage Open Access to the Electric Transmission Grid

This option will endeavor to give the non-utility generators (NUGs) the ability to contract with the customer directly. This customer could be an electric utility with high generating costs, a municipal utility or, in certain instances, an end user. At present, NUGs can only sell to the electric utility that serves the area. This reform will allow NUGs to access markets they can reliably serve, and compete on a price basis in the wholesale generating market.

With significant increases in the efficiency of long-distance transmission, physical and financial economies-of-scale in generation no longer favor larger facilities. In addition, State and Federal regulations now often permit third parties to bid on providing new generation capacity. These changes have resulted in a growth in inter-utility wheeling of power and the entrance of independent power producers and cogenerators or, as they are now called, non-utility generators, which rely upon small-scale generation fueled largely by natural gas. NUGs currently represent the biggest potential growth market for natural gas.

Implementation

The Energy Policy Act of 1992 mandates that the Federal Energy Regulatory Commission (FERC) promulgate new rules which would increase access to the electric transmission system and further competition in power generation. Given the large disparity in the costs of electric generation both within and among utilities and between new and existing facilities, the manner in which FERC responds to the Energy Policy Act can have a significant effect upon which fuels are used to generate electric power.

The Department of Energy (DOE) will work with FERC as it begins the process of establishing the rules which govern access to the electric transmission grid. As was true of the recently completed FERC Order No. 636, the "devil is in the details." DOE provided substantial input in that process, through written comments and involvement in meetings, and it would be appropriate to provide similar input in this proceeding in order to help ensure that the new rules allow these NUGs to compete with utility-owned generation as effectively as possible.

Measures of Success/Public and Private Costs

- **Change in gas production:**
 - 280 Bcf increase by the year 2000.
 - 550 Bcf increase by the year 2010.
- **Change in gas demand:** Same as production.
- **Economic costs/benefits**
 - **Direct and indirect jobs:** Increase of approximately 2,700 in direct jobs and 5,400 indirect jobs by the year 2000. Increase of approximately 5,400 direct jobs and 10,720 indirect jobs by the year 2010.
 - **Costs or savings to industry:** There will be minor transition costs borne by electric utilities, as the reforms are addressed in FERC hearings. However, longer term costs are negligible.
 - **GDP:** Increase of approximately \$360 million per year by the year 2000. Increase of approximately \$1.0 billion per year by the year 2010.
 - **Balance of payments:** Decrease deficit by approximately \$360 million per year by the year 2000, and by 1.0 billion per year by the year 2010.
 - **Impacts on other industries/manufacturing:** Positive
- **Federal outlays (FY1994 to FY2000):**
 - 1994 - \$200,000
 - 1995 to 2000 - \$0
- **Federal revenues:** Increase
- **State revenues:** Increase of approximately \$18 million by the year 2000, and approximately \$50 million in the year 2010.
- **Cost effectiveness:** \$.0002/Mcf
- **Environmental costs/benefits:** Reductions
 - Year 2000 - 2.8 million tons carbon dioxide, 0.76 million tons carbon
 - Year 2010 - 5.5 million tons carbon dioxide, 1.50 million tons carbon
- **Administrative complexity/improvements:** FERC is required by EPACT to do this, therefore this effort does not add to the administrative complexity.
- **Technological advancement:** No significance

Political Sensitivities/Affected Stakeholders

Non-utility generators, producers, pipelines, distributors (who are not bypassed), industrials, and large commercial customers will be avid supporters of this effort. Electric utilities will oppose opening the transmission grid to NUGs. Coal producers (and their representatives in Congress) can be expected to carefully monitor the impact of increased natural gas utilization on the coal industry. Residential and small commercial consumer groups may be skeptical at first, as they were with Order No. 436 when it was issued.

Status of Analysis

Basic analysis of issue is complete. Gas pipelines, local distribution companies, State utility commissions, and consumer groups have been contacted to assess the interest in these issues. FERC must be contacted next to determine the best way to effect these changes.

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.1

Reform Federal Rate Regulations

Option 4.1c

Expedite Construction of New Natural Gas Facilities

This option seeks to affect a rulemaking by the Federal Energy Regulatory Commission (FERC) that would expedite construction of new natural gas pipelines. Substantial impediments to the construction of new natural gas pipelines continue to exist, including regulatory uncertainty, cost recovery mechanisms, and delays caused by duplicative environmental regulations. Streamlining construction regulations and the permitting process would enhance the ability of natural gas to compete with other fuels. Although a near national consensus on expediting pipeline construction appears to exist, no generic action has been taken to expedite the FERC permitting process. Unless some changes are made, some proposed pipelines may not be built to areas with limited access to natural gas, the cost of building may be higher, or there may be delays in construction.

Implementation

In July 1990, FERC issued a notice of proposed rulemaking to streamline its pipeline certification process. However, some provisions of the proposed rulemaking (issued as Order No. 555, on September 20, 1991) were denounced by industry, while other provisions were opposed by Federal environmental agencies. Many groups contended the "at-risk" provisions (equitable return for the risk of new projects) and proposed environmental requirements would slow or kill new construction projects instead of accelerating them. As the Order was debated, the Commission continued to implement certain concepts on a case-by-case basis, but in March 1992, the rule was withdrawn. Pipeline certificate streamlining was also part of the Energy Policy Act (EPACT) debate, but was included in the gas title dropped in the closing days of the 102nd Congress.

The Department of Energy (DOE) will issue a proposed FERC generic rulemaking to expedite natural gas pipeline certification or, more preferably, work with FERC to draft such a rule. Within the rule would be a negotiated rate mechanism whereby parties can get automatic FERC approval for new pipeline construction provided they have satisfied National Environmental Protection Act (NEPA) environmental regulations. The DOE, working along with the Environmental Protection Agency (EPA) and other affected Federal agencies, would provide written comments and input in meetings to ensure that national goals are reflected in the final Order.

Measures of Success/Public and Private Costs

- **Change in gas production:**
 - 120 Bcf increase by the year 2000.
 - 130 Bcf increase by the year 2010.
- **Change in gas demand:** Same as production
- **Economic costs/benefits:**
 - **Direct and Indirect jobs:** Increase of approximately 1,150 direct jobs and 2,300 indirect jobs by the year 2000. Increase of approximately 1,250 direct jobs and 2,500 indirect jobs by the year 2010.
 - **Costs or cost savings to industry:** If reducing regulatory barriers could expedite construction by one year, it would reduce the cost of a project between 2% and 10%.
 - **GDP:** Increase of approximately \$150 million by the year 2000, and \$240 million by the year 2010.
 - **Balance of payments:** Decrease deficit by \$150 million by the year 2000, and \$240 million by the year 2010.
 - **Impacts on other Industries/manufacturing:** Positive
- **Federal outlays (FY1994 to FY2000):**
 - 1994 - \$75,000
 - 1995 to 2000 - \$0
- **Federal revenues:** Increase
- **State revenues:** Increase of approximately \$7,500,000 in the year 2000, and \$12,000,000 by the year 2010.
- **Cost effectiveness:** \$.0002/Mcf
- **Environmental costs/benefits:** Reductions
 - Year 2000 - 1.2 million tons carbon dioxide, .33 million tons carbon
 - Year 2010 - 1.3 million tons carbon dioxide, .35 million tons carbon
 - If the EPA is involved in this reform from the beginning, there is little reason to believe that the end goals of today's environmental pipeline construction regulations will be compromised.
- **Administrative complexity/improvements:** This effort will reduce the complexity and improve the administration of pipeline construction regulation.
- **Technological advancement:** No significance

Political Sensitivities/Affected Stakeholders

Natural gas consumers, producers, local distribution companies (LDCs), non-utility generators and marketers will welcome the reforms. Expanding pipeline companies will also welcome the reforms, while pipelines facing expansion into their market area will oppose them.

Status of Analysis

Basic analysis of issue is complete. Gas pipelines, LDCs, State utility commissions, and consumer groups have been contacted to assess interest in these issues. FERC must be contacted next to determine the best way to proceed.

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.1 Reform Federal Rate Regulations

Option 4.1d

Develop Incentive-Based Rate Structures for Interstate Natural Gas Pipelines in Noncompetitive Markets

This option seeks to develop a new rulemaking designed to move the natural gas pipeline industry toward a more competitive environment. Traditional cost-of-service, rate-of-return regulation provides few financial incentives for increased sales by interstate pipelines. Further, the Federal Energy Regulatory Commission's (FERC's) use of Straight Fixed Variable rate design under Order No. 636 may act to lessen even further the incentive to control costs and keep the pipelines full. The interstate pipeline's profit is insulated from most changes in throughput. A cost-sharing, incentive-based system that allows pipelines to retain some of the rewards of operating in an efficient manner will reduce costs to customers and increase throughput for the pipeline. Local distribution companies and municipals, their ratepayers, industrials, and non-utility generators will realize benefits from this effort in the form of lower unit costs.

Implementation

The Department of Energy (DOE) will work with FERC, the National Association of Regulatory Utility Commissioners (NARUC), and a group of State utility commissions on promulgating new rulemakings which divorce the pipelines' rates from their costs. The rulemaking would go far beyond FERC's policy statement on incentive ratemaking (which has yielded no filings to date) in moving the pipeline industry toward a competitive environment. Among the incentive rate mechanisms which would be considered are indexes, price caps, bounded rates, and incentive rates of return. Regulation would cap prices, not profits. This idea of "decoupling" costs from rates is addressed in the Energy Policy Act of 1992 in looking at Integrated Resource Planning, and States are beginning to consider this issue more seriously. To the extent that a particular market can be shown to be workably competitive, DOE will advocate market-based pricing.

Measures of Success/Public and Private Costs

- **Change in gas production:**
 - 220 Bcf increase by the year 2000.
 - 340 Bcf increase by the year 2010.
- **Change in gas demand:** Same as production
- **Economic costs/benefits:**
 - **Direct and indirect jobs:** Approximately 2,100 direct jobs and 4,200 indirect jobs by the year 2000. Approximately 3,300 direct jobs and 6,600 indirect jobs by the year 2010.
 - **Costs or cost savings to industry:** There will be minor transition costs borne by pipelines and FERC as each pipeline goes through the rate proceedings. However, longer term costs are negligible.
 - **GDP:** Increase of approximately \$280 million by the year 2000 and approximately \$625 million by the year 2010.
 - **Balance of payments:** Decrease deficit by approximately \$280 million by the year 2000 and \$625 million by the year 2010.
 - **Impacts on other industries/manufacturing:** Positive
- **Federal outlays (FY1994 to FY2000):**
 - 1994 - \$250,000
 - 1995 to 2000 - \$0
- **Federal revenues:** Increase
- **State revenues:** Increase of approximately \$14 million by the year 2000 and approximately \$31 million by the year 2010.
- **Cost effectiveness:** \$.0003/Mcf
- **Environmental costs/benefits:** Reductions
 - Year 2000 - 2.2 million tons carbon dioxide, .60 million tons carbon
 - Year 2010 - 3.4 million tons carbon dioxide, .93 million tons carbon
- **Administrative complexity/improvements:** Moderate complexity, as each pipeline must come in for a rate case. However, this effort will increase the time between rate cases and the attendant regulatory burden, thereby improving the administration of rate regulation.
- **Technological advancement:** No significance

Political Sensitivities/Affected Stakeholders

Pipelines, producers and industrials should be strong supporters of this effort. State regulatory agencies, local distribution companies (LDCs), and residential consumers will be skeptical of the impact incentive ratemaking will have on natural gas prices. As a result, it will be important to make sure State commissions have a strong presence in the reform process, as was suggested above.

Status of Analysis

Basic analysis of issue is complete. Gas pipelines, LDCs, State utility commissions, and consumer groups have been contacted to assess the interest in these issues. FERC must be contacted next to determine the best way to affect these changes.

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.1

Reform Federal Rate Regulations

Option 4.1e

Take a Leadership Role in Clean Cities Program

The Department of Energy (DOE) will take a leadership role to stimulate local activity and provide an organizational structure to facilitate interaction among those parties that are assembling alternative fuel vehicle (AFV) fleets. Clean Cities is a Federal commitment to work with cities and other local jurisdictions in partnership, as well as State governments and private industry, to serve as a conduit for Energy Policy Act (EPACT) activities, which will accelerate the deployment and operation of large numbers of AFVs.

Over the last few years, there have been notable efforts in this country to promote AFVs, including natural gas vehicles, as a means of reducing our dependence on petroleum in the transportation sector, as well as improving air quality, particularly in urban areas. To facilitate this commercialization effort, it is desirable to concentrate large numbers of AFVs in selected areas in order to provide an AFV population large enough to support alternative fuel refueling facilities and other infrastructure elements.

EPACT requirements necessitate the establishment of a broad-based market for AFVs and an associated infrastructure, by mandating the acquisition of large numbers of AFVs by fleets over a certain time. EPACT, however, does not provide an implementation framework. By acting as a coordinating "umbrella" to accelerate the realization of EPACT's requirements, the Clean Cities program will contribute to the goals of the Clean Air Act Amendments (CAAA) and other environmental efforts. The Clean Cities program also recognizes the significant role that will be played by the recently established Federal Fleet Conversion Task Force. The Task Force is scheduled to issue a report by the end of August 1993 that will make recommendations on how best to convert a portion of the Federal fleet to AFVs. The Clean Cities program will be reviewed and revised at that time to reflect those recommendations.

Implementation

At the core of the program is a city's commitment to acquire and operate AFVs. This core commitment is supported by the corresponding State's support in acquiring additional AFVs, the Federal government's commitment to acquire and place in service large numbers of Federal AFVs in the Clean City, and industry's voluntary commitment to alternative fuels and AFVs, as both a user and supplier. Each of the participants would be required to make certain commitments at the outset of their participation. Cities would be expected to take a leadership role to maintain momentum.

Commitments by selected Clean Cities may include:

- Execution of a Memorandum of Understanding with DOE and other appropriate Federal, State, and/or local government and private industry entities.
- Commitment to acquire and operate AFVs.
- Appointment of a city coordinator reporting to the mayor or other high-level local management.
- Commitment of monetary and/or other sources.

In return, the DOE will:

- Appoint a Federal coordinator specifically for the selected city.
- Encourage the placement of as many Federal AFVs as possible in or near the selected city under the provisions of AMFA, CAAA, and EPACT.
- Provide a hotline/clearinghouse for technical and other information.
- Provide sources for training for coordinators, open fleet operators, and other participants.
- Provide information and general assistance on public relations and promotional activities.
- Conduct information exchange workshops for participating cities and potential participants.

Measures of Success

- **Change in gas production:** Minimal increase. This program will contribute only marginally to increased natural gas use, but will be a visible example of how natural gas can be used to reduce pollution.
- **Change in gas demand:** Minimal increase
- **Economic costs/benefits**
 - **Direct and indirect jobs:** May result in a decrease in direct and indirect jobs, as coordination of various parties reduces manpower needs.
 - **Cost savings to industry:** Reduced costs, as it is much cheaper to coordinate fueling facilities and other infrastructure than have each fleet build separate facilities.
 - **GDP:** Little or no impact
 - **Balance of payments:** Little or no impact
 - **Impacts on other industries/manufacturing:** Marginally positive, as other entities may find it cheaper to convert to AFVs when they can use common facilities.
- **Federal outlays (FY1994 to FY2000):** Not yet quantified
- **Federal revenues:** No significant change
- **State revenues:** No significant change
- **Cost effectiveness:** This program has no budget.
- **Environmental costs/benefits:** Marginal benefits. The vast majority of the pollution reductions would occur by virtue of the Clean Air Act Amendments, Executive Order 12844 and other environmental efforts. This program only makes it cheaper to achieve those requirements.
- **Administrative complexity/improvements:** Administratively, this will not be difficult, since it is in the best interest of most cities to be involved in the coordination effort. The administration will not necessarily be improved, only made cheaper.
- **Technological advancement:** No significance

Affected Stakeholders

Cities, private fleets, and the Federal government will all benefit from this effort. No constituencies would be negatively affected by the implementation of this program.

Status of Analysis

Initial analysis is complete. Initial contacts have already been made to determine the interest in this program. The cities of Atlanta, Philadelphia, and Washington, D.C. have all shown an interest in this program.

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.2

Reform State Rate Regulations

Option 4.2a

Encourage Open Access for Gas Transporter through Distributor, to Resolve the Contract Portfolio Issue

This option seeks to encourage reform of State regulatory practices in order to provide nondiscriminatory access to natural gas distribution facilities. State regulation generally denies nondiscriminatory access from the distributor's city-gate to the customer's burner-tip. This lack of access is inextricably linked to an underutilized pipeline grid, interventions at the Federal Energy Regulatory Commission (FERC) that stymie efficiency, and retail pricing that shrouds the marginal costs of the commodity, storage, and pipeline capacity.

Nondiscriminatory access to the distribution grid would provide customers the opportunity to contract with independent brokers for gas supply and its delivery. Competition drives these brokers to charge market-based prices with terms that reflect the marginal cost of service. This results in increased efficiency by local distribution companies (LDCs) and the opportunity for customers to buy only those services that are needed, thereby reducing the attractiveness of bypassing the distribution system or switching to another fuel altogether. Providing access (1) eliminates regulatory oversight of the distributor's contracting for capacity, (2) prevents the regulator from distorting distributor responsiveness to market forces, (3) allows the market, through customer preference, to regulate the distributor's merchant function, and possibly also local storage and peaking services, (4) empowers future market conditions rather than the administrative process to determine which decisions are validated, and (5) provides a mechanism by which gas contracting (long-term, spot, etc.) is determined by real risk preference and transaction costs. By allowing the customer to decide on the type of contract and whether it is to be long-term, short-term, or something in-between, regulators no longer need to review the purchasing practices of the distributor. Since the regulators are no longer involved with prudence reviews, they do not question the customer's preference in purchasing gas via a long-term, fixed-price contract, or any other terms they prefer. The process of choosing a gas contract will be no more difficult than choosing a long distance carrier for telephone service today, or a fuel oil distributor for heating.

Nationwide, the competitive pressures on industrial customers have generally forced regulators to eliminate the interclass subsidies that have existed in the past. As a result, there is little reason to believe this effort will necessarily result in higher rates for customers in any class, unless they opt, by their own preference, for a higher quality of service.

Implementation

The Department of Energy (DOE) would work in cooperation with the National Association of Regulatory Utility Commissioners (NARUC) and several State regulatory commissions to establish additional pilot regulatory programs in which nondiscriminatory access to the distribution system will be available to all customers through third-party merchants. One such pilot program currently exists in the Southern California Gas Service territory. Through analysis and pilot programs with interested State commissions and utilities, DOE will provide States the tools to lessen State regulation over those services over which the distributor has no market power. During the pilot program, DOE will be able to monitor the changes that take place as a result of the reform. The results can then be used as a case study to show other States the value of the reform.

Measures of Success/Public and Private Costs

- **Change in gas production:**
 - 60 Bcf increase by the year 2000.
 - 90 Bcf increase by the year 2010.
- **Change in gas demand:** Same as production
- **Economic costs/benefits:**
 - **Direct and indirect jobs:** Increase of approximately 600 direct jobs and 1,200 indirect jobs by the year 2000. Approximately 900 direct jobs and 1,800 indirect jobs by the year 2010.
 - **Costs or cost savings to industry:** Reduced costs for local distribution companies, since gas contracting will be done by gas merchants. Gas merchants would develop larger marketing programs.
 - **GDP:** An increase of approximately \$75 million by the year 2000 and approximately \$165 million by the year 2010.
 - **Balance of payments:** Deficit reduced by \$75 million per year by the year 2000 and \$165 million by the year 2010.
 - **Impacts on other industries/manufacturers:** Reduced costs, as they buy in the competitive market only those services they need.

- **Federal outlays** (FY1994 to FY2000):
 - 1994 - \$150,000
 - 1995 - \$275,000
 - 1996 - \$275,000
 - 1997 - \$275,000
 - 1998 - \$275,000
 - 1999 - \$275,000
 - 2000 - \$275,000
- **Federal revenues:** Increase
- **State revenues:** An increase of approximately \$4 million by the year 2000 and approximately \$8 million by the year 2010.
- **Cost effectiveness:** \$.0086/Mcf
- **Environmental costs/benefits:** Reductions
 - Year 2000 - .60 million tons carbon dioxide, .16 million tons carbon
 - Year 2010 - .85 million tons carbon dioxide, .23 million tons carbon
- **Administrative complexity/improvements:** Moderate complexity. Each local distribution company must come in for a rate case. However, since the end-user is the buyer, there is little reason for purchasing practice reviews. As a result, rate regulation administration is lessened, and therefore improved.
- **Technological advancement:** No significance

Political Sensitivities/Affected Stakeholders

Producers, pipelines, non-utility generators, and large commercial/industrial customers should support distribution open access. LDCs will generally oppose this, although those that have potential bypass problems should be supportive. Those representing residential and small commercial customers will initially be skeptical, as they were when FERC's Order No. 436 (allowing open access for pipelines) came out.

Status of Analysis

Basic analysis of issue is complete. Gas pipelines, producers, LDCs, and consumer groups have been contacted to assess the interest in these issues. Numerous States have also been contacted to (1) identify those States that would be most likely to embrace the reforms, and (2) assess the potential of this effort.

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.2

State Regulatory Rate Reform

Option 4.2b

Promote the Use of Efficient Gas Pricing

Under this option, the Department of Energy (DOE) would encourage State utility regulators to adopt efficient price signals for local distribution companies (LDCs) that would reflect seasonal variations in the cost of serving customers. With proper time-of-use pricing, both gas cooling and gas-fired electric generation become more cost-effective.

The retail prices charged by LDCs typically do not correspond to the marginal costs of serving customers. As a result, customers do not see the appropriate market signals and so make inefficient fuel choice decisions. For instance, gas customers fail to make cost-effective investments to conserve energy during winter peaks, because the price the customer sees is the summer and/or winter average cost of service. Likewise, gas customers are discouraged from using gas for space cooling, because summer retail prices fail to reflect the lower marginal cost of off-peak service. The use of gas for space cooling could displace electricity generated by coal, thereby filling the pipelines year-round, reducing summer peaking problems, and reducing summer pollution.

Implementation

This option will be carried out by working in cooperation with State regulators who are interested in making the suggested changes, but who do not necessarily have the required manpower or expertise. DOE will sponsor workshops, submit testimony, produce white papers, and make presentations at conferences supporting these reforms. Through analysis and pilot programs with interested State commissions and utilities, DOE would give States the tools to reshape gas pricing. During the pilot program, DOE will be able to monitor the changes that take place as a result of the reform. The results can then be used as a case study to help other States see the virtues of the reforms.

Nationwide, the competitive pressures on industrial customers have generally forced regulators to eliminate the interclass subsidies that have existed in the past. As a result, there is little reason to believe this effort will necessarily result in higher overall rates for any class of customers.

Measures of Success/Public and Private Costs

- **Change in gas production:**
 - 130 Bcf increase by year 2000.
 - 195 Bcf increase by year 2010.
- **Change in gas demand:** Same as production
- **Economic costs/benefits:**
 - **Direct and Indirect Jobs:** An increase of approximately 1,250 direct jobs and 2,500 indirect jobs by the year 2000. An increase of approximately 1,900 direct jobs and 3,800 indirect jobs by the year 2010.
 - **Costs or cost savings to Industry:** This effort will save LDCs substantial amounts on their capital budget to meet peak demand by reducing peak consumption through the price signal. A reduced construction budget will mean lower overall rates for residential, commercial, and industrial customers. LDCs and regulators will incur minor, but only temporary, transitional costs as the reforms are put into place.
 - **GDP:** An increase of approximately \$165 million in by the year 2000 and an increase of \$360 million by the year 2010.
 - **Balance of payments:** Reduces the deficit by approximately \$165 million by the year 2000 and \$360 million by the year 2010.
 - **Impacts on other Industries/manufacturing:** Those customers that use substantial amounts of gas on the two or three winter peak months will see an increase in the cost of gas, while those that use substantial amounts of gas the other nine or ten months will see a decrease.
- **Federal outlays (FY1994 to FY2000):**
 - 1994 - \$150,000
 - 1995 - \$275,000
 - 1996 - \$275,000
 - 1997 - \$275,000
 - 1998 - \$275,000
 - 1999 - \$275,000
 - 2000 - \$275,000
- **Federal revenues:** Increase
- **State revenues:** An increase of approximately \$8 million by the year 2000 and \$18 million by the year 2010.
- **Cost effectiveness:** \$.0040/Mcf

- **Environmental costs/benefits:**
 - Year 2000 - 1.3 million tons carbon dioxide, .35 million tons carbon
 - Year 2010 - 1.95 million tons carbon dioxide, .53 million tons carbon
- **Administrative complexity/improvements:** Moderate complexity. Each LDC must come in for a rate case. In addition, as is addressed below, consumer's advocates may slow down these proceedings, unless they are "brought on board" with some compromise to protect low-income customers.
- **Technical advancement:** No significance

Affected Stakeholders

Producers, pipelines, and larger commercial/industrial customers would strongly favor this option. LDCs would also support it, since it improves the cost-effectiveness of gas cooling. However, consumer's advocates will oppose higher winter rates, unless the reforms are implemented along with some type of program to help lower-income winter heating customers make the transition to higher efficiency heating equipment. One tack is to make sure there is adequate funding of the Low Income Home Energy Assistance Program (LIHEAP).

Status of Analysis

The basic analysis of issue is complete. Producers, gas pipelines, LDCs, and consumers advocates have been contacted to assess their interest in these issues. Numerous State contacts have been made to (1) identify those States that would be most likely to embrace the reforms; and (2) assess the potential of this effort.

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.2

State Regulatory Rate Reform

Option 4.2c

Encourage the End of Fuel-Specific Subsidies

Under this option, State utility regulators would be encouraged to consider all energy options, including natural gas, in integrated resource planning. Two aspects of the current integrated resource planning process limit the cost-effective and resource-efficient use of natural gas: fuel-specific subsidies and the failure to consider fuel-switching options. For example, many State integrated resource planning programs create incentives to use energy-efficient electric cooling technologies, but none to use energy-efficient gas cooling options. This approach fails to consider: (1) that gas cooling may be more fuel-efficient than high-efficiency electric cooling (and therefore the program subsidizes the second-best option), and (2) that gas cooling will make even greater contributions to electric peak reduction than the high-efficiency electric option. As a result, the subsidy for high-efficiency electric cooling, in the name of energy efficiency, ends up promoting a less efficient option and further distorting the cooling market. A recognition by State regulators of the importance of truly integrated resource planning, considering all energy options, will lead to the most efficient use of all energy resources.

Implementation

The Department of Energy (DOE) will work cooperatively with State utility regulators, giving States the tools to evaluate integrated resource planning programs that consider electric, gas, and conservation measures simultaneously when determining the most efficient way to meet the needs of customers. This effort will be carried out by working with State regulators who are interested in making the suggested changes, but who do not necessarily have the required manpower or expertise. DOE will sponsor workshops, submit testimony, produce white papers, and make presentations at conferences supporting these reforms. During the pilot programs, DOE will be able to monitor the changes that take place as a result of the reforms. The results can then be used as a case study to help persuade other States of the importance of the reforms.

Measures of Success/Public and Private Costs

- **Change in gas production:**
 - 10 Bcf increase by year 2000.
 - 10 Bcf increase by year 2010.
- **Change in gas demand:** Same as production
- **Economic costs/benefits:**
 - **Direct and Indirect jobs:** An increase of approximately 100 direct jobs and 200 indirect jobs by the year 2000, maintaining that level beyond.
 - **Costs or cost savings to industry:** Local distribution companies (LDCs), electric utilities, and regulators will incur minor transitional costs as the subsidized programs are discontinued, but these are only temporary. Longer term, there may be a need to readjust utility rates downward, as the costs of programs are no part of the cost of service.
 - **GDP:** An increase of approximately \$13 million by the year 2000 and \$18 million by the year 2010.
 - **Balance of payments:** Reduces deficit by approximately \$13 million by the year 2000 and \$18 million by the year 2010.
 - **Impacts on other industries/manufacturing:** Most industrials would welcome the reform since they believe they subsidize residential and small commercial incentive programs.
- **Federal outlays (FY1994 to FY2000):**
 - 1994 - \$175,000
 - 1995 - \$275,000
 - 1996 - \$275,000
 - 1997 - \$275,000
 - 1998 - \$275,000
 - 1999 - \$275,000
 - 2000 - \$275,000
- **Federal revenues:** Increase
- **State revenues:** An increase of approximately \$650,000 by the year 2000 and \$1 million by the year 2010.
- **Cost effectiveness:** \$.0521/Mcf
- **Environmental costs/benefits:**
 - Year 2000 - .06 million tons carbon dioxide, .02 million tons carbon
 - Year 2010 - .10 million tons carbon dioxide, .03 million tons carbon
- **Administrative complexity/improvements:** Moderate complexity. Adding fuel switching to the integrated resource planning process will increase the complexity, but also improve process and the end result of cost-effective energy efficiency.
- **Technological advancement:** No significance

Political Sensitivity/Affected Stakeholders

Producers, pipelines, local distribution companies, non-utility generators, and larger commercial/industrial customers will strongly favor this option. Many LDCs contend that fuel-specific subsidies are the single biggest problem facing them. Consumers advocates will oppose the end of some subsidies, since their "clients" are the beneficiaries of many of these programs. Electric utilities will also oppose this reform, since these programs often act as "load builders" for them. Environmentalists will be in a quandary over this issue. On one hand they will oppose the elimination of incentives for some efficient energy-consuming products. On the other hand they will be hard pressed to argue against a reform that increases overall energy efficiency and reduces pollution.

Status of Analysis

The basic analysis of issue is complete. Producers, gas pipelines, local distribution companies, and consumer advocates have been contacted to assess their interest in these issues. Numerous State contacts have been made to (1) identify those States most likely to embrace the reforms, and (2) assess the potential of the proposed effort.

State Contacts

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.2

State Regulatory Rate Reform

Option 4.2d

Promote Efficient Pricing of Electricity

Under this option, the Department of Energy (DOE) will work cooperatively with State utility regulators to adopt efficient price signals for electric utilities that would reflect marginal cost-based pricing, including time-of-use rates, to bring about more balanced use of the electric system. The retail prices charged by electric utilities typically do not reflect marginal costs to ultimate customers by class of customer or by time of use. For instance, a customer may purchase electricity during a summer peak period for air conditioning at 9 cents/kwh, whereas the actual marginal cost to the utility is closer to 15 cents/kwh. The customer has the incentive to lower the thermostat and use more peak electricity than if actual costs were reflected in prices. If electricity were priced correctly, the cost of cooling with a gas heat pump at the equivalent of 11 cents/kwh would compare favorably to electric cooling. The customer would use gas to cool, reducing electric system peak and air pollution in the process. By pricing electricity (and gas) correctly, consumers would tend to consume less electricity in the summer and more electricity in the winter. As a consequence, marginal cost pricing would tend to increase electricity rates when and where usage of the pipeline is low, and to lower rates when and where pipeline usage is high.

Implementation

This effort will be carried out by working with State regulators who are interested in making the suggested changes, but who do not necessarily have the required manpower or expertise. DOE will sponsor workshops, submit testimony, produce white papers, and make presentations at conferences supporting these reforms. Through analysis and pilot programs with interested State commissions and utilities, the Department will provide the States the tools to reshape electricity pricing. In return for its contribution, it will be understood that during the pilot programs, DOE will be able to monitor the changes that take place as a result of the reforms. The results can then be used as a case study to help persuade other States of the importance of the reforms.

Nationwide, the competitive pressures on industrial customers have generally forced regulators to eliminate the interclass subsidies that have existed in the past. As a result, there is little reason to believe this effort will necessarily result in higher rates for any class of customers.

Measures of Success/Public and Private Costs:

- **Change in gas production:**
 - 40 Bcf Increase by year 2000.
 - 56 Bcf Increase by year 2010.
- **Change in gas demand:** Same as production.
- **Economic costs/benefits:**
 - **Direct and Indirect jobs:** An increase of approximately 400 direct jobs and 800 indirect jobs by the year 2000. An increase of approximately 550 direct jobs and 1,100 indirect jobs by the year 2010..
 - **Costs or cost savings to industry:** Reduces costs, as the price signal serves to move load off the peak and into the valley. This reduces the need for higher rates to cover the cost of generation additions. Electric utilities and regulators will incur minor, but only temporary, transitional costs as the reforms are put into place.
 - **GDP:** An increase of approximately \$50 million by the year 2000 and \$100 million by the year 2010.
 - **Balance of payments:** Reduces deficit by approximately \$50 million by the year 2000 and \$100 million by the year 2010.
 - **Impacts on other industries/manufacturing:** Industries will be largely unaffected, since most industrial/large commercial customers currently have time-of-use pricing. Residential and small commercial customers that use large amounts of electricity during the summer and on-peak will see increased bills. Likewise, those customers that consume large amounts of electricity over the non-summer months and off-peak during the summer will see reduced bills.
- **Federal outlays (FY1994 to FY2000)**
 - 1994 - \$150,000
 - 1995 - \$275,000
 - 1996 - \$275,000
 - 1997 - \$275,000
 - 1998 - \$275,000
 - 1999 - \$275,000
 - 2000 - \$275,000
- **Federal revenues:** An increase in corporate and personal income taxes.
- **State revenues:** An increase of approximately \$2.5 million by the year 2000 and \$5 million by the year 2010.
- **Cost effectiveness:** \$.0129/Mcf
- **Environmental costs/benefits:**
 - Year 2000 - .40 million tons carbon dioxide, .11 million tons carbon
 - Year 2010 - .56 million tons carbon dioxide, .15 million tons carbon

- **Administrative complexity/improvements:** Moderate complexity. Each electric utility must come in for a rate case. In addition, electric utilities may work to slow the process down and consumer advocates may do so as well unless they receive some compromise that protects low income consumers.
- **Technological advancement:** No significance

Affected Stakeholders

Producers, pipelines, local distribution companies (LDCs), and larger commercial/industrial customers would favor this option. Electric utilities also would probably support moving toward the proposed reforms, to the extent it is feasible (from a social policy perspective). However, consumer advocates will oppose higher summer rates, even with the benefit of lower winter rates, unless the reforms are implemented along with some type of program to help lower-income customers make the transition to higher efficiency window air conditioners, refrigerators, and water heaters. One tack is to make sure there is adequate funding of the Low Income Home Energy Assistance Program (LIHEAP).

Status of Analysis

The basic analysis of issue is complete. Producers, gas pipelines, LDCs, and consumer advocates have been contacted to assess their interest in these issues. Numerous State contacts have been made to (1) identify those States that would be most likely to embrace the reforms, and (2) assess the potential of this proposed effort.

Staff Contacts

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.2

State Regulatory Rate Reform

Option 4.2e

Foster the Use of Incentive Rate Design

Under this option, the Department of Energy (DOE) will work cooperatively with State utility regulators to adopt the tenets of incentive rate-making for local distribution companies (LDCs). Current State regulatory regimes provide few financial incentives for increased throughput or efficient operation by LDCs. Without these direct rewards, an LDC has little reason to act as an aggressive, cost-conscious company in a competitive environment. For example, if a distributor should successfully market new gas cooling technologies, devise new rate schedules that lead to greater total gas use, or institute policies that increase resource productivity, the distributor will realize little benefit. The regulatory commission will adjust its rates in the succeeding rate case so that the rate of return is unchanged by these activities. Worse yet, if the financial condition of the distributor is improved by these changes, the company would be perceived as less risky, and the rate of return may even be reduced. A cost-sharing, incentive-based system that allows LDCs to realize some of the rewards of operating in an efficient manner will increase profits, reduce rates for all customers, and increase total throughput.

Implementation

This option will be carried out by working cooperatively with State regulators who are interested in implementing the basic tenets of incentive ratemaking, but who may lack the required manpower or expertise. DOE will sponsor workshops, submit testimony, produce white papers, and make presentations at conferences supporting these reforms. Through analysis and pilot programs with interested State commissions and utilities, the Department will make available to States the tools needed to apply incentive ratemaking to their specific situation. During the pilot program, DOE will be able to monitor the changes that take place as a result of the reforms. These results can then be used as a case study to impress on other States of the virtues of the reforms.

Measures of Success/Public and Private Costs

- **Change in gas production:**
 - 115 Bcf increase by year 2000.
 - 168 Bcf increase by year 2010.
- **Change in gas demand:** Same as production
- **Economic costs/benefits:**
 - **Direct and Indirect jobs:** An increase in direct jobs of approximately 1,100 and indirect jobs of 2,250 by the year 2000. An increase of approximately 1,650 direct jobs and 3,300 indirect jobs by the year 2010.
 - **Costs or cost savings to industry:** Though this effort will not cut costs directly, industry will now have every reason to reduce costs, since the benefits will show up in the bottom line. LDCs and regulators will incur minor transitional costs as the reforms are put into place, but these are only temporary.
 - **GDP:** An increase of approximately \$145 million by the year 2000 and \$310 million by the year 2010.
 - **Balance of payments:** Reduces deficit by approximately \$145 million by the year 2000 and \$310 million by the year 2010.
 - **Impacts on other industries/manufacturing:** Rates to all classes of customer should be reduced, as cost-cutting benefits are shared with customers.
- **Federal outlays (FY1994 to FY2000):**
 - 1994 - \$175,000
 - 1995 - \$275,000
 - 1996 - \$275,000
 - 1997 - \$275,000
 - 1998 - \$275,000
 - 1999 - \$275,000
 - 2000 - \$275,000
- **Federal revenues:** Increase in corporate and personal income tax revenues.
- **State revenues:** Increase of approximately \$7 million by the year 2000 and \$15 million by the year 2010.
- **Cost effectiveness:** \$.0045/Mcf
- **Environmental costs/benefits:**
 - Year 2000 - 1.15 million tons carbon dioxide, .31 million tons carbon
 - Year 2010 - 1.68 million tons carbon dioxide, .46 million tons carbon
- **Administrative complexity/improvements:** Moderate complexity, since each pipeline must come in for a rate case. However, this effort will increase the time between rate cases and the attendant regulatory burden, thereby improving the administration of rate regulation.
- **Technological advancement:** No significance.

Affected Stakeholders

Producers, pipelines, LDCs, non-utility generators, and larger commercial/industrial customers should favor incentive rates. Consumer advocates will be skeptical because they are concerned that the rewards of cost-cutting will not be shared with consumers. Regulators may be skeptical as well, since they would lose some of their rate-making authority.

Status of Analysis

Basic analysis of issue is complete. Numerous State contacts have been made to (1) identify those States that would be most likely to embrace the reforms, and (2) assess the potential of this proposed effort.

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Issue Area 4.0

Encourage Natural Gas Regulatory Reform and a Contract Portfolio Approach

Option 4.2

State Regulatory Rate Reform

Option 4.2f

Encourage the Elimination of Regulations that Inhibit the Use of Natural Gas in Vehicles

Under this option, the Department of Energy (DOE) would encourage State utility regulators and legislative representatives to revise or eliminate laws that prohibit safe natural gas use for transportation purposes. The Clean Air Act Amendments, Executive Order 12844 and the Energy Policy Act of 1992 contain language that favors a move away from gasoline-powered vehicles and toward alternatively fueled vehicles. This legislation has led to an increasing interest in the use of compressed natural gas for transportation purposes. However, numerous State rules and regulations, unless revised in some manner, will severely limit the potential of this market. For example, many current State laws would classify a filling station as a public utility if it were to sell natural gas. Few filling stations would be willing to submit to the additional regulations of public utilities simply to offer natural gas. Other State regulations severely limit natural gas use for buses, prohibit driving natural-gas-fueled vehicles through tunnels, and prohibit parking natural-gas-fueled vehicles in underground parking garages. With the revision or elimination of these laws, compressed natural gas use will increase and vehicular pollution will be reduced.

Implementation

This option will be carried out by working cooperatively with State regulators and legislative representatives who are interested in making changes, but who do not have the required expertise. DOE will sponsor workshops, submit testimony before legislative and regulatory bodies, and make presentations at conferences supporting these reforms.

Measures of Success/Public and Private Costs

- **Change in gas production:** 10 Bcf increase by the year 2000, and continuing thereafter.
- **Change in gas demand:** Same as production.
- **Economic costs/benefits:**
 - **Direct and indirect jobs:** An increase of approximately 100 direct jobs and 200 indirect jobs by the year 2000, continuing thereafter.
 - **Costs or cost savings to industry:** This effort will primarily reduce the cost of compliance with existing regulations. Regulators may incur minor transitional costs as the reforms are put into place, but these are only temporary.
 - **GDP:** An increase of approximately \$13 million by the year 2000 and \$18 million by the year 2010.
 - **Balance of payments:** Reduces deficit by approximately \$13 million by the year 2000 and \$18 million by the year 2010.
 - **Impacts on other industries/manufacturing:** This effort will reduce the costs of commercial fleets complying with the CAAA.
- **Federal outlays (FY1994 to FY2000):**
 - 1994 - \$75,000
 - 1995 - \$75,000
 - 1996 - \$75,000
 - 1997 - \$75,000
 - 1998 - \$75,000
 - 1999 - \$75,000
 - 2000 - \$75,000
- **Federal revenues:** An increase in corporate and personal income taxes.
- **State revenues:** An increase of approximately \$600,000 by the year 2000 and \$1 million by the year 2010.
- **Cost effectiveness:** \$.0129/Mcf
- **Environmental costs/benefits:**
 - Year 2000 - .10 million tons carbon dioxide, .03 million tons carbon
 - Year 2010 - .10 million tons carbon dioxide, .03 million tons carbon
- **Administrative complexity/improvements:** Moderate to highly complex, since there may be some need for State legislative pressure for some laws that are safety- or transportation-related. This effort will clearly result in improvements in the ability to put natural gas vehicles on the road.

Affected Stakeholders

Producers, pipelines, environmentalists, and local distribution companies (LDCs) would strongly favor this option. LDCs will favor it as a high-profile way of demonstrating the fuel-switching capability of natural gas. Oil companies have strongly opposed past efforts to promote natural gas vehicles, since this would displace oil as a primary fuel. There is little reason to believe oil companies will act differently with this program.

Status of Analysis

The basic analysis is complete. Producers, gas pipelines, LDCs, and consumer advocates have been contacted to assess their interest in this issue. Numerous State contacts have been made to (1) identify those States that would be most likely to embrace the reforms, and (2) assess the potential of this proposed effort.

Staff Contacts

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Issue Area 5.0

Provide Information Services

Option 5.1

Develop an Energy and Resources Mapping and Information System (ERMIS)

This option would enable the Department of Energy (DOE) to spatially analyze energy issues at a broad level in order to quickly understand and communicate to responsible parties the potential impact on energy activities of pending legislation, regulations, or policy decisions promulgated by Congress, other Government agencies, and the private sector, that have spatial implications. It would also provide a readily available system to provide consistent, coherent data and information to facilitate decision-making processes.

The Office of Oil and Gas within the Energy Information Administration (EIA) has several combined database management and geographic information systems originally developed to support specific programs within DOE. These systems store, manage and retrieve data from EIA and other sources of data on energy resources, facilities, environmental issues, and employment demographics. They are able to display and analyze the proximity of these data to other georeferenced entities such as environmentally sensitive areas. The systems contain data and information that are pertinent to the categories currently defined for the Domestic Gas and Oil Initiative analysis. This option would use new technology to integrate the various existing systems into one consistent, user-friendly PC system.

Implementation

- Existing DOS-based systems will be integrated into one system operating in a WINDOWS environment.
- A full-time data base administrator will manage the maintenance and updates of the master data base and act as a point of contact for all users.
- The master data base and support software will be installed on individual PCs upon request.
- A users group will be formed to foster communication among all users.

Measures of Success

- **Change in oil and gas demand:** If properly used to develop and implement policy, ERMIS will foster an increase in natural gas demand.
- **Economic costs/benefits**
 - **Direct and Indirect Jobs:** Will result in a negligible increase in Federal contract personnel. Gas industry employment will grow if gas demand grows.
 - **GDP:** If domestic gas demand grows replacing imported oil, GDP will grow in concert.
 - **Balance of payments:** If gas demand grows, the adverse balance of payments imbalance will be reduced over what it otherwise would have been.
 - **Impact on other industries/manufacturing:** If gas demand grows, industries burn more gas, are less subject to oil price shocks, and have lower pollution-related liabilities. Use of the system in natural emergencies affecting gas production and transmission should mitigate and shorten industrial downtime. Use of the system in planning for peak gas flow periods should achieve the same results.
- **Federal outlays:**
 - FY1994: \$200,000 to merge existing systems into WINDOWS.
 - FY2000: \$150,000 per year to update and maintain.
- **Federal revenues:** It is intended to make ERMIS available to the public, via a licensed vendor. Royalty fees, typically on the order of 10%, will be paid back to the Treasury on a per installation basis. There is also a potential for increased royalty payments attached to potentially increased Federal gas production on the outer continental shelf (OCS).
- **State revenues:** If gas demand grows, State revenues will increase to the extent that the additional production is taxed by the States.
- **Cost effectiveness:** ERMIS will replace and consolidate, at a lower overall cost, several similar GIS efforts now separately conducted within DOE.
- **Environmental costs/benefits:** None directly from the project itself. However, by assisting in the striking of reasonable and balanced environmental protection policies, ERMIS use may well increase real protection of the environment while avoiding the imposition of excessively costly protection or mitigation measures.
- **Administrative complexity/improvements:** ERMIS will reduce the complexity associated with multiple, independently targeted and managed GIS programs, and provide a common set of authoritative facts with which everyone can work.
- **Technological advancement:** State-of-the-art PC-based GIS hardware and software will be used.

Affected Stakeholders

Virtually everyone, since the system goes very directly to the heart of most issues involving energy production and use, protection of the environment, and economic and job growth.

Political Sensitivity/Legislative Requirements

Not politically sensitive. No legislative requirements.

Status of Analysis

Tools and data bases currently exist, need to integrate systems and customize to meet user needs.

Staff Contacts

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Issue Area 5.0

Provide Information Services

Option 5.2

Enhance Energy Information Administration (EIA) Natural Gas Storage Data Collection

Under this option, the Energy Information Administration (EIA) of the Department of Energy would speed up the collection and publication of natural gas storage data from a monthly cycle to a weekly cycle, in order to enhance the efficiency of gas trading markets and of all energy users. EIA is already studying the efficacy of this option. Weekly government announcements of gas storage levels could have a significant effect on prices.

Implementation

EIA must present the costs and benefits to the Office of Management and Budget and get their approval before data collection can begin.

Measures of Success

- **Change in oil and gas production:** Increase resulting from greater demand for natural gas as a result of consumer confidence in reliability.
- **Change in oil and gas demand:** Increased efficiency and better market management will cause the natural gas market to be perceived as more reliable and will increase demand, especially by the electric generation sector.
- **Economic costs/benefits**
 - **Direct and Indirect Jobs:** Will result in an negligible increase in Federal contract personnel. If gas demand grows, gas industry employment will grow in concert.
 - **Costs to Industry:** Burden to the 92 respondents is estimated at 4000 hours/year.
 - **GDP:** If demand for domestic gas increases than demand for imported oil is lowered and GDP will increase.
 - **Balance of payments:** Use of domestic natural gas instead of imported oil will reduce imbalance.
- **Federal outlays:**
 - FY1994: \$150,000 to implement plus \$270,000 for operation and publication.
 - FY2000: \$270,000 for operation and publication per year.

- **Federal revenues:** None
- **State revenues:** None
- **Cost effectiveness:** Weekly gas storage level data could have a significant effect on prices.
- **Environmental benefits:** If the electric generation and industrial sectors consume more gas as it is perceived to be more reliable they will capitalize on the environmental advantages of natural gas.
- **Administrative complexity:** Approval from the Office of Management and Budget to collect weekly storage data is not expected as segments of the industry do not support weekly storage data collection by the Federal government.
- **Technological advancement:** Not applicable

Affected Stakeholders

All segments of the industry, from producers to consumers, will benefit from the increased information about the ability of the natural gas system to store natural gas. Government decision-makers and analysts will have readily available and consistent information on which to base analysis and decisions.

Political Sensitivity/Legislative Requirements

None.

Status of Analysis

Complete.

Staff Contacts

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Issue Area 5.0

Provide Information Services

Option 5.3

Develop Contact Lists Readily Accessible to the Oil and Gas Industry

Members of the oil and gas industry and the public often do not know whom to contact within the Federal government to have even their most basic questions answered. The lack of readily available answers can be costly to everyone. This option would establish a subject-matter list of whom to contact within the Federal government for answers to such questions as where to apply for research and development funds, what are the current regulations governing waste water management, who issues site permits, etc. Such questions often arise during the exploration, development, and production of oil and gas and commercialization of new technologies.

The contact list would be readily accessible and free to the user. While there are several ways such a list could be provided, it would probably make sense to have the contact list in a bulletin board file available on the INTERNET system. This would fit into the Reinventing Government initiative and would be an adjunct to the current initiative to provide real-time access to the Energy Information Administration's oil and gas information.

Implementation

- Establish which electronic system will be used.
- Obtain buy-in from other Federal agencies, such as Department of Interior, Federal Energy Regulatory Commission, Environmental Protection Agency, etc.
- Prepare list of contacts and develop file data base.
- Establish procedure for quarterly updates.
- Advertise system through Public Affairs and Energy Information Administration's marketing programs and marketing programs of other participating agencies.

Measures of Success

- **Change in oil and gas production:** Quick access to information will shorten time required to bring oil and gas exploration, development and production projects on-line.
- **Change in oil and gas demand:** Quick access to information will allow research, development and commercialization projects to commence with less start-up time and therefore should increase consumer confidence that natural gas is an abundant and reliable energy source.
- **Economic costs/benefits:**
 - **Direct and Indirect Jobs:** Increased demand and production will increase employment.
 - **Cost savings to Industry:** It will reduce costs (time) for industry to obtain information.
 - **GDP:** To the extent that increased domestic production of oil and gas and increased consumption of natural gas affects the use of imported oil, GDP will increase.
 - **Balance of payments:** Imbalance will be lessened to the extent that domestic oil and gas replaces imported.
 - **Impacts on other Industries/manufacturing:** Positive to the extent that new technologies come on-line sooner and are more efficient and less costly.
- **Federal outlays:**
 - FY1994: Low - Currently being assessed.
 - FY2000: Low - Currently being assessed.
- **Federal revenues:** It is intended that this contact list data base would be free to the user.
- **State revenues:** None
- **Cost effectiveness:** Increased efficiency and shorter lead times for all participants.
- **Environmental benefits:** Indirect - provides information on environmental programs, regulations and laws.
- **Administrative complexity/improvements:** No complexity. Improvements include increase access to information and prevents referrals to the wrong sources of information. Project can be implemented quickly.
- **Technological advancement:** Not applicable

Political Sensitivity/Affected Stakeholders

Stakeholders are the oil and gas industry, the public, DOE and other Federal agencies, and the Congress. There are no political sensitivities and no legislative requirements. This option can be quickly and cheaply implemented.

Status of Analysis

Preliminary analysis of proposal is underway. Tools currently exist, need to establish how data base will be provided.

Staff Contact

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