

ENERGY INFORMATION ADMINISTRATION

QUARTERLY PROJECTIONS

SHORT-TERM
ENERGY
OUTLOOK

QUARTER



1991

November 1991

See Inside Symposium Announcement

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The Energy Information Administration
is pleased to announce the

Symposium on Short-Term Energy Forecasting

November 21, 1991
Crystal Gateway Marriott
Arlington, VA

The focus of the symposium is to provide an opportunity for users of the *Short-Term Energy Outlook* and EIA staff members to discuss forecasting methodology as well as alternative insights into ongoing energy market developments and emerging issues having an impact on short-term energy analysts. Guest speakers from government and industry will discuss their forecasting methods and compare their results with the projections presented in the fourth quarter *Short-Term Energy Outlook*. It is anticipated that input from outside experts will enhance the understanding and ability of EIA staff to provide short-term energy analysis and forecasts. Attendance for the symposium is free, but reservations must be made in advance to reserve a place.

Morning Session

8:00 Registration and Reception

8:30 Welcome and Opening Remarks

Calvin A. Kent, Ph.D.
Administrator, EIA

9:00

**How Energy Forecasting Fared
During the Gulf War**

W. Calvin Kilgore
Director, Office of Energy Markets
and End Use, EIA

9:15

**Winter 1991-1992: Forecasting the
Heating Oil Market**

John Pearson, EIA

Moderator:

Guy Caruso, Office of Energy Emergency
Policy and Evaluation, DOE

Asa Jannay, ICF Resources
Edward N. Kravets, Energy Security Analysis
John Sauer, Conoco Inc.

10:30

Break

Keynote Speaker:

Michael T. Woo
Committee on Energy and Commerce
U.S. House of Representatives

11:30

Lunch Break

Electric Power Forecasting Issues

Moderator:

Mary Hutzler, EIA
David DeAngelis, Pennsylvania Power & Light
Jerry Karaganis, National Coal Association
Larry Makovich, DRI/McGraw-Hill
Paul Spurgeon, Ziegler Coal Company
Russell Tucker, Edison Electric Institute

Afternoon Session

2:15 Break

2:30 Concurrent Panel Discussions

1) Forecasting Petroleum Prices

Moderator:
Mark Rodekohr, EIA
Panellists:
Adam Sieminski, Washington Analysis
Corporation
William Veno, DRI/McGraw-Hill
Philip Verleger, Institute for International
Economics

2) Forecasting Natural Gas Prices

Moderator:
Diane Lique, EIA
Panellists:
Daniel A. Dreyfus, Gas Research Institute
Bruce Henning, American Gas Association
Bruce Stram, ENRON Corporation

**3) Short-Term Energy Model
Development**

Moderator:
David Costello, EIA
Panellists:
Timothy Conside,
Pennsylvania State University
G.S. Maddala, University of Florida
Timothy Mount, Cornell University

4:00

Conference Concludes

To register, please call:

Evelyn Amerchih
Energy Information Administration
(202) 586-8760

Short-Term Energy Outlook

Quarterly Projections

Fourth Quarter 1991

Energy Information Administration
Office of Energy Markets and End Use
U.S. Department of Energy
Washington, DC 20585

This report was prepared by the Energy Information Administration, the independent statistical and analytical agency within the Department of Energy. The information contained herein should not be construed as advocating or reflecting any policy position of the Department of Energy or any other organization.

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- Electricity Karen E. Elwell (202/586-2867)

Domestic crude oil production figures are provided by the EIA Dallas Field Office, under the supervision of John H. Wood. Nuclear electricity generation is provided by Betsy O'Brien (202/254-5490); hydroelectric generation, electricity imports, and electricity purchases from nonutilities are provided by Robin Reichenbach (202/254-5353); and coal production, imports, and exports are provided by Byung Doo Hong (202/254-5365)—all of the EIA Office of Coal, Nuclear, Electric and Alternate Fuels.

Preface

The Energy Information Administration (EIA) presents future cases of quarterly short-term energy supply, demand, and prices for publication in February, May, August, and November in the *Short-Term Energy Outlook* (*Outlook*). An annual supplement analyzes the performance of previous forecasts, compares recent cases with those of other forecasting services, and discusses current topics related to the short-term energy markets. (See *Short-Term Energy Outlook: Annual Supplement*, DOE/EIA-0202.) The principal users of the *Outlook* are managers and energy analysts in private industry and government.

The forecast period for this issue of the *Outlook* extends from the fourth quarter of 1991 through the fourth quarter of 1992. Some data for the third quarter of 1991 are preliminary EIA estimates (for example, some petroleum estimates are based on statistics from the *Weekly Petroleum Status Report*) or are derived from internal model simulations using the latest exogenous information available (for example, some electricity demand estimates are based on recent weather data).

The cases are produced using the Short-Term Integrated Forecasting System (STIFS). The STIFS model is driven principally by the following sets of assumptions or inputs: estimates of key macroeconomic variables, world oil price assumptions, and assumptions about the severity of weather. Macroeconomic estimates are produced by DRI/McGraw-Hill, but are adjusted by EIA to reflect EIA assumptions about the world price of crude oil, energy product prices, and other assumptions which may affect the macroeconomic outlook. (The EIA model is available on computer tape from the National Technical Information Service.)

The cases and historical data are based on EIA data published in the *Monthly Energy Review*, *Petroleum Supply Monthly*, and other EIA publications. Minor discrepancies between the data in those publications and the historical data in this *Outlook* are due to independent rounding. All percentage changes are calculated from the values in the tables rather than from any rounded numbers cited in the text.

In this *Outlook*, some initial methodological changes have been implemented which follow upon a review of the STIFS last fall by the National Petroleum Council. The results of the review were published in "Short Term Petroleum Outlook: An Examination of Issues and Projections," An Emergency Preparedness Report of the National Petroleum Council, January 1991. Key petroleum product price equations (for motor gasoline and distillate fuel) have been upgraded to include important demand/supply interaction terms which allow for a more realistic representation of price movements in sensitivity analysis.

A new routine to solve for electric utility fuel shares by region has been added which improves the reasonableness and defensibility of the projected impact of electricity growth on fossil fuel demands. More information on these and other methodological improvements to the STIFS will be available in the forthcoming *Short-Term Energy Outlook: Annual Supplement 1991*, DOE/EIA-0202(91).

Contents

1	Highlights
3	Assumptions
3	World Oil Prices
3	Macroeconomic Activity
4	International Petroleum
5	Energy Product Prices
5	U.S. Petroleum Outlook
9	Overview
9	Total Demand
10	Total Product Supplied and Production Sensitivities
10	Total Petroleum Supply
11	Motor Gasoline
12	Jet Fuel
12	Distillate Fuel Oil
13	Residual Fuel Oil
13	Other Petroleum Products
14	1991-92 Winter Fuels Outlook
15	Outlook for Other Major Energy Sources
19	Natural Gas
19	Coal
19	Electricity
20	References and Notes
23	

Figures

1.	Crude Oil Prices	3
2.	Annual Change in Components of Real Gross National Product	5
3.	New York Harbor Petroleum Spot Prices, 1991 Weekly	6
4.	Crude Oil and Product Prices	7
5.	Electric Utility Oil and Natural Gas Prices	8
6.	Total Petroleum Demand	10
7.	U.S. Crude Oil Production	10
8.	Total Net Petroleum Imports	11
9.	Annual Change in Motor Gasoline Demand Components	12
10.	Motor Gasoline Market Shares	13
11.	Annual Change in Jet Fuel Demand and Capacity	14
12.	Natural Gas Stocks	19
13.	Annual Change in Coal Consumption	20
14.	Electricity Sales by Sector	20

Tables

1.	U.S. Energy Supply and Demand Summary	2
2.	Macroeconomic and Weather Assumptions	25
3.	International Petroleum Balance: Mid World Oil Price Case	26
4.	Energy Prices	27
5.	Supply and Disposition of Petroleum: Low World Oil Price Case	28
6.	Supply and Disposition of Petroleum: Mid World Oil Price Case	29
7.	Supply and Disposition of Petroleum: High World Oil Price Case	30
8.	Petroleum Demand Sensitivities	31
9.	Crude Oil Production Forecast Components	31
10.	Supply and Disposition of Natural Gas: Mid World Oil Price Case	32
11.	Supply and Disposition of Coal: Mid World Oil Price Case	33
12.	Supply and Disposition of Electricity: Mid World Oil Price Case	34

Highlights

In 1992, a rebound in the economies of the industrialized countries is expected to drive a worldwide increase in petroleum demand of 750,000 barrels per day (1.2 percent). For the countries of the Organization for Economic Cooperation and Development (OECD), a total increase of 550,000 barrels per day in 1992 is anticipated. The United States is expected to account for one-half of the OECD increase, while Europe and Japan will each account for about one-fifth.

Strong growth in domestic petroleum use is expected during the current winter quarters, particularly in terms of year-over-year increases. However, the domestic petroleum industry appears to be adequately prepared to meet most expected demand increases in the near term. A high growth scenario combined with extremely cold temperatures could generate a challenge to the fuel distribution system. Going into the fourth quarter 1991, propane stocks are well below normal and could pose a problem. Overall increases in U.S. oil demand for 1992 are expected to average between 0.8 and 2.3 percent, depending on oil prices.

In contrast to recent improvements in domestic crude oil production, declines in daily average output of between 230,000 and 430,000 barrels per day are expected for 1992. Signs of a turn downward, reflecting modest prices (compared to late 1990) and an end to temporary benefits from projects which have halted output declines over the past year, are appearing. The fourth quarter of this year is expected to be the turning point on a year-over-year basis.

Total natural gas demand in 1992 is projected to total between 19.3 and 19.9 trillion cubic feet compared to an estimated 1991 total of about 18.7 trillion cubic feet. Thus, 1992 is expected to bring the highest annual level for gas use since 1981, as the economic recovery and assumed normal weather conditions increase demand in all major sectors. The expected increase next year would follow upon little if any change in total consumption between 1990 and 1991 (expected if weather conditions are normal for the rest of this year).

Growth in total electricity sales is expected to average more than 2 percent in 1991, despite the economic recession, because temperatures were above normal during this past spring and summer and heating requirements are assumed to be higher this coming fall than in the mild fourth quarter 1990. Electricity demand should also increase in 1992 if the economy turns around.

Coal production is expected to decrease by 2.3 percent for all of 1991 compared to last year's record level, mainly because of lower consumption and the aftermath of a significant secondary stock build-up in 1990. The 1991 total should still remain above the 1 billion ton level. Coal production is expected to rise 2.7 percent next year with higher demand and exports.

Note: The data referenced may be found in Table 1 or in the tables located in the back of this report.

World Oil Demand Increases Next Year if Economies Improve

U.S. Petroleum Demand Increases; Ample Supplies for Upcoming Heating Season

U.S. Petroleum Output Resumes Decline in 1992, As Price Outlook Remains Moderate

Natural Gas Demand Posts Firm Gains in 1992

Electricity Demand Growth Expected this Year Despite Economic Recession

Coal Production Retreats from Record Levels

Table 1. U. S. Energy Supply and Demand Summary

Price Range*	Year					Annual Percentage Change
	1989	1990	1991	1992	1989-1990 1990-1991 1991-1992	

Real Gross National Product (billion 1982 dollars)	Mild	4120	4157	4147	4263	0.9	-0.2	2.8
Imported Crude Oil Price (nominal dollars per barrel)	Low	18.09	21.77	19.11	20.00	20.3	-12.2	4.7
	Mid							
	High			19.87	23.00		-8.7	15.8
Petroleum Supply								
Crude Oil Production ¹ (million barrels per day)	Low	7.61	7.36	7.34	6.91	-3.3	-0.3	-5.9
	Mid		7.36		7.04		0.0	-4.3
	High		7.36	7.38	7.15		0.3	-3.1
Net Petroleum Imports, Including SPR (million barrels per day)	Low	7.20	7.16	6.74	7.58	-0.6	-5.9	12.5
	Mid			6.70	7.33		-6.4	9.4
	High			6.66	7.05		-7.0	5.9
Energy Demand								
Total Petroleum Product Supplied (million barrels per day)	Low	17.33	16.99	16.65	17.04	-2.0	-1.9	2.3
	Mid		16.99	16.65	16.92		-2.0	1.6
	High		16.63	16.63	16.76		-2.1	0.8
Natural Gas Consumption (trillion cubic feet)	Low	18.80	18.84	18.68	19.58	0.2	-0.8	4.8
	Mid		18.84	18.68	19.58		-0.8	6.2
	High			18.74	19.90		-0.5	
Coal Consumption (million short tons)	Mid	891	894	898	936	0.3	0.4	4.2
Electricity Sales ² (billion kilowatt-hours)	Mid	2647	2705	2771	2859	2.2	2.4	3.2
Gross Energy Consumption ³ (quadrillion Btu)	Mid	81.3	81.4	81.1	83.6	0.1	-0.4	3.1
Thousand Btu/1982 Dollar of GNP	Mid	19.73	19.58	19.56	19.61	-0.8	-0.1	0.3

*Price Range refers to the imported refiners' acquisition cost of crude oil assumed for the scenario depicted. In all cases for this table, the mid-case macroeconomic outlook is assumed, and weather is assumed to be normal.

¹Includes lease condensate.

²Total annual electricity sales for historical periods are derived from the sum of monthly sales figures based on submissions by electric utilities of Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions." These historical values differ from annual sales totals based on Form EIA-861, reported in several EIA publications, but match alternate annual totals reported in EIA's *Electric Power Monthly*, DOE/EIA-0226.

³The conversion from physical units to Btu is calculated using a subset of *Monthly Energy Review* (MER) conversion factors. Consequently, the historical data may not precisely match that published in the MER.

SPR: Strategic Petroleum Reserve

Notes: Minor discrepancies with other published EIA historical data are due to independent rounding. Historical values are printed in **boldface**, forecasts in *italics*. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BB16:16 and S100991BB14:39 for the middle oil price case; D092691BSB17:02 and S100991BSB13:49 for the low oil price case; and D092691BGB17:37 and S100991BGB14:02 for the high oil price case.

Sources: Historical data: Energy Information Administration, *Monthly Energy Review*, DOE/EIA-0035(9/1/0); *Petroleum Supply Monthly*, DOE/EIA-0190(9/1/10); *Petroleum Supply Annual 1990*, DOE/EIA-0340(90/1); *Natural Gas Monthly*, DOE/EIA-0130(9/1/10); *Electric Power Monthly*, DOE/EIA-0226(9/1/10); and *Quarterly Coal Report*, DOE/EIA-0121(9/1/20). Macroeconomic projections are based on DRI/McGraw-Hill Forecast CONTROL0991.

Assumptions

World Oil Prices

The world oil price is affected by three factors, each subject to substantial uncertainty. These three factors are oil supply, oil demand, and the amount of excess petroleum stocks relative to petroleum demand (as measured in days of forward consumption).

Oil supply factors appear to be subject to the most uncertainty over the forecast period, with considerable uncertainty surrounding both oil exports from the Union of Soviet Socialist Republics (U.S.S.R.) and oil production from the Organization of Petroleum Exporting Countries (OPEC). Oil exports from the U.S.S.R. will be determined by the relative decline rates of both Soviet oil production and consumption and the competing need for hard currency, each of which is highly uncertain at this time. Oil production by the OPEC will be determined by OPEC oil production capacity and by the actual production rates of the member countries, both of which are also subject to significant uncertainty. The OPEC oil production capacity will be affected primarily by the speed with which Iraq and Kuwait are able to restore their oil production facilities. While Kuwait will probably increase production as capacity is restored, Iraq's actual production will be affected by other uncertain factors. These will include whether Iraq will accept the United Nations oil export scheme, whether that scheme will be extended beyond the initial 6-month term and at what amounts, and how quickly Iraq will be able to repair its oil export facilities. Aggregate OPEC production will also be affected by the willingness of other OPEC member countries to restrain their production, if necessary, to accommodate increased exports from Iraq and Kuwait.

On the oil demand side, the two key uncertainties are the severity of winter weather and the magnitude of economic growth, especially in the United States and in the other countries that comprise the Organization for Economic Cooperation and Development (OECD). There is also uncertainty currently about the amount of excess petroleum stocks available relative to demand. An abnormally high level of petroleum stocks could prove useful this winter because it would offset, at least partially, the upward pressures on the world oil price from low levels of excess OPEC oil production capacity.

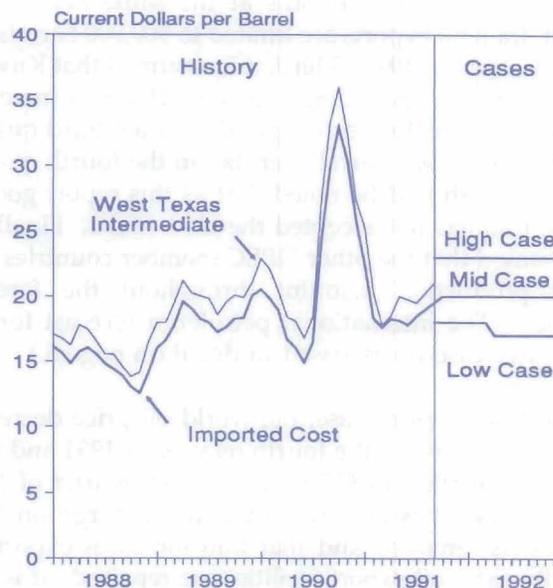


Figure 1. Crude Oil Prices

Note: Imported prices are defined as the cost of imported crude oil to U.S. refiners.

Sources: **History:** Energy Information Administration, *Monthly Energy Review* (October 1991); and *Oil and Gas Journal* Energy Database. **Cases:** Table 4.

Because of these uncertainties, three different world oil price cases are employed (Figure 1 and Table 1). These cases are used to develop a mid-price case projection and alternative projections for domestic petroleum supply and demand.

The three world oil price cases are meant to represent the range over which prices could vary during the forecast period. Given the uncertainties in the world oil market, the world oil price could be more toward the upper end of the range in the fourth quarter of 1991 and in the first and fourth quarters of 1992 and tend toward the lower end of the range in the second quarter of 1992.

In the mid-price case, the world oil price increases from an estimated \$19 per barrel in the third quarter of 1991

to \$20 in the fourth quarter and throughout 1992. This case is based on the following assumptions. First, oil exports from the U.S.S.R. are assumed to be 20 percent lower in the fourth quarter of 1991 than in the same period of 1990 and about 25 percent lower in 1992 than in 1991. Second, it is assumed that Iraq accepts the United Nations oil export scheme, that Iraqi exports begin in January 1992, and that the scheme is extended for an additional 6 months at the same rate. As a result, Iraqi oil exports are limited to 500,000 barrels per day throughout 1992. Third, it is assumed that Kuwaiti oil production (excluding the Neutral Zone) increases from about 150,000 barrels per day in the third quarter of 1991 to 800,000 barrels per day in the fourth quarter of 1992. It should be noted that as this report goes to press, Iraq has not accepted the U.N. terms. Finally, it is assumed that the other OPEC member countries will exert production restraint throughout the forecast period. (The international petroleum forecast for the mid-price case is discussed in detail on page 5.)

In the low oil price case, the world oil price decreases to \$18 per barrel in the fourth quarter of 1991 and then decreases further to \$17 in the second quarter of 1992. In this case, it is assumed that the embargo on Iraqi exports is removed and that Iraq increases exports as rapidly as its oil export facilities are repaired. It is also assumed that OPEC production restraint is weak so that other OPEC member countries do not reduce production as Iraqi and Kuwaiti exports increase. At the same time, other factors are assumed to contribute to lower prices, including higher exports from the U.S.S.R. and lower economic growth by the OECD countries than assumed in the mid-price case, as well as mild winter weather.

In the high oil price case, the world oil price increases to \$23 per barrel in the fourth quarter of 1991 and throughout 1992. In this case, it is assumed that there are no Iraqi oil exports throughout 1992 and that winter weather is abnormally cold. Also, it is assumed that oil production from Kuwait and oil exports from the U.S.S.R. are lower than in the mid-price case, and that other OPEC countries hold production down in order to push oil prices higher.

Macroeconomic Activity

After 2 consecutive years of weak economic growth, the economy is expected to recover, albeit modestly, in 1992. Gross national product (GNP) is expected to attain 2.8 percent growth (Table 2). Even though this recovery will be modest in contrast to past recoveries, it will have a similar pattern. Increases in business

investment will begin the 1992 growth of the economy. Investment spending will rebound, increasing by 13 percent, compared to the previous year's decline of 8 percent. Decreases in interest rates and growth in both exports and consumption will increase investments in late 1991 and early 1992. Consumer spending will begin to grow during the latter part of 1991, as increases in both consumer confidence and employment will lead to 1992 growth in consumption of 2.1 percent. The trade balance will serve as a check to GNP growth in 1992. Imports will increase more than exports, as consumers begin to increase spending and the exchange rate appreciates.

The economic recovery will be modest for several reasons. First, sectors that usually grow relatively quickly after recessions, the housing sector and residential construction, still suffer from overcapacity. Second, consumption will be held in check, compared to past recoveries, because of remaining high levels of consumer debt. Third, because of weaker capital positions, higher Federal Deposit Insurance Corporation premiums, and large loan losses, changes in monetary policy will not provide as much investment stimulus as in the past recoveries. Finally, since both the Federal and State budgets are under pressure, the government will not provide a spending stimulus for the economy.

For all of 1991, real GNP is expected to show a very modest decline of 0.2 percent. The recovery begins modestly in the third quarter of 1991 (Figure 2). Quarterly growth in GNP will remain in the 2.8- to 3-percent range through the rest of 1991 and the early part of 1992. Consumption begins to increase in the second half of 1991 with investment showing improvement in the third quarter in response to falling interest rates. Interest rates, falling in response to declines in output and slack investment demand, begin to increase in the fourth quarter of 1991, leading investment growth to level off in the last 2 quarters of 1992. The trade balance has improved in 1991, primarily due to a fall in imports rather than increases in exports. Export growth in 1992 will improve, but imports post higher growth, resulting in the real trade balance deteriorating slightly in 1992.

Manufacturing production will recover in 1992, showing 4.4-percent growth, compared to the 1991 decline of 1.9 percent. Improvements in business investment and exports explain much of the production sector's improvement. In 1992, real disposable income increases by 1.9 percent after the 1991 decline of 0.5 percent. The rate of inflation is expected to slow in 1992 as expected wage increases lessen in response to the increased unemployment experienced in 1991.

Petroleum demand by the countries in the Organization for Economic Cooperation and Development (OECD) is expected to average 37.9 million barrels per day in 1991, up only 60,000 barrels per day, or 0.2 percent, from the 1990 rate. This level of demand is based on the assumption that the OECD economies will grow at a rate of only 1.0 percent in 1991 (Table 2). Japan and OECD Europe are expected to account for most of the increase in petroleum demand in 1991, but this growth will be largely offset by the decline in demand from the United States. In 1992, a sharp rebound in the economies of all OECD regions, except Japan, is expected to result in OECD economic growth of 2.7 percent. This, in turn, will contribute to an increase in OECD petroleum demand of 550,000 barrels per day, or 1.5 percent. The United States is expected to account for one-half of the OECD increase, while Europe and Japan will each account for about one-fifth.

Petroleum demand in the non-OECD countries is expected to increase to an average of more than 28.2 million barrels per day in 1991, up 150,000 barrels per day, or 0.5 percent, from the 1990 rate. Declines in demand from the U.S.S.R. and non-OECD Europe, will be more than offset by increases from China and the other non-OECD countries, especially those in Asia. In 1992, petroleum demand by the non-OECD countries is expected to increase by 220,000 barrels per day, or 0.8 percent, with growth held down by a continued decline in demand from the U.S.S.R.

In 1991, world oil production is expected to average 66.2 million barrels per day, a decrease of 260,000 barrels per day from the 1990 rate. A massive production decline of over 1 million barrels per day from the U.S.S.R. is expected to more than offset modest increases from the OECD countries, OPEC, Mexico, and the other non-OECD countries. In 1992, world oil production is expected to increase by 270,000 barrels per day. Non-OPEC oil production is expected to decline by about 850,000 barrels per day, driven down by a further decrease of 1 million barrels per day from the U.S.S.R. This decline in non-OPEC production results in OPEC increasing aggregate production by more than 1.1 million barrels per day.

Energy Product Prices

Current Situation

World crude oil prices were only briefly affected by the August 21 failed coup attempt in the U.S.S.R. They jumped by about \$1.00 per barrel when news of the

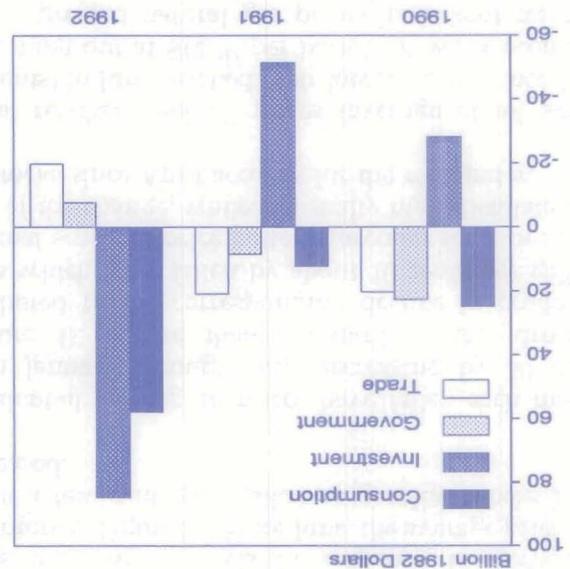
The international petroleum forecast uses supply and demand patterns that reflect the mid-price case. World demand for petroleum products is expected to increase to an average of 66.1 million barrels per day in 1991, up 210,000 barrels per day, or 0.3 percent, from the 1990 rate (Table 3). In 1992, demand is expected to increase by 770,000 barrels per day, or 1.2 percent.

International Petroleum

The high and low macroeconomic growth cases provide a range of projected economic growth rates since there is uncertainty regarding the magnitude of change of crucial economic variables. In addition, economic growth is a major determinant in explaining energy demand. As a result, the high and low economic growth cases incorporate a band of GNP growth, roughly 1 percentage point above and below the base case growth rates.

Consumer prices are expected to rise 4.3 percent in 1991, then increase by 3.6 percent in 1992, as inflation responds to slack demand and lower wage increases.

Figure 2. Annual Change in Components of Real Gross National Product



Sources: History: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (September 1991). Projections: Table 2.

Monthly retail motor gasoline prices peaked for this year at \$1.30 per gallon in January during the height of the Persian Gulf Crisis (Figure 4). In both May and June, prices reached \$1.20 per gallon in, climbing 5 cents over April levels in response to very low inventories (Figure 5). Since June, the average price has fallen a few cents per gallon as gasoline stocks have increased.

Residential heating oil prices have fallen each month from January through July decreasing by 30 cents (Figure 4). More than one-third of this drop is attributed to the corresponding decline in crude oil costs which have fallen by about 10 cents per gallon. Normal seasonal price patterns account for more than half of the change, while unusually high distillate fuel oil stocks since April account for the remainder.

Retail residual fuel oil prices (average of all sulfur contents) in June reached their lowest levels since 1986 bottoming out at \$12.39 per barrel. A weak economy and depressed natural gas prices have kept residual prices down. They have rebounded by a few dollars per barrel since June, commensurate with the rise in crude oil prices.

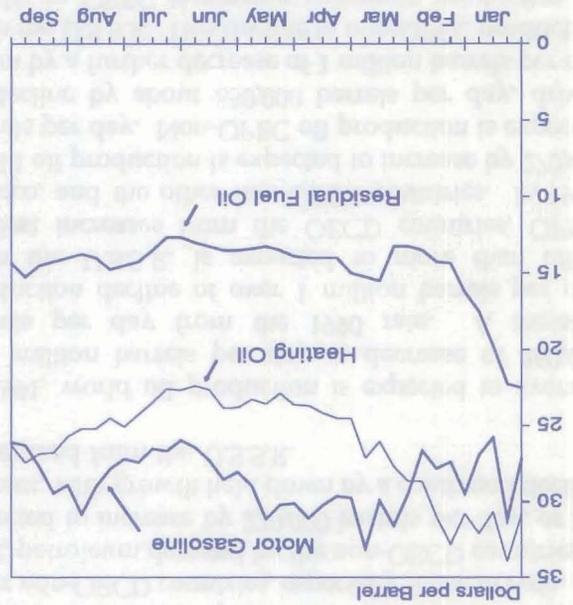
Natural gas wellhead spot prices have been on a downward trend since March of 1990. Several warm winters in a row and a weak economy have continued to hamper gas prices. However, recent spot price movements and higher futures prices for the heating season (November 1991 through March 1992) indicate possible price increases for natural gas in the near future. In September, spot prices rose by 13 cents per million Btu over the August price.² Although this September, prices are about 6 cents lower than in the previous year, August prices this year were 11 cents lower than last August.³

In the second quarter of this year, utility fuel prices for both natural gas and residual fuel oil have continued to compete with each other at levels close to \$2.00 per million Btu (Figure 5). It is interesting to note that far from being positively affected by a very warm spring and summer, oil and gas (and coal) have yielded shares in electric utility fuel use to nuclear power. Nuclear power generation was much improved in the second quarter of this year compared to last year in most regions and reached a record capacity utilization rate of 82 percent in July, on a national average basis.⁴ Further improvements of this type are not envisioned for the near future, implying that utility fossil fuel use (and fuel prices) should pick up if electric power output recovers over the next 2 quarters.

takeover first hit, but then eased back down to pre-coup levels within a few days, as the coup quickly unraveled. Since June, however, the world crude oil price has been steadily, though gradually, increasing in response to higher world demand for oil for the upcoming winter and to a general, albeit slow, improvement in the world economy which has been sluggish for nearly a year. In addition, there has been some concern regarding decreased production that has been plaguing the U.S.R. over the last few years. Spot prices for refined petroleum products, particularly motor gasoline and distillate fuel oil, mirrored crude oil prices in response to the coup. However, residual fuel oil spot prices were largely unaffected due to adequate worldwide inventories and to the continued glut of natural gas in the United States. In general, spot prices for distillate fuel oil and residual fuel oil have been rising since the late spring following the crude oil price path and the anticipation of the heating season (Figure 3). The end of the driving season brought spot motor gasoline prices down in September, although they have increased in recent weeks.¹

Figure 3. New York Harbor Petroleum Spot Prices, 1991 Weekly

Sources: Energy Information Administration, Weekly Petroleum Status Report (September 20, 1991).



Residential electricity prices have declined in real terms since 1986 and will continue to do so throughout the forecast. This expectation assumes continued low fuel prices (primarily coal) and relatively low interest rates, which would tend to reduce capital costs. Increases in maintenance and operation costs are also expected to be relatively small. Another factor that has held price increases to a minimum has been increases in the efficiency of electricity consumption. One result has been less need to build expensive new power plants whose costs would be added to the rate base.

In 1992, natural gas prices to electric utilities are expected to increase by 6 percent from the previous year after averaging an 8-percent decrease in 1991. An increase in the wellhead price, coupled with slightly higher oil prices should result in higher gas prices in 1992. Natural gas wellhead prices are expected to average about 5 percent below 1990 levels in 1991 if weather is normal for the fourth quarter. Underground storage levels have been high while demand for gas in 1991 has been flat overall. If the winter weather is mild once more, prices could be further depressed. On the other hand, a severe and prolonged cold spell, particularly on the East Coast could put upward pressure on prices. In 1992, an improved economy and a slight rise in oil prices should boost wellhead gas prices back to about 1990 levels.

Natural gas wellhead prices are expected to average about 5 percent below 1990 levels in 1991 if weather is normal for the fourth quarter. Underground storage levels have been high while demand for gas in 1991 has been flat overall. If the winter weather is mild once more, prices could be further depressed. On the other hand, a severe and prolonged cold spell, particularly on the East Coast could put upward pressure on prices. In 1992, an improved economy and a slight rise in oil prices should boost wellhead gas prices back to about 1990 levels.

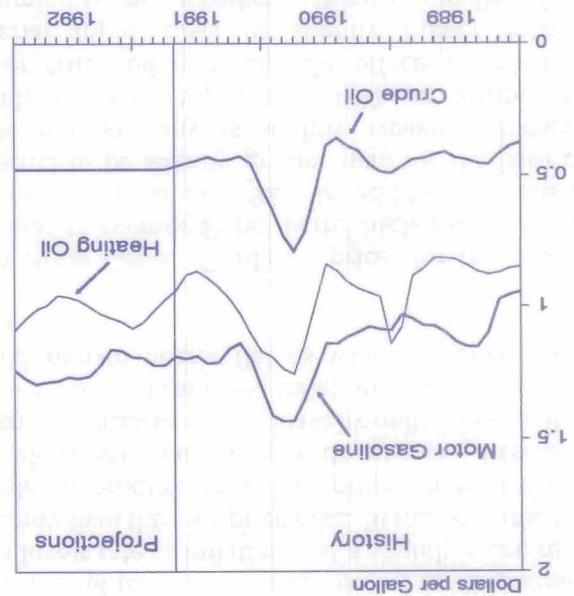
Mid-Price Case. As crude oil prices are expected to be about \$19 per barrel on average in 1991 and then increase slightly to \$20 per barrel in 1992, petroleum product prices are expected to follow the same price pattern. Motor gasoline prices are projected to fall slightly in 1991, then increase by 4 cents per gallon, or double the assumed crude oil price increase for 1992. This additional increase is expected to come from additional State and local taxes, as well as rising supply costs associated with the portions of the Clean Air Act that becomes effective in the latter half of the year. Diesel fuel prices should follow gasoline prices. Higher-than-average stock levels of distillate fuel in the beginning of the heating season should help keep residential heating oil prices at moderate levels for the remainder of the year. Average annual prices for 1991 are projected to be 6 cents per gallon lower than in 1990. Assuming normal winter weather, heating oil prices should rise by 3 cents per gallon in 1992 with most of the increase coming from the increase in crude oil costs.

The following discussion provides projections for oil price cases (Table 4). The variation among crude oil price cases is based almost entirely on the pass-through of the differences in crude oil prices and, to a lesser extent, from differences in supply and demand conditions for particular products. Based on crude oil prices of about \$20 per barrel, U.S. petroleum product prices should remain stable over the next several quarters. With crude oil prices in the range of \$17 to \$23 per barrel through 1992, average increases of 8 to 10 cents per gallon for consumer products (gasoline and heating oil) are possible in 1992, as well as increases in other energy sources (electricity and natural gas). A much more important set of possibilities concerns the vulnerability of supply and prices of fuel oil and natural gas to a severe winter, an unexpected rapid surge in overall economic activity, or a combination of these factors. A special analysis of the coming heating season is contained in "1991-92 Winter Fuels Outlook" on page 15.

Price Outlook

Sources: History: Energy Information Administration, *Monthly Energy Review* (October 1991). Projections: Table 4.

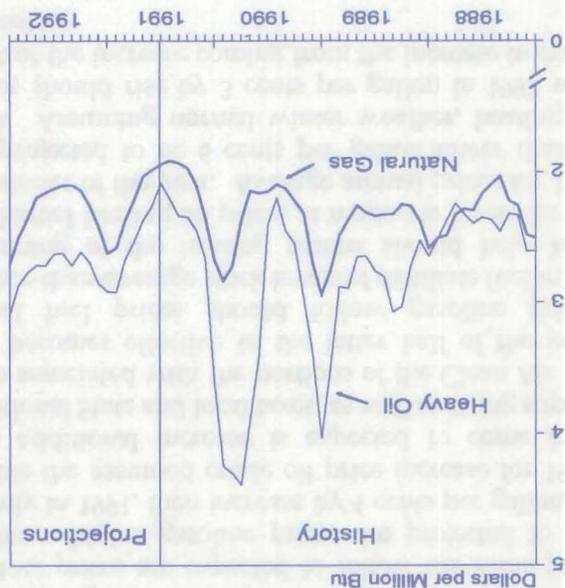
Figure 4. Crude Oil and Product Prices



Low Price Case. This scenario assumes crude oil prices holding at \$18 per barrel in the fourth quarter 1991 and first quarter 1992, then dropping to \$17 for the remainder of the year. Also projected for this scenario are a lower rate of inflation and a slightly more robust economy than the mid-price case. In this scenario, most petroleum product prices are projected to decline in 1992 along with the falling crude oil costs. Residential electricity prices would increase by only 1.3 percent due to lower fuel costs and less inflation. Natural gas prices would remain nearly flat as wellhead prices barely move.

High Price Case. Crude oil prices for this case are assumed to average \$3 per barrel higher than the mid-price case for all of 1992. In addition, inflation is expected to be slightly greater than for the base case while the economy is slightly weaker. Increased petroleum product prices in 1992 are attributed to higher crude oil costs and the effects on labor and material input costs of slightly higher inflation. Assuming normal weather, natural gas wellhead end-use prices would probably rise relative to the mid-price case as the competitive pressure from oil price eases. Coal prices to electric utilities would increase at about the rate of inflation as oil and gas prices to utilities increase and as the price of diesel fuel used in the operation of coal mines and transporting coal to electric utilities increases.

Figure 5. Electric Utility Oil and Natural Gas Prices



Sources: History: Energy Information Administration, *Monthly Energy Review* (October 1991). Projections: Table 4.

U.S. Petroleum Outlook

Overview

Since last fall, much has happened concerning domestic and world petroleum markets. The war in the Persian Gulf has been fought and won. The economic recession has continued, but guarded optimism that recovery is underway seems to hold sway among economic analysts. The fourth quarter of this year offers to bring several changes in the pattern of domestic petroleum demand and supply that have characterized the first 3 quarters. Petroleum demand is expected to rise in the fourth quarter of 1991, compared to a decline a year-ago, as the economy is expected to be on its way to recovery and a normal pattern of colder weather is assumed to appear. While remaining moderate throughout most of 1991, crude oil prices this fall are expected to average \$10 per barrel below fourth quarter 1990 levels in the mid-price case. Domestic crude oil production, which remained stable for the first 9 months of 1991 or actually increased compared to 1990 levels, is expected to decline slightly in the fourth quarter and to slip further for the remainder of the forecast. As a result of these developments, total net imports of crude oil and petroleum products in the mid-price case are expected to increase by more than 1 million barrels per day in the fourth quarter of this year compared to the same period in 1990. An average decline of more than 1 million barrels per day in total net imports characterized the first three quarters of this year.

Total Demand

Despite the obvious differences expected in the overall domestic petroleum market balance from a year ago, a relatively tranquil scene for the winter is envisioned in the mid-price case, barring any extremely severe weather patterns. The situation for petroleum (and other fuels markets) in the case of a severe winter is examined in "1991-92 Winter Fuels Outlook" on page 15. In the mid-price case, petroleum demand for the fourth quarter of 1991 is expected to average 17.06 million barrels per day, up 350,000 barrels per day from the fourth quarter 1990, but still well below the remarkably high level of shipments in the fourth quarter 1989. Even this increase for the winter could be in serious doubt if the expected recovery does not develop. Signs are not uniformly positive regarding the

onset of steady, moderate economic growth at this time.⁵ If crude oil prices remain stable or low, it is expected that year-over-year increases in petroleum demand will continue throughout the forecast. In 1992, domestic demand is expected to increase by about 270,000 barrels per day compared to average 1991 levels. Much of that anticipated growth is in the first quarter 1992, as the effects of normally cold weather will contrast sharply with the mild conditions in early 1991. Accordingly, some of the largest gains in shipments will be in the distillate and residual fuel oil sectors. Despite the recovery expected for 1992, demand next year is still likely to fall below 1990 levels.

The uncertainty surrounding the mid-price case is principally a function of the uncertainty surrounding crude oil prices and macroeconomic growth, in addition to the uncertainty surrounding weather conditions. The uncertainty surrounding crude oil prices is not insignificant, but is relatively small compared to the possibilities which arise when alternatives are considered for macroeconomic growth and weather. Tables 5 through 7 detail the range of domestic petroleum demand and supply results when a mid-case economic scenario is combined with normal weather and the range of oil prices shown in Figure 1. Figure 6 overlays expected alternative petroleum demand paths when extreme weather and macroeconomic assumptions are incorporated. Figures 7 and 8 provide a view of petroleum supply and imports variability under various world oil price assumptions.

An extreme weather case, particularly if combined with a very high economic growth scenario for the winter, could lead to petroleum demand in the first quarter of next year of 17.78 million barrels per day, 1.35 million barrels per day above the same period in 1990. The question of whether or not this scenario could pose a problem for domestic petroleum supply at peak periods during the winter is addressed in some detail in the "1991-92 Winter Fuels Outlook" on page 15. The factors which seem to be working against such a situation occurring probably outweigh the factors which might foster it. In particular, the apparently low probability of the economy accelerating at a rate much above the mid-price case, significant conversions to natural gas from heating oil since 1989,⁶ and the generally ample supplies of natural gas (which would tend to lessen the likelihood of gas interruptions creating severe additional pressure on supply and prices of fuel oil), all

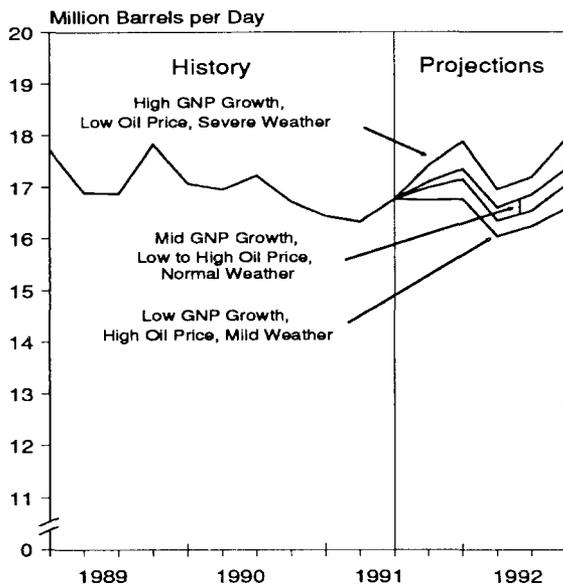


Figure 6. Total Petroleum Demand

Sources: **History:** Energy Information Administration, *Petroleum Supply Annual 1989*, and *Petroleum Supply Monthly* (October 1991). **Projections:** Tables 5, 6, and 7 and internal model calculations from the Short-Term Integrated Forecasting System.

make the prospects for supply shortages this winter somewhat remote. It should be noted that the occurrence of weather as cold as that seen for the month of December 1989 is an event expected approximately once in every one hundred years.⁷

In order to provide broader information on the significance for the U.S. petroleum demand and supply outlook presented in this report to varying assumptions about prices, the economy, and weather, a summary of petroleum demand and production sensitivities is presented below.

Total Product Supplied and Production Sensitivities

The petroleum demand and supply outlook for the mid-price case is based on normal temperatures and a particular set of macroeconomic assumptions. In order to widen the usefulness of the basic projections provided in the *Outlook*, Table 8 provides a range of possible outcomes and sensitivities when alternative macroeconomic, price, and weather assumptions are used.

The petroleum price sensitivity assumes that non-petroleum prices remain constant. Weather sensitivities are based on assumed deviations from normal temperatures which correspond to one-half the greatest quarterly variances in weather observed during the past 15 years.

Average petroleum sensitivity factors for 1992 for this *Outlook* are summarized below:⁸

- A 1-percent increase in real GNP raises petroleum product supplied by about 119,000 barrels per day;
- A \$1-increase in crude oil prices, assuming no price response from non-oil energy sources, reduces product supplied by about 48,000 barrels per day.
- A \$1-increase in crude oil prices, increases domestic oil supply (crude oil and natural gas liquids production) by 42,000 barrels per day;
- A 1-percent increase in heating degree-days increases product supplied by about 34,000 barrels per day; a 1-percent increase in cooling degree-days increases petroleum product supplied by about 12,000 barrels per day.

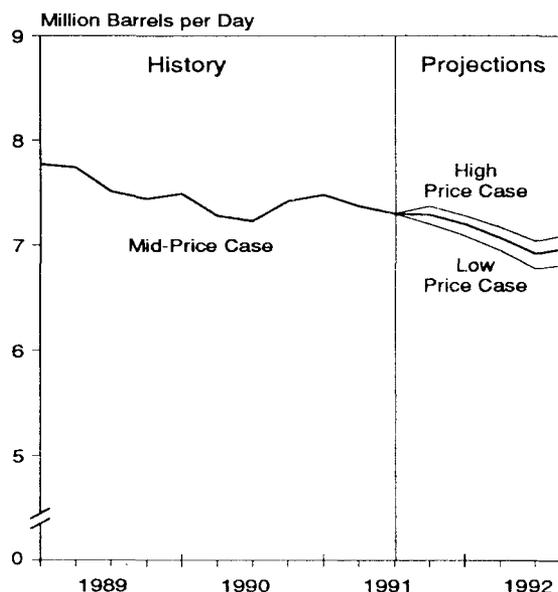


Figure 7. U.S. Crude Oil Production

Sources: **History:** Energy Information Administration, *Petroleum Supply Annual 1989*, *Petroleum Supply Monthly* (October 1991), and *Weekly Petroleum Status Report* (91-37,38,42). **Projections:** Tables 5, 6, and 7.

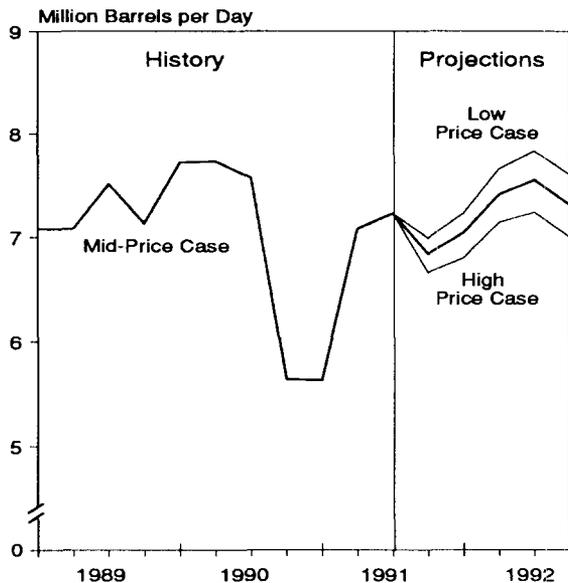


Figure 8. Total Net Petroleum Imports

Note: Crude oil production includes lease condensate.
 Sources: **History:** Energy Information Administration, *Petroleum Supply Annual 1989*, *Petroleum Supply Monthly* (October 1991), *Weekly Petroleum Status Report* (91-37,38,42). **Projections:** Tables 5, 6, and 7.

Total Petroleum Supply

In the base case, domestic crude oil production is expected to drop off slightly in the fourth quarter of 1991, leaving the expected annual production level for 1991 essentially unchanged from the 1990 level, with a drop of 320,000 barrels per day expected for 1992 (Table 6 and Figure 7). In 1991, Alaskan production increased enough to offset a small decline in the lower-48 States. This increase was caused by expanded gas handling facilities in the Prudhoe Bay field in the latter part of 1990, allowing higher rates of oil production to be achieved by the end of the year. Production from this field has apparently begun to decline again, but the higher level of output achieved in late 1990 and early 1991 has resulted in an expected higher annual average in 1991. In 1992, the lower-48 States are expected to show a greater decline than in 1991, and Alaskan production is expected to fall below 1.7 million barrels per day. According to the Baker-Hughes rotary rig count, the total rotary rigs in operation fell below 900 in April of 1991, and averaged just over 800 in August. For the mid-price case of \$20 per barrel for crude oil,

the rig count for 1991 and 1992 is expected to be below the 1990 level.

Domestic crude oil production could fall as low as 6.91 million barrels per day in 1992 under the low world oil price case (Table 5), or could average 7.15 million barrels per day in 1992 in the high world oil price case (Table 7). These estimates contain an element of uncertainty which goes beyond expected outcomes for various price ranges. This uncertainty, associated with both the current production level and with the timing of expected events, accounts for approximately 47 percent of the range of production in the fourth quarter of 1992 between the low and the high oil price cases (Tables 5 and 7). The difference between low and high price projections of 290,000 barrels per day in the fourth quarter of 1992 contains 150,000 barrels per day attributable to the price impact (Table 9).

Throughout the summer, the domestic refining industry has been geared to supplying the seasonal demand for motor gasoline. Primary stocks of finished motor gasoline were only slightly above 170 million barrels at the end of the first quarter of this year, due to a lack of the usual winter motor gasoline stock build. With two different kinds of gasoline quality regulation taking effect during the course of the year (the summer Reid Vapor Pressure limitations and the winter oxygenates restrictions in some locales), this much flatter stock profile appears to be the new seasonal pattern for the near future. According to the most recent data from the EIA *Petroleum Supply Monthly*, the amount of liquefied petroleum gases, pentanes plus, and other motor gasoline blending components blended to motor gasoline was 760,000 barrels per day from October 1990 through January 1991 and 550,000 barrels per day from February through July 1991. With less crude oil and unfinished oil, refinery inputs for the first 4 months of this period (13.49 million barrels per day in October through January, versus 14.15 otherwise), a different formulation of motor gasoline product emerges in the winter when compared to the summer. Refinery yields (the portions of refinery output going to particular products expressed as a percent of crude oil and unfinished oil refinery inputs), still turn from motor gasoline to distillate fuel oil in the winter. However, the amount of distillate fuel oil produced is more a function of the level of refinery inputs than of altering the product mix. As a result, product stocks of distillate are currently plentiful, as refinery inputs have been high during the summer, and demand for distillate has generally been weak.

With refinery outputs accounting for most of the domestic petroleum product supply, there is less need

for petroleum product imports, and in fact, a greater amount of products have lately been exported. Thus, the forecast for net imports of petroleum products continues to remain low, near 1.1 million barrels per day in 1992 in the base case. Net crude oil imports increase in 1992 as demand rises and domestic production falls, increasing net import dependence to just under 42 percent in 1992, after falling back to 40 percent in 1991.

Motor Gasoline

Demand for motor gasoline in the mid-price case is projected to decline by 0.3 percent in 1991 and in 1992 (Table 6). Through September 1991, demand fell by an average of 1.3 percent. Anticipation of a noticeable year-to-year increase in the fourth quarter follows the expectation of sharply lower prices for gasoline and the onset of an economic recovery. Last year's decline reflects the combined impact of the slowing economy and the fuel price hikes brought about by the Persian Gulf conflict. In 1990, highway travel activity grew by 2.0 percent, less than half the growth rate of the previous year and the smallest increase since the recession of the early 1980's. Apparent fuel efficiency increased by a substantial 3.3 percent in 1990 (Figure 9), more than offsetting the impact of the increase in highway travel. In that year, however, shipments were apparently depressed by large drawdowns in secondary stocks. As a result, data on product supplied for 1990 may have understated actual consumption, thereby overstating underlying fuel efficiency increases.

In 1991, the decline in economic activity as well as continued efficiency gains are expected to bring about another annual decline in gasoline demand (Figure 9). For the mid-price case, vehicle-miles traveled, which remained flat for the first 7 months of the year compared to the same period last year, are projected to rise only 1 percent for the year. Fuel efficiencies are projected to rise a more moderate 1.3 percent. Secondary stocks, which were drawn down substantially during the previous 2 years, were replenished earlier this year, indicating that the decline in actual consumption may be even greater than implied by the deliveries data. As a result, fuel economy growth based on actual consumption may be somewhat greater than indicated by primary shipments. Motor gasoline shipments are expected to decline slightly in 1992. The projected efficiency increase of 2.4 percent is expected to offset the impact of a 2.1-percent increase in highway travel activity on motor gasoline demand.

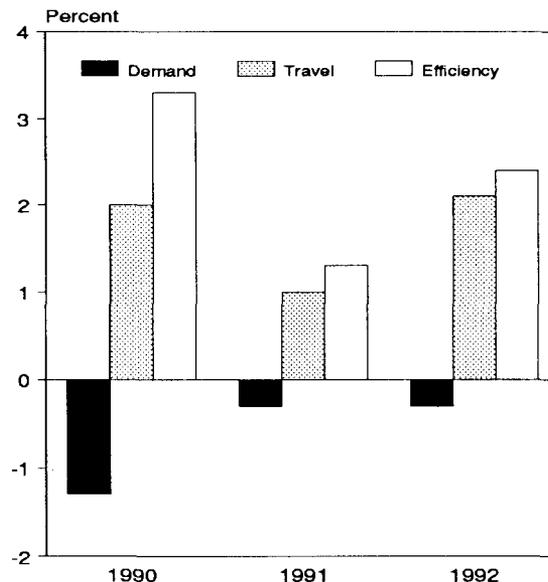


Figure 9. Annual Change in Motor Gasoline Demand Components

Sources: **History:** Energy Information Administration, *Petroleum Supply Monthly* (October 1991); and Federal Highway Administration, *Traffic Volume Trends*. **Projections:** Table 6 and internal calculations from the Short-Term Integrated Forecasting System.

Fuel shares by gasoline grade continue to respond slowly to the decline in prices resulting from the end of Persian Gulf hostilities (Figure 10). As a result, regular unleaded gasoline's share, which reached a record 71 percent of the market last October, has gradually fallen to 67 percent by July, somewhat above the pre-Gulf crisis level of 63 percent. Premium gasoline's share, which had slid from 23 percent before the Persian Gulf conflict to 17 percent by January, recovered slightly to 19 percent. Midgrade gasoline's market share, having remained stable for several months, has displayed small increases, reaching a record 10.3 percent in July. Regular leaded gasoline's share, whose rate of decline has slowed markedly since the beginning of 1990, continues to hold just over 3 percent of the domestic gasoline market.

Jet Fuel

Jet fuel demand rose by an average rate of 2.2 percent in 1990 from that of the previous year. A sharp slowdown in civilian air travel growth was partly offset

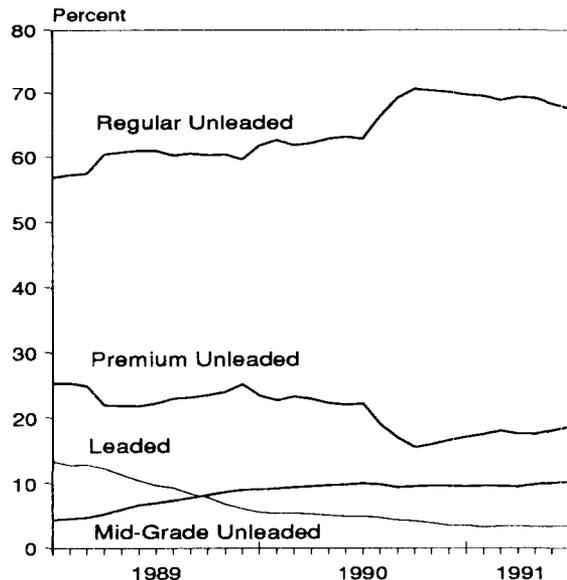


Figure 10. Motor Gasoline Market Shares

Sources: **History:** Energy Information Administration, *Petroleum Marketing Monthly* (October 1991).

by increases in Persian-Gulf related military travel. For 1991, the combination of an economic recession, the end of Persian Gulf hostilities, and continuing increases in fuel efficiency is projected to bring about a 3.3-percent decline in jet fuel demand, the first year-to-year decline in 10 years (Figure 11). This performance follows upon modest growth in 1990. Air travel activity posted sizeable year-to-year declines during the first half of 1991. Available data for the third quarter suggest only a slow recovery in travel activity despite substantial promotional air fare discounts. For the year, revenue ton-miles (a measure of air travel demand) are projected to decline by 2.5 percent.

The economic recovery is projected to increase jet fuel demand by 1.4 percent in 1992; this growth rate lags behind that of travel activity due to increases in both fuel efficiency and average load factors. Revenue ton-miles are projected to increase by 5.6 percent; increases in load factor are expected to constrain the increase in available capacity to 4.1 percent.

Distillate Fuel Oil

Distillate fuel oil demand is expected to lead petroleum markets out of the slump which developed this year as

a result of the recession and mild weather. Total distillate is expected to be about 250,000 barrels per day above 1990 levels in the fourth quarter of this year and as much as 400,000 barrels per day stronger in the first quarter 1992 compared to the same period in 1991 (Table 6). Much of this growth will result from anticipated increases in economic growth, but much of it depends on the weather and the precise interplay of markets for competing fuels.

With natural gas prices still struggling to pull out of the slump caused by the sluggish economy and consecutive mild winter quarters, it is expected that any recovery in the industrial market (or other markets with the ability to switch between natural gas and other fuels) will induce higher gas consumption rather than fuel oil use, even though most switching has already occurred. Higher diesel fuel consumption hinges mainly on an upsurge in truck traffic which will undoubtedly accompany higher industrial and commercial activity as the economy rebounds. While a normally cold winter probably guarantees a solid gain for distillate fuel in the heating oil market, a very cold winter could yield increases well beyond the requirements for increased space heating. In early 1991, mild winter temperatures left significant excess gas available to industrial and electric utility users who would normally have expected to reduce gas use. The first quarter of 1992 should bring sharp year-over-year gains in industrial fuel oil use even if temperatures only get back to long-term average levels. This would reflect the return to more normal patterns of winter natural gas availability. A more detailed look at the implications for fuel oil markets of various economic growth and weather scenarios is presented in "1991-92 Winter Fuels Outlook" on page 15.

Residual Fuel Oil

While total demand for residual fuel oil is expected to remain below or even with 1990 levels for the rest of this year (and for the year as a whole), the first quarter of 1992 is expected to bring a sizeable recovery in product supplied (Table 6). Electric utility shipments during the winter, which were depressed last year, are expected to be particularly strong as 1992 begins. On average, total residual fuel oil demand is expected to increase by about 160,000 barrels per day for the first 3 months of 1992 compared to the same period 1991.

While the electric utility sector is likely to see some gains in residual fuel oil use throughout 1992, total residual fuel oil demand in 1992 in the mid-price and high-price cases will not grow significantly because of

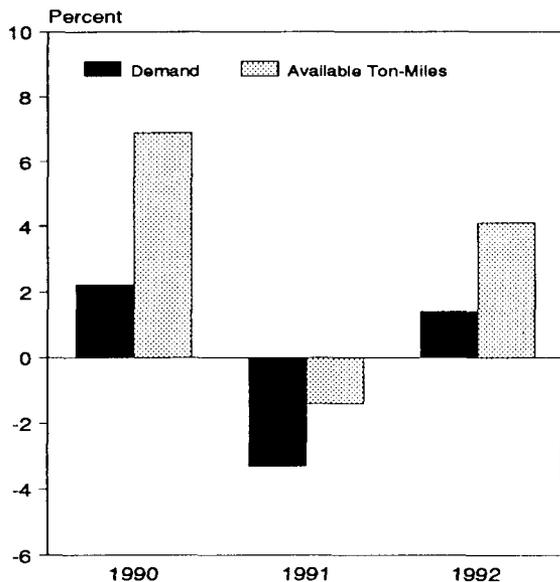


Figure 11. Annual Change in Jet Fuel Demand and Travel

Sources: History: Energy Information Administration, *Petroleum Supply Monthly* (October 1991); and Federal Aviation Administration, Form 41. Projections: Table 6 and internal calculations from the Short-Term Integrated Forecasting System.

efficiency trends and the continuing substitution of other fuels, especially in the nonutility sector. For the low price case, demand is expected to rise somewhat in 1992 (Table 5). Driving this increase in demand is the lower, and therefore more competitive, residual fuel oil price against natural gas and coal.

Other Petroleum Products

Demand for minor petroleum products declined by 0.6 percent in 1990 (Table 6). The impact of increases in industrial and petrochemical activity was offset by the milder-than-average weather in the first quarter of the year. In addition, demand for liquefied petroleum gases (LPG) in 1990 was dampened by price shifts during the first half of the year when oil prices declined, boosting demand for oil-based feedstocks.

In 1991, other petroleum products' demand is projected to decline by 3.0 percent in the mid-price case (Table 6). LPG demand, however, is projected to rise 7.3 percent despite the mild first quarter. That substantial increase is brought about by a recovery in petrochemical activity that started earlier in the year and a sizeable replenishment of secondary stocks from primary inventories, which has contributed to the recent dampening of the normal seasonal buildup of primary stocks. In addition, the decline of oil prices from their Persian Gulf-related peaks of the previous year is expected to boost demand for oil-based feedstocks in 1991. Increases in LPG and feedstock demand, however, are more than offset by a projected 10.8-percent decline in miscellaneous products consumption. Among the factors accounting for that decline are: declines in still gas output due to reduced refinery runs, reduced asphalt and road oil demand stemming from budgetary constraints as well as a weak housing market, and reduced kerosene demand due to mild weather.

The assumed return to normal weather patterns and the onset of an economic recovery are expected to boost demand for minor petroleum products in 1992 by 3.4 percent in the mid-price case. LPG demand is projected to rise by 2.0 percent; oil-based feedstocks are expected to rise by 2.4 percent, and miscellaneous products are projected to rise by 4.3 percent.

1991-92 Winter Fuels Outlook

Supplies of heating oil and natural gas are expected to meet the anticipated winter peak demand. Propane, however, may pose a problem because stocks are low as the heating season approaches. The assumption of normal weather is projected to bring about an increase in demand for heating fuels from that of last winter, which was substantially warmer than normal. Nonetheless, heating oil and natural gas supplies would be able to meet the demand of a colder-than-average winter. Propane inventories, however, are lower than those of last year. They would therefore pose a potential problem should a cold snap similar to that of December 1989 reoccur. The resulting tightness in supply would be especially acute if increases in domestic production and imports are insufficient to meet the high demand for propane.

Heating Oil

Demand for distillate fuel oil is projected to increase by 330,000 barrels per day, or 9.2 percent, to 3.36 million barrels per day during the winter season, defined as the period from October 1, 1991, to March 31, 1992. The assumption of normal weather patterns, which contrasts with a season that was 9.2 percent warmer than normal in 1990-91, accounts for part of the increase, including about 80,000 barrels per day in the residential/commercial sector, despite continued erosion of market share to natural gas. Transportation and industrial demand is expected to increase by about 240,000 barrels per day as a result of the ongoing recovery in industrial production as well as a substantial decline in fuel prices from last season's high levels brought about by events in the Persian Gulf.

Domestic refinery production is expected to account for 3.07 million barrels per day, or 91.1 percent of winter distillate requirements, compared to 2.89 million barrels per day during the same period last year. This is based on a refinery utilization rate of 88.5 percent and an average distillate yield of 22.3 percent. These rates contrast with last winter's rates of 83.4 and 21.5 percent, respectively. Net imports are projected to average 97,000 barrels per day, or 2.9 percent of demand, compared to net exports of 65,000 barrels per day last winter. Primary inventory drawdown is projected to account for 202,000 barrels per day, or 6.0 percent of winter demand, similar to last year's stock draw of 207,000 barrels per day.

A severe winter could be met by additional supplies from each of the three sources: production, imports, and inventories. "Severe" refers to a winter whose heating-degree days for each month equal the 10-year high for that month. In such a winter, heating-degree days would be 18.7 percent higher than normal, resulting in an additional 235,000 barrels-per-day, or 7.8 percent, increase in total winter distillate requirements. In previous winters, refinery utilization and yields for any given winter quarter have been as high as 86.5 percent and 23.8 percent, respectively. Since these would be regarded as indicators of sustainable refinery distillate production for an entire winter, refinery output could reach 3.275 million barrels per day, sufficient to meet 92.3 percent of the requirements of a severe winter and 98.9 percent of normal demand. Moreover, short-term, or monthly, refinery production has exceeded those estimates, indicating that refineries can produce additional quantities to meet unanticipated peak requirements.

Even though refineries are able to respond quickly to meet additional demand, imports have usually provided the bulk of additional requirements brought about by severe winter weather. Net imports of distillate have averaged as much as 314,000 barrels per day in previous winter quarters. In addition, it is estimated that more than three-quarters of the exports (or 120,000 barrels per day projected for this season) could be diverted to domestic consumption.

Inventories are an additional source of distillate requirements, especially in the short term. The end-of-September estimate for primary inventories is 140 million barrels, 4 million barrels more than a year ago. Although a stock draw of 202,000 barrels per day is projected during the winter months, a withdrawal rate averaging 301,000 barrels per day can be sustained without inventories falling below the threshold of 85 million barrels regarded as the minimum required to avoid spot shortages.

The table, "Winter 1991-92 Distillate Supply/Demand Balances," summarizes the relevant range of heating oil availability by major source for the upcoming winter season. It shows that availability would be more than sufficient to meet the requirements of a severe winter.

Winter 1991-92 Distillate Supply/Demand Balances
(Million Barrels Per Day)

Source	Outlook Forecast	Severe Winter	Potential Availability
Refineries	3.066	3.257	3.275
Net Imports	0.097	0.111	*0.411
Inventories	0.202	0.232	0.301
Total	3.365	3.600	3.987
Demand	3.365	3.600	--

*Includes curtailment of 97,000 barrels per day of exports.

Despite the apparent adequacy of supplies, several problems could arise. First, higher-than-projected economic growth would boost distillate demand. It is estimated that a 1-percent increase in economic growth would boost distillate consumption by an estimated 50,000 barrels per day during the winter season. Although that additional requirement could easily be met from existing sources, the combination of robust economic growth and a severe winter might result in occasional spot shortages if colder-than-average weather persisted for the whole season.

Second, a severe winter may result in substantial increases in petroleum product prices. In particular, the interruptibility of gas supplies to industrial and utility customers may be an additional source of price pressure. Under these conditions, it is estimated that as much as 0.60 trillion cubic feet of interruptible gas above historical averages could raise petroleum products' demand by as much as 280,000 barrels per day during periods of severe weather.⁹

Third, recent substantial declines in secondary storage capacity could create spot shortages during a severe winter, even if primary inventories were ample. Much of that decline has resulted from recently enacted pollution control requirements and liability concerns on the part of both secondary storage holders and transportation operators.

Natural Gas

Total natural gas demand for the winter months is projected to be 11.28 trillion cubic feet, an increase of

0.37 trillion cubic feet from the same period a year ago. Residential and commercial demand, however, is projected to increase by 0.30 trillion cubic feet, or 5.9 percent, under assumptions of a normal winter. Utility demand is projected to increase by 0.05 trillion cubic feet, or 4.8 percent. Industrial demand, despite the ongoing economic recovery, is projected to fall 0.08 trillion cubic feet, largely as a result of fuel switching induced by the precipitous decline in petroleum prices from those of the previous winter.

As in the heating oil case, supplies should be more than adequate to meet the requirements of a severe winter. The table, "Winter 1991-92 Natural Gas Supply/Demand Balances," summarizes the base case projections for potential gas availability.

Winter 1991-92 Natural Gas Supply/Demand Balances
(Trillion Cubic Feet)

Source	Outlook Forecast	Severe Winter
Production*	9.237	9.473
Net Imports	0.833	0.833
Inventories	1.494	1.593
Discrepancy**	-0.299	0.162
Total	11.277	12.011
Consumption	11.277	12.011

*Includes supplementals of 0.057 trillion cubic feet.

**Statistical discrepancy between calculated demand and supply.

The table indicates that natural gas demand would increase by an additional 0.73 trillion cubic feet in the event of a severe winter. Production and inventory changes are expected to meet the increased demand, while net imports are assumed to remain constant.

Potential availability of natural gas, however, exceeds that demand projected in the *Outlook* under assumptions of normal weather by a wide margin. Potential domestic production, including supplemental gas, is estimated to be 11.4 trillion cubic feet. This estimate exceeds the *Outlook* consumption volume for this winter by more than 2 trillion cubic feet.¹⁰

Supplying this volume to end-users depends on both avoiding a recurrence of production problems that may arise under severe weather conditions, and the ability of the transmission and distribution network to move the gas from the production fields. In severe circumstances, higher flows of net imports are probable, but a specific estimate of incremental supplies is highly uncertain because the conditions affecting the availability of additional supplies from foreign sources may vary greatly in any likely scenario.

Supplies from net imports (including interruptible exports) could increase significantly depending on the circumstances. For the first 7 months of 1991, total net imports of natural gas increased by 10.4 percent compared to the same period a year ago.¹¹ However, because it is possible that cold weather conditions could negatively affect availability of Canadian imports, it is assumed that little or no availability from imports above the base case level would exist in any severe weather situation. While under 1.6 trillion cubic feet of winter gas supplies from primary storage is anticipated for the winter even in a severe weather case, much more gas from inventories could theoretically be made available.

The maximum potential primary stock draw for the whole winter would be 3.42 trillion cubic feet assuming a complete drawdown of working gas during the winter from end-of-September levels. It is unlikely that the maximum draw rate would be observed. It should be noted that the distribution system accommodated a monthly record withdrawal of 0.821 trillion cubic feet in December 1989.¹² This indicates that a drawdown of working gas storage to levels below the previous low of 1.57 trillion cubic feet recorded in the first quarter of 1984 represents a substantial source of additional potential supply if needed.

Propane

Liquefied petroleum gas (LPG) demand for the winter months is projected to be 1.87 million barrels per day, an increase of 70,000 barrels per day, or 3.9 percent, from that of the previous winter. Although the *Outlook* does not provide separate projections for each LPG product, it is assumed that propane accounts for the bulk of weather-related fluctuations in LPG demand.

It is estimated that a severe winter would result in an increase of 130,000 barrels per day in propane demand. Increases in domestic refinery throughput as a result of cold weather would boost crude oil-related propane production by as much as 70,000 barrels per day. In addition, increases in gas plant processing supplies would boost potential propane supplies from that source by as much as 50,000 barrels per day. Although net imports have declined in recent years (averaging just over 50,000 barrels per day in 1991), they were a record 142,000 barrels per day during the first quarter of 1990, having reached 186,000 barrels per day in January of that year.

Inventories, however, are the most problematical source of propane availability. The end-of-September primary inventories are estimated to be 53 million barrels, 4.3 million barrels below that of the previous year. The traditional seasonal buildup of inventories was constrained by higher-than-expected petrochemical demand due to propane's favorable economics resulting from low natural gas prices and by lower imports. The cold temperatures in December 1989 highlighted the vulnerability of propane inventories to an unanticipated increase in demand. Although inventories were considered to be adequate at the beginning of that winter season, the conditions in December revealed limits to the deliverability of the distribution system that may be a constraint on inventory supplies if additional supplies from domestic production and imports are not forthcoming.

Outlook for Other Major Energy Sources

Natural Gas

Natural gas consumption in 1991 is expected to be 18.7 trillion cubic feet in the mid-price case, somewhat lower than the 1990 level, due mainly to the effects of mild weather in first quarter 1991 and the economic recession. Residential and commercial sector demand increases due to the assumed return to normal winter weather patterns in fourth quarter 1991 serve to counterbalance declining demand in the industrial and electric utility sectors. In 1992, however, total natural gas demand is projected to rise by 4.6 percent to 19.6 trillion cubic feet, the highest annual level for gas use since 1981, as economic recovery increases demand in all major sectors (Table 10).

Lower industrial gas use in 1991 follows from weaker industrial output and rising gas prices by late 1991. With significant recovery in the industrial sector not expected until late this year, and with stable prices and plentiful supplies of fuel oil expected for the rest of 1991, industrial gas use should not improve again until second quarter 1992. In 1992, the economic recovery causes overall industrial gas use to rise by 4.7 percent. Electric utility demand for gas in 1992 increases by 3.2 percent as electricity output increases and as available non-fossil fuel electric power sources level off. Residential and commercial sector demand rises faster in 1992 as higher heating degree-days push up demand for gas for heating.

The continuing weakness in natural gas prices is due to a combination of low residual fuel oil prices, abnormally mild winter weather for the past 2 years, and resulting high gas inventories. Natural gas prices in 1991 are expected to remain below 1990 levels as gas in storage is at a 6-year high, keeping downward pressure on prices (Figure 12). The abnormally mild weather in first quarter 1991 has served to reinforce this situation by restricting inventory drawdown. Gas prices at the wellhead are expected to recover by more than 4 percent in 1992, however, as the economic recovery spurs demand.

Coal

Coal production in 1991 is expected to decrease from last year's record level by 2.3 percent (Table 11), but

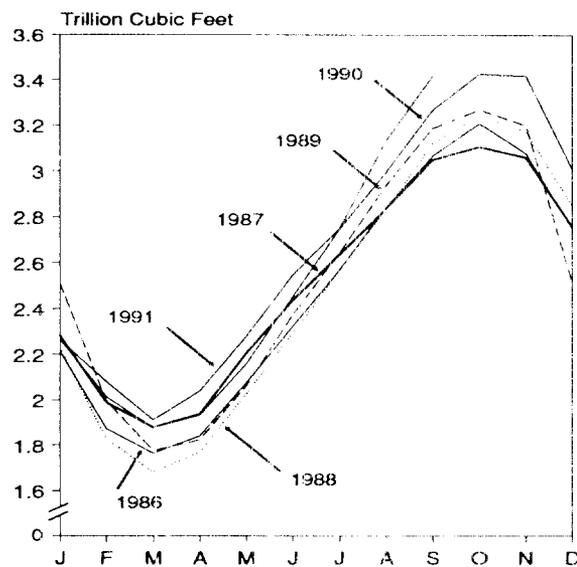


Figure 12. Natural Gas Stocks

Source: Energy Information Administration, *Natural Gas Monthly* (October 1991).

should still remain above the 1 billion ton level. Lowernonutility consumption, reduced exports, and a significant secondary stock build in 1990 contribute to the expected decline in production in 1991. Increases in demand in all sectors lead to a production increase of 2.7 percent in 1992.

Although demand other than electric utility use decreases by roughly 5 percent, total coal consumption will remain virtually flat in 1991 (Table 11). The economic growth projected for 1992 will foster growth in all sectors. Total consumption is expected to increase by 4.2 percent in 1992.

Coal consumption at electric utilities has grown slowly this year and is projected to post a 1.3-percent growth rate for 1991 (Figure 13). In 1992, a stronger economy and declining nuclear generation will cause electric utility coal demand to increase by 4.3 percent.

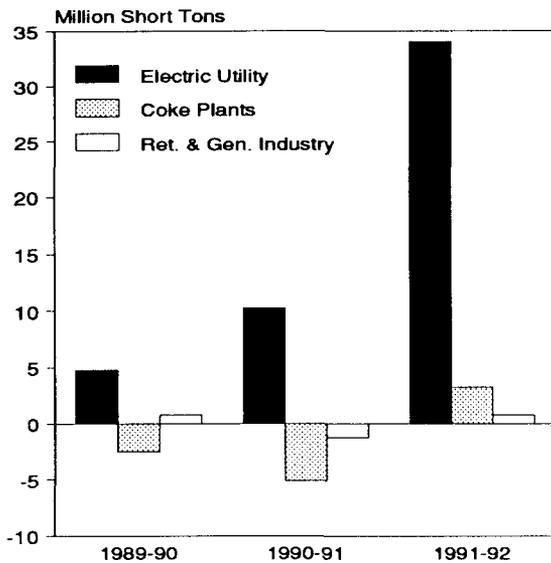


Figure 13. Annual Change In Coal Consumption

Sources: **History:** Energy Information Administration, *Quarterly Coal Report* (Second Quarter 1991). **Projections:** Table 11.

The decline in economic activity in 1991 has caused a substantial reduction in the production of raw steel, resulting in a lower demand for coking coal.¹³ The expected decrease in coking coal consumption is 12.8 percent for all of 1991. A stronger economy, including increased steel demand and production, will cause coal consumption at coke plants to increase by 8.8 percent in 1992.

Consumption of coal in the retail and general industry sectors is also expected to decline slightly in 1991, a result of the weak economy this year. Retail and general industry coal consumption will grow by 1.2 percent in 1992.

Electricity

Demand

Total electricity sales are expected to increase by 3.2 percent in 1992 (Table 12). A modest improvement in the economy and a return to normal, colder weather in the first quarter are the cause of this increase (Table 2). Growth in total sales is expected to be strong in 1991

also, despite the economic recession, because of above normal spring and summer temperatures. The annual increase for this year is expected to be 2.4 percent. If weather had been normal earlier this year and returns to normal for the remainder of the forecast period, electricity sales growth would be expected to be 1.4 percent in 1991 and 3.4 percent in 1992.¹⁴

Growth in electricity demand in the individual sectors should be fairly consistent in 1992 (Figure 14). In contrast, much variance in growth across sectors is anticipated for 1991: the residential sector is expected to be somewhat insulated from the economic recession, sales to the industrial sector decline due to sluggish manufacturing output, and the commercial sector falls somewhere in between with modest growth.

Supply

Growth in total generation differs from total sales by patterns in nonutility supply and net imports. These two sources are expected to continue increasing through 1992 (Table 12). Nonutility supply growth should maintain a steady pace, while net imports should rebound substantially from the low 1990 level. Increases in nonutility sales are based on recent growth trends and announced orders of nonutility generators.

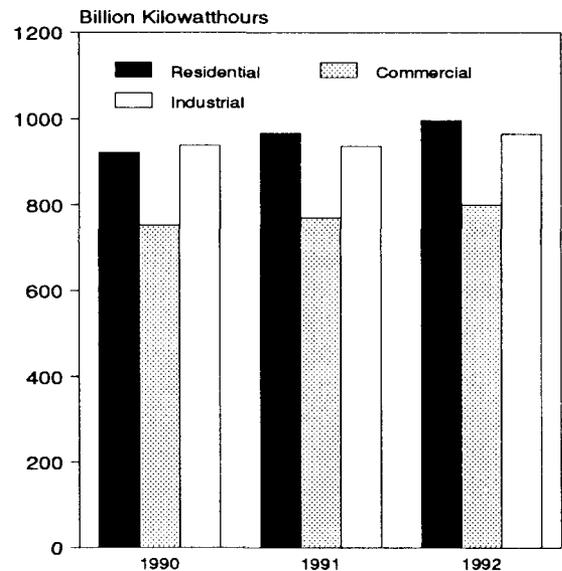


Figure 14. Electricity Sales by Sector

Sources: **History:** Energy Information Administration, *Electric Power Monthly* (October 1991). **Projections:** Table 12.

Imports are not expected to rise as rapidly in 1992 as previously thought. This change is caused by the cancellation of a new contract between Central Maine Power and New Brunswick Electric Power Commission and expected lower demand for imported power, particularly in the Northeast where the economy has slowed considerably.

Increases in generation in 1992 are expected to come primarily from coal. One reason for this is that additional coal capacity is expected to come on line.¹⁵ Nuclear power is expected to decline, and oil and gas are expected to pick up only some of the additional electricity demand. Hydroelectric power is expected to increase in 1992 (based on the assumption of normal precipitation), as regions continue to recover from dry conditions. However, because of the severity of the drought in a number of regions, such as California, it will take a number of years of normal rainfall or significantly higher than normal rainfall in 1991 before water conditions fully recover. The expected decline in nuclear power is caused by normal refueling and

maintenance shutdowns which allow for fewer hours of operation in 1992 than in 1991. This is also reflected in the capacity factors, which were at historical highs during 1991 but are assumed to be slightly lower in 1992.

This situation is somewhat of a contrast to that expected for 1991. Lower expectations for total electricity should put less demand on all sources of generation. Nuclear availability was 68 percent during the first half of 1991, on average. Hydroelectric power availability is expected to increase modestly in 1991 as a number of regions of the country continue to recover from low water conditions. However, because below normal water conditions exist in the Northeast, the Great Plains, and the West, hydroelectric generation will not have reached its full potential. Coal generation should pick up the remaining demand. Thus, the more expensive alternatives, oil and natural gas, are not needed and are expected to decline from 1990 levels in 1991.

References and Notes

1. Energy Information Administration. *Weekly Petroleum Status Report*. DOE/EIA-0208(91-45). (Washington, DC.) Table 13.
2. "Spot Market Report." *Natural Gas Intelligence*. (Washington, DC, September 23, 1991.) Page 4.
3. "Spot Market Report." *Natural Gas Intelligence*. (Washington, DC, September 23, 1991.) Page 4.
4. Energy Information Administration. Form EIA-759. (October 1991.)
5. In August, real personal income fell by 0.2 percent, following recent gains. Housing starts were up sharply in August, while retail sales faltered. Consumer confidence dipped in August after falling in July. Finally, the index of offending economic indicators was flat in August after rising from February through July. (Source: The Economic Bulletin, Board of the U.S. Department of Commerce, Summary Table of Current Business Conditions.)
6. *Energy Report*. (August 26, 1991.)
7. The deviation from the average December heating degree-days for the Northeast in December 1989 was 2.32 times the standard deviation for December. Assuming a normal distribution, this implies a probability of equalling or exceeding the December 1989 record of about 1 percent.
8. The oil demand sensitivity factors were derived from internal calculations of the Demand Models of the Short-Term Integrated Forecasting System. The oil supply sensitivity was derived implicitly from Tables 5 and 7 and includes uncertainty components not strictly related to price variation.
9. Based on information provided in the following service report. Energy Information Administration. "Effects of Interruptible Natural Gas Service: Winter 1989-1990." DOE/EIA-SR/OG/91-01. (Washington, DC, July 1991.)
10. Energy Information Administration. *Natural Gas Productive Capacity for the Lower 48 States, 1980 through 1991*. DOE/EIA-0542. (Washington, DC, January 1991.) Table 2. The estimate includes 0.110 and 0.057 trillion cubic feet for Alaskan and supplemental production, respectively, to facilitate comparison with the supply/demand balances presented in the table.
11. Energy Information Administration. *Monthly Energy Review*. DOE/EIA-0035. (Washington, DC.) Table 4.2.
12. Energy Information Administration. *Natural Gas Monthly*. DOE/EIA-0130. (Washington, DC, various issues.) Table 2.
13. Steel production forecasts are produced by a sub-model in the Coking Coal Demand Model of the Short-Term Integrated Forecasting System.
14. Based on internal calculations from the Electricity Model of the Short-Term Integrated Forecasting System.
15. Based on internal calculations from the Electricity Model of the Short-Term Integrated Forecasting System.

Table 2. Macroeconomic, Oil Price, and Weather Assumptions

Assumption	1990				1991			Case	1991	1992					Year			
	1st	2nd	3rd	4th	1st	2nd	3rd		4th	1st	2nd	3rd	4th	1990	1991	1992		
Macroeconomic^a																		
Real Gross National Product (billion 1982 dollars)	4151	4155	4170	4153	4124	4123	4158		High	4204	4272	4331	4366	4388		4152	4339	
									Mid	4184	4222	4254	4276	4298	4157	4147	4263	
									Low	4165	4171	4177	4187	4208		4142	4186	
Percentage Change from Prior Year	1.4	0.8	1.0	0.5	-0.7	-0.8	-0.3		High	1.2	3.6	5.0	5.0	4.4		-0.1	4.5	
									Mid	0.7	2.4	3.2	2.8	2.7	0.9	-0.2	2.8	
									Low	0.3	1.1	1.3	0.7	1.0		-0.4	1.1	
GNP Implicit Price Deflator (index, 1982=1.000)	1.295	1.310	1.322	1.331	1.348	1.362	1.370		High	1.377	1.384	1.391	1.399	1.409		1.364	1.396	
									Mid	1.379	1.389	1.399	1.408	1.418	1.314	1.365	1.404	
									Low	1.382	1.394	1.407	1.417	1.427		1.365	1.411	
Percentage Change from Prior Year	3.9	4.1	4.2	4.0	4.1	4.0	3.6		High	3.5	2.7	2.1	2.1	2.3		3.8	2.3	
									Mid	3.6	3.0	2.7	2.8	2.8	4.0	3.9	2.9	
									Low	3.8	3.4	3.3	3.4	3.3		3.9	3.4	
Real Disposable Personal Income ^b (billion 1982 dollars)	2901	2903	2898	2872	2862	2879	2889		High	2905	2952	2986	3006	3021		2884	2991	
									Mid	2891	2915	2930	2941	2955	2894	2880	2935	
									Low	2877	2879	2875	2876	2890		2877	2880	
Percentage Change from Prior Year	1.3	1.7	0.8	-0.4	-1.3	-0.8	-0.3		High	1.1	3.1	3.7	4.0	4.0		-0.3	3.7	
									Mid	0.7	1.9	1.8	1.8	2.2	0.9	-0.5	1.9	
									Low	0.2	0.6	-0.1	-0.4	0.5		-0.6	0.1	
Index of Industrial Production (Mfg.) (index, 1987=1.000)	1.092	1.102	1.111	1.090	1.061	1.066	1.085		High	1.112	1.144	1.167	1.182	1.190		1.081	1.171	
									Mid	1.100	1.114	1.122	1.129	1.136	1.099	1.078	1.125	
									Low	1.088	1.084	1.076	1.076	1.082		1.075	1.079	
Percentage Change from Prior Year	0.5	0.8	2.0	0.3	-2.8	-3.3	-2.3		High	2.0	7.8	9.5	8.9	7.0		-1.6	8.3	
									Mid	0.9	5.0	5.3	4.1	3.3	0.9	-1.9	4.4	
									Low	-0.2	2.2	0.9	-0.8	-0.6		-2.2	0.4	
OECD Economic Growth																2.3	1.0	2.7
Weather^c																		
Heating Degree Days	1970	553	75	1529	2187	418	89			1669	2425	536	88	1669	4127	4363	4719	
Cooling Degree Days	47	335	760	73	36	420	798			63	28	327	755	63	1215	1317	1172	

^aMacroeconomic projections from the Data Resources, Inc., model forecasts are seasonally adjusted at annual rates and modified as appropriate to the mid world oil price case. The mid macroeconomic projections are then modified by the \$16 and \$22 world price cases and by various explicit economic assumptions, with \$16 world oil prices applied to the high macroeconomic case, and \$22 world oil prices applied to the low macroeconomic case.

^bSeasonally adjusted at annual rates.

^cPopulation-weighted average degree days. A degree day indicates the temperature variation from 65 degrees Fahrenheit (calculated as the simple average of the daily minimum and maximum temperatures) weighted by 1980 population.

Note: Historical values are printed in boldface, forecasts in italics. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BBB16:16 and S100791BBB13:39 for the middle oil price case; D100491HSL14:50 and S100791HSL15:13 for the low oil price case; and D100491LGS13:54 and S100791LGS15:02 for the high oil price case.

Source: Historical data: Energy Information Administration, *Monthly Energy Review*, DOE/EIA-0035(91/10); U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, September 1991; U.S. Department of Commerce, National Oceanic and Atmospheric Administration, *Monthly State, Regional, and National Heating/Cooling Degree Days Weighted by Population*, Federal Reserve System, *Statistical Release G.17(419)* September 1991. Macroeconomic projections are based on DRI/McGraw-Hill Forecast CONTROL991.

Table 3. International Petroleum Balance: Mid World Oil Price Case
(Million Barrels per Day, Except Closing Stocks)

	1990				1991				1992				Year		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1990	1991	1992
Demand															
OECD															
U.S. (50 States)	17.07	16.95	17.22	16.71	16.43	16.32	16.76	17.06	17.28	16.49	16.71	17.21	16.99	16.65	16.92
U.S. Territories	0.20	0.17	0.20	0.24	0.26	0.25	0.22	0.21	0.22	0.23	0.23	0.22	0.20	0.23	0.23
Canada	1.72	1.65	1.76	1.67	1.58	1.64	1.78	1.87	1.71	1.69	1.77	1.85	1.70	1.72	1.76
Europe ^a	13.13	12.58	12.92	12.89	13.40	13.02	12.53	13.50	13.50	12.69	12.97	13.77	12.88	13.11	13.23
Japan	5.70	4.63	5.15	5.41	5.95	4.96	4.94	5.50	6.04	4.81	4.99	5.94	5.22	5.34	5.45
Australia and New Zealand	0.82	0.84	0.85	0.80	0.80	0.80	0.86	0.88	0.82	0.86	0.85	0.87	0.83	0.84	0.85
Total OECD	38.63	36.81	38.10	37.73	38.41	37.00	37.10	39.02	39.57	36.77	37.51	39.87	37.82	37.88	38.43
Non-OECD															
U.S.S.R.	8.95	8.18	8.02	8.46	8.53	8.03	7.46	7.95	7.97	7.50	7.39	7.55	8.40	7.99	7.60
China	2.36	2.36	2.26	2.16	2.33	2.39	2.44	2.44	2.38	2.44	2.49	2.49	2.28	2.40	2.45
Europe	1.69	1.67	1.58	1.64	1.51	1.55	1.48	1.52	1.50	1.55	1.47	1.52	1.64	1.51	1.51
Other Non-OECD	15.80	15.37	15.75	16.11	16.42	16.05	16.11	16.72	16.77	16.67	16.71	17.40	15.76	16.32	16.89
Total Non-OECD	28.78	27.58	27.60	28.37	28.79	28.01	27.49	28.63	28.62	28.15	28.06	28.95	28.08	28.23	28.45
Total World	67.42	64.40	65.70	66.09	67.19	65.01	64.59	67.65	68.19	64.93	65.58	68.82	65.90	66.11	68.88
Supply^b															
OECD															
U.S. (50 States)	9.81	9.51	9.53	9.87	9.90	9.74	9.67	9.70	9.59	9.47	9.36	9.49	9.68	9.75	9.47
Canada	2.00	1.96	1.94	2.01	2.04	2.01	1.86	1.89	1.93	1.93	1.93	1.93	1.98	1.95	1.93
North Sea ^c	3.91	3.90	3.51	3.93	4.08	3.63	3.85	4.35	4.36	3.96	4.16	4.36	3.81	3.98	4.21
Other OECD	1.42	1.45	1.51	1.49	1.53	1.47	1.47	1.50	1.47	1.47	1.47	1.47	1.47	1.49	1.47
Total OECD	17.14	16.81	16.48	17.29	17.54	16.85	16.86	17.44	17.35	16.83	16.92	17.25	16.93	17.17	17.08
Non-OECD															
OPEC	25.28	25.48	23.89	25.02	24.95	24.50	25.60	25.80	26.15	25.70	26.55	26.90	24.91	25.21	26.33
U.S.S.R.	11.90	11.65	11.29	10.90	10.73	10.52	10.08	9.90	9.73	9.52	9.08	8.90	11.43	10.30	9.30
China	2.78	2.75	2.76	2.78	2.79	2.80	2.81	2.81	2.81	2.81	2.81	2.81	2.77	2.80	2.81
Mexico	2.95	2.92	2.99	3.14	3.15	3.17	3.19	3.19	3.22	3.22	3.22	3.22	3.00	3.17	3.22
Other Non-OECD	7.36	7.40	7.40	7.50	7.55	7.52	7.51	7.57	7.61	7.70	7.77	7.84	7.42	7.54	7.73
Total Non-OECD	50.26	50.20	48.34	49.34	49.17	48.50	49.19	49.26	49.52	48.94	49.42	49.66	49.53	49.03	49.39
Total World	67.40	67.00	64.82	66.63	66.71	65.34	66.04	66.70	66.87	65.77	66.34	66.91	66.46	66.20	66.47
Stock Changes and Statistical Discrepancy															
Net Stock Withdrawals or Additions (-)															
U.S. (50 States including SPR)	-0.67	-0.47	-0.14	0.84	0.69	-0.82	-0.36	0.38	0.50	-0.54	-0.34	0.28	-0.11	-0.03	-0.02
Other	-0.30	-0.91	0.40	-1.16	-0.03	0.45	-1.47	0.27	0.53	-0.60	-0.72	1.34	-0.49	-0.20	0.14
Total Stock Withdrawals	-0.97	-1.38	0.25	-0.31	0.65	-0.37	-1.83	0.65	1.03	-1.14	-1.05	1.62	-0.60	-0.23	0.11
Statistical Discrepancy	0.98	-1.23	0.63	-0.22	-0.17	0.04	0.37	0.29	0.30	0.30	0.29	0.29	0.04	0.14	0.30
Closing Stocks (billion barrels) ^d	5.43	5.55	5.53	5.56	5.50	5.53	5.70	5.64	5.55	5.65	5.75	5.60	5.56	5.64	5.60
Market Economies Demand ^e	54.11	51.87	53.53	53.52	54.54	52.76	52.93	55.45	56.08	53.18	53.96	57.00	53.26	53.92	55.06
Net Exports from Former CPEs	1.80	2.32	2.32	1.53	1.27	1.47	1.62	0.92	0.82	0.97	0.67	0.30	1.99	1.32	0.69

^aOECD Europe includes eastern Germany.

^bIncludes production of crude oil (including lease condensates), natural gas plant liquids, other hydrogen and hydrocarbons for refinery feedstocks, refinery gains, alcohol, and liquids produced from coal and other sources.

^cIncludes offshore supply from Denmark, Germany, the Netherlands, Norway, and the United Kingdom.

^dExcludes stocks held in the Former CPEs (defined below).

^eExcludes demand from the Former CPEs (defined below).

Former CPEs: Albania, Bulgaria, Cambodia, China, Cuba, Czechoslovakia, Hungary, Laos, Mongolia, North Korea, Poland, Romania, the Union of Soviet Socialist Republics, Vietnam, and Yugoslavia.

OECD: Organization for Economic Cooperation and Development

OPEC: Organization of Petroleum Exporting Countries

SPR: Strategic Petroleum Reserve

Notes: Minor discrepancies with other published EIA historical data are due to rounding. Historical values are printed in **boldface**, forecasts in *italics*. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BBB16:16 and S100791BBB13:39 for the middle oil price case.

Sources: Energy Information Administration, *International Petroleum Statistics Report*, DOE/EIA-0529(91/08); and *International Energy Annual 1989*, DOE/EIA-0219(89); Organization for Economic Cooperation and Development, Annual and Monthly Oil Statistics Database through March 1991.

**Table 4. Energy Prices
(Nominal Dollars)**

Product	1990				1991			Price Range	1991	1992				Year		
	1st	2nd	3rd	4th	1st	2nd	3rd		4th	1st	2nd	3rd	4th	1990	1991	1992
Imported Crude Oil Price^a (dollars per barrel)	19.76	15.85	23.16	29.71	19.40	18.06	19.03	Low	18.00	18.00	17.00	17.00	17.00	18.59	17.23	
								Mid	20.00	20.00	20.00	20.00	20.00	21.77	19.11	20.00
								High	23.00	23.00	23.00	23.00	23.00	19.87	23.00	
Natural Gas Wellhead Price (dollars per thousand cubic feet)	1.88	1.49	1.53	1.95	1.67	1.45	1.49	Low	1.80	1.69	1.38	1.48	1.85	1.60	1.61	
								Mid	1.88	1.78	1.48	1.56	1.95	1.72	1.63	1.70
								High	1.97	1.90	1.58	1.68	2.06	1.66	1.82	
Petroleum Products																
Gasoline ^b (dollars per gallon)	1.08	1.12	1.24	1.42	1.21	1.19	1.19	Low	1.19	1.13	1.20	1.22	1.21	1.20	1.19	
								Mid	1.21	1.17	1.25	1.28	1.27	1.22	1.20	1.24
								High	1.26	1.23	1.32	1.34	1.34	1.21	1.31	
No. 2 Diesel Oil, Retail (dollars per gallon)	1.10	1.00	1.17	1.39	1.20	1.08	1.11	Low	1.16	1.16	1.10	1.11	1.17	1.13	1.14	
								Mid	1.21	1.21	1.16	1.17	1.24	1.17	1.15	1.20
								High	1.28	1.28	1.23	1.24	1.31	1.16	1.26	
No. 2 Heating Oil, Wholesale (dollars per gallon)	0.63	0.54	0.70	0.89	0.69	0.56	0.58	Low	0.59	0.60	0.54	0.53	0.56	0.61	0.56	
								Mid	0.63	0.65	0.61	0.60	0.63	0.70	0.62	0.63
								High	0.71	0.72	0.69	0.68	0.71	0.64	0.70	
No. 2 Heating Oil, Retail (dollars per gallon)	1.03	0.91	1.01	1.22	1.11	0.94	0.90	Low	0.98	1.01	0.94	0.91	0.98	0.99	0.97	
								Mid	1.02	1.06	1.00	0.97	1.05	1.06	1.00	1.03
								High	1.08	1.13	1.07	1.04	1.12	1.02	1.10	
No. 6 Residual Fuel Oil ^c (dollars per barrel)	19.27	14.03	17.41	24.41	17.50	12.68	13.90	Low	15.73	16.77	14.74	14.94	16.45	15.00	15.85	
								Mid	16.98	17.95	16.60	16.82	18.26	18.64	15.24	17.43
								High	19.22	20.34	18.74	18.93	20.64	15.73	19.74	
Electric Utility Fuels																
Coal (dollars per million Btu)	1.46	1.47	1.45	1.44	1.46	1.47	1.45	Low	1.43	1.42	1.41	1.38	1.38	1.45	1.40	
								Mid	1.46	1.47	1.48	1.46	1.47	1.45	1.46	1.47
								High	1.49	1.51	1.53	1.52	1.53	1.47	1.52	
Heavy Oil ^d (dollars per million Btu)	3.49	2.38	3.12	4.31	2.91	2.24	2.22	Low	2.53	2.66	2.34	2.36	2.65	2.47	2.52	
								Mid	2.71	2.82	2.65	2.68	2.92	3.22	2.50	2.76
								High	3.07	3.20	2.98	3.02	3.31	2.57	3.13	
Natural Gas (dollars per million Btu)	2.62	2.14	2.15	2.60	2.40	1.99	1.98	Low	2.26	2.32	1.99	2.02	2.36	2.12	2.14	
								Mid	2.36	2.42	2.11	2.16	2.50	2.32	2.14	2.27
								High	2.50	2.60	2.27	2.32	2.68	2.18	2.45	
Other Residential																
Natural Gas (dollars per thousand cubic feet)	5.53	5.91	6.97	5.70	5.56	6.21	7.14	Low	5.77	5.55	5.99	7.06	5.89	5.85	5.83	
								Mid	5.87	5.68	6.14	7.25	6.03	5.77	5.88	5.98
								High	6.04	5.88	6.39	7.56	6.28	5.93	6.23	
Electricity (cents per kilowatthour)	7.4	7.9	8.2	7.8	7.6	8.2	8.3	Low	7.6	7.6	8.1	8.4	7.9	7.9	8.0	
								Mid	7.9	7.8	8.4	8.6	8.2	7.8	8.0	8.2
								High	8.1	8.0	8.6	8.9	8.4	8.1	8.5	

^aCost of imported crude oil to U.S. refiners.

^bAverage retail for all grades and services.

^cRetail residual fuel oil-average, all sulfur contents.

^dHeavy fuel oil prices include fuel oils No. 4, No. 5, and No. 6, and topped crude fuel oil prices.

Notes: Second quarter 1991 is estimated. Prices exclude taxes, except gasoline, residential natural gas, and diesel prices. Price ranges are derived by simulating all energy product price models in STIFS under the assumptions of: \$16 world oil prices (low price), \$20 world oil prices (mid price), and \$22 world oil prices (high price), with macroeconomic and weather assumptions kept as in the mid case for all cases. Historical values are printed in boldface, forecasts in italics. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BBB16:16 and S100991BBB14:39 for the middle oil price case; D100491HSL14:50 and S100991HSL15:47 for the low oil price case; and D100491LGS13:54 and S100991LGS15:20 for the high oil price case.

Sources: Historical data: Energy Information Administration, *Monthly Energy Review*, DOE/EIA-0035(91/10); and *Petroleum Marketing Monthly*, DOE/EIA-0380(91/10).

Table 5. Supply and Disposition of Petroleum: Low World Oil Price Case
(Million Barrels per Day, Except Closing Stocks)

Supply and Disposition	1990				1991				1992				Year		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1990	1991	1992
Supply															
Crude Oil Supply															
Domestic Production ^a	7.49	7.28	7.23	7.42	7.48	7.37	7.30	7.20	7.09	6.95	6.78	6.82	7.36	7.34	6.91
Alaska	1.84	1.73	1.71	1.82	1.88	1.77	1.77	1.77	1.70	1.66	1.56	1.64	1.77	1.80	1.64
Lower 48	5.65	5.55	5.52	5.60	5.60	5.60	5.53	5.43	5.39	5.29	5.22	5.18	5.58	5.54	5.27
Net Imports (Including SPR) ^b	5.96	6.13	6.26	4.81	5.19	5.94	6.16	5.93	6.16	6.45	6.81	6.42	5.79	5.81	6.46
Gross Imports (Excluding SPR)	6.05	6.18	6.30	4.94	5.30	6.08	6.27	6.06	6.28	6.54	6.84	6.53	5.87	5.93	6.55
SPR Imports	0.03	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.03	0.00	0.03
Exports	0.12	0.10	0.07	0.13	0.11	0.14	0.11	0.14	0.12	0.14	0.08	0.14	0.11	0.12	0.12
SPR Stock Withdrawn or Added (-)	-0.03	-0.05	-0.03	0.04	0.19	0.00	0.00	0.00	0.00	-0.05	-0.05	-0.03	-0.02	0.05	-0.03
Other Stock Withdrawn or Added (-)	-0.33	-0.15	0.45	0.22	-0.16	-0.12	0.11	-0.01	-0.07	-0.03	0.07	0.03	0.05	-0.04	0.00
Product Supplied and Losses	-0.03	-0.03	-0.02	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Unaccounted-for Crude	0.22	0.19	0.27	0.35	0.18	0.32	0.22	0.15	0.15	0.15	0.14	0.14	0.26	0.22	0.15
Crude Oil Input to Refineries	13.28	13.38	14.15	12.83	12.86	13.50	13.77	13.24	13.31	13.44	13.72	13.37	13.41	13.35	13.46
Other Supply															
NGL Production	1.55	1.48	1.55	1.65	1.66	1.64	1.60	1.62	1.63	1.61	1.60	1.62	1.56	1.63	1.62
Other Hydrocarbon and Alcohol Inputs	0.08	0.08	0.07	0.08	0.08	0.09	0.08	0.11	0.10	0.10	0.15	0.20	0.08	0.09	0.14
Crude Oil Product Supplied	0.03	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Processing Gain	0.69	0.65	0.68	0.71	0.67	0.64	0.69	0.67	0.66	0.68	0.69	0.69	0.68	0.67	0.68
Net Product Imports ^c	1.76	1.60	1.31	0.84	0.44	1.14	1.07	1.06	1.07	1.21	1.02	1.18	1.38	0.93	1.12
Gross Product Imports ^c	2.44	2.25	2.03	1.78	1.52	1.94	1.80	1.82	1.80	1.89	1.68	1.94	2.12	1.77	1.82
Product Exports	0.68	0.65	0.72	0.94	1.07	0.80	0.73	0.76	0.73	0.67	0.66	0.76	0.75	0.84	0.70
Product Stock Withdrawn or Added (-) ^d	-0.32	-0.28	-0.56	0.58	0.65	-0.70	-0.47	0.37	0.56	-0.47	-0.36	0.27	-0.14	-0.04	0.00
Total Product Supplied, Domestic Use	17.07	16.95	17.22	16.71	16.40	16.32	16.76	17.10	17.35	16.60	16.85	17.34	16.99	16.65	17.04
Disposition															
Motor Gasoline	7.05	7.33	7.41	7.15	6.83	7.36	7.41	7.23	6.95	7.31	7.39	7.25	7.23	7.21	7.23
Jet Fuel	1.52	1.50	1.50	1.57	1.50	1.38	1.50	1.50	1.51	1.43	1.49	1.56	1.52	1.47	1.49
Distillate Fuel Oil	3.24	2.95	2.94	2.95	3.11	2.79	2.78	3.22	3.55	2.94	2.79	3.30	3.02	2.97	3.14
Residual Fuel Oil	1.42	1.23	1.18	1.10	1.19	1.13	1.08	1.17	1.38	1.05	1.08	1.23	1.23	1.15	1.18
Other Oils Supplied ^e	3.84	3.93	4.20	3.94	3.79	3.65	3.99	3.97	3.97	3.86	4.10	4.01	3.98	3.85	3.99
Total Product Supplied	17.07	16.95	17.22	16.71	16.43	16.32	16.76	17.10	17.35	16.60	16.85	17.34	16.99	16.66	17.04
Total Petroleum Net Imports	7.72	7.73	7.57	5.64	5.63	7.08	7.23	6.99	7.23	7.66	7.83	7.60	7.16	6.74	7.58
Closing Stocks (million barrels)															
Crude Oil (Excluding SPR) ^f	371	384	343	323	337	348	338	338	345	348	342	340	323	338	340
Total Motor Gasoline	227	213	229	220	211	215	214	226	226	221	227	228	220	226	228
Finished Motor Gasoline	186	176	188	181	173	177	177	185	185	182	184	187	181	185	187
Blending Components	42	37	41	39	39	38	37	41	41	39	43	41	39	41	41
Jet Fuel	49	47	50	52	45	49	51	48	46	48	50	48	52	48	48
Distillate Fuel Oil	99	110	136	132	98	113	140	133	104	111	126	135	132	133	135
Residual Fuel Oil	46	47	49	49	43	43	48	44	42	45	46	44	49	44	44
Other Oils ^g	267	298	302	260	257	297	307	276	257	293	303	273	260	276	273
Total Stocks (Excluding SPR)	1060	1098	1109	1035	990	1065	1098	1065	1021	1067	1094	1067	1035	1065	1067
Crude Oil in SPR	582	587	590	586	568	568	569	569	569	573	578	580	586	569	580
Total Stocks (Including SPR)	1642	1685	1698	1621	1559	1634	1667	1633	1589	1640	1671	1647	1621	1633	1647

^aIncludes lease condensate.

^bNet imports equals gross imports plus SPR imports minus exports.

^cIncludes finished petroleum products, unfinished oils, gasoline blending components, and natural gas plant liquids for processing.

^dIncludes an estimate of minor product stock change based on monthly data.

^eIncludes crude oil product supplied, natural gas liquids, liquefied refinery gas, other liquids, and all finished petroleum products except motor gasoline, jet fuel, distillate, and residual fuel oil.

^fIncludes crude oil in transit to refineries.

^gIncludes stocks of all other oils such as aviation gasoline, kerosene, natural gas liquids (including ethane), aviation gasoline blending components, naphtha and other oils for petrochemical feedstock use, special naphthas, lube oils, wax, coke, asphalt, road oil, and miscellaneous oils.

SPR: Strategic Petroleum Reserve

NGL: Natural Gas Liquids

Notes: Minor discrepancies with other EIA published historical data are due to rounding. Historical values are printed in boldface, forecasts in italics. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BSB17:02 and S100991BSB13:49 for the low oil price case.

Sources: Historical data: Energy Information Administration, *Petroleum Supply Annual 1990*, DOE/EIA-0340(90)/1; *Petroleum Supply Monthly*, DOE/EIA-0109, Jan. 1991 to July 1991; and *Weekly Petroleum Status Report*, DOE/EIA-0208(various issues).

Table 6. Supply and Disposition of Petroleum: Mid World Oil Price Case
(Million Barrels per Day, Except Closing Stocks)

Supply and Disposition	1990				1991				1992				Year		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1990	1991	1992
Supply															
Crude Oil Supply															
Domestic Production ^a	7.49	7.28	7.23	7.42	7.48	7.37	7.30	7.29	7.20	7.07	6.92	6.98	7.36	7.36	7.04
Alaska	1.84	1.73	1.71	1.82	1.88	1.77	1.77	1.79	1.72	1.68	1.58	1.66	1.77	1.81	1.66
Lower 48	5.65	5.55	5.52	5.60	5.60	5.60	5.53	5.49	5.47	5.39	5.33	5.31	5.58	5.56	5.38
Net Imports (Including SPR) ^b	5.96	6.13	6.26	4.81	5.19	5.94	6.16	5.81	6.01	6.26	6.60	6.16	5.79	5.78	6.26
Gross Imports (Excluding SPR)	6.05	6.18	6.30	4.94	5.30	6.08	6.27	5.95	6.12	6.34	6.63	6.27	5.87	5.90	6.34
SPR Imports	0.03	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.03	0.00	0.03
Exports	0.12	0.10	0.07	0.13	0.11	0.14	0.11	0.14	0.12	0.14	0.08	0.14	0.11	0.12	0.12
SPR Stock Withdrawn or Added (-)	-0.03	-0.05	-0.03	0.04	0.19	0.00	0.00	0.00	0.00	-0.05	-0.05	-0.03	-0.02	0.05	-0.03
Other Stock Withdrawn or Added (-)	-0.33	-0.15	0.45	0.22	-0.16	-0.12	0.11	0.00	-0.07	-0.03	0.07	0.03	0.05	-0.04	0.00
Product Supplied and Losses	-0.03	-0.03	-0.02	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Unaccounted-for Crude	0.22	0.19	0.27	0.35	0.18	0.32	0.22	0.14	0.15	0.15	0.14	0.14	0.26	0.21	0.15
Crude Oil Input to Refineries	13.28	13.38	14.15	12.83	12.86	13.50	13.77	13.22	13.26	13.38	13.65	13.26	13.41	13.34	13.39
Other Supply															
NGL Production	1.55	1.48	1.55	1.65	1.66	1.64	1.60	1.62	1.63	1.61	1.60	1.63	1.56	1.63	1.62
Other Hydrocarbon and Alcohol Inputs	0.08	0.08	0.07	0.08	0.08	0.09	0.08	0.11	0.10	0.10	0.15	0.20	0.08	0.09	0.14
Crude Oil Product Supplied	0.03	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Processing Gain	0.69	0.65	0.68	0.71	0.67	0.64	0.69	0.67	0.66	0.68	0.69	0.68	0.68	0.67	0.68
Net Product Imports ^c	1.76	1.60	1.31	0.84	0.44	1.14	1.07	1.03	1.03	1.16	0.95	1.15	1.38	0.92	1.07
Gross Product Imports ^c	2.44	2.25	2.03	1.78	1.52	1.94	1.80	1.79	1.76	1.83	1.60	1.91	2.12	1.76	1.78
Product Exports	0.68	0.65	0.72	0.94	1.07	0.80	0.73	0.76	0.73	0.67	0.66	0.76	0.75	0.84	0.70
Product Stock Withdrawn or Added (-) ^d	-0.32	-0.28	-0.56	0.58	0.65	-0.70	-0.47	0.38	0.57	-0.46	-0.35	0.27	-0.14	-0.04	0.01
Total Product Supplied, Domestic Use	17.07	16.95	17.22	16.71	16.40	16.32	16.76	17.06	17.28	16.49	16.71	17.21	16.99	16.64	16.92
Disposition															
Motor Gasoline	7.05	7.33	7.41	7.15	6.83	7.36	7.41	7.22	6.93	7.28	7.35	7.21	7.23	7.21	7.19
Jet Fuel	1.52	1.50	1.50	1.57	1.50	1.38	1.50	1.50	1.50	1.42	1.48	1.55	1.52	1.47	1.49
Distillate Fuel Oil	3.24	2.95	2.94	2.95	3.11	2.79	2.78	3.20	3.53	2.91	2.75	3.27	3.02	2.97	3.12
Residual Fuel Oil	1.42	1.23	1.18	1.10	1.19	1.13	1.08	1.16	1.35	1.01	1.02	1.17	1.23	1.14	1.13
Other Oils Supplied ^e	3.84	3.93	4.20	3.94	3.79	3.65	3.99	3.98	3.98	3.87	4.11	4.01	3.98	3.86	3.99
Total Product Supplied	17.07	16.95	17.22	16.71	16.43	16.32	16.76	17.06	17.28	16.49	16.71	17.21	16.99	16.65	16.92
Total Petroleum Net Imports	7.72	7.73	7.57	5.64	5.63	7.08	7.23	6.84	7.04	7.41	7.55	7.31	7.16	6.70	7.33
Closing Stocks (million barrels)															
Crude Oil (Excluding SPR) ^f	371	384	343	323	337	348	338	338	344	347	341	338	323	338	338
Total Motor Gasoline	227	213	229	220	211	215	214	226	225	220	226	227	220	226	227
Finished Motor Gasoline	186	176	188	181	173	177	177	185	184	181	183	186	181	185	186
Blending Components	42	37	41	39	38	37	37	41	41	39	43	41	39	41	41
Jet Fuel	49	47	50	52	45	49	51	48	46	48	50	47	52	48	47
Distillate Fuel Oil	99	110	136	132	98	113	140	132	103	110	125	133	132	132	133
Residual Fuel Oil	46	47	49	49	43	43	48	44	42	45	45	43	49	44	43
Other Oils ^g	267	298	302	260	257	297	307	276	257	293	303	272	260	276	272
Total Stocks (Excluding SPR)	1060	1098	1109	1035	990	1065	1098	1063	1018	1062	1089	1061	1035	1063	1061
Crude Oil in SPR	582	587	590	586	568	568	569	569	569	573	578	580	586	569	580
Total Stocks (Including SPR)	1642	1685	1698	1621	1559	1634	1667	1632	1586	1635	1666	1641	1621	1632	1641

^aIncludes lease condensate.

^bNet imports equals gross imports plus SPR imports minus exports.

^cIncludes finished petroleum products, unfinished oils, gasoline blending components, and natural gas plant liquids for processing.

^dIncludes an estimate of minor product stock change based on monthly data.

^eIncludes crude oil product supplied, natural gas liquids, liquefied refinery gas, other liquids, and all finished petroleum products except motor gasoline, jet fuel, distillate, and residual fuel oil.

^fIncludes crude oil in transit to refineries.

^gIncludes stocks of all other oils such as aviation gasoline, kerosene, natural gas liquids (including ethane), aviation gasoline blending components, naphtha and other oils for petrochemical feedstock use, special naphthas, lube oils, wax, coke, asphalt, road oil, and miscellaneous oils.

SPR: Strategic Petroleum Reserve

NGL: Natural Gas Liquids

Notes: Minor discrepancies with other EIA published historical data are due to rounding. Historical values are printed in **boldface**, forecasts in *italics*. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BBB16:16 and S100991BBB14:39 for the middle oil price case.

Sources: Historical data: Energy Information Administration, *Petroleum Supply Annual 1990*, DOE/EIA-0340(90)1; *Petroleum Supply Monthly*, DOE/EIA-0109, Jan. 1991 to July 1991; and *Weekly Petroleum Status Report*, DOE/EIA-0208(various issues).

Table 7. Supply and Disposition of Petroleum: High World Oil Price Case
(Million Barrels per Day, Except Closing Stocks)

Supply and Disposition	1990				1991				1992				Year		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1990	1991	1992
Supply															
Crude Oil Supply															
Domestic Production ^a	7.49	7.28	7.23	7.42	7.46	7.37	7.30	7.37	7.28	7.17	7.04	7.11	7.36	7.38	7.15
Alaska	1.84	1.73	1.71	1.82	1.88	1.77	1.77	1.82	1.74	1.70	1.60	1.68	1.77	1.81	1.68
Lower 48	5.65	5.55	5.52	5.60	5.60	5.60	5.53	5.55	5.54	5.44	5.42	5.58	5.57	5.47	
Net Imports (Including SPR) ^b	5.96	6.13	6.26	4.81	5.19	5.94	6.16	5.68	5.83	6.03	6.35	5.88	5.79	5.75	6.03
Gross Imports (Excluding SPR)	6.05	6.18	6.30	4.94	5.30	6.08	6.27	5.82	5.95	6.12	6.38	6.00	5.87	5.87	6.11
SPR Imports	0.03	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.03	0.00	0.03
Exports	0.12	0.10	0.07	0.13	0.11	0.14	0.11	0.14	0.12	0.14	0.08	0.14	0.11	0.12	0.12
SPR Stock Withdrawn or Added (-)	-0.03	-0.05	-0.03	0.04	0.19	0.00	0.00	0.00	0.00	-0.05	-0.05	-0.03	-0.02	0.05	-0.03
Other Stock Withdrawn or Added (-)	-0.33	-0.15	0.45	0.22	-0.16	-0.12	0.11	0.01	-0.07	-0.02	0.07	0.03	0.05	-0.04	0.00
Product Supplied and Losses	-0.03	-0.03	-0.02	-0.01	-0.02										
Unaccounted-for Crude	0.22	0.19	0.27	0.35	0.18	0.32	0.22	0.14	0.15	0.15	0.14	0.14	0.26	0.21	0.14
Crude Oil Input to Refineries	13.28	13.38	14.15	12.83	12.86	13.50	13.77	13.18	13.18	13.26	13.53	13.11	13.41	13.33	13.27
Other Supply															
NGL Production	1.55	1.48	1.55	1.65	1.66	1.64	1.60	1.63	1.63	1.62	1.61	1.63	1.56	1.63	1.62
Other Hydrocarbon and Alcohol Inputs	0.08	0.08	0.07	0.08	0.08	0.09	0.08	0.11	0.10	0.10	0.15	0.20	0.08	0.09	0.14
Crude Oil Product Supplied	0.03	0.03	0.02	0.01	0.02										
Processing Gain	0.69	0.65	0.68	0.71	0.67	0.64	0.69	0.67	0.66	0.68	0.68	0.68	0.68	0.67	0.67
Net Product Imports ^c	1.76	1.60	1.31	0.84	0.44	1.14	1.07	0.97	0.97	1.11	0.89	1.12	1.38	0.91	1.02
Gross Product Imports ^c	2.44	2.25	2.03	1.78	1.52	1.94	1.80	1.73	1.69	1.79	1.55	1.87	2.12	1.75	1.73
Product Exports	0.68	0.65	0.72	0.94	1.07	0.80	0.73	0.76	0.73	0.67	0.66	0.76	0.75	0.84	0.70
Product Stock Withdrawn or Added (-) ^d	-0.32	-0.28	-0.56	0.58	0.65	-0.70	-0.47	0.41	0.59	-0.44	-0.34	0.28	-0.14	-0.03	0.02
Total Product Supplied, Domestic Use	17.07	16.95	17.22	16.71	16.40	16.32	16.76	16.99	17.15	16.34	16.53	17.03	16.99	16.62	16.76
Disposition															
Motor Gasoline	7.05	7.33	7.41	7.15	6.83	7.36	7.41	7.20	6.90	7.24	7.31	7.18	7.23	7.20	7.16
Jet Fuel	1.52	1.50	1.50	1.57	1.50	1.38	1.50	1.50	1.49	1.41	1.47	1.54	1.52	1.47	1.48
Distillate Fuel Oil	3.24	2.95	2.94	2.95	3.11	2.79	2.78	3.17	3.47	2.86	2.69	3.19	3.02	2.96	3.05
Residual Fuel Oil	1.42	1.23	1.18	1.10	1.19	1.13	1.08	1.13	1.30	0.95	0.95	1.11	1.23	1.14	1.08
Other Oils Supplied ^e	3.84	3.93	4.20	3.94	3.79	3.65	3.99	3.99	3.99	3.87	4.11	4.02	3.98	3.86	4.00
Total Product Supplied	17.07	16.95	17.22	16.71	16.43	16.32	16.76	16.99	17.15	16.34	16.53	17.03	16.99	16.63	16.76
Total Petroleum Net Imports	7.72	7.73	7.57	5.64	5.63	7.08	7.23	6.66	6.80	7.14	7.24	7.00	7.16	6.66	7.05
Closing Stocks (million barrels)															
Crude Oil (Excluding SPR) ^f	371	384	343	323	337	348	338	337	343	345	338	336	323	337	336
Total Motor Gasoline	227	213	229	220	211	215	214	225	224	218	225	225	220	225	225
Finished Motor Gasoline	186	176	188	181	173	177	177	184	183	180	182	184	181	184	184
Blending Components	42	37	41	39	39	38	37	41	41	38	42	41	39	41	41
Jet Fuel	49	47	50	52	45	49	51	48	46	47	49	47	52	48	47
Distillate Fuel Oil	99	110	136	132	98	113	140	131	102	108	122	130	132	131	130
Residual Fuel Oil	46	47	49	49	43	43	48	44	42	44	43	43	49	44	43
Other Oils ^g	267	298	302	260	257	297	307	276	256	293	303	271	260	276	271
Total Stocks (Excluding SPR)	1060	1098	1109	1035	990	1065	1098	1060	1013	1055	1080	1052	1035	1060	1052
Crude Oil in SPR	582	587	590	586	568	568	569	569	569	573	578	580	586	569	580
Total Stocks (Including SPR)	1642	1685	1698	1621	1559	1634	1667	1629	1581	1628	1658	1632	1621	1629	1632

^aIncludes lease condensate.

^bNet imports equals gross imports plus SPR imports minus exports.

^cIncludes finished petroleum products, unfinished oils, gasoline blending components, and natural gas plant liquids for processing.

^dIncludes an estimate of minor product stock change based on monthly data.

^eIncludes crude oil product supplied, natural gas liquids, liquefied refinery gas, other liquids, and all finished petroleum products except motor gasoline, jet fuel, distillate, and residual fuel oil.

^fIncludes crude oil in transit to refineries.

^gIncludes stocks of all other oils such as aviation gasoline, kerosene, natural gas liquids (including ethane), aviation gasoline blending components, naphtha and other oils for petrochemical feedstock use, special naphthas, lube oils, wax, coke, asphalt, road oil, and miscellaneous oils.

SPR: Strategic Petroleum Reserve

NGL: Natural Gas Liquids

Notes: Minor discrepancies with other EIA published historical data are due to rounding. Historical values are printed in **boldface**, forecasts in *italics*. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BGB17:37 and S100991BGB14:02 for the high oil price case.

Sources: Historical data: Energy Information Administration, *Petroleum Supply Annual 1990*, DOE/EIA-0340(90)1; *Petroleum Supply Monthly*, DOE/EIA-0109, Jan. 1991 to July 1991; and *Weekly Petroleum Status Report*, DOE/EIA-0208(various issues).

Table 8. Petroleum Demand Sensitivities

Demand Determinant	1991	1992
	One Quarter	Four Quarters
Economic Activity		
Level of GNP ^a	4,164 - 4,203	4,186 - 4,339
Resulting Petroleum Demand Difference ^b	0.1	0.43
Energy Prices		
Crude Oil ^c	\$18 - \$23	\$17.25 - \$23
Resulting Petroleum Demand Difference ^b		
All Energy Prices Change06	.18
Only Oil Prices Change12	.28
Weather		
Heating Degree Days ^d	1,371 - 2,043	3,969 - 5,645
Cooling Degree Days ^d	49 - 87	991 - 1,411
Resulting Petroleum Demand Difference ^b46	.39

^aReal gross national product, in billions of 1982 dollars per year.

^bPetroleum demand ranges associated with varying each demand determinant (or set of demand determinants), holding other things equal, in million barrels per day.

^cRefiners' acquisition cost of import oil, in current dollars per barrel.

^dHeating and cooling degree days shown are national population-weighted.

Source: Energy Information Administration, Office of Energy Markets and End Use, Short-Term Integrated Forecasting System.

**Table 9. Crude Oil Production Forecast Components
(Million Barrels per Day)**

	High Price Case	Low Price Case	Difference		
			Total	Uncertainty	Price Impact
United States	7.11	6.82	.28	.13	.15
Lower 48 States	5.42	5.18	.24	.11	.13
Alaska	1.68	1.64	.04	.02	.02

Note: Components provided are for the fourth quarter 1992 from tables 5 and 7. Totals may not add to sum of components due to independent rounding.
Source: Energy Information Administration, Office of Oil and Gas, Reserves and Natural Gas Division.

**Table 10. Supply and Disposition of Natural Gas: Mid World Oil Price Case
(Trillion Cubic Feet)**

Supply and Disposition	1990				1991				1992				Year		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1990	1991	1992
Supply															
Total Dry Gas Production ^a	4.55	4.29	4.24	4.54	4.50	4.32	<i>4.26</i>	<i>4.53</i>	<i>4.64</i>	<i>4.37</i>	<i>4.30</i>	<i>4.56</i>	17.61	<i>17.61</i>	<i>17.87</i>
Net Imports	0.34	0.35	0.34	0.42	0.38	0.38	<i>0.36</i>	<i>0.39</i>	<i>0.45</i>	<i>0.39</i>	<i>0.37</i>	<i>0.41</i>	1.45	<i>1.50</i>	<i>1.62</i>
Supplemental Gaseous Fuels	0.03	0.02	0.03	0.03	0.03	0.03	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.02</i>	<i>0.02</i>	<i>0.03</i>	0.11	<i>0.11</i>	<i>0.10</i>
Total New Supply	4.92	4.66	4.60	4.98	4.92	4.72	<i>4.64</i>	<i>4.94</i>	<i>5.12</i>	<i>4.79</i>	<i>4.69</i>	<i>5.00</i>	19.16	<i>19.22</i>	<i>19.59</i>
Underground Working Gas Storage															
Opening	2.51	1.88	2.45	3.27	3.01	1.91	<i>2.55</i>	<i>3.42</i>	<i>3.03</i>	<i>1.92</i>	<i>2.52</i>	<i>3.36</i>	2.51	<i>3.01</i>	<i>3.03</i>
Closing	1.88	2.45	3.27	3.01	1.91	2.55	<i>3.42</i>	<i>3.03</i>	<i>1.92</i>	<i>2.52</i>	<i>3.36</i>	<i>2.97</i>	3.01	<i>3.03</i>	<i>2.97</i>
Net Withdrawals ^b	0.63	-0.57	-0.83	0.25	1.04	-0.69	<i>-0.76</i>	<i>0.39</i>	<i>1.11</i>	<i>-0.60</i>	<i>-0.84</i>	<i>0.39</i>	-0.52	<i>-0.02</i>	<i>0.06</i>
Total Supply ^a	5.55	4.09	3.77	5.23	5.96	4.03	<i>3.89</i>	<i>5.33</i>	<i>6.23</i>	<i>4.19</i>	<i>3.84</i>	<i>5.38</i>	18.64	<i>19.19</i>	<i>19.65</i>
Balancing Item ^c	0.20	0.22	0.11	-0.33	0.06	0.07	<i>-0.25</i>	<i>-0.38</i>	<i>0.08</i>	<i>0.34</i>	<i>-0.09</i>	<i>-0.35</i>	0.19	<i>-0.51</i>	<i>-0.02</i>
Total Primary Supply ^a	5.76	4.30	3.88	4.90	6.01	4.09	<i>3.63</i>	<i>4.94</i>	<i>6.31</i>	<i>4.53</i>	<i>3.76</i>	<i>5.03</i>	18.84	<i>18.68</i>	<i>19.63</i>
Consumption															
Lease and Plant Fuel	0.32	0.30	0.29	0.31	0.31	0.30	<i>0.25</i>	<i>0.31</i>	<i>0.31</i>	<i>0.32</i>	<i>0.28</i>	<i>0.31</i>	1.21	<i>1.17</i>	<i>1.22</i>
Pipeline Use	0.15	0.14	0.15	0.14	0.16	0.14	<i>0.15</i>	<i>0.14</i>	<i>0.14</i>	<i>0.15</i>	<i>0.13</i>	<i>0.15</i>	0.57	<i>0.59</i>	<i>0.57</i>
Residential	1.97	0.80	0.38	1.21	2.09	0.75	<i>0.36</i>	<i>1.29</i>	<i>2.30</i>	<i>0.86</i>	<i>0.37</i>	<i>1.31</i>	4.37	<i>4.50</i>	<i>4.84</i>
Commercial	1.04	0.52	0.36	0.71	1.10	0.50	<i>0.33</i>	<i>0.73</i>	<i>1.18</i>	<i>0.54</i>	<i>0.34</i>	<i>0.74</i>	2.63	<i>2.66</i>	<i>2.80</i>
Industrial	1.82	1.81	1.73	1.91	1.84	1.68	<i>1.59</i>	<i>1.84</i>	<i>1.83</i>	<i>1.91</i>	<i>1.66</i>	<i>1.87</i>	7.27	<i>6.95</i>	<i>7.28</i>
Electric Utilities	0.46	0.74	0.97	0.62	0.51	0.72	<i>0.95</i>	<i>0.63</i>	<i>0.55</i>	<i>0.75</i>	<i>0.97</i>	<i>0.64</i>	2.79	<i>2.82</i>	<i>2.91</i>
Subtotal	5.76	4.30	3.88	4.90	6.01	4.09	<i>3.63</i>	<i>4.94</i>	<i>6.31</i>	<i>4.53</i>	<i>3.76</i>	<i>5.03</i>	18.84	<i>18.68</i>	<i>19.63</i>

^aExcludes nonhydrocarbon gases removed.

^bNet withdrawals may vary from the difference between opening and closing stocks of gas in working gas storage due to book transfers between base and working gas categories, and other storage operator revisions of working gas inventories.

^cThe balancing item represents the difference between the sum of the components of natural gas supply and the sum of components of natural gas disposition.

Notes: Minor discrepancies with other EIA published historical data are due to rounding. Historical values are printed in **boldface**, forecasts in *italics*. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BBB16:16 and S100991BBB14:39 for the middle oil price case.

Sources: Historical data: Energy Information Administration, *Monthly Energy Review*, DOE/EIA-0035(91/10); *Natural Gas Monthly*, DOE/EIA-0130(91/10); and *Electric Power Monthly*, DOE/EIA-0226(91/10).

Table 11. Supply and Disposition of Coal: Mid World Oil Price Case
(Million Short Tons)

Supply and Disposition	1990				1991				1992				Year		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1990	1991	1992
Supply															
Production	264	254	255	256	254	237	256	258	259	251	255	266	1029	1005	1032
Primary Stock Levels ^a															
Opening	29	35	37	34	33	42	41	37	35	39	36	33	29	33	35
Closing	35	37	34	33	42	41	37	35	39	36	33	31	33	35	31
Net Withdrawals	-6	-2	3	0	-9	1	4	2	-4	3	3	2	-4	-2	4
Imports	1	3	3	3											
Exports	22	28	29	26	22	26	27	27	22	29	27	27	106	103	106
Total Net Domestic Supply	236	225	229	231	224	213	234	233	234	226	232	242	922	903	933
Secondary Stock Levels ^b															
Opening	146	160	172	161	167	167	172	164	170	173	176	159	146	167	170
Closing	160	172	161	167	172	172	164	170	173	176	159	167	167	170	167
Net Withdrawals	-14	-12	11	-6	0	-4	8	-6	-3	-3	17	-8	-21	-3	3
Total Indicated Consumption	222	213	240	224	224	208	242	227	231	223	249	234	900	901	936
Consumption															
Coke Plants	10	10	9	10	9	8	8	9	9	9	9	10	39	34	37
Electric Utilities	185	182	211	194	189	183	214	196	200	194	220	202	772	782	816
Retail and General Industry ^c	22	19	20	23	22	19	19	22	22	19	19	22	83	82	83
Subtotal	217	211	240	226	219	209	242	227	231	223	249	234	894	898	936
Total Disposition	222	213	240	224	224	208	242	227	231	223	249	234	900	901	936
Discrepancy^d	6	2	0	-1	4	-1	0	0	0	0	0	0	7	3	0

^aPrimary stocks are held at the mines, preparation plants, and distribution points.

^bSecondary stocks are held by users. Most of the secondary stocks are held by electric utilities.

^cSynfuels plant consumption in 1990 was 1.7 million tons per quarter, and is assumed to remain at that level in 1991 and 1992.

^dHistorical period discrepancy reflects an unaccounted for shipper and receiver reporting difference.

Notes: Rows and columns may not add due to independent rounding. Zeros indicate amounts of less than 500,000 tons. Historical values are printed in **boldface**, forecasts in *italics*. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BBB16:16 and S100791BBB13:39 for the middle oil price case.

Sources: Historical data: Energy Information Administration, *Monthly Energy Review*, DOE/EIA-0035(91/10); and *Quarterly Coal Report*, DOE/EIA-0221(91/2Q).

**Table 12. Supply and Disposition of Electricity: Mid World Oil Price Case
(Billion Kilowatthours)**

Supply and Disposition	1990				1991				1992				Year		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1990	1991	1992
Net Utility Generation															
Coal	371.5	369.5	426.7	390.7	377.3	367.5	424.2	401.3	404.5	381.7	433.2	414.5	1558.5	1570.3	1633.9
Petroleum	31.1	32.9	31.8	21.3	26.7	30.2	30.2	22.5	29.5	32.2	30.5	23.1	117.2	109.7	115.4
Natural Gas	43.8	70.1	91.8	58.4	48.3	68.3	90.8	59.8	51.6	71.0	91.8	60.7	264.1	267.3	275.1
Nuclear	151.2	127.8	157.9	140.0	151.4	142.6	164.0	139.7	153.7	133.8	158.3	140.5	576.9	597.7	586.4
Hydroelectric	75.6	80.0	61.7	62.5	73.4	80.0	66.0	67.1	78.1	82.4	68.2	69.1	279.8	286.4	297.8
Geothermal and Other ^a	2.7	2.5	2.7	2.7	2.5	2.5	2.9	3.1	3.1	3.1	3.2	3.2	10.7	11.0	12.6
Total Utility Generation	675.9	682.9	772.6	675.6	679.6	691.1	778.1	693.5	720.6	704.3	785.2	711.1	2807.1	2842.3	2921.2
Net Imports	-2.8	-1.8	2.9	3.7	2.2	4.1	6.1	6.0	4.8	5.4	6.8	4.8	2.0	18.4	21.8
Purchase from Nonutilities^b	27.8	28.1	31.8	27.8	31.6	31.9	36.1	31.6	37.1	37.4	42.4	37.0	115.5	131.1	153.9
Total Supply	700.9	709.2	807.3	707.1	713.4	727.1	820.3	731.1	762.5	747.1	834.3	752.9	2924.6	2991.8	3096.9
Losses and Unaccounted For^c	34.2	71.5	61.3	52.9	39.4	66.3	57.4	58.0	45.6	70.4	62.7	59.6	219.9	221.1	238.3
Sales															
Residential	241.2	201.3	264.5	214.0	247.6	214.6	279.1	225.3	267.8	216.2	278.4	233.5	921.1	966.5	995.9
Commercial	177.9	180.3	211.6	182.7	179.9	186.4	217.4	187.6	191.2	193.7	220.9	194.6	752.6	771.3	800.4
Industrial	224.6	233.3	244.7	234.9	223.5	235.4	240.9	236.3	233.4	243.4	247.3	241.3	937.5	936.0	965.3
Other	23.1	22.9	25.1	22.5	22.9	24.6	25.6	23.9	24.5	23.5	25.0	24.0	93.5	96.9	97.0
Total	666.7	637.8	745.9	654.2	673.9	660.8	762.9	673.1	716.9	676.7	771.7	693.3	2704.7	2770.7	2858.6

^aOther includes generation from wind, wood, waste, and solar sources.

^bElectricity received from nonutility sources, including cogenerators and small power producers.

^cBalancing item, mainly transmission and distribution losses.

Notes: Values for purchases from nonutilities and losses and unaccounted for are estimated for 1990. Minor discrepancies with other EIA published historical data are due to rounding. Historical values are printed in **boldface**, forecasts in *italics*. The forecasts were generated by the following simulations of the demand and supply subsystems of the Short-Term Integrated Forecasting System: D092691BBB16:16 and S100791BBB13:39 for the middle oil price case.

Sources: Historical data: Energy Information Administration, *Monthly Energy Review*, DOE/EIA-0035(91/10); and *Electric Power Monthly*, DOE/EIA-0226(91/10).

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