

## Chapter 4: Petroleum Refining

### Industry Definition

(boxed text)

The petroleum refining industry (SIC 2911) comprises establishments engaged primarily in producing gasoline, kerosene, distillate fuel oils, residual fuel oils, and lubricants through straight distillation of crude oil, redistillation of unfinished petroleum derivatives, cracking, or other processes. Quantities of oil are reported here in barrels. For conversion to metric tons, see [Table 4-1](#).

U.S. demand for refined petroleum products is expected to increase about 3 percent between 1995 and 1997 to more than 18 million barrels per day, assuming normal weather conditions and a continuing economic expansion of about 2 percent annually. U.S. refinery output may increase about 4 percent between 1995 and 1997. Net petroleum product imports are forecast to increase about 43 percent between 1995 and 1997, expanding from 750 thousand barrels per day to more than 1 million barrels per day. From 1995 through 1997, demand for both jet fuel and distillate should increase about 6 percent, while the demand for motor gasoline is forecast to increase 2 percent and the demand for residual fuel oil is expected to fall by 5 percent. Prices of various petroleum products are expected to increase in 1997 principally because of higher environmental costs.

Refining margins, i.e., refined product revenues less raw material expense and product purchases divided by refined product sales volume, for motor gasoline fell between 1990 and 1995, as did refining margins for a composite (weighted) average of petroleum products. Low returns during the first half of the 1990s have diminished expectations for a competitive return, thus eliminating from active consideration many potential investments in refineries. With fewer investment alternatives under consideration, relatively less investment occurred. However, declining product prices and falling margins have increased the pressure to reduce operating costs and to spread fixed costs over more output. Such incentives have shaped refinery investment thus far in the 1990s.

### Factors Affecting U.S. Petroleum Refining

For the U.S. refining and marketing industry, the 1990s have been characterized by unusually low product margins, low profitability, and selective retrenchment. Costs involved in complying with environmental laws have grown substantially during the 1990s and have also affected the profitability of the domestic industry. Profitability (measured by rate of return on investment) from the refining operations of domestic petroleum companies has varied widely over the last nine years ([Figure 4-1](#)). Although the variability of returns seems to have diminished over the last five years, returns have become consistently low, impairing refiners' abilities to recoup their investments.

Additionally, these persistently low profits have prompted serious efforts by domestic refiners to realize greater value from their fixed assets and to reduce their operating costs in recent years. Refining operations have been consolidated, the capacity of existing facilities has been expanded, and several refineries have closed.

## Consolidation and Joint Ventures

Joint ventures are one way refineries have consolidated their operations. Such deals may provide refiners with a way of increasing the value of their fixed assets, reducing their costs, or both, by sharing assets and operations with a partner. One of the largest of recent joint ventures was announced early in 1996. That venture merges the European downstream operations of British Petroleum and Mobil. That consolidation is anticipated to reduce the costs of the two companies by \$400 to \$500 million. Also during 1996, Exxon and Conoco announced a joint venture involving their German refineries.

In addition, downstream joint ventures have been undertaken in the United States. For example, Ultramar and Diamond Shamrock, two independent U.S. refiners operating in different regions of the country, recently merged, creating a substantial downstream company. In late 1996, Texaco, Star Enterprise (a joint venture between Texaco and Aramco, the Saudi Arabian state-oil company), and Shell Oil (the U.S. subsidiary of Royal Dutch/Shell) have been negotiating an alliance to merge their U.S. refining and marketing operations. The resulting venture will have assets worth approximately \$10 billion and will have roughly 80 percent greater refining capacity than Chevron, currently the second-largest domestic refiner.

## Upgrading Existing Capacity

Despite low returns, U.S. refinery investment, although down from its recent peak of 1991-1992, has remained at historically high levels. Recent investments have expanded the ability of domestic refineries to refine heavier grades of crude oil and to refine crude with higher levels of sulfur. For example, during 1996 Shell Oil installed a delayed coking unit and a sulfur recovery unit while making modifications to its crude oil distillation unit; and Lyondell made similar changes during 1996.

Capacity has expanded through conventional projects (e.g., adding a catalytic cracking unit) and through debottlenecking investments, which are marginal investments that effectively create additional refining capacity from the same physical structure. The additional capacity is termed "capacity creep." In fact, operating capacity has "creeped" so substantially that distillation of domestic crude oil expanded more than 63,000 barrels per day between 1988 and 1995, the result of a combination of conventional and debottlenecking investments ([Table 4-2](#)). Those years also saw capacity per operating refinery increase by 19 percent to 91,400 barrels per day. However, over the same period, 33 domestic refineries with capacities totalling more than 800,000 barrels per day closed their doors.

## Environmental Issues and Costs

Over the last few years, petroleum refiners have made significant investments in an effort to comply with environmental regulations. Environmentally-related capital spending, as a percentage of all capital spending for U.S. refining, has risen dramatically since 1989 ([Figure 4-2](#)). However, the absolute amount of capital spending for pollution abatement by U.S. refineries had peaked in 1992 at about \$2.7 billion ([Figure 4-3](#)). Environmentally-related investment by the major domestic refineries increased almost four hundred percent between 1988 and 1992, rising from \$0.56 billion to \$2.69

billion. In 1994, reported expenditures were about \$2.5 billion. But capital expenditures are merely part of the picture. The domestic refining industry also has seen operating costs (adjusted for inflation) increase as a result of environmental laws. Operating costs related to complying with environmental regulations peaked in 1991 at \$3 billion, dropping modestly to \$2.8 billion by 1994.

The Clean Air Act Amendments of 1990 introduced reformulated gasoline (RFG) in almost one-third of domestic gasoline markets. The requirement had unexpected consequences for refiners producing RFG. Several areas of states that had voluntarily agreed to participate in the RFG program in Phase I, unexpectedly withdrew, leaving excess amounts of RFG and depressed prices. In order to reduce similar risks to refiners during Phase II, the Environmental Protection Agency (EPA) proposed rules that would make it more difficult to abruptly leave the program. These rules require areas now voluntarily using Phase I RFG to notify the EPA by December 1997 should they wish to leave the program on January 1, 2000, when Phase II begins. Any areas voluntarily staying in the program for Phase II would have to remain at least until December 2003.

## **Growth Projections for the U.S. Industry**

Demand for domestic petroleum is forecast to increase by about 1 percent during 1997 ([Table 4-3](#)). Much of the increase in demand should be for motor gasoline, which is forecast to increase almost 3 percent in 1997 ([Table 4-4](#)). Net imports of petroleum products are forecast to decline during 1997 ([Table 4-3](#)).

The shares of petroleum products that different sectors of the domestic economy consume are changing gradually over time as electric utilities and, to a lesser extent, residential and commercial users continue reducing their consumption of petroleum products ([Table 4-5](#)). Conversely, the industrial and transportation sectors are slowly consuming greater shares of petroleum products, and both sectors are expected to increase their consumption of petroleum products during 1997. The overall importance (estimated by the share of total domestic energy they comprise) of petroleum products to the domestic economy has changed little during the 1990s and is expected to be largely unchanged during 1997 ([Table 4-6](#)).

The U.S. economy is expected to expand at about 2 percent annually through 2002. As a consequence, consumption of petroleum products will also expand slowly through 2002, averaging less than 2 percent growth annually. Motor gasoline's share of petroleum product consumption falls from 45 to 43 percent despite increasing approximately 2 percent annually over the period. Jet fuel increases about 4 percent annually between 1995 and 2002. Both distillate and residual fuel oil are each expected to increase by about 2 percent between 1995 and 2002. U.S. refined product output will probably expand more slowly than consumption between 1995 and 2002 ([Table 4-3](#)), whereas, by 2002, net imports of petroleum product are expected to nearly double.

Compliance with environmental regulations will most likely continue to be a major cost to domestic refiners. The most substantial legislation between 1995 and 2000 affecting domestic refiners is Phase II of the Clean Air Act Amendments. Phase II will require further refinery upgrades and investments for refiners to produce compliant RFG.

## **Global Patterns**

The latest information on petroleum product demand (1995) indicates that member countries of the Organization for Economic Cooperation and Development (OECD) consume 61 percent of the world's petroleum with the United States accounting for 25 percent ([Table 4-7](#)).

Demand for petroleum product is anticipated to increase by 11 million barrels per day, or by 16 percent, between 1995 and 2002. The bulk of that growth is expected to occur in the economically developing countries, most notably Southeast Asia and the Pacific Rim countries. China's petroleum consumption is expected to increase 46 percent between 1995 and 2002, with the economies of other nonindustrialized countries of Asia and the Pacific Rim expected to increase their petroleum consumption by 44 percent. (See [Figure 4-4](#)).

Prospects of foreign investment for U.S. refining and marketing companies between 1995 and 2002 appear to be greatest in non-OECD Asia, which is forecast to have the largest growth in petroleum consumption during that period. The Middle East and Asia should lead the world in growth of refining capacity well into the next century.

*Neal Davis, Energy Information Administration (202) 586-6581, December 1996.*

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

## Glossary

capacity creep -- The increased capacity of refining units resulting from debottlenecking investments.

catalytic cracking unit -- The part of a refinery in which larger, heavier, and more complex hydrocarbon molecules are broken into simpler and lighter molecules. Catalytic cracking is accomplished by the use of a catalytic agent and is an effective process for increasing the yield of gasoline from crude oil. Catalytic cracking processes fresh feeds and recycled feeds.

catalytic hydrocracking unit -- The part of a refinery in which hydrogen and catalysts are applied to middle-boiling or residual material at relatively low temperatures and high pressures, resulting in high-octane gasoline, reformer charge stock, jet fuel, and/or high-grade fuel oil. The process uses one or more catalysts, depending on product output and can handle high-sulfur feedstocks without prior desulfurization.

debottlenecking investments -- Upgrading one or more parts of a refinery that thereby allows fuller use of other parts of the refinery without making any direct changes to them. Such relatively inexpensive investments in a refinery may result in substantial increases in the capacity of the refinery.

distillate fuel oil -- A general classification for one of the petroleum fractions produced in conventional distillation operations. Included are kerosene and products known as heating oils.

refining margin -- Refined product revenues less raw material expense and product purchases divided by refined product sales volume.

residual fuel oil -- The heavier oils that remain after the distillate fuel oils and lighter hydrocarbons are distilled in refinery operations and that conform to ASTM Specifications D396 and 975. Among the common uses for residual fuel oil are electricity generation, commercial and industrial heating, and powering ships.

## REFERENCES

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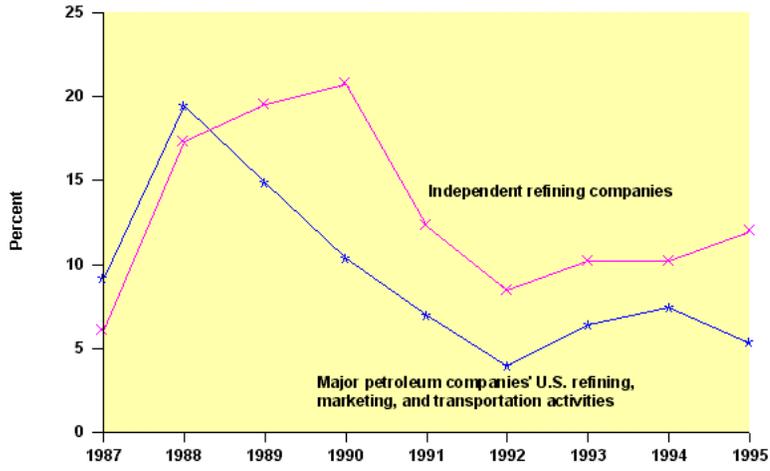
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## RELATED CHAPTERS

Chapter 2, Coal Mining

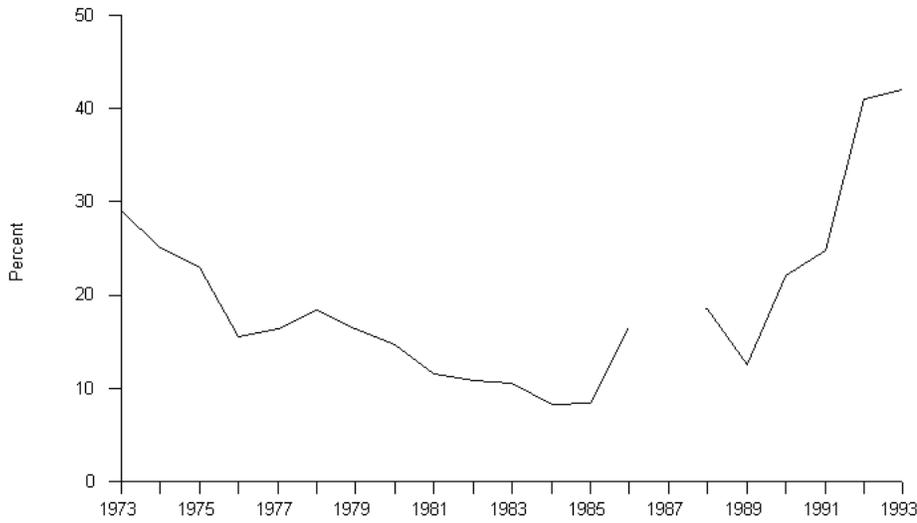
Chapter 3, Crude Petroleum and Natural Gas

Figure 4-1. Operating Income as a Percentage of Net Property, Plant, and Equipment, 1987-1995



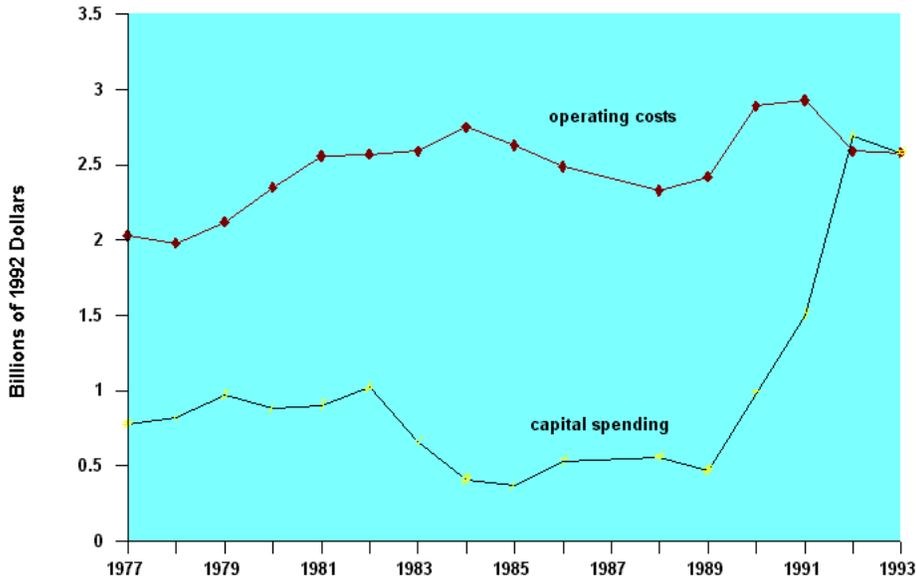
Sources: Energy Information Administration and Standard and Poor's Compustat

Figure 4-2. Pollution Abatement Capital Expenditures as a Percentage of All New Capital Expenditures for Petroleum Refining and Coal Products Firms, 1973-1993



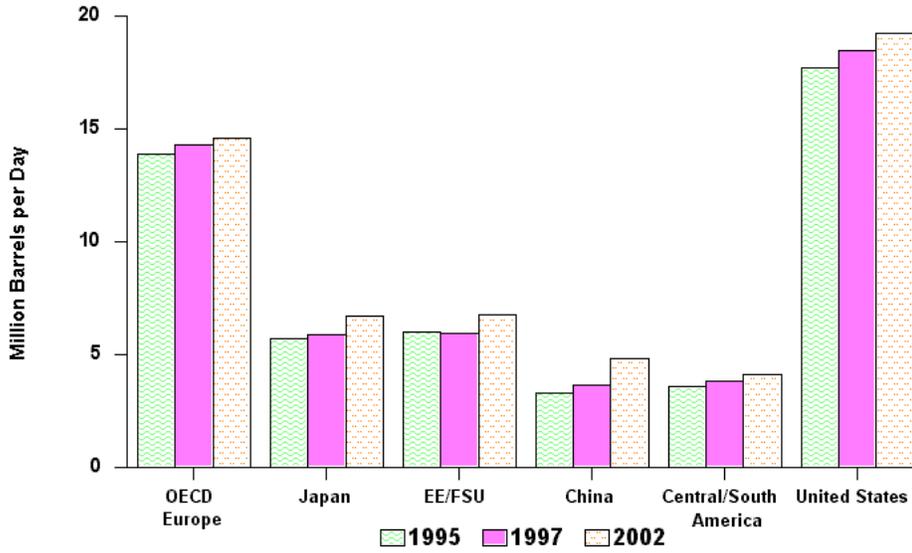
Note: data for 1987 not collected  
Source: U.S. Department of Commerce

Figure 4-3. Environmental Expenditures by U.S. Refining Industry, 1977-1993



Note: data for 1987 not collected  
Source: U.S. Department of Commerce

Figure 4-4. Petroleum Consumption, by Region, for Selected Years



Note: EE--Eastern Europe, and FSU--Former Soviet Union

Source: Energy Information Administration, *International Energy Outlook, 1997*

| <b>Table 4-1. Average Energy Conversion Factors</b>   |                            |                          |
|---|----------------------------|--------------------------|
|   | <b>U.S. Customary Unit</b> | <b>Metric Equivalent</b> |
| Crude oil   | 1 barrel                   | 0.1364 metric tons       |
| Coal  | 1 short ton                | 0.9072 metric tons       |
| Natural gas   | 1 cubic foot               | 0.0283 cubic meters      |
| Natural gas plant liquids   | 1 barrel                   | 0.0862 metric tons       |
| Btu/joule   | 1 Btu                      | 1,055.1 joules           |
| <b>Petroleum products</b>   |                            |                          |
| Motor gasoline  | 1 barrel                   | 0.1172 metric tons       |
| Distillate fuel oil   | 1 barrel                   | 0.1340 metric tons       |
| Residual fuel oil   | 1 barrel                   | 0.1502 metric tons       |
| <p>Source: Energy Information Administration, <i>Annual Energy Review 1995</i>, DOE/EIA-0384(95) (Washington, DC, July 1996), Appendix B.</p> |                            |                          |

**Table 4-2. U.S. Refineries and Refining Capacities, 1987-1996**

| Year | Operable Refineries<br>(number) |           | Crude Distillation Capacity<br>(thousand barrels per calendar day) |           | Downstream Charge Capacity<br>(thousand barrels per stream day) |                     |                  |   |                     |                         |                         |
|------|---------------------------------|-----------|--|-----------|---|---------------------|------------------|---|---------------------|-------------------------|-------------------------|
|      | Total                           | Operating | Total  | Operating | Total   | Vacuum Distillation | Thermal Cracking | Catalytic Cracking (Fresh and Recycled) | Catalytic reforming | Catalytic Hydrocracking | Catalytic Hydrotreating |
| 1987 | 219                             | 195       | 15,565   | 14,940    | 28,656  | 6,935               | 1,928            | 5,716                                   | 3,805               | 1,189                   | 9,083                   |
| 1988 | 213                             | 195       | 15,915   | 15,018    | 29,347  | 7,198               | 2,080            | 5,806                                   | 3,891               | 1,202                   | 9,170                   |
| 1989 | 204                             | 193       | 15,655   | 15,012    | 29,537  | 7,225               | 2,073            | 5,650                                   | 3,911               | 1,238                   | 9,440                   |
| 1990 | 205                             | 194       | 15,572   | 15,063    | 29,823  | 7,245               | 2,108            | 5,755                                   | 3,896               | 1,282                   | 9,537                   |
| 1991 | 202                             | 184       | 15,676   | 14,959    | 30,206  | 7,276               | 2,158            | 5,862                                   | 3,926               | 1,308                   | 9,676                   |
| 1992 | 192                             | 183       | 15,696   | 14,966    | 30,074  | 7,172               | 2,100            | 5,888                                   | 3,907               | 1,363                   | 9,644                   |
| 1993 | 187                             | 175       | 15,121   | 14,777    | 29,560  | 6,892               | 2,082            | 5,784                                   | 3,728               | 1,397                   | 9,677                   |
| 1994 | 179                             | 171       | 15,034   | 14,704    | 30,642  | 6,892               | 2,107            | 5,777                                   | 3,875               | 1,376                   | 10,616                  |
| 1995 | 175                             | 165       | 15,434   | 15,081    | 31,292  | 7,248               | 2,123            | 5,752                                   | 3,867               | 1,386                   | 10,916                  |
| 1996 | N.A.                            | 162       | 15,286   | N.A.      | 31,353  | 7,314               | 2,153            | 5,599                                   | 3,852               | 1,385                   | 11,050                  |

N.A.: Information not available

Note: Totals may not add due to rounding.

Source: U.S. Department of Energy, Energy Information Administration

| <b>Table 4-3. Petroleum Products: U.S. Refinery Output, Trade, and Supply, 1987-1997, 2002</b> |                        |                    |  |                          |
|--|------------------------|--------------------|--|--------------------------|
| (Million Barrels per Day)  |                        |                    |  |                          |
| <b>Year</b>  | <b>Refinery Output</b> | <b>Net Imports</b> | <b>Stock Changes and Other Adjustments</b> | <b>Products Supplied</b> |
| 1987   | 14.63                  | 1.39               | 0.64                                       | 16.67                    |
| 1988   | 15.02                  | 1.63               | 0.63                                       | 17.28                    |
| 1989   | 15.17                  | 1.50               | 0.65                                       | 17.33                    |
| 1990   | 15.27                  | 1.38               | 0.34                                       | 16.99                    |
| 1991   | 15.26                  | 0.96               | 0.49                                       | 16.71                    |
| 1992   | 15.40                  | 0.94               | 0.69                                       | 17.03                    |
| 1993   | 15.79                  | 0.93               | 0.52                                       | 17.24                    |
| 1994   | 15.79                  | 1.09               | 0.84                                       | 17.72                    |
| 1995   | 15.99                  | 0.75               | 0.98                                       | 17.72                    |
| 1996   | 16.31                  | 1.05               | 0.87                                       | 18.23                    |
| 1997   | 16.56                  | 1.14               | 0.53                                       | 18.23                    |
| 2002   | 17.55                  | 1.91               | 0.45                                       | 19.91                    |

Note: Totals may not add due to independent rounding

Source: U.S. Department of Energy, Energy Information Administration

| <b>Table 4-4. Petroleum Products Supplied to the U.S. Market by Type, 1987-1997, 2002</b> |                       |                 |                            |                          |                       |                       |
|---|-----------------------|-----------------|----------------------------|--------------------------|-----------------------|-----------------------|
| (Million Barrels per Day)   |                       |                 |                            |                          |                       |                       |
| <b>Year</b>   | <b>Motor Gasoline</b> | <b>Jet Fuel</b> | <b>Distillate Fuel Oil</b> | <b>Residual Fuel Oil</b> | <b>Other Products</b> | <b>Total Products</b> |
| 1987  | 7.21                  | 1.38            | 2.98                       | 1.26                     | 3.84                  | 16.67                 |
| 1988  | 7.34                  | 1.45            | 3.12                       | 1.38                     | 3.99                  | 17.28                 |
| 1989  | 7.33                  | 1.49            | 3.16                       | 1.37                     | 3.98                  | 17.33                 |
| 1990  | 7.23                  | 1.52            | 3.02                       | 1.23                     | 3.99                  | 16.99                 |
| 1991  | 7.19                  | 1.47            | 2.92                       | 1.16                     | 3.97                  | 16.71                 |
| 1992  | 7.27                  | 1.45            | 2.98                       | 1.09                     | 4.24                  | 17.03                 |
| 1993  | 7.48                  | 1.47            | 3.04                       | 1.08                     | 4.17                  | 17.24                 |
| 1994  | 7.60                  | 1.53            | 3.16                       | 1.02                     | 4.41                  | 17.72                 |
| 1995  | 7.79                  | 1.51            | 3.21                       | 0.85                     | 4.36                  | 17.72                 |
| 1996  | 7.85                  | 1.58            | 3.37                       | 0.84                     | 4.60                  | 18.23                 |
| 1997  | 7.97                  | 1.61            | 3.40                       | 0.81                     | 4.44                  | 18.23                 |
| 2002  | 8.64                  | 1.92            | 3.65                       | 0.98                     | 4.71                  | 19.91                 |
| Note: Totals may not add due to independent rounding                                      |                       |                 |                            |                          |                       |                       |
| Source: U.S. Department of Energy, Energy Information Administration                      |                       |                 |                            |                          |                       |                       |

**Table 4-5. Petroleum Products Supplied to U.S. End-Use Sectors, 1987-1997, 2002**

(Million Barrels per Day)

| <b>Year</b> | <b>Residential and Commercial</b> | <b>Industrial</b> | <b>Transportation</b> | <b>Electric Utilities</b> | <b>Total Products</b> |
|-------------|-----------------------------------|-------------------|-----------------------|---------------------------|-----------------------|
| 1987        | 1.33                              | 4.25              | 10.53                 | 0.55                      | 16.67                 |
| 1988        | 1.34                              | 4.39              | 10.87                 | 0.68                      | 17.28                 |
| 1989        | 1.32                              | 4.26              | 11.01                 | 0.74                      | 17.33                 |
| 1990        | 1.14                              | 4.32              | 10.97                 | 0.55                      | 16.99                 |
| 1991        | 1.14                              | 4.25              | 10.80                 | 0.52                      | 16.71                 |
| 1992        | 1.12                              | 4.55              | 10.95                 | 0.42                      | 17.03                 |
| 1993        | 1.14                              | 4.45              | 11.18                 | 0.46                      | 17.24                 |
| 1994        | 1.11                              | 4.69              | 11.49                 | 0.43                      | 17.72                 |
| 1995        | 1.07                              | 4.58              | 11.79                 | 0.30                      | 17.73                 |
| 1996        | 1.10                              | 4.69              | 12.14                 | 0.29                      | 18.23                 |
| 1997        | 1.03                              | 4.56              | 12.36                 | 0.27                      | 18.23                 |
| 2002        | 1.04                              | 4.99              | 13.64                 | 0.24                      | 19.91                 |

Note: Totals may not add due to independent rounding

Source: U.S. Department of Energy, Energy Information Administration

| <b>Table 4-6. U.S. Consumption of Petroleum Products and Total Energy, 1987-2002</b> |                           |                     |   |
|--|---------------------------|---------------------|---|
| (Quadrillion Btu Unless Otherwise Noted)   |                           |                     |   |
| <b>Year</b>  | <b>Petroleum Products</b> | <b>Total Energy</b> | <b>Petroleum Products as a Percentage of all Energy</b> |
| 1987   | 32.87                     | 76.89               | 42.7  |
| 1988   | 34.22                     | 80.22               | 42.7  |
| 1989   | 34.21                     | 81.33               | 42.1  |
| 1990   | 33.55                     | 84.17               | 39.9  |
| 1991   | 32.85                     | 84.05               | 39.1  |
| 1992   | 33.53                     | 85.26               | 39.3  |
| 1993   | 33.84                     | 87.03               | 38.9  |
| 1994   | 34.73                     | 88.90               | 39.1  |
| 1995   | 34.62                     | 90.62               | 38.2  |
| 1996   | 35.07                     | 91.26               | 38.4  |
| 1997   | 35.54                     | 92.54               | 38.4  |
| 2002   | 37.74                     | 96.92               | 38.9  |
| Source: U.S. Department of Energy, Energy Information Administration                 |                           |                     |   |

**Table 4-7. International Petroleum Consumption by Region, 1995-2002**

(Million Barrels per Day)

|  | 1995  | 1996  | 1997  | 1998  | 1999  | 2000  | 2001  | 2002  |
|--|-------|-------|-------|-------|-------|-------|-------|-------|
| OECD                                       |       |       |       |       |       |       |       |       |
| United States                              | 17.70 | 18.15 | 18.46 | 18.38 | 18.58 | 18.79 | 19.02 | 19.21 |
| United States Territories                  | 0.25  | 0.26  | 0.27  | 0.29  | 0.30  | 0.31  | 0.32  | 0.32  |
| Canada                                     | 1.77  | 1.80  | 1.83  | 1.86  | 1.88  | 1.90  | 1.92  | 1.95  |
| Mexico                                     | 1.96  | 1.99  | 2.01  | 2.06  | 2.10  | 2.14  | 2.19  | 2.24  |
| Japan                                      | 5.72  | 5.79  | 5.87  | 6.25  | 6.37  | 6.48  | 6.59  | 6.69  |
| Australia and New Zealand                  | 0.96  | 0.97  | 0.98  | 1.00  | 1.01  | 1.03  | 1.04  | 1.06  |
| OECD Europe                                | 13.85 | 14.05 | 14.26 | 14.31 | 14.35 | 14.38 | 14.51 | 14.60 |
| OECD Total                                 | 42.21 | 43.00 | 43.68 | 44.14 | 44.59 | 45.03 | 45.59 | 46.07 |
|  |       |       |       |       |       |       |       |       |
| Developing Countries                       |       |       |       |       |       |       |       |       |
| Other South and Central American Countries | 3.59  | 3.70  | 3.82  | 3.86  | 3.90  | 3.96  | 4.04  | 4.12  |
| Pacific Rim                                | 4.39  | 4.67  | 5.03  | 5.28  | 5.54  | 5.82  | 6.16  | 6.53  |
| OPEC                                       | 4.94  | 5.14  | 5.25  | 5.37  | 5.50  | 5.62  | 5.75  | 5.89  |
| Other Developing Countries                 | 5.27  | 5.48  | 5.73  | 5.86  | 5.99  | 6.12  | 6.33  | 6.55  |

|                            |       |       |       |       |       |       |       |       |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Developing Countries Total | 18.19 | 18.99 | 19.84 | 20.38 | 20.93 | 21.51 | 22.29 | 23.08 |
|                            |       |       |       |       |       |       |       |       |
| Eurasia                    |       |       |       |       |       |       |       |       |
| Former Soviet Union        | 4.60  | 4.51  | 4.48  | 4.59  | 4.77  | 4.91  | 5.08  | 5.26  |
| Eastern Europe             | 1.41  | 1.45  | 1.48  | 1.47  | 1.47  | 1.45  | 1.46  | 1.48  |
| China                      | 3.31  | 3.49  | 3.67  | 3.92  | 4.18  | 4.43  | 4.63  | 4.84  |
| Eurasia Total              | 9.32  | 9.44  | 9.63  | 9.98  | 10.41 | 10.79 | 11.18 | 11.58 |
|                            |       |       |       |       |       |       |       |       |
| Total World Consumption    | 69.72 | 71.43 | 73.15 | 74.50 | 75.93 | 77.33 | 79.05 | 80.74 |

Note: Individual values may not sum to totals value due to independent rounding.

Source: U.S. Department of Energy, Energy Information Administration