

## 2. Overview

### National Summary

The United States had the following proved reserves as of December 31, 2005:

- **Crude Oil** — 21,757 million barrels
- **Dry Natural Gas** — 204,385 billion cubic feet
- **Natural Gas Liquids** — 8,165 million barrels.

This Overview summarizes the 2005 proved reserves balances of crude oil, dry natural gas, and natural gas liquids on a National level and provides historical comparisons between 2005 and prior years. **Table 1** lists the estimated annual reserve balances since 1995 for crude oil, dry natural gas, and natural gas liquids.

### Crude Oil

Crude oil proved reserves went up for the first time in 3 years, increasing by 386 million barrels in 2005. **Figure 1** shows the crude oil proved reserves levels by major region and **Figure 2** shows the components of reserves changes from 1995 through 2005.

As indicated in **Figure 1**, U.S. crude oil proved reserves increased onshore in the lower 48 States in 2005, but declined in Alaska and the Federal Offshore.

The components of reserves changes for crude oil are shown in **Figure 2**. EIA tracks all components of reserves changes: adjustments, revision increases, revision decreases, sales, acquisitions, extensions, new field discoveries, new reservoir discoveries in old fields, and estimated production. These components are discussed below.

Total discoveries are those reserves attributable to field extensions, new field discoveries, and new reservoir discoveries in old fields. They result from the drilling of exploratory wells. Total discoveries of crude oil were 1,051 million barrels in 2005, 7 percent less than the prior 10-year average but 34 percent more than 2004's discoveries of 782 million barrels.

The majority of crude oil total discoveries in 2005 came from extensions to fields in Texas, California, Montana, and Wyoming.

New field discoveries accounted for 205 million barrels of crude oil total discoveries. Almost all of these

discoveries (201 of 205 million) were in the Gulf of Mexico Federal Offshore. While this was 6 times greater than the new field discoveries of 2004 (33 million barrels), it was only 49 percent of the prior 10-year average (419 million barrels).

Operators discovered 805 million barrels in extensions in 2005, 30 percent more than in 2004 and 53 percent more than the prior 10-year average (527 million barrels).

New reservoir discoveries in old fields were 41 million barrels, 69 percent less than 2004 and only 23 percent of the prior 10-year average (180 million barrels).

Reserves additions are the sum of total discoveries, revisions, adjustments, sales, and acquisitions. In 2005, crude oil reserves additions were 2,119 million barrels, 63 percent more than in 2004 and 13 percent more than the prior 10-year average (1,875 million barrels).

Crude oil net revisions and adjustments were 790 million barrels, 60 percent more than the net revisions and adjustments of 2004 and almost equal to the prior 10-year average (795 million barrels). The net of sales and acquisitions of crude oil proved reserves was 278 million barrels.

U.S. crude oil production declined in 2005 due to lower production in the Gulf of Mexico and Alaska. The Rocky Mountain States generally increased crude oil production in 2005 with the largest increase occurring in Montana (up 36 percent, from 22 to 30 million barrels) owing to development of the Bakken formation of the Williston Basin. Reserves additions of crude oil replaced 122 percent of the 2005 production.

### Natural Gas

Dry natural gas proved reserves increased by 11,872 billion cubic feet in 2005. **Figure 3** shows the dry natural gas proved reserves levels by major region. It indicates that additions of gas reserves in the Lower 48 onshore are raising the National total despite declining offshore gas reserves. **Figure 4** shows the components of reserves changes from 1995 through 2005.

Total discoveries of dry natural gas reserves, which is the sum of field extensions, new field discoveries, and

**Table 1. Total U.S. Proved Reserves of Crude Oil, Dry Natural Gas, and Natural Gas Liquids, 1995-2005**

| Year  | Adjustments<br>(1) | Net<br>Revisions<br>(2) | Revisions <sup>a</sup><br>and<br>Adjustments<br>(3) | Net of Sales <sup>b</sup><br>and<br>Acquisitions<br>(4) | Extensions<br>(5) | New Field<br>Discoveries<br>(6) | New Reservoir<br>Discoveries<br>in Old Fields<br>(7) | Total <sup>c</sup><br>Discoveries<br>(8) | Estimated<br>Production<br>(9) | Proved <sup>d</sup><br>Reserves<br>12/31<br>(10) | Change<br>from<br>Prior Year<br>(11) |
|---|--------------------|-------------------------|---|---|-------------------|---------------------------------|--|--|--------------------------------|--|--------------------------------------|
| <b>Crude Oil</b> (million barrels of 42 U.S. gallons)                   |                    |                         |   |   |                   |                                 |  |  |                                |  |                                      |
| 1995  | 122                | 1,028                   | 1,150   | NA  | 500               | 114                             | 343  | 957                                      | 2,213                          | 22,351   | -106                                 |
| 1996  | 175                | 737                     | 912   | NA  | 543               | 243                             | 141  | 927                                      | 2,173                          | 22,017   | -334                                 |
| 1997  | 520                | 914                     | 1,434   | NA  | 477               | 637                             | 119  | 1,233                                    | 2,138                          | 22,546   | +529                                 |
| 1998  | -638               | 518                     | -120  | NA  | 327               | 152                             | 120  | 599                                      | 1,991                          | 21,034   | -1,512                               |
| 1999  | 139                | 1,819                   | 1,958   | NA  | 259               | 321                             | 145  | 725                                      | 1,952                          | 21,765   | +731                                 |
| 2000  | 143                | 746                     | 889   | -20   | 766               | 276                             | 249  | 1,291                                    | 1,880                          | 22,045   | +280                                 |
| 2001  | -4                 | -158                    | -162  | -87   | 866               | 1,407                           | 292  | 2,565                                    | 1,915                          | 22,446   | +401                                 |
| 2002  | 416                | 720                     | 1,136   | 24  | 492               | 300                             | 154  | 946                                      | 1,875                          | 22,677   | +231                                 |
| 2003  | 163                | 94                      | 257   | -398  | 426               | 705                             | 101  | 1,232                                    | 1,877                          | 21,891   | -786                                 |
| 2004  | 74                 | 420                     | 494   | 23  | 617               | 33                              | 132  | 782                                      | 1,819                          | 21,371   | -520                                 |
| 2005  | 221                | 569                     | 790   | 278   | 805               | 205                             | 41   | 1,051                                    | 1,733                          | 21,757   | +386                                 |
| <b>Dry Natural Gas</b> (billion cubic feet, 14.73 psia, 60° Fahrenheit) |                    |                         |   |   |                   |                                 |  |  |                                |  |                                      |
| 1995  | 580                | 7,734                   | 8,314   | NA  | 6,843             | 1,666                           | 2,452  | 10,961                                   | 17,966                         | 165,146  | +1,309                               |
| 1996  | 3,785              | 4,086                   | 7,871   | NA  | 7,757             | 1,451                           | 3,110  | 12,318                                   | 18,861                         | 166,474  | +1,328                               |
| 1997  | -590               | 4,902                   | 4,312   | NA  | 10,585            | 2,681                           | 2,382  | 15,648                                   | 19,211                         | 167,223  | +749                                 |
| 1998  | -1,635             | 5,740                   | 4,105   | NA  | 8,197             | 1,074                           | 2,162  | 11,433                                   | 18,720                         | 164,041  | -3,182                               |
| 1999  | 982                | 10,504                  | 11,486  | NA  | 7,043             | 1,568                           | 2,196  | 10,807                                   | 18,928                         | 167,406  | +3,365                               |
| 2000  | -891               | 6,962                   | 6,071   | 4,031   | 14,787            | 1,983                           | 2,368  | 19,138                                   | 19,219                         | 177,427  | +10,021                              |
| 2001  | 2,742              | -2,318                  | 424   | 2,630   | 16,380            | 3,578                           | 2,800  | 22,758                                   | 19,779                         | 183,460  | +6,033                               |
| 2002  | 3,727              | 937                     | 4,664   | 380   | 14,769            | 1,332                           | 1,694  | 17,795                                   | 19,353                         | 186,946  | +3,486                               |
| 2003  | 2,841              | -1,638                  | 1,203   | 1,034   | 16,454            | 1,222                           | 1,610  | 19,286                                   | 19,425                         | 189,044  | +2,098                               |
| 2004  | -114               | 744                     | 630   | 1,844   | 18,198            | 759                             | 1,206  | 20,163                                   | 19,168                         | 192,513  | +3,469                               |
| 2005  | 1,887              | 2,699                   | 4,586   | 2,544   | 21,050            | 942                             | 1,208  | 23,200                                   | 18,458                         | 204,385  | +11,872                              |
| <b>Natural Gas Liquids</b> (million barrels of 42 U.S. gallons)         |                    |                         |   |   |                   |                                 |  |  |                                |  |                                      |
| 1995  | 192                | 277                     | 469   | NA  | 432               | 52                              | 67   | 551                                      | 791                            | 7,399  | +229                                 |
| 1996  | 474                | 175                     | 649   | NA  | 451               | 65                              | 109  | 625                                      | 850                            | 7,823  | +424                                 |
| 1997  | -15                | 289                     | 274   | NA  | 535               | 114                             | 90   | 739                                      | 864                            | 7,973  | +150                                 |
| 1998  | -361               | 208                     | -153  | NA  | 383               | 66                              | 88   | 537                                      | 833                            | 7,524  | -449                                 |
| 1999  | 99                 | 727                     | 826   | NA  | 313               | 51                              | 88   | 452                                      | 896                            | 7,906  | +382                                 |
| 2000  | -83                | 459                     | 376   | 145   | 645               | 92                              | 102  | 839                                      | 921                            | 8,345  | +439                                 |
| 2001  | -429               | -132                    | -561  | 102   | 717               | 138                             | 142  | 997                                      | 890                            | 7,993  | -352                                 |
| 2002  | 62                 | 31                      | 93  | 54  | 612               | 48                              | 78   | 738                                      | 884                            | 7,994  | +1                                   |
| 2003  | -338               | -161                    | -499  | 30  | 629               | 35                              | 72   | 736                                      | 802                            | 7,459  | -535                                 |
| 2004  | 273                | 97                      | 370   | 112   | 734               | 26                              | 54   | 814                                      | 827                            | 7,928  | +469                                 |
| 2005  | -89                | 21                      | -68   | 156   | 863               | 32                              | 42   | 937                                      | 788                            | 8,165  | +237                                 |

<sup>a</sup>Revisions and adjustments = Col. 1 + Col. 2.<sup>b</sup>Net of sales and acquisitions = acquisitions - sales.<sup>c</sup>Total discoveries = Col. 5 + Col. 6 + Col. 7.<sup>d</sup>Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

NA=Not available.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves" and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." They may differ from the official EIA production data for crude oil, natural gas, and natural gas liquids for 2005 contained in the *Petroleum Supply Annual 2005*, DOE/EIA-0340(05) and the *Natural Gas Annual 2005*, DOE/EIA-0131(05).

Sources: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1995 through 2005 annual reports, DOE/EIA-0216.

Figure 1. U.S. Crude Oil Proved Reserves, 1995-2005

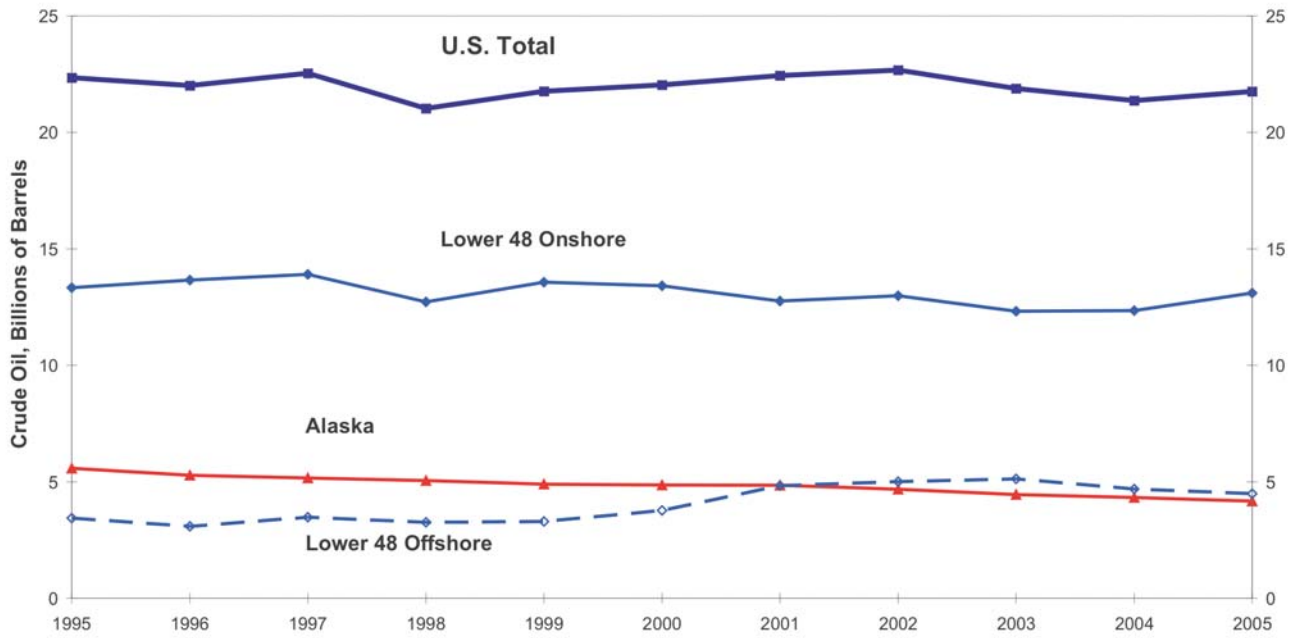
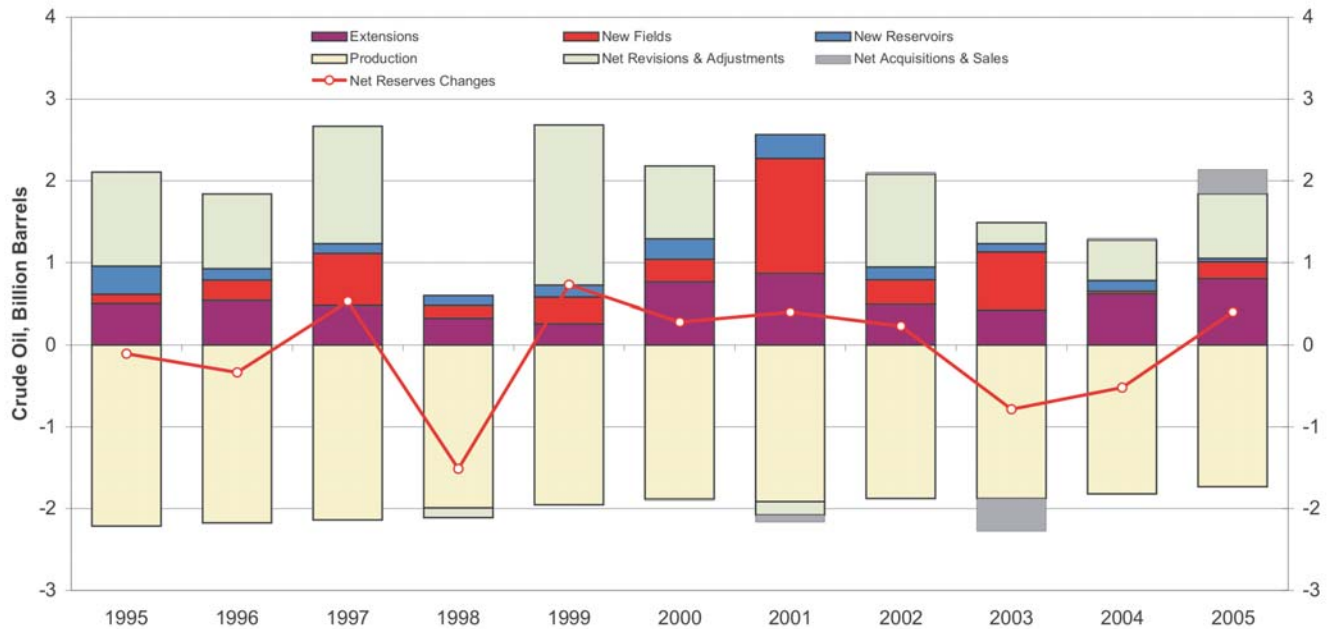
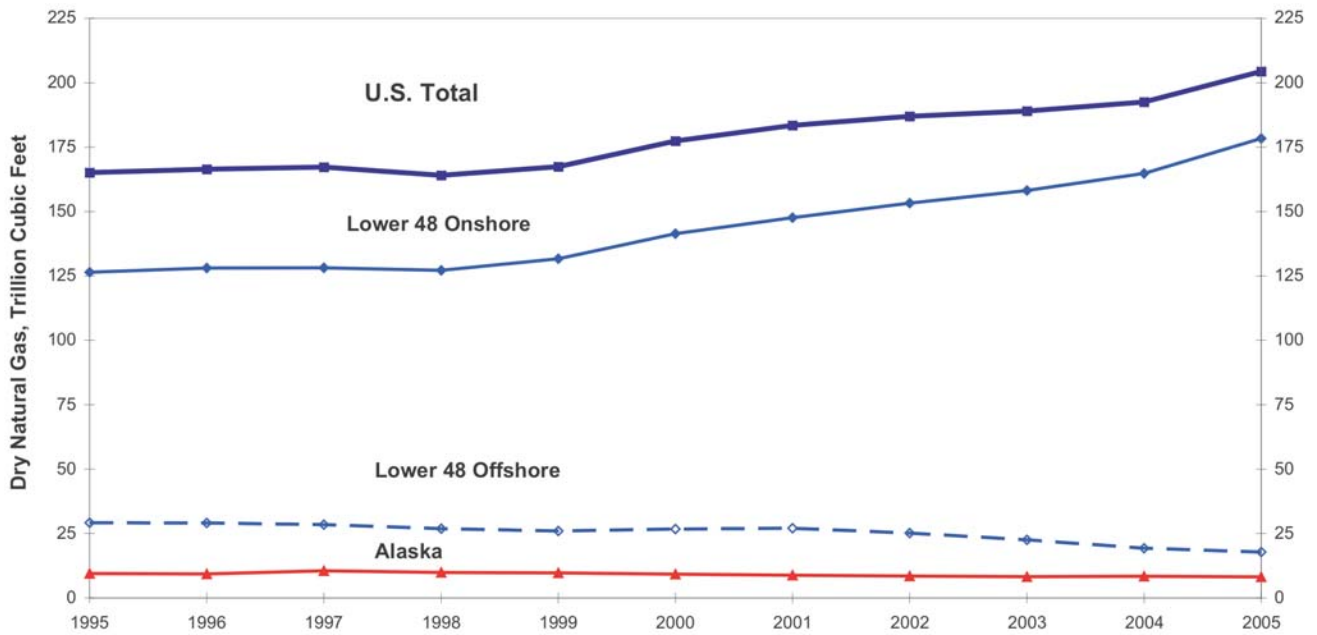


Figure 2. Components of Reserves Changes for Crude Oil, 1995-2005

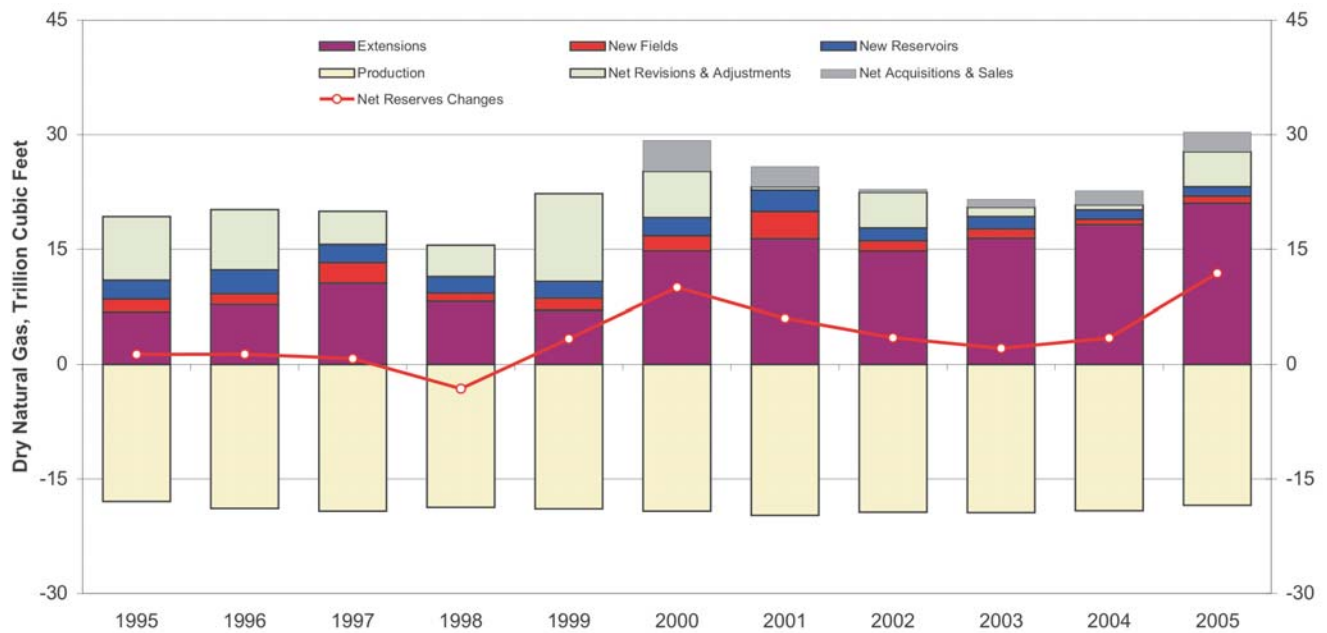


Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1995-2004 annual reports, DOE/EIA-0216.{19-28}

**Figure 3. U.S. Dry Natural Gas Proved Reserves, 1995-2005**



**Figure 4. Components of Reserves Changes for Dry Natural Gas, 1995-2005**



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1995-2004 annual reports, DOE/EIA-0216.{19-28}

new reservoir discoveries in old fields, were 23,200 billion cubic feet in 2005. This was 45 percent more than the prior 10-year average and 15 percent more than in 2004.

The majority of natural gas total discoveries in 2005 were from extensions to existing fields. Field extensions were 21,050 billion cubic feet, 16 percent more than in 2004 and 74 percent more than the prior 10-year average (12,101 billion cubic feet).

New field discoveries were 942 billion cubic feet, 24 percent more than the volume discovered in 2004 and 46 percent less than the prior 10-year average (1,731 billion cubic feet).

New reservoir discoveries in old fields were 1,208 billion cubic feet, up slightly from 2004 and 45 percent less than the prior 10-year average (2,198 billion cubic feet).

Natural gas net revisions and adjustments were 4,586 billion cubic feet, which is seven times the net revisions and adjustments of 2004, but 7 percent less than the prior 10-year average (4,908 billion cubic feet). The net of sales and acquisitions of dry natural gas proved reserves was 2,544 billion cubic feet.

Total U.S. natural gas production declined 4 percent in 2005 because, in August and September of 2005, Hurricanes Katrina and Rita wreaked havoc along the Gulf Coast. Beyond devastating much of coastal Alabama, Louisiana, Mississippi, and the flooding of New Orleans, these storms destroyed 113 offshore platforms and seriously damaged offshore pipelines and coastal oil and natural gas processing facilities, impacting the Nation's oil and gas production. At its nadir, natural gas production in the Gulf of Mexico (which accounted for 20 percent of U.S. dry gas production in 2004) was cut by 80 percent. Gulf of Mexico production slowly returned and reached roughly 80 percent of 2005's pre-hurricane production rate (10.2 Bcf/day gross withdrawal in June 2005) in September 2006. For several years before Hurricane Katrina, gas production from the Gulf had been declining about 10 percent per year.

Coalbed natural gas reserves increased 8 percent in 2005 and accounted for 10 percent of U.S. dry natural gas reserves. Coalbed natural gas production increased less than 1 percent from 2004 and accounted for 9 percent of U.S. dry natural gas production.

## Natural Gas Liquids

Natural gas liquids reserves are the sum of lease condensate reserves and natural gas plant liquids reserves. Natural gas liquids proved reserves increased 3 percent in 2005. Operators replaced 130 percent of U.S. natural gas liquids production with reserves additions.

Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 29,922 million barrels in 2005, a 2 percent increase from the 2004 level. Natural gas liquids represented 27 percent of total liquid hydrocarbon proved reserves in 2005.

## Reserves Changes Since 1977

EIA has collected oil and gas reserves estimates annually since 1977. **Table 2** lists the cumulative totals of the components of reserves changes for crude oil and dry natural gas from 1977 through 2005. The table has two sections, one for the lower 48 States and another for the U.S. total (which includes Alaska's contribution). Annual averages for each component of reserves changes are also listed, along with the percentage of that particular component's impact on total U.S. proved reserves. In this section, we compare these averages to the 2005 proved reserves estimates as a means of gauging the past year against history.

**Crude Oil:** Since 1977 U.S. operators have:

- had average annual new reserves discoveries of 906 million barrels,
- had average annual proved reserves additions of 2,067 million barrels from total discoveries, net revisions and adjustments, and net sales and acquisitions, and
- had an average annual proved reserves decline of 405 million barrels Nationwide, because production exceeded reserve additions.

Since 1977, crude oil reserves have primarily been sustained by proved ultimate recovery appreciation in existing fields rather than by the discovery of new oil fields. Only 12 percent of reserves additions since 1977 were booked as new field discoveries. Proved ultimate recovery appreciation is the sum of net revisions, adjustments, net sales and acquisitions, extensions, and new reservoir discoveries in old fields (see the Proved Ultimate Recovery section later in this chapter.) Since 1977, the 26,260 million barrels of total discoveries accounted for 44 percent of reserves additions.

Figure 5. U.S. Natural Gas Liquids Proved Reserves, 1995-2005

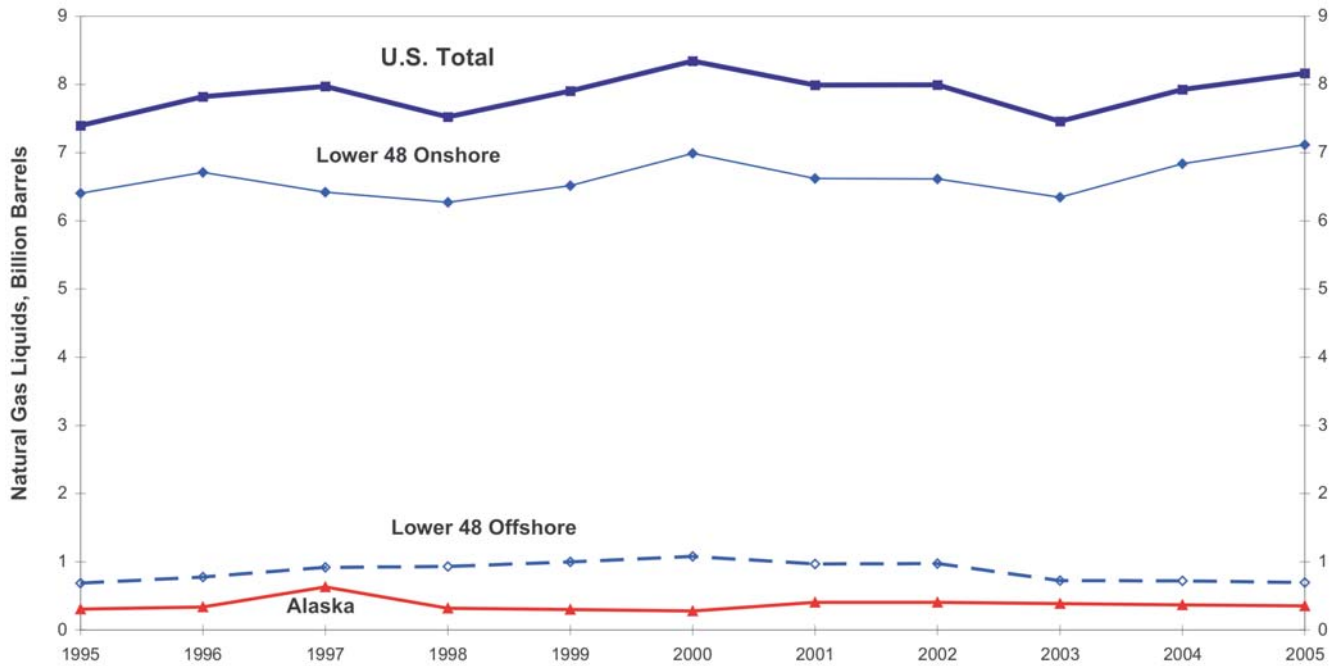
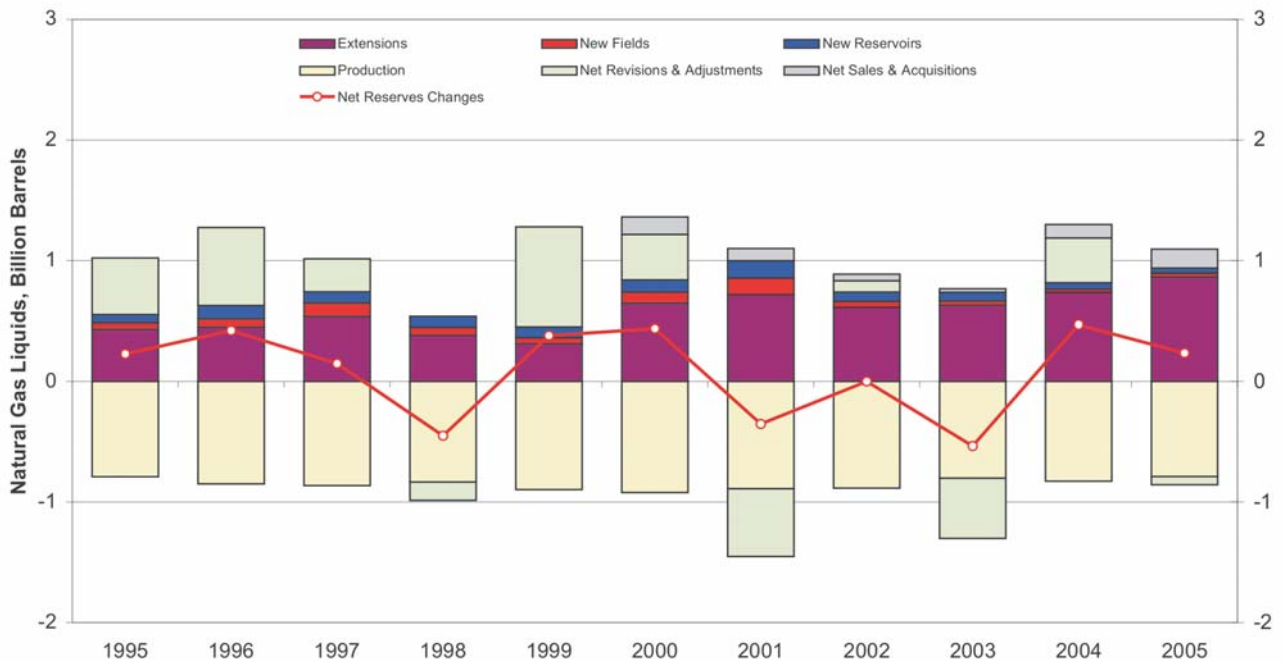


Figure 6. Components of Reserves Changes for Natural Gas Liquids, 1995-2005



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1995-2004 annual reports, DOE/EIA-0216.{19-28}



**Table 2. Reserves Changes, 1977-2005**

| Components of Change   | Lower 48 States |                  |                               | U.S. Total     |                  |                               |
|--|-----------------|------------------|-------------------------------|----------------|------------------|-------------------------------|
|  | Volume          | Average per Year | Percent of Reserves Additions | Volume         | Average per Year | Percent of Reserves Additions |
| <b>Crude Oil</b> (million barrels of 42 U.S. gallons)                        |                 |                  |                               |                |                  |                               |
| <b>Proved Reserves as of 12/31/76</b> . . . . .                              | <b>24,928</b>   | —                | —                             | <b>33,502</b>  | —                | —                             |
| New Field Discoveries . . . . .  | 5,930           | 204              | 12.0                          | 6,881          | 237              | 11.5                          |
| New Reservoir Discoveries in Old Fields . .                                  | 3,955           | 136              | 8.0                           | 4,143          | 143              | 6.9                           |
| Extensions . . . . .   | 13,478          | 465              | 27.4                          | 15,236         | 525              | 25.4                          |
| <b>Total Discoveries</b> . . . . .   | <b>23,363</b>   | <b>806</b>       | <b>47.5</b>                   | <b>26,260</b>  | <b>906</b>       | <b>43.8</b>                   |
| Revisions, Adjustments, Sales & Acquisitions <sup>a</sup>                    | 25,855          | 892              | 52.5                          | 33,682         | 1,161            | 56.2                          |
| <b>Total Reserves Additions</b> . . . . .                                    | <b>49,218</b>   | <b>1,697</b>     | <b>100.0</b>                  | <b>59,942</b>  | <b>2,067</b>     | <b>100.0</b>                  |
| <b>Production</b> . . . . .  | <b>56,496</b>   | <b>1,948</b>     | <b>114.8</b>                  | <b>71,687</b>  | <b>2,472</b>     | <b>119.6</b>                  |
| <b>Net Reserves Change</b> . . . . .   | <b>-7,278</b>   | <b>-251</b>      | <b>-14.8</b>                  | <b>-11,745</b> | <b>-405</b>      | <b>-19.6</b>                  |
| <b>Dry Natural Gas</b> (billion cubic feet at 14.73 psia and 60° Fahrenheit) |                 |                  |                               |                |                  |                               |
| <b>Proved Reserves as of 12/31/76</b> . . . . .                              | <b>180,838</b>  | —                | —                             | <b>213,278</b> | —                | —                             |
| New Field Discoveries . . . . .  | 53,849          | 1,857            | 10.2                          | 54,113         | 1,866            | 10.5                          |
| New Reservoir Discoveries in Old Fields . .                                  | 69,288          | 2,389            | 13.1                          | 69,747         | 2,405            | 13.6                          |
| Extensions . . . . .   | 270,580         | 9,330            | 51.3                          | 273,853        | 9,443            | 53.2                          |
| <b>Total Discoveries</b> . . . . .   | <b>393,717</b>  | <b>13,576</b>    | <b>74.6</b>                   | <b>397,713</b> | <b>13,714</b>    | <b>77.3</b>                   |
| Revisions, Adjustments, Sales & Acquisitions <sup>a</sup>                    | 134,101         | 4,624            | 25.4                          | 116,641        | 4,022            | 22.7                          |
| <b>Total Reserves Additions</b> . . . . .                                    | <b>527,818</b>  | <b>18,201</b>    | <b>100.0</b>                  | <b>514,354</b> | <b>17,736</b>    | <b>100.0</b>                  |
| <b>Production</b> . . . . .  | <b>512,442</b>  | <b>17,670</b>    | <b>97.1</b>                   | <b>523,247</b> | <b>18,043</b>    | <b>101.7</b>                  |
| <b>Net Reserves Change</b> . . . . .   | <b>15,376</b>   | <b>530</b>       | <b>2.9</b>                    | <b>-8,893</b>  | <b>-307</b>      | <b>-1.7</b>                   |

<sup>a</sup> EIA did not separately collect data on sales and acquisitions of proved reserves until the year 2000.  
Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 1977-2005 annual reports, DOE/EIA-0216.(1-28)

Compared to the averages of reserves changes since 1977, 2005 was an up year for crude oil discoveries. Total discoveries of crude oil (1,051 million barrels) in 2005 were 16 percent more than the post-1976 U.S. average (906 million barrels per year).

Looking at the components of total discoveries in 2005:

- Extensions in 2005 (805 million barrels) were 53 percent more than the post-1976 average (525 million barrels),
- 2005's new field discoveries (205 million barrels) were 14 percent less than the post-1976 average for crude oil (237 million barrels), and
- New reservoir discoveries in old fields (41 million barrels) were 71 percent less than the post-1976 average (143 million barrels).

Revisions, Adjustments, Sales & Acquisitions were 1,068 million barrels in 2005. This was 8 percent less than the post-1976 average of 1,161 million barrels per year.

**Dry Natural Gas:** Since 1977 U.S. operators have:

- had average annual new reserves discoveries of 13,714 billion cubic feet,
- had average annual proved reserves additions of 17,736 billion cubic feet from total discoveries, net revisions and adjustments, and net sales and acquisitions, and
- had an average annual production of 18,043 billion cubic feet, decreasing U.S. dry natural gas reserves by an average 307 billion cubic feet per year.

Like crude oil reserves, natural gas reserves have primarily been sustained by proved ultimate recovery appreciation since 1977. For gas, extensions rather than net revisions and adjustments are usually the largest component. Extensions accounted for 53 percent of all reserves additions since 1977 while net revisions and adjustments accounted for only 23 percent.

Compared to the averages of reserves changes since 1977, 2005 was an up year for dry natural gas total

**Table 3. U.S. Average Annual Domestic First Purchase Prices for Crude Oil, Wellhead Prices for Natural Gas, and the Average Number of Active Rotary Drilling Rigs, 1977-2005**

| Year        | Crude Oil            |               | Natural Gas                       |               | Number of Rigs |              |
|-------------|----------------------|---------------|-----------------------------------|---------------|----------------|--------------|
|             | Current              | 2005 Constant | Current                           | 2005 Constant |                |              |
|             | (dollars per barrel) |               | (dollars per thousand cubic feet) |               |                |              |
| 1977        | 8.57                 | 22.22         | 0.79                              | 2.05          | 2,001          |              |
| 1978        | 9.00                 | 21.78         | 0.91                              | 2.20          | 2,259          |              |
| 1979        | 12.64                | 28.24         | 1.18                              | 2.64          | 2,177          |              |
| 1980        | 21.59                | 44.16         | 1.59                              | 3.25          | 2,909          |              |
| 1981        | 31.77                | 59.45         | 1.98                              | 3.70          | 3,970          |              |
| 1982        | 28.52                | 50.23         | 2.46                              | 4.33          | 3,105          |              |
| 1983        | 26.19                | 44.38         | 2.59                              | 4.39          | 2,232          |              |
| 1984        | 25.88                | 42.28         | 2.66                              | 4.35          | 2,428          |              |
| 1985        | 24.09                | 38.15         | 2.51                              | 3.97          | 1,980          |              |
| 1986        | 12.51                | 19.38         | 1.94                              | 3.01          | 964            |              |
| 1987        | 15.40                | 23.17         | 1.67                              | 2.51          | 936            |              |
| 1988        | 12.58                | 18.30         | 1.69                              | 2.46          | 936            |              |
| 1989        | 15.86                | 22.23         | 1.69                              | 2.37          | 869            |              |
| 1990        | 20.03                | 27.01         | 1.71                              | 2.31          | 1,010          |              |
| 1991        | 16.54                | 21.53         | 1.64                              | 2.13          | 860            |              |
| 1992        | 15.99                | 20.32         | 1.74                              | 2.21          | 721            |              |
| 1993        | 14.25                | 17.68         | 2.04                              | 2.53          | 754            |              |
| 1994        | 13.19                | 16.03         | 1.85                              | 2.25          | 775            |              |
| 1995        | 14.62                | 17.39         | 1.55                              | 1.84          | 723            |              |
| 1996        | 18.46                | 21.54         | 2.17                              | 2.53          | 779            |              |
| 1997        | 17.23                | 19.72         | 2.32                              | 2.66          | 943            |              |
| 1998        | 10.87                | 12.29         | 1.96                              | 2.22          | 827            |              |
| 1999        | 15.56                | 17.35         | 2.19                              | 2.44          | 625            |              |
| 2000        | 26.72                | 29.17         | 3.68                              | 4.02          | 918            |              |
| 2001        | 21.84                | 23.29         | 4.00                              | 4.27          | 1,156          |              |
| 2002        | 22.51                | 23.74         | 2.95                              | 3.11          | 830            |              |
| 2003        | 27.56                | 28.60         | 4.88                              | 5.06          | 1,032          |              |
| 2004        | January              | 30.35         | 31.21                             | 5.21          | 5.36           | 1,101        |
|             | February             | 31.21         | 32.05                             | 5.02          | 5.16           | 1,119        |
|             | March                | 32.86         | 33.70                             | 5.12          | 5.25           | 1,135        |
|             | April                | 33.20         | 34.01                             | 5.03          | 5.15           | 1,151        |
|             | May                  | 35.73         | 36.55                             | 5.40          | 5.52           | 1,164        |
|             | June                 | 34.53         | 35.26                             | 5.82          | 5.94           | 1,176        |
|             | July                 | 36.54         | 37.23                             | 5.62          | 5.73           | 1,213        |
|             | August               | 40.10         | 40.78                             | 5.52          | 5.61           | 1,234        |
|             | September            | 40.56         | 41.18                             | 5.06          | 5.14           | 1,240        |
|             | October              | 46.14         | 46.76                             | 5.43          | 5.50           | 1,240        |
|             | November             | 42.85         | 43.35                             | 6.21          | 6.28           | 1,262        |
|             | December             | 38.22         | 38.61                             | 6.01          | 6.07           | 1,246        |
| <b>2004</b> | <b>Average</b>       | <b>36.77</b>  | <b>37.51</b>                      | <b>5.46</b>   | <b>5.57</b>    | <b>1,192</b> |
| 2005        | January              | 40.18         | 40.53                             | 5.52          | 5.57           | 1,255        |
|             | February             | 42.19         | 42.50                             | 5.59          | 5.63           | 1,276        |
|             | March                | 47.56         | 47.84                             | 5.98          | 6.02           | 1,306        |
|             | April                | 47.26         | 47.48                             | 6.44          | 6.47           | 1,334        |
|             | May                  | 44.03         | 44.18                             | 6.02          | 6.04           | 1,320        |
|             | June                 | 49.83         | 49.93                             | 6.15          | 6.16           | 1,355        |
|             | July                 | 53.35         | 53.40                             | 6.69          | 6.70           | 1,398        |
|             | August               | 58.90         | 58.87                             | 7.68          | 7.68           | 1,436        |
|             | September            | 59.64         | 59.53                             | 9.50          | 9.48           | 1,452        |
|             | October              | 56.99         | 56.79                             | 10.97         | 10.93          | 1,479        |
|             | November             | 53.20         | 52.92                             | 9.54          | 9.49           | 1,486        |
|             | December             | 53.24         | 52.87                             | 10.02         | 9.95           | 1,470        |
| <b>2005</b> | <b>Average</b>       | <b>50.28</b>  | <b>50.28</b>                      | <b>7.51</b>   | <b>7.51</b>    | <b>1,383</b> |

Sources: Current dollars and number of rigs: *Monthly Energy Review September 2006*, DOE/EIA-0035(2006/09). 2005 constant dollars: U.S. Department of Commerce, Bureau of Economic Analysis, Gross Domestic Product Implicit Price Deflators, October 2006.



discoveries. Operators reported 23,200 billion cubic feet of total discoveries of dry natural gas proved reserves, 69 percent more than the post-1976 average (13,714 billion cubic feet).

The net of revisions, adjustments, sales, and acquisitions was 7,130 billion cubic feet in 2005, 77 percent higher than the post-1976 U.S. average (4,022 billion cubic feet per year).

For the seventh year in a row (and 11 out of the last 12 years), the annual change to the National total of gas reserves has been positive, not negative.

## Economics and Drilling

**Economics:** Table 3 lists the average annual domestic wellhead prices of crude oil and natural gas from 1977 to 2005.

In 2005, the U.S. crude oil first purchase price started at a monthly average of \$40.18 per barrel in January, rose to a high of \$59.64 in September, and ended the year at \$53.24 per barrel in December. The average annual U.S. crude oil first purchase price increased from \$36.77 in 2004 to \$50.28 per barrel in 2005.

Oil prices vary by region. The average annual 2005 crude oil first purchase price ranged from \$52.61 per barrel in Texas through \$47.08 per barrel in California, \$55.34 per barrel in Colorado, and \$53.47 per barrel in Ohio, to a low of \$43.48 per barrel in the California Federal Offshore. {29}

The average annual wellhead natural gas price increased from \$5.46 per thousand cubic feet in 2004 to \$7.51 in 2005. Monthly average natural gas prices started at \$5.52 per thousand cubic feet in January 2005, rose to a high of \$10.97 in October, and ended the year at \$10.02 per thousand cubic feet in December 2005. {30}

**Drilling:** Also listed in Table 3 is the average number of active rotary drilling rigs from 1977 to 2005. From 2004 to 2005, the annual average active rig count rose from 1,192 to 1,383, a 16 percent increase.

Looking first at exploratory wells, there were 3,458 exploratory wells drilled in 2005 (Table 4). Of these, 12 percent were completed as oil wells, 42 percent were completed as gas wells, and 46 percent were dry holes. Exploratory oil and gas completions (excluding dry holes) in 2005 were 12 percent more (Figure 7) than the revised 2004 total.

Figures 9 and 10 show the average volume of discoveries per exploratory well for dry natural gas and oil, respectively, since 1977. The 2005 average volume of oil discoveries per exploratory well increased 5 percent compared to 2004. The 2005 average volume of gas discoveries per exploratory well increased 5 percent compared to 2004.

The number of successful development wells increased by 28 percent for oil and by 27 percent for gas from their 2004 levels (Figure 8). Including dry holes, there were an estimated 41,874 exploratory and development wells drilled in 2005. This is 27 percent more than in 2004 and 57 percent more than the average number of wells drilled annually in the prior 10 years (26,705).

For the twelfth year in a row, the number of gas well completions exceeded the number of oil well completions in both the exploratory and development categories.

## Mergers and Acquisitions

The following large mergers and acquisitions were announced in 2005 and are expected to have an impact on the energy industry in the future:

On August 10, 2005, Chevron Corporation announced that it had completed its merger with Unocal Corporation. Unocal's stockholders agreed to Chevron's offer, which was originally announced on April 4, 2005, and rejected a higher bid tendered on June 24, 2005 by Chinese oil company CNOOC Ltd. The merger will reportedly increase Chevron's proved reserves (based on year-end 2004 reporting and including the company's share of equity affiliates) by more than 15 percent. {31}

On April 26, 2005, Valero Energy Corporation agreed to acquire refiner Premcor Incorporated for \$8.9 billion in cash and stock plus the assumption of about \$1.8 billion of debt. The merger created the largest refiner of crude oil in North America and marks a major step in the U.S. refinery industry's rapid consolidation. The deal between Valero and Premcor will give Valero total refining capacity of 3.3 million barrels per day and will raise it above Exxon Mobil Corporation's North American refinery capacity. Valero will then claim about 13 percent of the U.S. market for refined products. {32}

**Table 4. U.S. Exploratory and Development Well Completions,<sup>a</sup> 1973-2005**

| Year   | Exploratory |       |        |        | Total Exploratory and Development |        |        |        |
|--------|-------------|-------|--------|--------|-----------------------------------|--------|--------|--------|
|        | Oil         | Gas   | Dry    | Total  | Oil                               | Gas    | Dry    | Total  |
| 1973   | 642         | 1,067 | 5,952  | 7,661  | 10,167                            | 6,933  | 10,320 | 27,420 |
| 1974   | 859         | 1,190 | 6,833  | 8,882  | 13,647                            | 7,138  | 12,116 | 32,901 |
| 1975   | 982         | 1,248 | 7,129  | 9,359  | 16,948                            | 8,127  | 13,646 | 38,721 |
| 1976   | 1,086       | 1,346 | 6,772  | 9,204  | 17,688                            | 9,409  | 13,758 | 40,855 |
| 1977   | 1,164       | 1,548 | 7,283  | 9,995  | 18,745                            | 12,122 | 14,985 | 45,852 |
| 1978   | 1,171       | 1,771 | 7,965  | 10,907 | 19,181                            | 14,413 | 16,551 | 50,145 |
| 1979   | 1,321       | 1,907 | 7,437  | 10,665 | 20,851                            | 15,254 | 16,099 | 52,204 |
| 1980 R | 1,777       | 2,099 | 9,081  | 12,957 | 32,959                            | 17,461 | 20,785 | 71,205 |
| 1981 R | 2,651       | 2,522 | 12,400 | 17,573 | 43,887                            | 20,250 | 27,953 | 92,090 |
| 1982 R | 2,437       | 2,133 | 11,307 | 15,877 | 39,459                            | 19,076 | 26,379 | 84,914 |
| 1983 R | 2,030       | 1,605 | 10,206 | 13,841 | 37,366                            | 14,684 | 24,355 | 76,405 |
| 1984 R | 2,209       | 1,528 | 11,321 | 15,058 | 42,906                            | 17,338 | 25,884 | 86,128 |
| 1985 R | 1,680       | 1,200 | 8,954  | 11,834 | 35,261                            | 14,324 | 21,211 | 70,796 |
| 1986 R | 1,084       | 797   | 5,567  | 7,448  | 19,213                            | 8,599  | 12,799 | 40,611 |
| 1987 R | 926         | 756   | 5,052  | 6,734  | 16,210                            | 8,096  | 11,167 | 35,473 |
| 1988 R | 855         | 747   | 4,711  | 6,313  | 13,646                            | 8,578  | 10,119 | 32,343 |
| 1989 R | 607         | 706   | 3,934  | 5,247  | 10,230                            | 9,522  | 8,236  | 27,988 |
| 1990 R | 664         | 693   | 3,793  | 5,150  | 12,445                            | 11,126 | 8,496  | 32,067 |
| 1991 R | 601         | 544   | 3,390  | 4,535  | 12,035                            | 9,611  | 7,882  | 29,528 |
| 1992 R | 498         | 427   | 2,550  | 3,475  | 9,019                             | 8,305  | 6,284  | 23,608 |
| 1993 R | 509         | 541   | 2,509  | 3,559  | 8,764                             | 10,174 | 6,513  | 25,451 |
| 1994 R | 579         | 740   | 2,465  | 3,784  | 7,001                             | 9,739  | 5,515  | 22,255 |
| 1995 R | 549         | 583   | 2,279  | 3,411  | 7,827                             | 8,454  | 5,319  | 21,600 |
| 1996 R | 496         | 591   | 2,246  | 3,333  | 8,760                             | 9,539  | 5,587  | 23,886 |
| 1997 R | 434         | 543   | 2,178  | 3,155  | 10,445                            | 11,186 | 5,955  | 27,586 |
| 1998 R | 286         | 510   | 1,649  | 2,445  | 6,979                             | 11,127 | 4,805  | 22,911 |
| 1999 R | 156         | 519   | 1,167  | 1,842  | 4,314                             | 11,121 | 3,504  | 18,939 |
| 2000 R | 267         | 615   | 1,349  | 2,231  | 7,585                             | 16,242 | 4,046  | 27,873 |
| 2001 R | 330         | 972   | 1,716  | 3,018  | 8,186                             | 21,403 | 4,432  | 34,021 |
| 2002 R | 239         | 701   | 1,283  | 2,223  | 6,226                             | 16,728 | 3,610  | 26,564 |
| 2003 R | 326         | 892   | 1,266  | 2,484  | 7,465                             | 19,522 | 3,688  | 30,675 |
| 2004 R | 353         | 1,323 | 1,200  | 2,876  | 7,703                             | 21,816 | 3,474  | 32,993 |
| 2005   | 429         | 1,452 | 1,577  | 3,458  | 9,833                             | 27,397 | 4,644  | 41,874 |

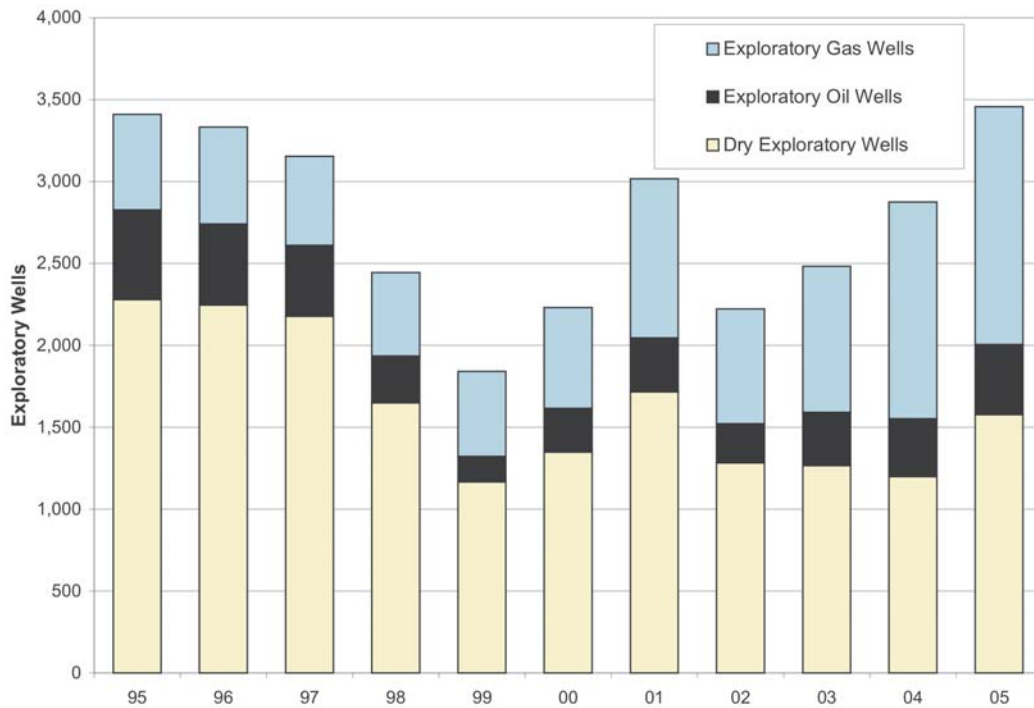
<sup>a</sup>Excludes service wells and stratigraphic and core testing.

R = Revised Data.

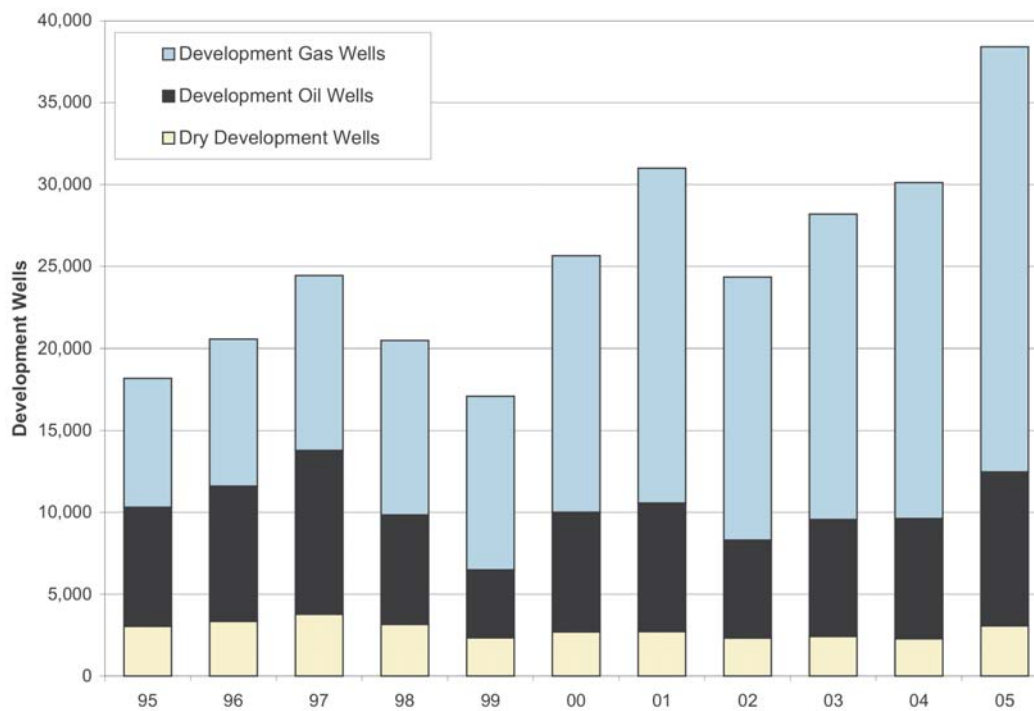
Notes: Estimates include only the original drilling of a hole intended to discover or further develop already discovered oil or gas resources. Other drilling activities, such as drilling an old well deeper, drilling of laterals from the original well, drilling of service and injection wells, and drilling for resources other than oil and gas are excluded.

Source: Table 5.2, EIA *Monthly Energy Review October 2006*, DOE/EIA-0035(2006/10).

**Figure 7. U.S. Exploratory Well Completions, 1995-2005**

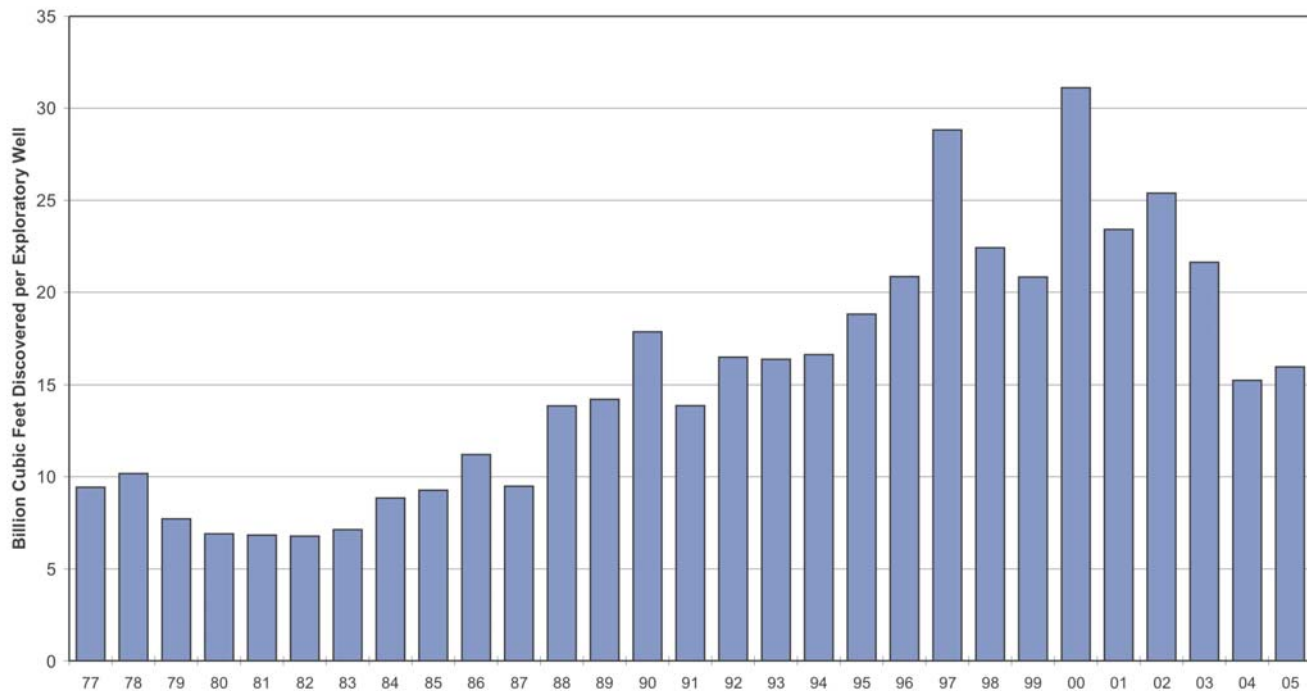


**Figure 8. U.S. Development Well Completions, 1995-2005**

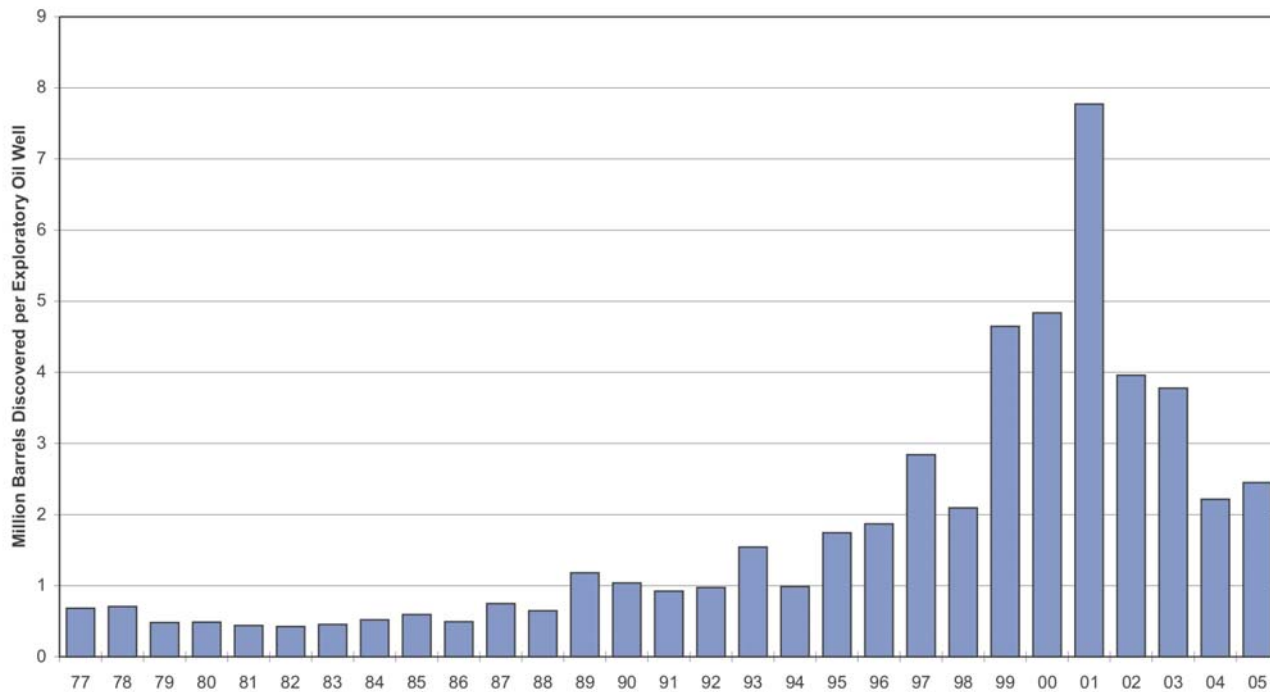


Source: Energy Information Administration, Office of Oil and Gas.

**Figure 9. U.S. Total Discoveries of Dry Natural Gas per Exploratory Gas Well Completion, 1977-2005**



**Figure 10. U.S. Total Discoveries of Crude Oil per Exploratory Oil Well Completion, 1977-2005**



Source: Energy Information Administration, Office of Oil and Gas.

On May 9, 2005, Duke Energy and Cinergy announced their merger. The combined company, to be named Duke Energy Corporation, through its joint venture with ConocoPhillips, is now the largest producer of natural gas liquids in North America. {33}

## Reserve-to-Production Ratio and Ultimate Recovery

### R/P Ratios

The relationship between proved reserves and production levels, expressed as the ratio of reserves to production (R/P ratio) is often used in analyses. For a mature producing area, the R/P ratio tends to be reasonably stable, so that the proved reserves at the end of a year serve as a rough guide to the production level that can be maintained during the following year. Operators report data which yield R/P ratios that vary widely by area depending upon:

- category of operator
- geology and economics
- number and size of new discoveries
- amount of drilling that has occurred.

R/P ratios are an indication of the state of development in an area and, over time, the ratios change. For example, when the Alaskan North Slope oil reserves were booked, the U.S. R/P ratio for crude oil increased because significant production from these reserves did not begin until 7 years after booking due to the need to first build the Trans Alaska pipeline. The U.S. R/P ratio for crude oil decreased from 11.1-to-1 to 9.4-to-1 between 1977 and 1982 as Alaskan North Slope oil production reached high levels.

In 2005, U.S. crude oil proved reserves increased and oil production decreased, increasing the National average R/P ratio from 11.8 to 12.6.

**Figure 11** shows the U.S. R/P ratio trend for crude oil since 1945. After World War II, increased drilling and discoveries led to a greater R/P ratio. Later, when drilling found fewer reserves than were produced, the ratio became smaller. R/P ratios also vary geographically, because of differences in development history and reservoir conditions. The 2005 National average R/P ratio for crude oil was 12.6-to-1. Areas with relatively high R/P ratios are the Permian Basin of Texas and New Mexico, and California, where enhanced oil recovery techniques such as carbon dioxide (CO<sub>2</sub>) injection or steamflooding have

improved the recoverability of oil in old, mature fields. Areas that have the lowest R/P ratios, like the Mid-Continent region, usually have many older fields. There, new technologies such as horizontal drilling have helped to add reserves equivalent to the annual production, keeping the regional reserves and R/P ratio for oil relatively stable.

**Figure 12** shows the historical R/P ratio for wet natural gas since 1945. Prior to 1945, R/P ratios were very high since the interstate pipeline infrastructure was not well developed. The market for natural gas grew rapidly after World War II, lowering the R/P ratio. From 2004 to 2005 the U.S. average R/P ratio for natural gas increased from 10.1 to 11.1 since proved reserves increased and production decreased.

Different marketing, transportation, and production characteristics for gas are seen when looking at regional average R/P ratios as compared to the 2005 U.S. average R/P ratio of about 11.1-to-1. Areas with a higher range of R/P ratios than the National average were the Pacific offshore and the Rockies. Several major gas producing areas have R/P ratios below the National average, particularly Texas, the Gulf of Mexico Federal Offshore, and Oklahoma.

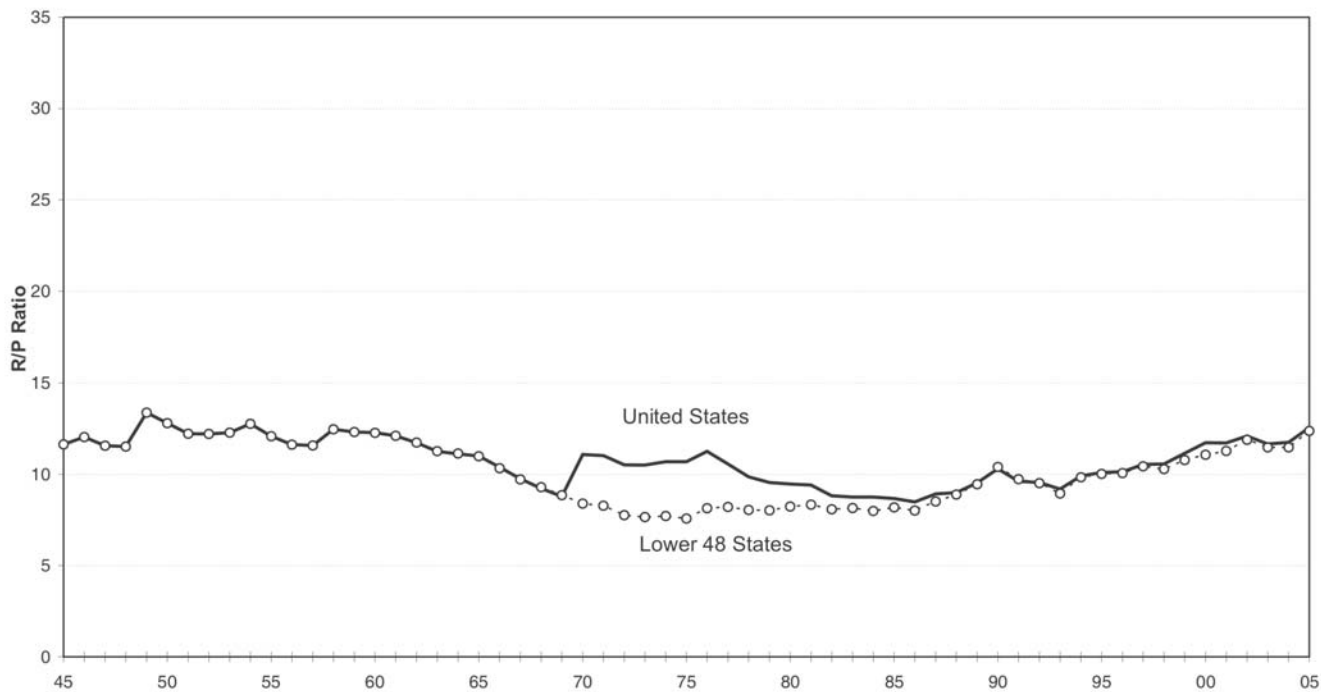
### Proved Ultimate Recovery

**Proved Ultimate Recovery** is the sum of proved reserves and cumulative production at a specified point in time. It measures the maximum recoverable volume *known* at that time and is a dynamic quantity that is expected to change over time for any field, group of fields, State, or Country. In most instances, therefore, an estimate of Proved Ultimate Recovery does not represent the all-time maximum recoverable volume of resources for a given field or area. Also, the proved ultimate recovery of a field, a group of fields, a State, or a Country grows (appreciates) over time in most instances.

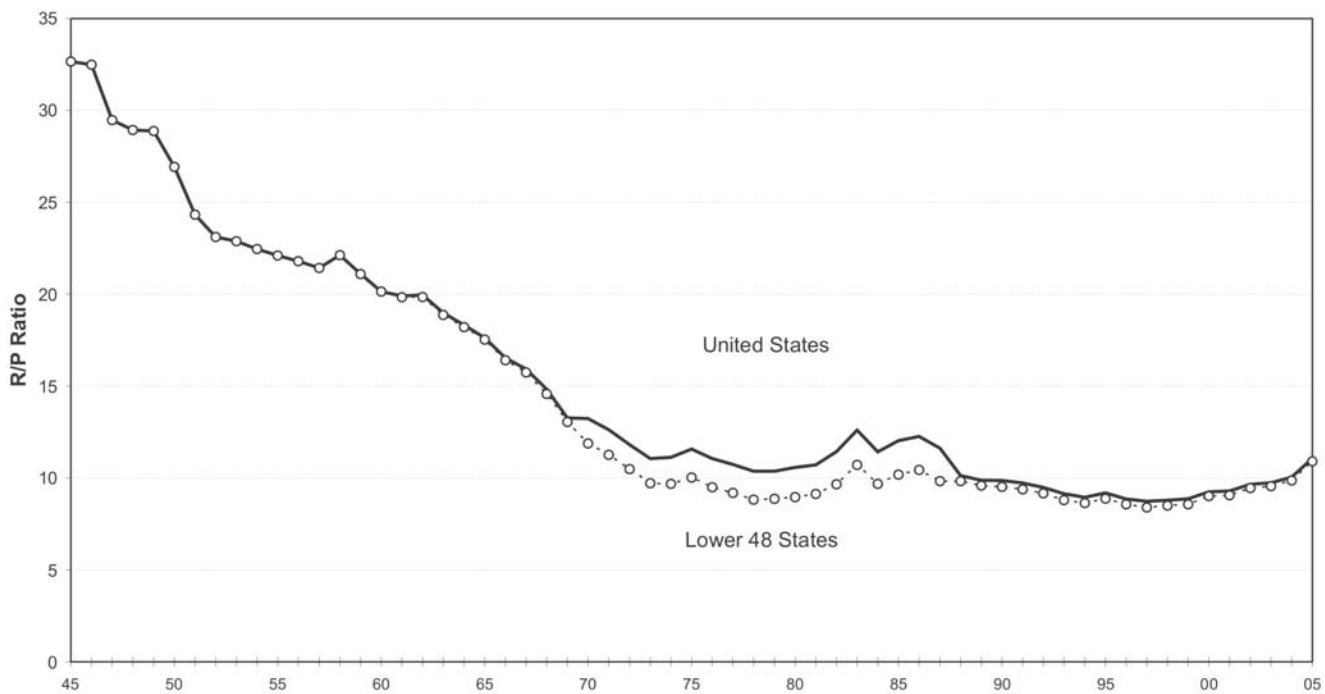
**Figures 13 and 14** show successive estimates of proved ultimate recovery for the United States. The figures show proved reserves and cumulative production for *crude oil plus lease condensate* and *wet natural gas*, over the period 1977 through 2005. They illustrate the continued appreciation (growth) of proved ultimate recovery over time.

In 1977, U.S. *crude oil plus lease condensate* proved reserves were 33,615 million barrels. Cumulative production of *crude oil plus lease condensate* for 1977 through 2005 was 73,640 million barrels. This

**Figure 11. Reserves-to-Production Ratios for Crude Oil, 1945-2005**



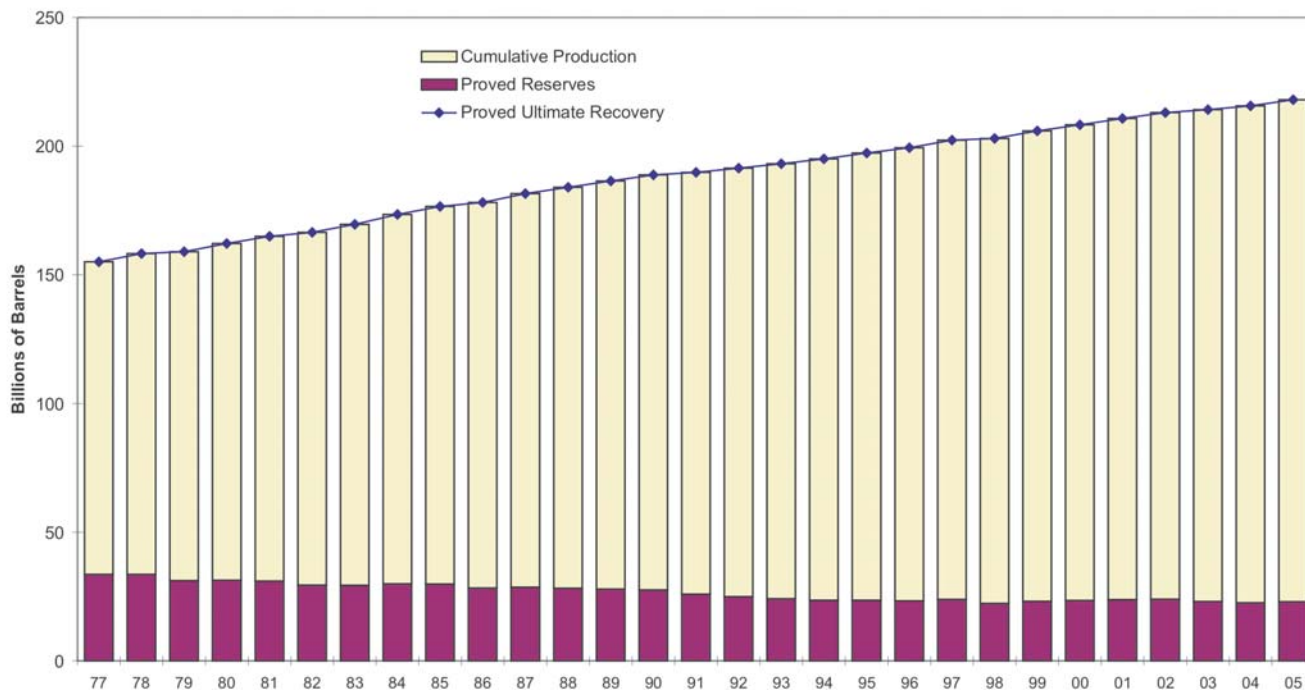
**Figure 12. Reserves-to-Production Ratios for Wet Natural Gas, 1945-2005**



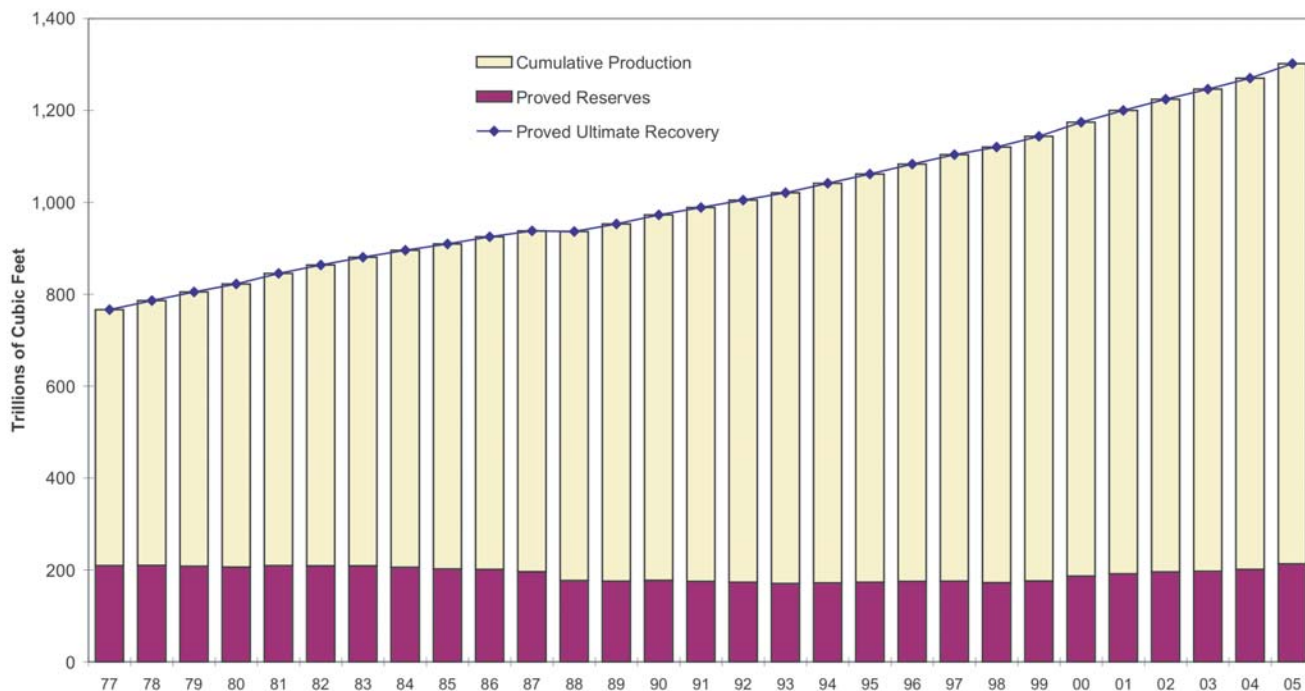
Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {34} and Energy Information Administration, Office of Oil and Gas (1977–2004){1-28}. Cumulative production: *U.S. Oil and Gas Reserves by Year of Field Discovery* (1977-1988).{35}



**Figure 13. Components of Proved Ultimate Recovery for Crude Oil and Lease Condensate, 1977-2005**



**Figure 14. Components of Proved Ultimate Recovery for Wet Natural Gas, 1977-2005**



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {34} and Energy Information Administration, Office of Oil and Gas (1977–2004){1-28}. Cumulative production: *U.S. Oil and Gas Reserves by Year of Field Discovery* (1977-1988).{35}

**Table 5. International Oil and Natural Gas Reserves as of December 31, 2005**

| Oil<br>(million barrels) |                                   |                      |                      | Natural Gas<br>(billion cubic feet) |                                   |                      |                      |
|--------------------------|-----------------------------------|----------------------|----------------------|-------------------------------------|-----------------------------------|----------------------|----------------------|
| Rank <sup>a</sup>        | Country                           | Oil & Gas Journal    | World Oil            | Rank <sup>b</sup>                   | Country                           | Oil & Gas Journal    | World Oil            |
| 1                        | Saudia Arabia <sup>c</sup>        | <sup>d</sup> 266,810 | <sup>d</sup> 262,175 | 1                                   | Russia                            | 1,680,000            | 1,688,749            |
| 2                        | Iran <sup>c</sup>                 | 132,460              | 131,500              | 2                                   | Iran <sup>c</sup>                 | 971,150              | 965,000              |
| 3                        | Iraq <sup>c</sup>                 | 115,000              | 115,000              | 3                                   | Qatar <sup>c</sup>                | 910,520              | 906,000              |
| 4                        | Kuwait <sup>c</sup>               | <sup>d</sup> 104,000 | <sup>d</sup> 100,875 | 4                                   | Saudia Arabia <sup>c</sup>        | <sup>d</sup> 241,840 | <sup>d</sup> 243,500 |
| 5                        | Canada <sup>e</sup>               | 178,792              | 12,025               | 5                                   | United Arab Emirates <sup>c</sup> | 214,400              | 205,550              |
| 6                        | United Arab Emirates <sup>c</sup> | 97,800               | 70,250               | 6                                   | United States                     | 204,385              | 204,385              |
| 7                        | Russia                            | 60,000               | 74,400               | 7                                   | Nigeria <sup>c</sup>              | 184,660              | 182,000              |
| 8                        | Venezuela <sup>c</sup>            | 79,729               | 52,650               | 8                                   | Algeria <sup>c</sup>              | 160,505              | 160,682              |
| 9                        | Libya <sup>c</sup>                | 39,126               | 34,050               | 9                                   | Venezuela <sup>c</sup>            | 151,395              | 150,890              |
| 10                       | Nigeria <sup>c</sup>              | 35,876               | 37,175               | 10                                  | Iraq <sup>c</sup>                 | 111,950              | 84,000               |
| <b>Top 10 Total</b>      |                                   | <b>1,109,593</b>     | <b>890,100</b>       | <b>Top 10 Total</b>                 |                                   | <b>4,830,805</b>     | <b>4,790,756</b>     |
| 11                       | United States                     | 21,757               | 21,757               | 11                                  | Indonesia <sup>c</sup>            | 97,786               | 91,500               |
| 12                       | Qatar <sup>c</sup>                | 15,207               | 20,346               | 12                                  | Norway                            | 84,260               | 83,272               |
| 13                       | China                             | 18,250               | 16,189               | 13                                  | Australia                         | 27,640               | 119,500              |
| 14                       | Mexico                            | 12,882               | 12,353               | 14                                  | Turkmenistan                      | 71,000               | -                    |
| 15                       | Brazil                            | 11,243               | 11,925               | 15                                  | Malaysia                          | 75,000               | 58,000               |
| 16                       | Algeria <sup>c</sup>              | 11,350               | 11,350               | 16                                  | Uzbekistan                        | 66,200               | -                    |
| 17                       | Kazakhstan                        | 9,000                | -                    | 17                                  | Kazakhstan                        | 65,000               | -                    |
| 18                       | Norway                            | 7,705                | 8,246                | 18                                  | Egypt                             | 58,500               | 66,840               |
| 19                       | Angola                            | 5,412                | 9,050                | 19                                  | Kuwait <sup>c</sup>               | <sup>d</sup> 56,015  | <sup>d</sup> 57,000  |
| 20                       | Azerbaijan                        | 7,000                | -                    | 20                                  | Netherlands                       | 62,000               | 50,500               |
| 21                       | Oman                              | 5,506                | 4,790                | 21                                  | Canada                            | 56,577               | 53,700               |
| 22                       | India                             | 5,848                | 3,980                | 22                                  | China                             | 53,325               | 55,606               |
| 23                       | Ecuador                           | 4,630                | 5,145                | 23                                  | Libya <sup>c</sup>                | 52,650               | 51,500               |
| 24                       | Indonesia <sup>c</sup>            | 4,301                | 5,025                | 24                                  | Ukraine                           | 39,600               | -                    |
| 25                       | United Kingdom                    | 4,029                | 3,750                | 25                                  | India                             | 38,800               | 27,259               |
| <b>Top 25 Total</b>      |                                   | <b>1,253,713</b>     | <b>1,024,006</b>     | <b>Top 25 Total</b>                 |                                   | <b>5,735,238</b>     | <b>5,448,433</b>     |
| <b>OPEC Total</b>        |                                   | <b>901,659</b>       | <b>840,396</b>       | <b>OPEC Total</b>                   |                                   | <b>3,152,871</b>     | <b>3,097,622</b>     |
| <b>World Total</b>       |                                   | <b>1,292,550</b>     | <b>1,119,058</b>     | <b>World Total</b>                  |                                   | <b>6,112,144</b>     | <b>6,215,220</b>     |

<sup>a</sup>Rank is based on an average of oil reserves reported by *Oil & Gas Journal* and *World Oil*.

<sup>b</sup>Rank is based on an average of natural gas reserves reported by *Oil & Gas Journal* and *World Oil*.

<sup>c</sup>Member of the Organization of Petroleum Exporting Countries (OPEC).

<sup>d</sup>Includes one-half of the reserves in the Neutral Zone.

<sup>e</sup>*Oil and Gas Journal* Canadian oil reserves include heavy (low gravity) oil.

Note: The Energy Information Administration does not certify these international reserves data, but reproduces the information as a matter of convenience for the reader.

Sources: PennWell Publishing Company, *Oil and Gas Journal*, Vol. 103, No. 47 (December 19, 2005). Gulf Publishing Company, *World Oil*, Vol. 227, No. 9 (September, 2006).

substantially exceeds the 1977 proved reserves, but at the end of 2005 there were still 23,019 million barrels of *crude oil plus lease condensate* proved reserves. Therefore, the Nation's estimated proved ultimate recovery of crude oil was fundamentally increased during this period owing to the *proved ultimate recovery appreciation* phenomenon that typically accompanies the continued development of old fields. In fact, only 12 percent of proved reserves additions of crude oil were booked as *new field discoveries* from 1976 through 2005. The other 88 percent came from the proved reserves categories related to the proved ultimate recovery appreciation process.

Similarly, the 1977 *wet natural gas* proved reserves were 209,490 billion cubic feet, but 531 trillion cubic feet of gas was produced from 1977 through 2005 and there are still 213,308 billion cubic feet of *wet natural gas* proved reserves in 2005. Only 11 percent of proved reserve additions of natural gas were booked as *new field discoveries* from 1976 through 2005. The other 89 percent came from proved ultimate recovery appreciation.

## International Perspective

### International Reserves

The EIA estimates domestic oil and gas reserves but does not systematically estimate worldwide reserves. As shown in **Table 5**, international reserves estimates are presented in two widely circulated trade publications. The world's total reserves are estimated to be roughly 1.2 trillion barrels of oil and 6.2 quadrillion cubic feet of gas.

The United States ranked 11th in the world for proved reserves of crude oil and 6th for natural gas in 2005. A comparison of EIA's U.S. proved reserves estimates with worldwide estimates obtained from other sources shows that the United States had 2 percent of the world's total crude oil proved reserves and 3 percent of the world's total natural gas proved reserves at the end of 2005. There are sometimes substantial differences between the estimates from these sources. The *Oil & Gas Journal* reported oil reserves for Canada at about 179 billion barrels. This is much higher than the *World Oil* estimate of 12 billion. The *Oil and Gas Journal* estimate includes heavy oil from Canadian tar sands, the *World Oil* estimate does not. Another reason

(among many) for these differences is that condensate is often included in foreign oil reserve estimates.

The *Oil & Gas Journal* {35} estimate for world oil reserves increased 1 percent in 2004 owing to an increase in its estimate of Saudi Arabian and Iranian reserves. The *World Oil* {36} estimate increased 3 percent in 2005 due to its larger estimate of Russian and Canadian reserves. For world gas reserves, the *Oil & Gas Journal* reported a 1 percent increase, while *World Oil* reported an 11 percent decrease in 2005. The decrease in *World Oil*'s estimate is from lower estimates of Russian, Indonesian, and Australian gas reserves.

Several foreign countries have oil reserves considerably larger than those of the United States. Saudi Arabian oil reserves are the largest in the world, dwarfing U.S. oil reserves. Iraqi oil reserves are almost 5 times U.S. reserves. Closer to home, Venezuela and Canada have about 3 times U.S. Reserves based on averages of the *World Oil* and *Oil & Gas Journal* estimates.

### Petroleum Consumption

The United States is the world's largest energy consumer. The EIA estimates energy consumption and publishes it in its *Annual Energy Review*.{38} In 2005:

- The U.S. consumed 99,894,000,000,000,000 Btu of energy (99.9 quadrillion Btu). This was a decrease of 0.52 quadrillion Btu from the 2004 level of consumption.
- 63 percent of U.S. energy consumption was provided by petroleum and natural gas—crude oil and natural gas liquids combined (40 percent), and natural gas (23 percent).
- U.S. petroleum consumption was about 21 million barrels of oil and natural gas liquids and 60 billion cubic feet of gas per day.

### Dependence on Imports

The United States remains dependent on imported oil and gas. In 2005, crude oil imports made up 66 percent of the U.S. crude oil supply. Canada, Mexico, Saudi Arabia, Venezuela, Nigeria, and Iraq were the primary foreign suppliers of petroleum to the United States.{39}

Net gas imports increased from the 2004 total of 4.26 trillion cubic feet to 4.33 trillion cubic feet in 2005. Imports satisfied approximately 20 percent of consumption. Almost all of this gas was pipelined from Canada. Some liquefied natural gas was imported from

Trinidad and Tobago, Algeria, and for the first time ever, Russia.

## List of Appendices

**Appendix A: Operator Level Data** - How much of the National total of proved reserves are operated by the large oil and gas corporations? Appendix A separates the large operators from the small and presents reserves data according to operator production size classes. Table A6 lists the top U.S. operators by reported 2005 production.

**Appendix B: Top 100 Oil and Gas Fields** - What fields have the most reserves and production in the United States? The top 100 fields for oil and natural gas out of the inventory of more than 45,000 oil and gas fields are listed in Appendix B. These fields hold two-thirds of U.S. crude oil proved reserves.

**Appendix C: Conversion to the Metric System** - To simplify international comparisons, a summary of U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves expressed in metric units is included as Appendix C.

**Appendix D: Historical Reserves Statistics** - Appendix D contains selected historical reserves data presented at the National level. Readers interested in a historical look at one specific State or region can review these tables in an electronic data archive on the EIA website. Table D9 contains the production and proved reserves for 1995-2005 for the Gulf of Mexico Federal Offshore region by water depths greater than 200 meters, and less than 200 meters. Table D10 contains Nonproducing Reserves.

**Appendix E: Summary of Data Collection Operations** - This report is based on two annual EIA surveys. Proved reserves data is collected from U.S. oil and gas field operators on Form EIA-23. Natural gas liquids production data is collected annually from U.S. natural gas plant operators on Form EIA-64A. Appendix E describes survey designs, response statistics, reporting requirements, and sampling frame maintenance.

**Appendix F: Statistical Considerations** - The EIA strives to maintain or improve the accuracy of its reports. Since complete coverage of all oil and gas operators is impractical, the EIA has adopted sound statistical methods to impute data for those operators not sampled and for those data elements that smaller operators are not required to file. These methods are described in Appendix F.

**Appendix G: Estimation of Reserves and Resources** - Reserves are not measured directly. Reserves are estimated on the basis of the best geological, engineering, and economic data available to the estimator. Appendix G describes reserve estimation techniques commonly used by oil and gas field operators and EIA personnel when in the field performing quality assurance checks. A discussion of the relationship of reserves to overall U.S. oil and gas resources is also included.

**Appendix H: Maps of Selected State Subdivisions** - Certain large producing States have been subdivided into smaller regions to allow more specific reporting of reserves data. Maps of these States identifying the smaller regions are provided in Appendix H.

**Appendix I: Annual Survey Forms of Domestic Oil and Gas Reserves** - Samples of Form EIA-23 and Form EIA-64A are presented in Appendix I.

**Glossary** - Contains definitions of all of the technical terms used in this report.