

## U.S. Department of Energy - Energy Efficiency and Renewable Energy Biomass Program

### National Energy Security

Cheap oil fuels America's economy. According to the [Energy Information Administration](#) (EIA), in 2002, the United States consumed 19.656 million barrels of petroleum (crude oil and petroleum products) per day, or about one-quarter of total world oil production. More than half (62%) was imported oil. The EIA projected total petroleum consumption in 2025 at 28.3 million barrels per day - increasing to 70% dependency on foreign imports (EIA Annual Energy Outlook 2004). Most of this demand for oil over the next two decades is in the [transportation sector](#). As sources of [domestic oil supplies](#) disappear, the nation's increasing reliance on [imported oil](#) makes the United States vulnerable to [oil supply disruptions](#), and threatens America's economic and energy security.

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### Energy Security and the U.S. Transportation Sector

The transportation sector relies heavily on oil, accounting for two-thirds of U.S. petroleum use in 2002 and this level of consumption is expected to continue through 2025 ([EIA Annual Energy Outlook 2004 Figure 102](#)). Throughout this forecast period, the level of gasoline consumption is projected to increase from 8.9 to 13.3 million barrels per day ([EIA Annual Energy Outlook 2004, Figure 103](#)). In addition, more than 50% of the fuel used by the transportation sector is imported-far more than any other part of the U.S. economy. This makes transportation particularly vulnerable to the risks of relying on foreign oil.

Reducing the transportation sector's reliance on oil is clearly the key to improving our nation's energy security. Together with measures such as improving vehicle fuel efficiency, using biomass derived ethanol and biodiesel as additives to gasoline and diesel can help offset some of our demand for petroleum. U.S. ethanol production, with corn as the primary feedstock, totaled 2.81 billion gallons in 2003 (up from 2.14 billion gallons in 2002) and production is projected to increase to 3.2 billion gallons in 2025 ([EIA Annual Energy Outlook 2004, Figure 104](#)), with about 27 percent of the growth from conversion of cellulosic biomass (such as wood and agricultural residues). Use of biodiesel has also increased significantly - about 20 million gallons of biodiesel were produced in the United States in 2001. ([Renewable Fuels Association](#), and [Alternative Fuel News \(PDF 625 KB\)](#) ([Download Adobe Reader](#))). Incrementally increasing the biofuels content of motor vehicle fuel (gasoline and diesel) from 1.2 to 4.0 percent between 2002 and 2016 would displace a total of 2.9 billion barrels of crude oil (Urbanchuk, J.M. "An Economic Analysis of Legislation for a Renewable Fuels Requirement for Highway Motor Fuels." AUS Consultants, November 7, 2001 ([PDF 130 KB](#))).

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## U.S. Oil Imports

To keep up with America's ever-increasing demand for oil, the United States has steadily increased its dependence on foreign oil since 1985. In 1993, total imports as a share of petroleum products supplied broke the 50% mark for the first time. Today total imports of 11.5 million barrels per day comprise 58.2% of petroleum products supplied (EIA Monthly Energy Review December 2001, Table 1.8).

The statistics above are based on gross imports and ignore U.S. exports of petroleum. Net imports, which take into account U.S. exports of petroleum, give a better indication of the big picture—the fraction of oil consumed that could not have been supplied by domestic sources. In 2000, net imports totaled 10.4 million barrels per day, or 53% of petroleum products supplied. Net imports are projected to increase to 16.6 million barrels per day, or 62% of petroleum supplied by 2020 (EIA Annual Energy Outlook 2002, Figure 80 and Table 15).

America's heavy reliance on imported oil jeopardizes our nation's energy, economic, and environmental security, particularly in the transportation sector. In the current situation, the United States has little control over oil supply disruptions and oil price fluctuations. The necessity of maintaining a stable supply of imported oil imposes foreign policy constraints, and in times of crisis, forces the U.S. military into action. See [U.S. Military and Oil](#).

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## Depletion of U.S. Oil Reserves

Declining U.S. oil reserves and falling domestic production from aging oil fields are key factors in America's increasing dependence on foreign imports. In addition, America has already developed the bulk of its known and easily accessible low-cost deposits. The following statistics from EIA clearly summarize the problem:

- U.S. proven oil reserves have declined by an estimated 16.3 billion barrels from 39.0 billion barrels in 1970 to 22.7 billion barrels at the end of 2002 (EIA U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2002 Annual Report, Table 6 ([PDF 126 KB](#))). This less than 2% of the world's known oil reserves ([EIA International Energy Outlook 2003](#), Table 11).
- Domestic oil production has been steadily declining since 1970. U.S. petroleum production is expected to decrease slightly from 9.2 million barrels per day in 2002 to 8.6 million barrels per day by 2025, but oil consumption in the United States is expected to rise from 19.6 million barrels per day in 2002 to 28.3 million barrels per day in 2025, a 44% increase (EIA Annual Energy Outlook 2004, Figure 99 ([PDF 126 KB](#))).

The combination of dwindling U.S. oil reserves and increasing oil demand make it impossible for the United States to significantly improve energy security by using more domestic petroleum, even if the United States were to tap every remaining oil deposit in America. That would just delay the inevitable; and the United States would still have to reduce its use of petroleum products and turn to alternative transportation fuel sources such as biofuels in order to gain a secure energy future.

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## U.S. Vulnerability to Oil Supply Disruptions

While there is no question that the United States is increasingly dependent on foreign oil, the level of oil dependence doesn't really give a full indication of how vulnerable the United States is to an oil supply disruption. If the U.S. oil supply came from many small producers, and one of them suddenly stopped exporting oil, then the impact on oil supply and prices would be small, even at a high level of dependence. However, this is not the case; today, four major producers provide over nearly 70% of the U.S. oil supply: Canada, Mexico, Venezuela, and the Persian Gulf region (Bahrain, Iran, Iraq, Kuwait, Qatar, Saudi Arabia and the United Arab Emirates).

- Canada, Mexico, and Venezuela, combined, supplied over 45% of the oil supplied to the United States in 2002 (EIA's Petroleum Supply Annual 2002 ([PDF 22 KB](#)), Volume 1, Table 21). Trade agreements with Canada and Mexico, and the proximity of these sources should make their supplies less vulnerable to disruptions.
- In 2002, the Persian Gulf supplied nearly 20% of U.S. imported petroleum (EIA Annual Energy Review 2002 ([PDF 15 KB](#)), Table 5.4). This region will continue to increase its influence in world oil markets, as oil supplies in other regions are exhausted, because over half the world's known oil reserves are concentrated in the Persian Gulf ([EIA International Energy Outlook 2003](#)).

The United States first experienced oil supply disruptions from the Persian Gulf region in the 1970s, when two sudden and sharp oil price hikes rocked the American economy. Since then, additional disruptions in oil supply, such as those occurring during the 1979 Iranian revolution and the 1990 invasion of Kuwait by Iraq, reinforce the need to reduce America's dependence on Middle Eastern oil. See [Oil Supply Disruptions and the Economy](#).

The ability of the United States to offset a major oil supply disruption has improved little since the 1970s. Several factors are contributing to America's increasing vulnerability.

- By 2025, oil and oil production facilities will be concentrated in the Asia/Pacific region ([EIA Annual Energy Outlook 2003](#), Figure 101). At these levels, a supply disruption from this one region would have an immediate impact on oil supplies and prices worldwide.
- The U.S. government's emergency supply of crude oil, the [strategic petroleum reserve](#) (SPR), provides less protection from an oil supply disruption than in previous years, because of America's increasing demand for oil. The maximum days of inventory protection peaked at 118 days in 1985; it currently down to 53 days.
- About 61% of the increase in petroleum demand over the next two decades will be met by an increase in production by members of OPEC rather than by non-OPEC suppliers. By 2025, OPEC production is expected to be more than 25 million barrels per day higher than it was in 2001 ([EIA International Energy Outlook 2003](#), Figure 37).
- Although these factors are all indicators of America's vulnerability, there is no

real way to estimate the probability of disruption. In the near term, greater diversity of oil import sources can reduce America's vulnerability to oil supply disruptions. In the long term, promoting energy efficiency and producing and using fuels from renewable, domestic biomass resources—particularly in the transportation sector—will ease our dependence on foreign oil imports and improve our nation's energy security. In addition to its direct displacement of imported oil, biofuels production and use creates the infrastructure to respond to future oil supply disruptions. The greater the percentage of transportation fuel coming from biofuels, the more quickly the industry will be able to increase production if needed to meet an emergency situation.

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