

Estimated U.S. Imports, Domestic Supply and Potential Production from the Arctic National Wildlife Refuge Coastal Region, 2005-2050

Sources

The accompanying chart is based on high price and high discovery projections for the Arctic National Wildlife Refuge (including adjacent Native lands and state near-shore waters), as presented in U.S. Energy Information Administration (EIA) and U.S. Geological Survey (USGS) reports. Petroleum consumption and domestic supply estimates are taken from the EIA *Annual Energy Outlook 2005*;¹ the source for potential production from the Arctic National Wildlife Refuge through 2025 is the agency's March 2004 report, *Analysis of Oil and Gas Production in the Arctic National Wildlife Refuge*.² The EIA model runs through 2025; estimates for total domestic supply and consumption for 2026-2050 are projected from the rates of change estimated by EIA for 2021-2025. EIA's "high ANWR resources" projection through 2025, extended to 2050 as shown here, results in production of 10.4 billion barrels, the total mean technically recoverable resources estimated by the USGS for the Arctic Refuge Coastal Plain region.³

Discussion

The course of this nation's long-term energy supply and consumption path cannot be known with certainty. Nevertheless, this scenario provides the most reasonable basis for understanding the relatively small role the Arctic Refuge can play in resolving the drastic and increasing imbalance between domestic petroleum supplies and consumption.⁴

¹ U.S. Energy Information Administration, *Annual Energy Outlook 2005*, Table 11 ("Current Futures" case). This is the agency's high price scenario, which forecasts oil prices averaging \$35.00 per barrel in 2003 dollars in 2025 (compared to \$30.31 per barrel in the *AEO 2005* reference case).

² See: U.S. Energy Information Administration, *Analysis of Oil and Gas Production in the Arctic National Wildlife Refuge*, March 2004 (Report No. SR/OIAF/2004-04), Figures 2 and 3, pp. 7-8 (includes production from adjacent state offshore development and onshore Native lands; annual production figures provided by EIA).

³ EIA draws the mean technically recoverable estimate for the Arctic Refuge, plus adjacent state and Native lands from U.S. Geological Survey, *Arctic National Wildlife Refuge, 1002 Area, Petroleum Assessment, 1998, Including Economic Analysis* (fact sheet summarizing U.S. Open File Report 98-34 [CD], updated in 2001), Table 1 (<http://pubs.usgs.gov/fs/fs-0028-01/fs-0028-01.htm>).

⁴ Domestic supply includes crude oil, natural gas liquids and condensate, refinery processing gains and other inputs (including alcohols, ethers, blending components and other hydrocarbons converted to liquid fuel).

The chart on which this discussion is focused, derived principally from the *Annual Energy Outlook 2005* “current futures” (high) oil price scenario, shows greater domestic production and lower consumption than lower-price scenarios. For example, the *Annual Energy Outlook 2005* reference case, based on future oil prices approximately \$5.00 per barrel lower than the “current futures” case, would show (1) greater total domestic petroleum consumption and (2) less domestic production, resulting in (3) a wider gap between domestic supply and demand. In the scenario depicted here, U.S. imports (the upper tier of domestic consumption in the chart, shown in blue) total approximately 12 million barrels per day (bpd) of oil in 2005, increasing to approximately 16.5 million bpd by 2025 and 28.3 million bpd by 2050. By comparison, in the reference case scenario imports rise to 17.5 million bpd in 2025 and 31.0 million bpd by 2050. The key price, production and domestic consumption figures for these two scenarios are shown in the following table.

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	(1)	(2)	(3)	(4)	(5)
Case	Avg. Price, 2005-2025 (2005 \$/Bbl.)	/ ----- Billion Barrels ----- /			
		Domestic Production (without Arctic Refuge)	Potential Arctic Refuge Region	Total Domestic Consumption	Import Requirement
Reference Case	\$25.83	143.5	10.4	489.1	335.2
Current Futures Case	\$31.17	152.5	10.4	475.9	313.0

Sources:
 Col. (1): From U.S. Energy Information Administration, *Annual Energy Outlook 2005*, Table 11 (prices in 2003 \$ adjusted using Table 19, Macroeconomic Indicators [Reference Case]).
 Col. (2), (4): From: *Annual Energy Outlook 2005*, Table 11 (see discussion in text).
 Col. (3): U.S. Geological Survey, *Arctic National Wildlife Refuge, 1002 Area, Petroleum Assessment, 1998, Including Economic Analysis* (fact sheet summarizing U.S. Open File Report 98-34 [CD], updated in 2001), Table 1.
 Col. (5): Col. (4) - (Col. [2] + Col. [3]).

Under both scenarios (and most plausible scenarios) this nation’s dependence on imported oil will increase in future years. As indicated above, production from the Arctic Refuge region will not significantly alter this situation.

The Arctic Refuge production scenario shown here represents full production of the USGS mean estimate of technically recoverable oil (10.4 billion barrels). Because this volume represents 100 percent of a geologic estimate, production from the Arctic Refuge region will not increase from this level with higher oil prices.⁵ (On the other hand, in the event of sustained lower oil prices, Arctic Refuge production volumes would be less than the technically recoverable limit.)

⁵ See: U.S. Geological Survey, “Resource Costs – ANWR 1002” (*Analysis of Oil and Gas Production in the Arctic National Wildlife Refuge*, Figure 6), where increases in production virtually cease as prices rise.

The difference between the maximum estimate of 10.4 billion barrels of oil from the Arctic Refuge region used here and the frequently-heard claim that the Arctic Refuge is likely to add 16 billion barrels to the nation's petroleum reserves requires explanation. The 16 billion barrel estimate represents the USGS five percentile estimate of technically recoverable oil from the Arctic Refuge Coastal Plain, adjacent state waters and Native lands. In other words, the USGS team estimates there one chance in 20 that 16 billion barrels of technically recoverable oil will be discovered. Balanced against this outlier possibility, at the other end of the spectrum USGS estimates there is an equal probability that less than 5.7 billion barrels of technically recoverable oil will be found.⁶ In light of this range of uncertainty, the mean estimate (10.4 billion barrels) is the most appropriate figure to use in this context. Moreover, some might consider the 16 billion barrel estimate inappropriate, if not misleading, unless the scant likelihood of that possibility is clearly noted.

The fact that the United States possesses reserves of less than 31 billion barrels of oil might lead some to question EIA's projection that domestic production of 152 billion barrels between 2005 and 2050. A critical factor in this regard is the rate at which this nation is able to replace the petroleum it produces. Since 1985, the United States has produced approximately 50 billion barrels of petroleum, while estimated reserves have declined from approximately 36 billion barrels to present level of approximately 30 billion. While EIA believes this nation can continue to discover and turn new sources of oil into reserves, petroleum geologists and energy experts who subscribe to the "peak oil" theory believe that new reserves will become increasingly difficult to locate and expensive to develop, making continued reserve replacement highly unlikely, if not impossible.⁷ If the peak oil theorists are correct, diminished domestic supplies will cause the dependence on imports to rise above the levels presented in this analysis.

The thrust of this analysis is that 10.4 billion barrels of oil (in this context the maximum estimate for Arctic Refuge production) pales in comparison to the gap between estimated U.S. production and consumption between now and 2050 of more than 300 million barrels. This nation is becoming increasingly dependent on imported crude oil; exploration of the Arctic Refuge will not alter (or significantly mitigate) this disturbing trend.

⁶ *Arctic National Wildlife Refuge, 1002 Area, Petroleum Assessment, 1998, Including Economic Analysis*, Table 1.

⁷ The peak oil argument has graced the cover of *Scientific American* (Campbell C.J., and J.H. Laherrère, "The End of Cheap Oil," March 1998, pp. 80-86) and, more recently, the front page of the *Wall Street Journal* (Jeffrey Ball, "Dire Prophecy: As Prices As Soar, Doomsayers Provoke Debate on Oil's Future – In a 1970s Echo, Dr. Campbell Warns Supply is Drying Up, But Industry Isn't Worried – Charges of 'Malthusian Bias,'" Sept. 21, 2004, p. A1).