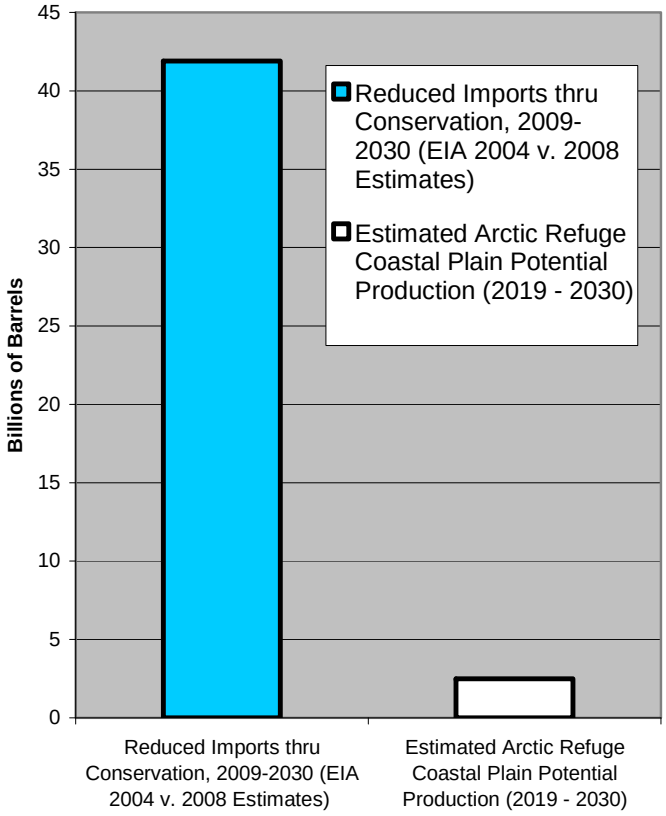
Oil Drilling on the Arctic National Wildlife Refuge Coastal Plain: Economic Perspectives on a Misguided Distraction from the Nation's Energy Crisis



(See Figure 6, p. 12.)

Recent EIA Data Show Actual and Forecast Oil Imports Are Declining; Conservation Gains Far Outweigh Arctic Refuge Production Potential

A Report to the Alaska Wilderness League

by

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Executive Summary

I. What the Seven Figures in This Report Tell Us About Recent Petroleum Price, Consumption and Import Data

➔ **Annual petroleum consumption and import totals, on a generally increasing trend between 1985 and 2005, leveled off in 2006 and began declining.**

- **Between 1985 and 2005, imports increased by an average of 5.5% per year. Since 2005, this trend has reversed; import totals declined slightly in 2006 and 2007 and by approximately 7.7% in 2008, to reach a current level of 57.2% of the nation's total petroleum requirement.**
- **2008 marks the first time in more than two decades that imports have declined for three years in a row.**
  - ***(See Figure 1)***

➔ **Monthly oil price and consumption data during 2008 suggests that the price of oil is a significant factor in determining oil consumption patterns.**

- **During the first half of 2008, petroleum consumption fell significantly as oil prices skyrocketed. But after oil prices crashed during the last half of the year, the consumption trend reversed.**
  - ***(See Figure 2)***

➔ **EIA's current reference or base case long-term scenario anticipates that oil imports between 2009 and 2030 will decline by significantly greater volumes than the import reductions realized in 2008.**

- **EIA now estimates that in 2030 imports will constitute 41% of the nation's total petroleum requirement, compared to current import levels of approximately 57%.**
  - ***(See Figure 3)***

➔ Review of EIA estimated future oil price and import data since 2004 shows increasing future oil prices and decreasing import levels.

- **The steady increase in estimated future oil prices between 2004 and 2008 and the corresponding decrease in imports associated with that price increase lends additional support to the proposition that when oil prices rise, consumption declines, reducing the level of imports needed to fill the gap between domestic production and consumption. (However, as noted in the discussion of Figure 2, the real-world effects of this general rule do not play out with the precision of a metronome.)**
  - ***– (See Figure 4)***

➔ EIA data indicate that since 2004 conservation has resulted in an anticipated import reduction of 41.9 billion barrels between now and 2030.

- **Compared to the corresponding figures for 2004, this figure represents a 43% reduction in the nation's total import requirement for the 22-year period between 2009 and 2030.**
  - ***– (See Figure 5)***

➔ By comparison, EIA estimates that during the period between 2009 and 2030 the Arctic Refuge can be expected to produce approximately 2.5 billion barrels of oil.

- **For every barrel of oil drillers might discover and produce from the Arctic National Wildlife Refuge Coastal Plain, over the last four years conservation has delivered nearly 17 barrels of oil savings.**
  - ***– (See Figure 6)***

➔ Two factors – uncertain oil prices and increasing field costs – reduce the odds that economic conditions will support the high costs of finding and then developing oil that might lie beneath the Arctic Refuge Coastal Plain.

– (See Figure 7)

II. Principal Economic Considerations

➔ 1. Barrels of oil saved through conservation far outweigh the potential of drilling for oil on the Coastal Plain of the Arctic National Wildlife Refuge.

➔ 2. In addition to delivering far greater petroleum savings than drilling in remote provinces, conservation measures offer the significant public policy benefits of not exacerbating climate change or incurring other pollution-related costs associated with the use of fossil fuels.

➔ 3. Oil consumption and price patterns over the last three decades demonstrate the folly of relying on market forces to determine energy policy: Despite the fact that the economic and strategic dangers of dependence on imported petroleum were well recognized more than three decades ago, the United States continued to pursue a course of energy inefficiency and increasing dependence on imported oil for another two decades. The manner in which consumption rose as prices fell in the final months of 2008 further demonstrates that it would be a mistake to assume that market forces will deliver reduced petroleum consumption in the absence of government policy mandates.

➔ 4. The chronic volatility and uncertainty of oil prices creates a feast or famine dilemma that undermines rational economic planning.

III. Conclusions

Exploration and development of the Arctic Refuge Coastal Plain should be dismissed as a distraction from rational energy policy for the following reasons:

➔ 1. Arctic Refuge drilling is demonstrably far less efficient than conservation in reducing petroleum import requirements.

➔ 2. Unlike conservation, Arctic Refuge drilling would contribute to the potential detrimental effects of climate change.

➔ 3. Instead of contributing to the restructuring the nation's economic and energy delivery systems, Arctic Refuge drilling would tie up capital on a status-quo reliance on oil.

➔ 4. Arctic Refuge drilling would be prone to inefficient use of capital resources due to either: (a) project failure or delay if oil prices remain low; or (b) requirements for additional capital to cover cost overruns and project delays frequently associated with high oil prices.

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Introduction

This briefing paper discusses seven figures that focus on current economic analyses to place the likely volume of potential oil production from the Arctic National Wildlife Refuge in its appropriate national energy context. Central to this report are the December 2008 early release of the U.S. Energy Information Administration (EIA) 2009 *Annual Energy Outlook* [1] and the agency's May 2008 analysis of Arctic Refuge production potential.[2] The latter report relies on geologic data from the 1998 U.S. Geological Survey (USGS) assessment of the Arctic Refuge Coastal Plain and adjacent lands.[3] During the ten years since USGS completed its Arctic Refuge study, oil prices increased from near-record lows to unprecedented highs in the summer of 2008, only to collapse, precipitously and unexpectedly in recent months. By the end of 2008, as the global economy lurched into a severe recession oil had lost roughly three-quarters of its record high trading value.[4] Global and national debate on energy and climate change policy combine with the extremely volatile oil prices of 2008 to underscore the importance of this review of updated data relevant to the Arctic Refuge.[5]

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[1] U.S. Energy Information Administration, *Annual Energy Outlook* 2009, Dec. 17, 2009 (Report # DOE/EIA-0383[2009] Early Release).

[2] U.S. Energy Information Administration, *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge,* May 2008 (Report No. SR/OIAF/2008-03).

[3] U.S. Geological Survey, *The Oil and Gas Resource Potential of the Arctic National Wildlife Refuge, 1002 Area, Petroleum Assessment, 1998, Including Economic Analysis* [2-disc CD, summarized in USGS Fact Sheet FS-028-01, April 2001 http://pubs.usgs.gov/fs/fs-0028-01/fs-0028-01.pdf]).

[4] In December 1998, oil sold for an average of $11.32 per barrel (2009 $) on the U.S. spot oil market. Over the next ten years, the spot oil price rose to record high levels, averaging $134.82 during the four weeks preceding its peak in July 2008. The spot oil price immediately tumbled from that peak to an average of $37.51 per barrel during the last four weeks of 2008. (From: U.S. Energy Information Administration, "Weekly United States Spot Price FOB Weighted by Estimated Import Volume [Dollars per Barrel]," http://tonto.eia.doe.gov/dnav/pet/hist/wtotusaw.htm. Note: Unless indicated otherwise, oil prices in this report are shown in real [2009] dollars [see Appendix 2 for conversion factors].)

[5] For additional background information on this issue, see: Richard A. Fineberg, *Existing Conservation and Alternative Technology Gains Far Outweigh Arctic National Wildlife Refuge Potential: Oil Imports Have Declined Significantly Since 2005,* prepared for the Alaska Wilderness League (http://www.finebergresearch.com/pdf/Fineberg%20Report%206-4-08%20(Rev2).pdf).

I. Petroleum Price, Consumption and Import Data

A. Seven Figures

About Figure 1. *(U.S. Petroleum Production and Net Imports, 1985 – 2008)*

The nation's petroleum imports declined for the third year in a row in 2008, reversing a long-standing trend of increasing dependence on foreign oil. During the 21 years between 1985 and 2005, net imports increased by an average of 5.5% per year to fill the gap between increasing domestic consumption and generally declining domestic production.[6] As shown in this figure, consumption and production leveled off in 2005, with imports dropping from a high of 12.5 million bpd in 2005 to a current level of approximately 11.1 million bpd in 2008 (a reduction of about 11%).[7] Import rates declined at a record pace in 2008, comprising 57.2% of this nation's total petroleum supply. Ignoring these important developments, drilling advocates frequently overstate the nation's dependence on foreign oil.[8] Even respected oil industry veterans such as wind power advocate T. Boone Pickens get it wrong.[9]

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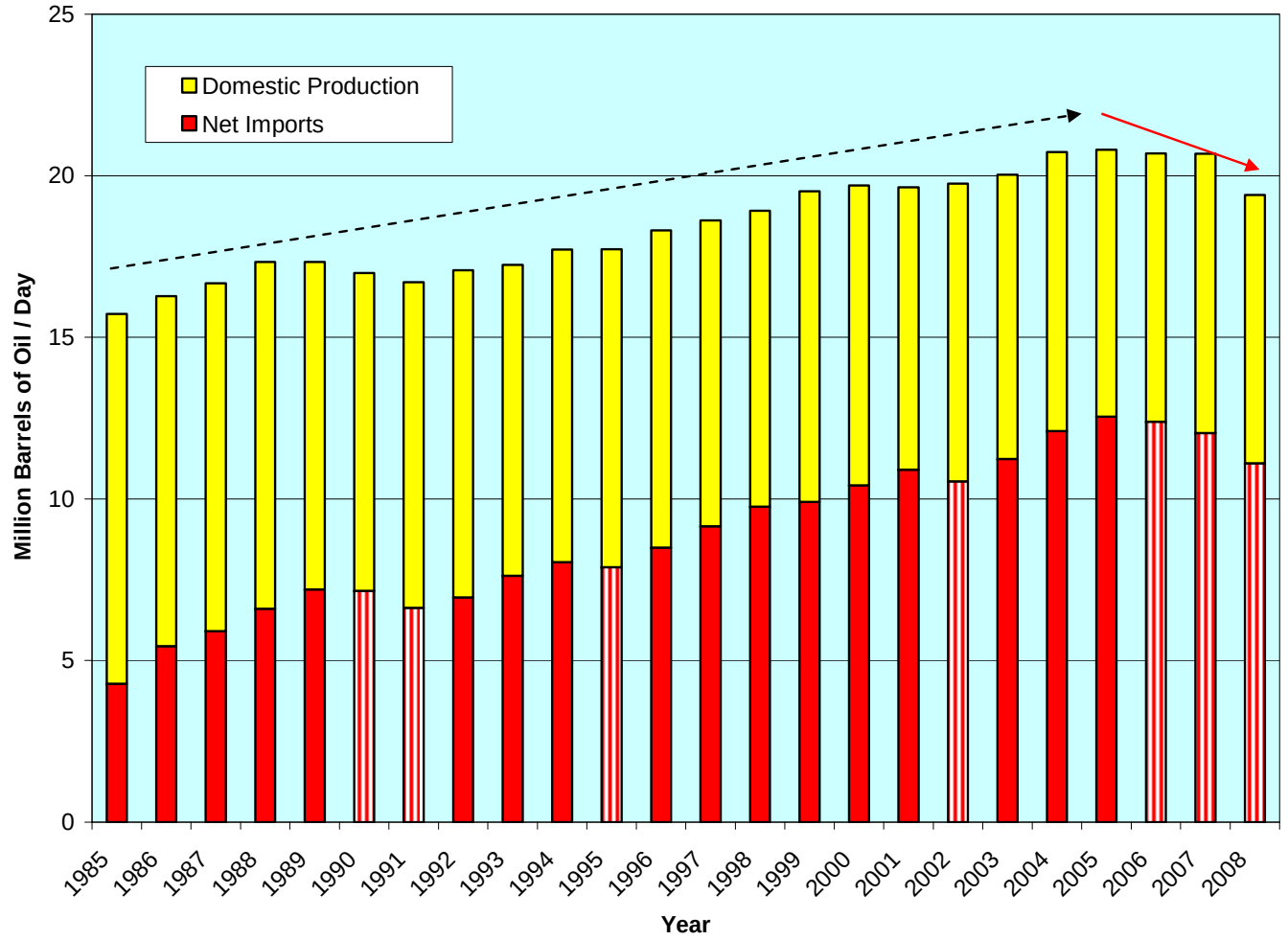
[6] In 1985, total consumption averaged about 15 million bpd, of which net imports comprised about 4.2 million; both figures were significantly lower than the corresponding figures for 1980. But by 1985, the nation's abandonment of adherence to CAFÉ (corporate automotive fuel efficiency) standards was beginning to make itself felt, as imports and total consumption began to increase again. By 2005, total domestic consumption topped 20 million bpd and imports exceeded 12 million.

[7] EIA data presented here covers the first 11 months of 2008. (U.S. Energy Information Administration, *Monthly Energy Review*, December 2008, p. 37 [Table 3.1, Petroleum Overview].)

[8] For example, on May 1, 2008, then-U.S. Senator Ted Stevens, speaking on the Senate floor, said, "Mr. President, we import more than 12.5 million barrels a day of petroleum – over 60 percent of our energy needs. As a matter of fact, I think it's higher than that now in the last two or three days." Three weeks later, Senator Stevens told his colleagues, "we import today 67 percent of our oil." (Senator Ted Stevens, "Senator Stevens Highlights Inconsistencies in Anti-Drilling Stance" and "Senator Stevens Calls for Oil and Gas Development in Alaska" [press releases on Senate floor statements], May 1 and May 23, 2008 [accessed in June 2008 at the former senator's web site, now defunct]).

[9] In his national campaign to promote wind power, veteran oilman T. Boone Pickens frequently states that U.S. oil imports comprise more than 70% of the nation's total petroleum supply. (See, for example, the video of excerpts from Pickens' presentation at Rice University, displayed on the home page of the Pickens plan web site, which opens with Pickens telling students, "We have the problem of the imports that are now up to 70%" [accessed Jan. 12, 2009 at *http://www.pickensplan.com/index.php*]).

Figure 1. **U.S. Petroleum Production and Net Imports, 1985 - 2008**



Declining Imports: Between 1985 and 2005, petroleum net imports (the best measure of dependency on foreign oil; shown in red) increased at an average rate of more than 5.5% per year, increasing 17 times and decreasing only 4 times in 21 years (shown with red & white vertical stripes). Since 2005, this trend has reversed; Total domestic consumption and imports have decreased for three consecutive years.

Sources: *U.S. Energy Information Administration,* Annual Energy Outlook Retrospective Review, *2006, Tables 5 and 7 (1985-2005) and* Monthly Energy Review, *Dec. 2008, Table 3.1 (2006 – 2008).*
(See discussion in text.)

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About Figure 2. *(Oil Prices v. U.S. Petroleum Consumption, 2008)*

In 2008 oil prices averaged nearly $100 per barrel on an annualized basis. However, in terms of oil prices the year was divided into two distinct and remarkable parts. During the first half of 2008, oil prices skyrocketed and consumption declined significantly. But after oil prices crashed during the last half of the year, the consumption trend reversed, as shown in Figure 2.

History demonstrates that the imbalance between supply and demand creates an erratic price pendulum that swings, with disconcerting irregularity, back and forth over time.[10] The factors creating oil price pendulum swings are not equal in intensity or duration. Moreover, global factors may either strengthen or offset domestic trends. As various factors come together, their effects do not occur with regularity or predictability.[11] What was most unusual about 2008 was the extremes to which the price of oil soared and the suddenness of its subsequent collapse. While most observers now believe oil prices are on a long-term upward trend (reversing the prevailing view a decade ago), it is not known when oil prices will rebound, how high oil prices will go, or how long it will take for higher oil prices to induce further reductions in consumption.[12]

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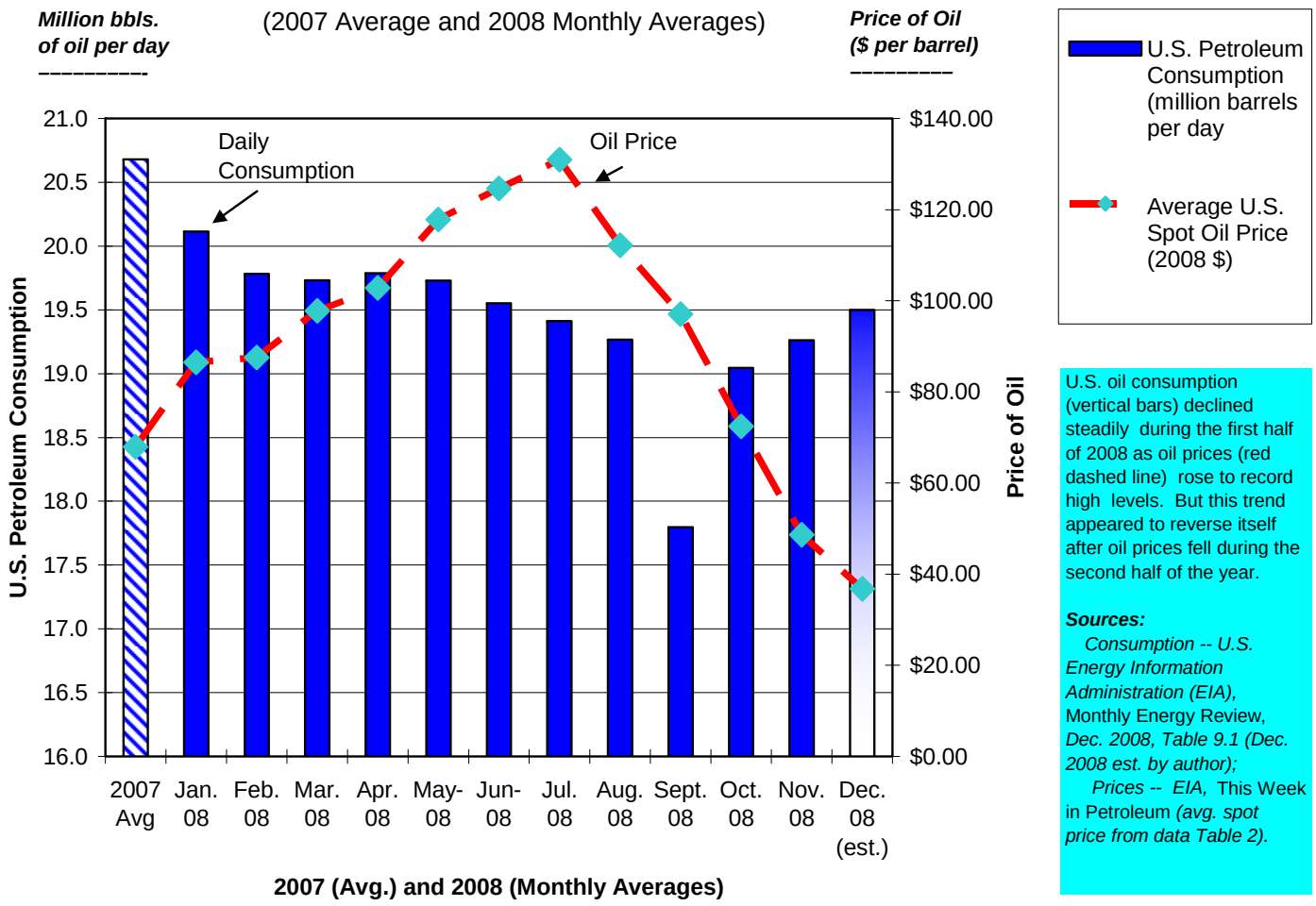
[10] In 1975, after the first of the two oil price run-ups of that decade, Anthony Sampson offered this comment in the opening chapter of his seminal study of the oil industry: "I found myself marveling that the West should ever have become dependent on such an unreliable commodity. . . . the black stuff had always seemed to be spurting up in the most impossible places, one moment in excessive quantities, the next moment threatening a terrifying shortage, as if to exasperate its millions of dependents." Anthony Sampson, *The Seven Sisters: The Great Oil Companies and the World They Shaped* (Bantam Books [Viking Press], 1975), p. 3.

[11] For example, during the decade between 1999 and 2008, as oil prices rose, United States consumption continued to rise for the first seven years, leveled off (with slight decline) for two years, followed by the more precipitous decline in 2008, as shown in Figure 1.

[12] See, for example, John Porretto, "Don't get accustomed to cheap oil: Cutbacks in exploration now will help fuel price increase when demand heats up again; some see oil topping $150 per barrel," *Petroleum News*, Jan. 11, 2009, p. 10 ("The oil industry is scaling back on exploration and production because some projects don't make economic sense when energy prices are low. . . . No one knows for sure, but some analysts say the spike could happen as soon as next year, perhaps in 2011 or 2012").

Figure 2.

Oil Prices v. U.S. Petroleum Consumption, 2008



U.S. oil consumption (vertical bars) declined steadily during the first half of 2008 as oil prices (red dashed line) rose to record high levels. But this trend appeared to reverse itself after oil prices fell during the second half of the year.

Sources:

Consumption -- U.S. Energy Information Administration (EIA), Monthly Energy Review, *Dec. 2008, Table 9.1 (Dec. 2008 est. by author);*

Prices -- EIA, This Week in Petroleum *(avg. spot price from data Table 2).*

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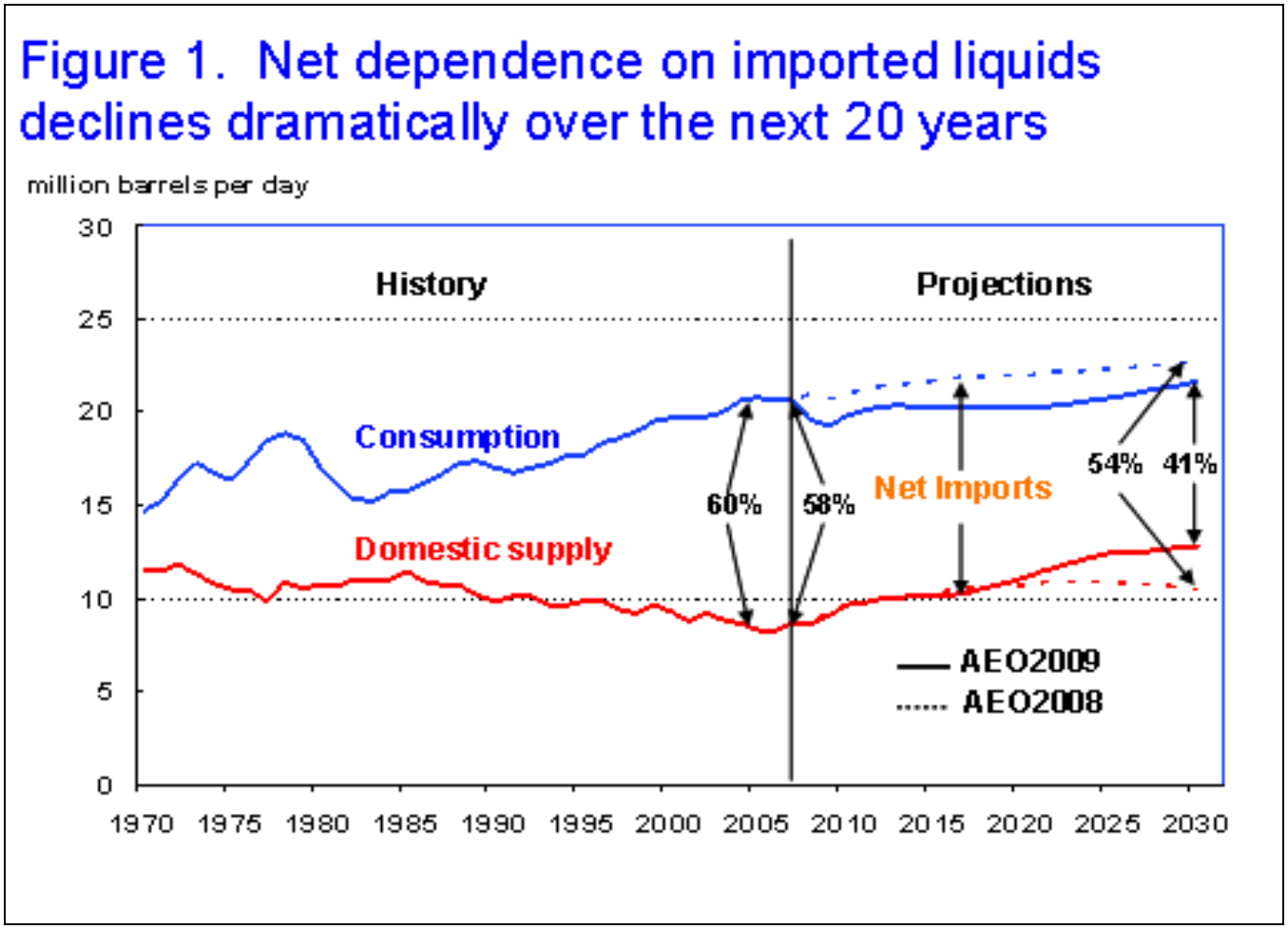
About Figure 3. *(Petroleum Imports – Looking Forward)*

As shown in Figure 3, EIA's current reference or base case long-term scenario anticipates future imports will decline significantly, resulting in far greater petroleum savings than the import reduction already delivered in 2008. EIA now estimates that imports will constitute 41% of the nation's total petroleum requirement in 2030, significantly below the current import level of approximately 57%. The energy agency's current estimate of declining future imports (Figure 3) was prominently displayed as the first chart accompanying the early release of *Annual Energy Outlook 2009*.[13]

[13] U.S. Energy Information Administration, "New EIA Energy Outlook Projects Flat Oil Consumption to 2030, Slower Growth in Energy Use and Carbon Dioxide Emissions, and Reduced Import Dependence," Dec. 17, 2008 (press release and press release Figure 1, accessed Jan. 2, 2009 at *http://www.eia.doe.gov/neic/press/press312.html*).

Figure 3. **Petroleum Imports – Looking Forward**



U.S. Energy Information Administration, "New EIA Energy Outlook Projects Flat Oil Consumption to 2030, Slower Growth in Energy Use and Carbon Dioxide Emissions, and Reduced Import Dependence," Dec. 17, 2008 (press release and press release Figure 1, accessed Jan. 2, 2009 at *http://www.eia.doe.gov/neic/press/press312.html*).

About Figure 4. (*Rising Future Oil Price Forecasts between 2004 and 2009 v. Declining Imports as Percentage of U.S. Petroleum Consumption)*

EIA's current import estimate for 2030 reflects a reduction of more than 40% from the agency's corresponding estimate five years ago. Figure 4 shows the steady decline in EIA's estimate of future imports since 2004,[14] as well as the estimated oil price for 2025 associated with each annual forecast.

The steady increase in estimated future oil prices between 2004 and 2008 and the corresponding decrease in imports lend additional support to the proposition (discussed with Figure 2, above) that when oil prices rise, consumption declines, reducing the level of imports needed to fill the gap between domestic production and consumption.[15]

[14] A series of past EIA charts delineating this trend is attached to this report as Appendix 1.

[15] As noted in the discussion of Figure 2, above, the real-world effects of this general rule do not play out with the precision of a metronome.

Figure 4.

Rising Future Oil Price Forecasts between 2004 and 2009 v. Declining Imports as Percentage of U.S. Petroleum Consumption

(Data from EIA, *Annual Energy Outlook*, various years)

(1)	*(2)*	*(3)*	
U.S. Energy Information Administration ***Annual Energy Outlook (AEO)***	Average Oil Price, 2025 *(2009 $ / Bbl.)*	Imported Oil as Percentage of Total U.S. Consumption */ - - - - - - Year - - - - - - /*	
		(2025)	*(2030)*
AEO 2004 (Reference Case)	**$32.35**	***70%***	
AEO 2005 (Current [Oct. '04] Futures Case)	**$41.11**	***68%***	
AEO 2006 (Reference Case)	**$61.90**		***62%***
AEO 2007 (Reference Case)	**$65.57**		**61%**
AEO 2008 (Reference Case)	**$69.08**		**54%**
AEO 2009 (Reference Case)	**$126.74**		**41%**

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Sources:

Col. (2): From U.S. Energy Information Administration, *Annual Energy Outlook,* 2004 through 2009 (*AEO*), Table A1, except 2005 (Table D1). Prices adjusted to 2009 $ using Gross Domestic Product deflator (U.S. Energy Information Administration, *Annual Energy Outlook 2009*, Table 20, "Macroeconomic Indicators," [EIA Early Release, 12/17/08]; see Appendix B for estimating factors calculated as follows:

AEO 2004 = $27.00 (2002 $/bbl.) * 125.00 / 104.32 = $32.35
AEO 2005 = $35.00 (2003 $) * 125.00 / 106.43 = $41.1
AEO 2006 = $54.08 (2004 $) * 125.00 / 109.2 = $61.90
AEO 2007 = $59.12 (2005 $) * 125.00 / 112.7 = $65.57
AEO 2008 = $64.49 (2006 $) * 125.00 / 116.7 = $69.08
AEO 2009 = $121.47 (2007 $) * 125.00 / 119.8 = $126.74

Col. (3): See Figure 5 and Appendix 1.

About Figure 5. *(Reductions to Estimated U.S. Oil Imports between 2009 and 2030 v. Potential Production from the Arctic National Wildlife Refuge; 2004 v. 2008)*

To understand the long-term effects of declining petroleum imports shown in Figures 2, 3 and 4, we now compare EIA's 2004 and 2008 reference case estimates for the 2009 – 2030 period by looking at the following categories: domestic oil production (col. [2]), potential Arctic Refuge production (col. [3]), total petroleum consumption (col. [4]) and petroleum imports (col. [5]).[16] As shown in Figure 5, between 2004 and 2008:

- **The nation's projected total petroleum import requirement for the 22 years between 2009 and 2030 decreased by 55 billion barrels (from 129 billion barrels projected by the EIA at the end of 2004 to approximately 74 billion barrels in the current *Annual Energy Outlook*). That's a reduction of 43% in total imports between now and 2030.**
- **Out of the 55.3 billion barrels of reduced imports, 41.9 billion barrels (75.8%) can be attributable to reduced consumption.**
- **The remaining 13.4 billion barrels of reduced imports consists of increased conventional petroleum sources and alternative energy additions to this nation's liquid energy fuel supply total.**
- **In contrast, under EIA's mean resource case, between now and 2030 potential production from the Arctic National Wildlife Refuge would be approximately 2.5 billion barrels.[17]**

To place these numbers in perspective, at current consumption rates this nation is using approximately seven billion barrels of oil per year.[18]

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[16] Totals compiled from the U.S. Energy Information Administration, *Annual Energy Outlook 2005* (Current [Oct. 2004] Futures Case, circa Dec. 2004), Table 11; and *Annual Energy Outlook 2009* (Reference Case; early release, Dec. 17, 2008), Table 11.

[17] U.S. Energy Information Administration, *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge,* May 2008 (Report No. SR/OIAF/2008-03), p. 8. (See discussion of Figure 6, below.)

[18] U.S. consumption of 20 million bpd equals approximately 7.3 billion barrels of oil per year (20 x 365 = 7,300).

Figure 5.

Reductions to Estimated U.S. Oil Imports between 2009 and 2030

(Comparison of Estimates from U.S. Energy Information Administration Data, 2004 and 2008)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
		/ - *Billion Barrels of Oil* - /			
Scenario	Avg. Price, Of Oil, 2025 *(2009 $/Bbl.)*	Domestic Production *(excluding Arctic Refuge)*	Potential Arctic Refuge Region Production *(2019 – 2030)*	Total Domestic Consumption *(2009 – 2030)*	Import Requirement *(2009-2030; with [without] Arctic Refuge)*
Annual Energy Outlook 2009 (Reference Case)	**$126.74**	**89.7**	**2.5**	**163.6**	**71.4** ***[73.9]***
Annual Energy Outlook 2005 (Current [Oct. '04] Futures Case)	**$41.11**	**76.3**	**2.5**	**205.5**	**126.7** ***[129.2]***
Change (AEO 2009 v. AEO 2005)	**$85.63**	**13.4**	**0.0**	**(41.9)**	**(55.3)** ***[55.3]***
% Change (*AEO 2009* v. *AEO 2005*)	+208.3%	+17.6%	(0.0%)	(20.4%)	(43.6%) *[42.8%]*

***Sources**:*

Col. (1): From U.S. Energy Information Administration, *Annual Energy Outlook 2005* (Current [Oct. 2004] Futures Case; circa Dec. 2004) and *Annual Energy Outlook 2009* (Reference Case; early release, Dec. 17, 2008), Table A1. Prices adjusted to 2009 $ using Gross Domestic Product deflator (U.S. Energy Information Administration, *Annual Energy Outlook 2009*, Table 20, "Macroeconomic Indicators," [2009: $121.86 * 125.00 / 119.93 = $126.74/bbl.; 2005: $35.00 * 125.00/106.43 = $41.11/bbl.]).

Col. (2), (4): Based on projections through 2030 in *Annual Energy Outlook 2005* (Current [Oct. 2004] Futures Case) and *Annual Energy Outlook 2009* (early release), Table 11.

Col. (3): Estimated from**:** From U.S. Energy Information Administration, *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge,* May 2008), p. 8. ("Cumulative oil production resulting from the opening of ANWR from 2018 through 2030 amounts to 2.6 billion barrels in the mean resource case.") EIA's May 2008 Arctic Refuge production estimate assumed drilling authorization in 2008; we have reduced that estimate by 0.1 billion barrels to reflect production through 2030 In the event that drilling were authorized in 2009.)

Col. (5): With Arctic Refuge = Col. (4) - (Col. [2] + Col. [3]); without Arctic Refuge (in brackets) = Col. (4) - Col. (2).

About Figure 6. *(Reduced Imports through Conservation Since 2004 v. Arctic Refuge Production Potential, 2009 - 2030)*

EIA based its May 2008 estimate of potential oil production from the Arctic Refuge Coastal Plain region on the USGS estimate of the seven largest potential fields in that region, as described in the USGS 1998 geologic analysis of the Arctic Refuge Coastal Plain region.[19] In its 2008 report, EIA stated that due to logistical constraints increases in oil prices would not increase Arctic Refuge region production estimates or accelerate production prior to 2030, compared to the agency's previous analysis, prepared in 2004.[20]

- **EIA estimates that Arctic Refuge oil production could contribute approximately 2.5 billion barrels or 1.5% of the nation's total domestic petroleum requirement for the 2009 – 2030 period.[21]**
- **By comparison, since 2004 conservation has reduced this nation's total import requirement for the same period by 41.9 billion barrels. Put otherwise: The ratio between conservation savings since 2004 and every barrel of oil that drilling in the Arctic Refuge region might yield between now and 2030 is nearly 17:1.[22]**

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[19] See: USGS, *The Oil and Gas Resource Potential of the Arctic National Wildlife Refuge, 1002 Area, Petroleum Assessment, 1998, Including Economic Analysis* (footnote 3, above) and EIA*, Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, p. 5.

[20] EIA's mean resource case assumes that the seven largest potential fields in the Arctic Refuge Coastal Plain region, as described by the USGS in its 1998 mean estimate, would come on line in alternate years between 2018 and 2030, producing approximately 2.5 billion barrels of oil during the first 12 years of production. Under this scenario, production would peak at 0.78 million bpd in the 10th year and averaging about 0.675 million bpd during this period. EIA estimates these seven fields would produce an additional 1.7 billion barrels of oil after 2030. *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, pp. 3 ("Timing of First Production"), p. 5 ("Field Size Distribution") and pp. 6-8 ("Current Oil Market conditions"). EIA's estimated Arctic Refuge mean resources case scenario production profile between first production in 2019 and 2030 is calculated from Table 11 of the EIA reference and Arctic Refuge mean resource case scenarios (posted on line with the *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*; (http://www.eia.doe.gov/oiaf/servicerpt/anwr/index.html) by subtracting Alaska reference case annual production totals (without Arctic Refuge development) from the Alaska totals for the corresponding years in the Arctic Refuge development mean resources case.

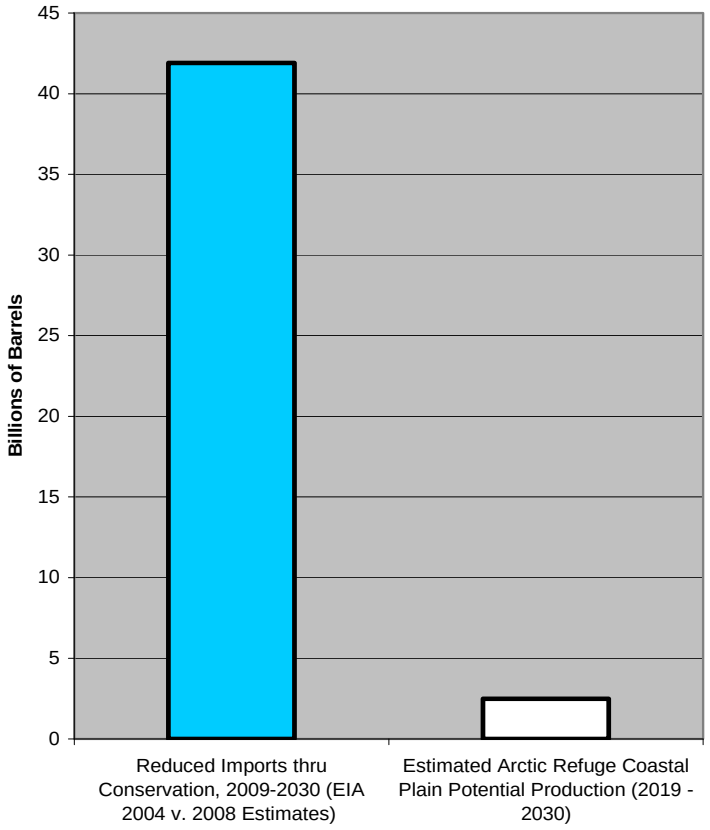
[21] 2.5 billion barrels / 163.6 billion barrels = 1.53% (see Figure 5, col. [3] and [4]).

[22] 2.5 billion barrels * 16.76 = 41.9 billion barrels (see Figure 5, col. [4]).

Figure 6.

Reduced Imports through Conservation Since 2004 v. Arctic Refuge Production Potential, 2009 - 2030

(Estimates derived from U.S. Energy Information Administration [EIA] Reports)



Reduced Imports thru Conservation, 2009-2030 (EIA 2004 v. 2008 Estimates)

Estimated Arctic Refuge Coastal Plain Potential Production (2019 - 2030)

The tall blue bar at the left represents the dramatic reduction to this nation's estimated import requirement between now and 2030 achieved in the last four years by decreased oil consumption This estimate is based on EIA's 2009 projections through 2030, compared to the agency's 2005 estimates.

During this 22-YEAR period, EIA estimates that the Arctic Refuge can produce approximately 2.5 billion barrels, based on the USGS estimate of the mean technically recoverable volume of undiscovered oil this region is thought to hold.

<u>Sources:</u> *From U.S. Energy Information Administration,* Annual Energy Outlook 2005 *(Current [Oct. 2004] Futures Case),* Annual Energy Outlook 2009 *(early release), Table 11 and* Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, May 2008), p. 8.*

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About Figure 7. (*Volatile Oil Prices and Rising Alaska North Slope Field Costs between 2005 and 2009)*

Two factors reduce the odds that economic conditions will support the high costs of finding and then developing whatever oil might lie beneath the Arctic Refuge Coastal Plain:

➔ Uncertain Oil Prices: Although the oil price spike during the first half of 2008 delivered another year of significant oil price increase on an annualized basis, by year's end oil prices had plummeted. Both EIA and the Alaska Dept. of Revenue higher oil prices in 2009,[23] but speedy recovery from the global recession, which has reduced the demand, is by no means certain. How long oil prices will remain at current (low) levels – or how high they will go when they rebound – is unknown. The uncertain trajectory of future of oil prices reduces the attractiveness of high-priced petroleum development projects for many investors.[24]

➔ Increasing Field Costs: A second damper on prospective development is increasing field costs. Reversing a long-term trend of declining field costs, since 2005 costs of oil field operations have increased significantly as contractors strain to provide the needed equipment, materials and personnel.[25] Because field costs vary by region, Figure 7 focuses on Alaska Revenue Dept. North Slope cost estimates. As shown in columns (3) and (4), the current forecast shows field costs for 2008 doubling compared to 2005 estimates, with field costs for 2009 anticipated to increase significantly once again.

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[23] EIA's 2009 forecast price is $63.53 in 2009 dollars. (*Annual Energy Outlook 2009*, Early Release, Table 12 "Petroleum Product Prices;" imported light sweet crude = $60.89 [2007 $]; for conversion factors, see Appendix 2.)

[24] For discussion of the effects of price volatility on current oil development activities, see, for example: John Porretto, "Don't get accustomed to cheap oil;" Gary Park, "Open season for oil gurus," *Petroleum News*, Nov. 23, 2008, p. 1; and Gary Park, "Poised to Pounce," *Petroleum News*, Nov. 23, 2008, p. 14.

[25] See, for example: Gary Park, "Shell puts sands in limbo: Once on track for a million bpd, supermajor is slowing research and expansion plans in favor of cost cutting and higher profits," *Petroleum News*, Dec. 7, 2008, p. 5; and Eric Lidji, "Increasing costs cloud view of prices: As oil prices fall to levels not seen since mid-2000s, costs are becoming more important for assessing the near term in Alaska," *Petroleum News*, December 28, 2008, p. 6.

Figure 7.

Volatile Oil Prices and Rising Alaska North Slope Field Costs between 2005 and 2009

(Alaska Department of Revenue Estimates for Alaska North Slope Crude Oil)

(1)	*(2)*	*(3)*	*(4)*	*(5)*
Calendar Year	Average ANS Oil Price *(2009 $ / Bbl.*)*	/ - - - - - - - - - Estimated Field Costs - - - - - - - - - / *(2009 $ / Bbl.*)*		
		Fall 2005 Estimate	*/ - - - Fall 2008 Estimate - - - /*	*(% Increase over prior year)*
2004	$44.46	- - - -	- - - -	- - - -
2005	$59.32	- - - -	- - - -	- - - -
2006	$68.11	- - - -	$11.55	- - - -
2007	$74.95	/ - - - $7.31	$12.72	*10.1%*
2008	$99.86	/ - - -	$15.00 **	*17.9%*
Dec. 1, 2008 - Jan. 13. 2009	***$36.61***	- - - -	- - - -	- - - -
2009 (ADOR forecast)	$76.72	- - - -	$18.01 **	*20.1%*

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Sources:

Col. (2): 2004 – November 2008: from monthly average spot price from Alaska Dept. of Revenue, "ANS West Coast Price;" and Dec. 1, 2008 – Jan. 12, 2009: from daily spot prices, Alaska Dept. of Revenue, "ANS West Coast Price (accessed Jan. 12, 2009 at http://www.tax.alaska.gov/programs/oil/index.aspx?10026).
2009 forecast – From Alaska Dept. of Revenue, *Fall 2008 Revenue Sources Book*, p. 10 (http://www.tax.alaska.gov/programs/documentviewer/viewer.aspx?1530f).

Col. (3): Fall 2005 estimate for state fiscal year 2008 from Alaska Dept. of Revenue, "The Cost Story," Oct. 21, 2007, slides 4 and 7 (property taxes subtracted from ADOR estimates).

Cols. (4), (5): Fall 2008 calendar year estimate for CY 2008 from Alaska Dept. of Revenue data. (2006 and 2007: Field cost estimates provided by Dept. of Revenue, September 2007.2008 and 2009: See Alaska Dept. of Revenue, *Revenue Sources Book*, Fall 2008, p. 10 [fiscal year forecast prices], p. 49 ["Opex" and "Capex" field cost estimates], p. 54 [production], pp. 54 and 57 [property tax estimates, subtracted from ADOR field costs]).

* All figures adjusted to 2009 $ using EIA Gross Domestic Product Deflator; for adjustment factors see Appendix 2.

** See Appendix 2 for note on conversion from state fiscal year to calendar year.

I. Petroleum Price, Consumption and Import Data (Continued)

B. What Petroleum Price, Consumption and Import Data Tell Us

(Figure 1.) ➔ **Annual petroleum consumption and import totals, on a generally increasing trend between 1985 and 2005, leveled off in 2006 and began declining.**

- **Between 1985 and 2005, imports increased by an average of 5.5% per year. Since 2005, this trend has reversed; import totals declined slightly in 2006 and 2007 and by approximately 7.7% in 2008, to reach a current level of 57.2% of the nation's total petroleum requirement.**
- **2008 marks the first time in more than two decades that imports have declined for three years in a row.**

(Figure 2.) ➔ **Monthly oil price and consumption data during 2008 suggests that the price of oil is a significant factor in determining oil consumption patterns.**

- **During the first half of 2008, petroleum consumption fell significantly as oil prices skyrocketed. But after oil prices crashed during the last half of the year, the consumption trend reversed.**

(Figure 3.) ➔ **EIA's current reference or base case long-term scenario anticipates that oil imports between 2009 and 2030 will decline by significantly greater volumes than the import reductions realized in 2008.**

- **EIA now estimates that in 2030 imports will constitute 41% of the nation's total petroleum requirement, compared to current import levels of approximately 57%.**

What Petroleum Price, Consumption and Import Data Tell Us (Continued)

(Figure 4.) ➔ **Review of EIA estimated future oil price and import data since 2004 shows increasing future oil prices and decreasing import levels.**

- **The steady increase in estimated future oil prices between 2004 and 2008 and the corresponding decrease in imports associated with that price increase lends additional support to the proposition that when oil prices rise, consumption declines, reducing the level of imports needed to fill the gap between domestic production and consumption. (However, as noted in the discussion of Figure 2, the real-world effects of this general rule do not play out with the precision of a metronome.)**

(Figure 5.) ➔ **EIA data indicate that since 2004 conservation has resulted in an anticipated import reduction of 41.9 billion barrels between now and 2030.**

- **Compared to the corresponding figures for 2004, this figure represents a 43% reduction in the nation's total import requirement for the 22-year period between 2009 and 2030.**

(Figure 6.) ➔ **By comparison, EIA estimates that during the period between 2009 and 2030 the Arctic Refuge can be expected to produce approximately 2.5 billion barrels of oil.**

- **For every barrel of oil drillers might discover and produce from the Arctic National Wildlife Refuge Coastal Plain, over the last four years conservation has delivered nearly 17 barrels of oil savings.**

(Figure 7.) ➔ **Two factors – uncertain oil prices and increasing field costs – reduce the odds that economic conditions will support the high costs of finding and then developing oil that might lie beneath the Arctic Refuge Coastal Plain.**

II. Principal Economic Considerations

The data presented in Section I. underscore the importance of the following economic considerations:

➔ 1. Barrels of oil saved through conservation far outweigh the potential of drilling for oil on the Coastal Plain of the Arctic National Wildlife Refuge.

➔ 2. In addition to delivering far greater petroleum savings than drilling in remote provinces, conservation measures offer the significant public policy benefits of not exacerbating climate change or incurring other pollution-related costs associated with the use of fossil fuels.

➔ 3. Oil consumption and price patterns over the last three decades demonstrate the folly of relying on market forces to determine energy policy: Despite the fact that the economic and strategic dangers of dependence on imported petroleum were well recognized more than three decades ago, the United States continued to pursue a course of energy inefficiency and increasing dependence on imported oil for another two decades. The manner in which consumption rose as prices fell in the final months of 2008 further demonstrates that it would be a mistake to assume that market forces will deliver reduced petroleum consumption in the absence of government policy mandates.

➔ 4. The chronic volatility and uncertainty of long-term oil prices creates a feast or famine dilemma that undermines rational economic planning. The prospect of low prices and price uncertainty inhibit investment in the technology and the infrastructure necessary to sustain development, while the prospect of high long-term oil prices induces development but strains the system, pushing up costs.

III. Conclusion

The data and principal economic considerations outlined in the preceding sections suggest that exploration and development of the Arctic Refuge Coastal Plain should be dismissed as a distraction from rational energy policy for the following reasons:

➔ 1. Arctic Refuge drilling is demonstrably far less efficient than conservation in reducing petroleum import requirements.

➔ 2. Unlike conservation, Arctic Refuge drilling would contribute to the potential detrimental effects of climate change.

➔ 3. Instead of contributing to the restructuring the nation's energy delivery system, Arctic Refuge drilling would tie up capital on a status-quo reliance on oil.

➔ 4. Arctic Refuge drilling is prone to inefficient use of capital resources due to either: (a)) project failure or delay if oil prices remain low; or (b) requirements for additional capital to cover cost overruns and project delays frequently associated with high oil prices.

Appendices

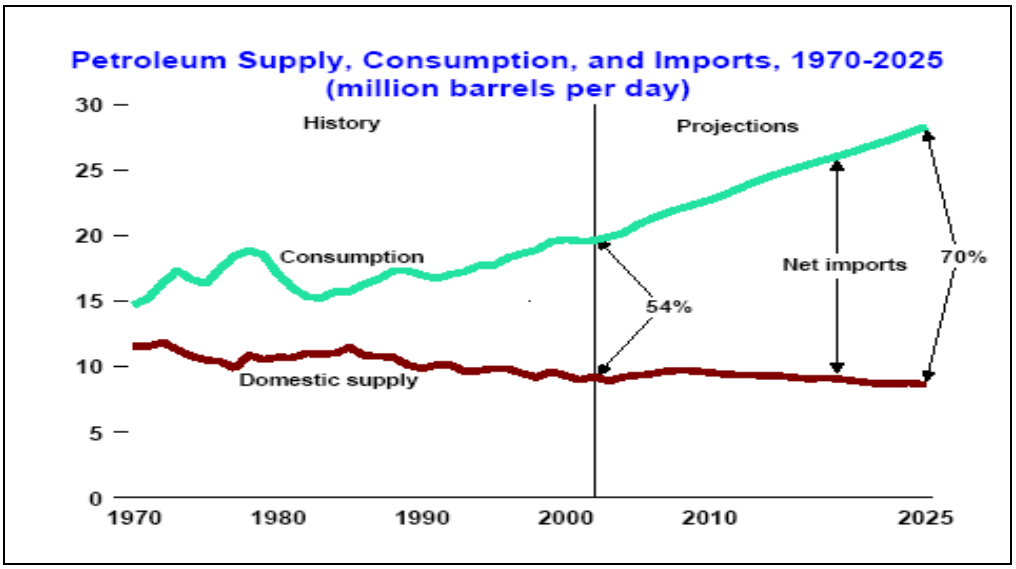
1. **Selected EIA Net Import Projections, 2004 – 2008**

2. **Worksheet: Inflation and Fiscal Year to Calendar Year Conversions**

Appendix 1 (Sheet 1)

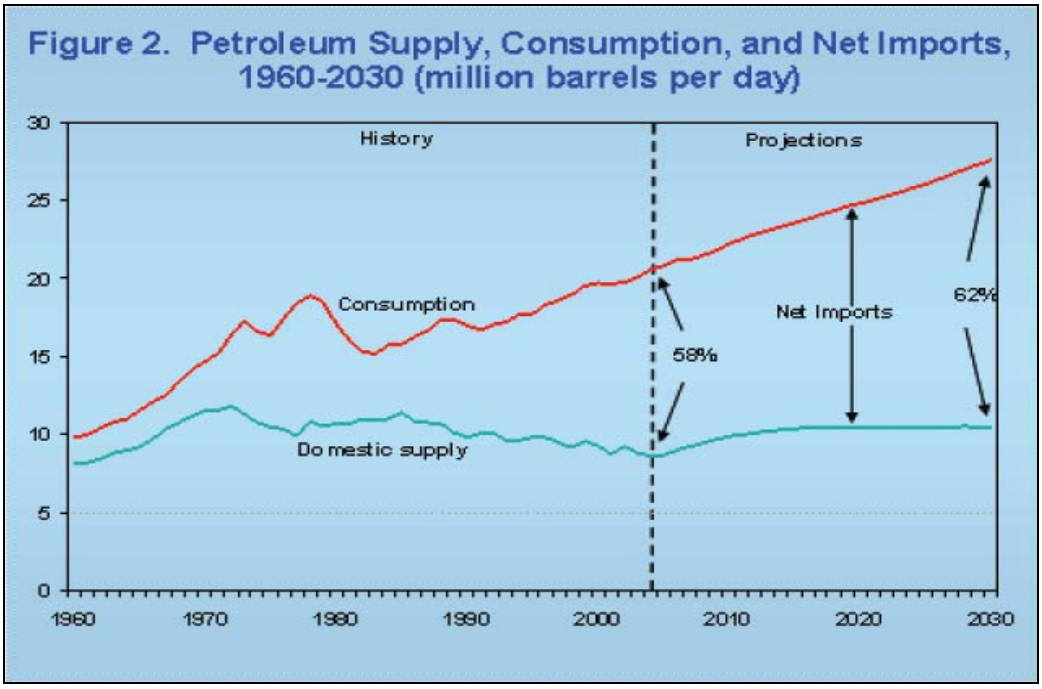
EIA Net Import Projections, 2004 - 2008

2004:



From: U.S. EIA, *Overview of the Annual Energy Outlook 2004*, March 23, 2004.
(Note: Early versions of this report incorrectly sourced this chart to *"Annual Energy Outlook 2007,* March 23, 2004.")

2006:

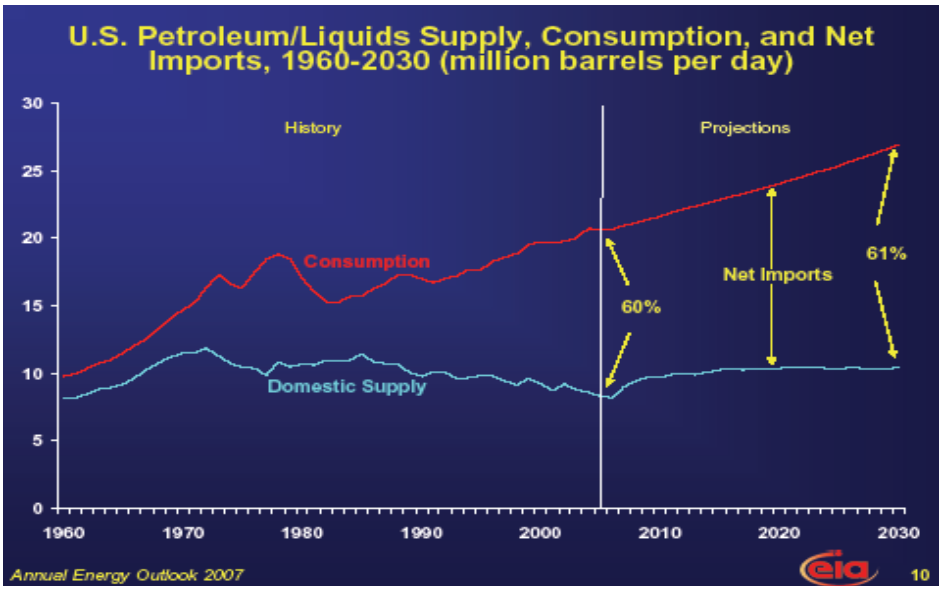


From, U.S. EIA, *"Annual Energy Outlook 2006* (Administrator's Presentation)," December 2005.

Appendix 1 (Sheet 2)

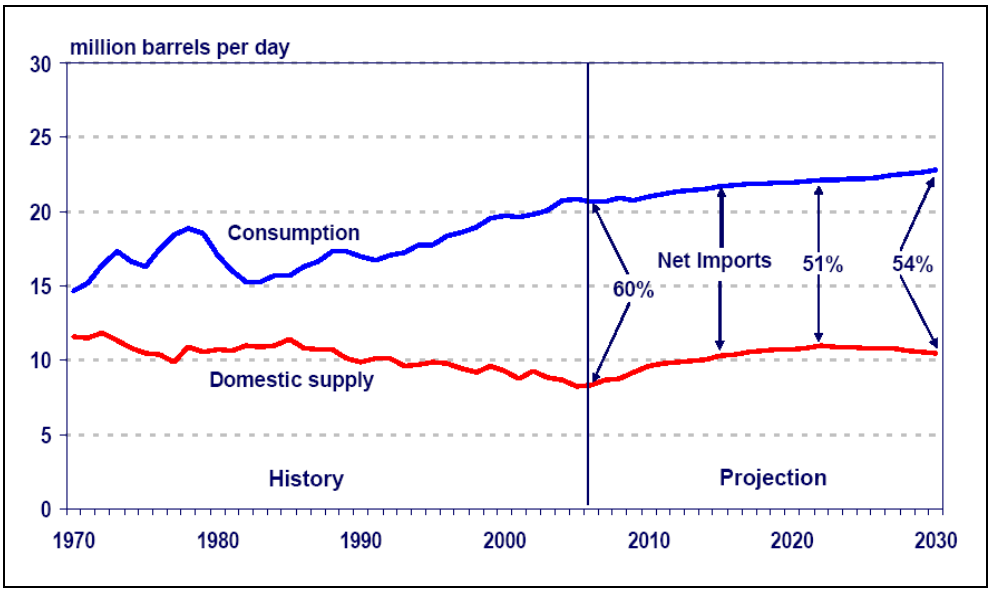
EIA Net Import Projections, 2004 - 2008

2007:



From U.S. EIA, *Annual Energy Outlook 2007*, Advanced Release presentation (posted Dec. 5, 2006).

2008: IMPORT SHARE OF NET LIQUIDS USE DECLINES FROM ITS CURRENT LEVEL.



The EIA's 2008 projection of future oil imports was presented as Figure 9 in EIA Administrator Guy Caruso's March 4, 2008 testimony to the U.S. Senate Energy and Natural Resources Committee,

Appendix 2 **Worksheet: Inflation and Fiscal Year to Calendar Year Conversion**
(Sheet 1 of 1)

(1)	(2)	(3)	(4)	(5)
Year	***CPI-U (Index)***	***Inflation (%)***	***GDP Implicit Price Deflator (FFY Index)***	***Inflation (%)***
1976	56.9000		40.6300	
1977	60.6000	6.5%	42.3300	4.2%
1978	65.2000	7.6%	45.1800	6.7%
1979	72.6000	11.3%	48.8200	8.1%
1980	82.4000	13.5%	53.1000	8.8%
1981	90.9000	10.3%	58.3000	9.8%
1982	96.5000	6.2%	62.2900	6.8%
1983	99.6000	3.2%	65.0400	4.4%
1984	103.9000	4.3%	67.4400	3.7%
1985	107.6000	3.6%	69.9300	3.7%
1986	109.6000	1.9%	71.2500	1.9%
1987	113.6000	3.6%	73.1100	2.6%
1988	118.3000	4.1%	75.4100	3.1%
1989	124.0000	4.8%	78.3400	3.9%
1990	130.7000	5.4%	81.2500	3.7%
1991	136.2000	4.2%	84.3000	3.8%
1992	140.3000	3.0%	86.4200	2.5%
1993	144.5000	3.0%	88.3800	2.3%
1994	148.2000	2.6%	90.2800	2.1%
1995	152.4000	2.8%	92.1800	2.1%
1996	**156.9000**	**3.0%**	**93.9500**	**1.9%**
1997	160.5000	2.3%	95.5900	1.7%
1998	163.0000	1.6%	96.7500	1.2%
1999	166.6000	2.2%	98.0200	1.3%
2000	**172.2000**	3.4%	**100.0000**	2.0%
2001	177.1000	2.8%	102.3600	2.4%
2002	179.9000	1.6%	104.3200	1.9%
2003	184.0000	2.3%	106.4300	2.0%
2004	188.9000	2.7%	109.2000	2.6%
2005	**195.3000**	3.4%	**112.7000**	3.2%
2006	201.6000	3.2%	116.7000	3.5%
2007	207.3420	2.8%	119.8000	2.7%
2008	***216.0000***	**4.2%**	***122.7000***	**2.4%**
2009	*215.0000*	-0.5%	*125.0000*	*1.9%*
2010	**219.0000**	1.9%	***126.2000***	*1.0%*
2011	*224.0000*	2.3%	*127.8000*	*1.3%*
2012	*230.0000*	2.7%	*130.0000*	*1.7%*
2013	*236.0000*	2.6%	*132.7000*	*2.1%*
2014	*242.0000*	2.5%	*135.6000*	*2.2%*
2015	**249.0000**	2.9%	***138.6000***	*2.2%*
2016	*256.0000*	2.8%	*141.8000*	*2.3%*
2017	*262.0000*	2.3%	*144.9000*	*2.2%*
2018	*269.0000*	2.7%	*148.2000*	*2.3%*
2019	*276.0000*	2.6%	*151.5000*	*2.2%*
2020	**283.0000**	2.5%	***154.7000***	*2.1%*
2021	*288.0000*	1.8%	*157.4000*	*1.7%*
2022	*294.0000*	2.1%	*159.7000*	*1.5%*
2023	*299.0000*	1.7%	*161.8000*	*1.3%*
2024	*304.0000*	1.7%	*163.6000*	*1.1%*
2025	**308.0000**	1.3%	***165.3000***	*1.0%*
2026	*312.0000*	1.3%	*166.9000*	*1.0%*
2027	*317.0000*	1.6%	*168.6000*	*1.0%*
2028	*321.0000*	1.3%	*170.3000*	*1.0%*
2029	*326.0000*	1.6%	*171.9000*	*0.9%*
2030	**331.0000**	1.5%	***173.7000***	*1.0%*

Converting Nominal Dollars ("Money of the Day") to Real (2009) Dollars

Unless otherwise indicated, to minimize distortion of economic data, dollar values in this report have been converted to real (inflation-adjusted 2009) dollars by using the GDP deflator (column [4], at left), as shown in the following example (from Introduction footnote 2).

(a)	*(b)*	*(c)*	*(d)*	*(e)*
Year	**Nominal Value**	**GDP Deflator**	**Real (2009) $**	**How Calculated**
1998	*$8.76*	*96.75*	$11.32	= (8.76) * 125.00 / 96.75

The formula can be reversed to obtain nominal dollars by using the following formula:

$11.32 * 96.75 / 125.00 = $8.76

Inflation Indices:

Col. *Source (or basis for calculation)*

(2) **1976-2007:** U.S. Dept. of Labor, Bureau of Labor Statistics, "Consumer Price Index – All Urban Consumers – (CPI-U)" (ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt [accessed Jan. 7, 2009]). **2008-2030:** From U.S. Dept. of Energy, Energy Information Administration, *Annual Energy Outlook 2009* , Table 20, "Macroeconomic Indicators " (Report #:DOE/EIA-0383[2009] early release), 12/17/08.

(3) **1976-2030:** (Current year Index / Previous year index) -1.00

(4) **1976-2005:** *Budget for Fiscal Year 2009, Historical Tables* , "Gross Domestic Product and Deflators," pp. 194-195 (released 2/4/08). **2006-2030: "**GDP Chain-type Price Index (2000 = 1.000)" from U.S. Dept. of Energy, Energy Information Administration, *Annual Energy Outlook 2009* , Table 20, "Macroeconomic Indicators " (Report #:DOE/EIA-0383[2009] early release), 12/17/08.

(5) 1976-2030: (Current year Index - Previous year index) / (previous year index) * 100.

Converting State Fiscal Year Data to CalendarYear

The Alaska Department of Revenue typically displays its data on a state fiscal year basis (July 1 to June 30). For comparison to calendar-year data used in most economic reports, if monthly state data are unavailable fiscal year totals have been converted to calendar-year basis by combining data for the preceding state fiscal year with the current state fiscal year on a 7:5 basis.

Richard A. Fineberg is an independent, Alaska-based analyst who has reported on economic and environmental issues associated with Alaska petroleum development for more than three decades. In addition to the numerous reports he has prepared for non-government organizations (available on-line at http://www.finebergresearch.com), he has served as a senior advisor to the governor of Alaska on oil and gas policy, and as an occasional consultant to various state and federal agencies, including the U.S. Internal Revenue Service, the Alaska Department of Revenue and the Regulatory Commission of Alaska.

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