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The Honorable Carl Levin
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The Honorable John McCain
Ranking Member
Committee on Armed Services
United States Senate

The Honorable Ike Skelton
Chairman
The Honorable Duncan L. Hunter
Ranking Member
Committee on Armed Services
House of Representatives

Subject: Defense Budget: Review of DOD's Report on Budgeting for Fuel Cost Fluctuations

The Office of Management and Budget (OMB) establishes for the Department of Defense (DOD) the price DOD will use for pricing crude oil when constructing its budget for upcoming fiscal years. DOD in turn uses OMB's price in establishing the standard price to be used for a barrel of fuel for budgeting purposes by DOD fuel customers such as the military services. Because of the volatility of world petroleum prices, the standard price for a barrel of fuel included in the President's annual budget request for DOD may be lower or higher than the actual price established by the world market at any point in time after DOD's budget request is submitted to the Congress. During the fiscal year, DOD pays for fuel at the actual market rate, which typically varies from the budgeted rate. As a result, if the actual price of crude oil increases above the price DOD charges its customers, more dollars are needed to pay for fuel than originally budgeted. If the actual price is lower than what DOD charges its customers, DOD has more dollars than needed. Additionally, if DOD responds to increases in the world market crude oil prices by increasing the price it charges its customers above what they initially budgeted, the customers will have additional funding needs to pay their fuel bills.

Concerned as to whether DOD's method for setting fuel prices has produced realistic budget estimates, last year the Congress required DOD to consider alternative methods. Specifically, the John Warner National Defense Authorization Act for Fiscal Year 2007 requires the Secretary of Defense to submit a report on the fuel rate and

cost projection used in the annual DOD budget presentation.¹ The act required that DOD identify alternative approaches, including approaches used by other federal departments and agencies and the feasibility of using private economic forecasting organizations, for selecting fuel rates that would produce more realistic estimates of the amounts required for DOD to accommodate fuel rate fluctuations. DOD is also required to discuss the advantages and disadvantages of each approach and to identify the department's preferred approach among the alternatives and provide a rationale for preferring that approach. Finally, the act further requires that GAO review DOD's report, including the basis for the Secretary's conclusions for the preferred approach. DOD submitted its report to the Congress on February 27, 2007.

In response to the act, we determined (1) the extent to which DOD identified and evaluated alternative crude oil forecasts that could be used in setting its fuel rates—such as forecasts used by other federal departments and agencies and private economic forecasting organizations, and (2) DOD's basis for selecting its preferred fuel rate setting approach.

In conducting our work, we examined DOD's report to the Congress on budgeting for fuel cost fluctuations and other pertinent documentation on DOD's methodology to identify the alternative crude oil forecasts DOD considered for selecting budgeted fuel rates. We interviewed responsible officials from the Office of the Under Secretary of Defense, the DOD Comptroller, and Defense Logistics Agency (DLA), and OMB to discuss DOD's methodology and rationale for selecting its preferred fuel rate selection approach. We also assessed DOD's comparative analyses and the basis for its conclusions. We conducted our work from February 2007 to April 2007 in accordance with generally accepted government auditing standards.

Summary

DOD identified and evaluated approaches for forecasting crude oil prices used by other federal departments and forecasts from private forecasting organizations. DOD received responses from eight agencies.² DOD determined that seven of the eight respondents used DOD's forecast, did not have a forecast method, or did not have a forecasting method that would accommodate the size and complexity of DOD's fuel requirement. Thus, DOD concluded that only the Department of Energy's (DOE) forecasting method, which uses the Energy Information Administration (EIA)³ to provide forecast prices for crude oil, was an option that warranted further evaluation. According to DOD's report, it conducted four⁴ analyses using different scenarios to compare its forecast approach, which is based on crude oil forecasts provided by

¹Pub. L. No. 109-364, § 1006 (2006).

²DOD solicited inquiries from at least 21 federal departments and several independent agencies but did not have information on the exact number.

³The Congress created EIA within the DOE in 1977. As a statistical agency, it provides policy-independent data, forecasts, and analyses to promote sound policy making, efficient markets, and public understanding regarding energy and its interaction with the economy and the environment.

⁴DOD actually analyzed five scenarios but eliminated one in its report to the Congress because the data were similar to scenario four.

OMB with the methods used by DOE and 38 private forecasting organizations. DOD reported that DOE's EIA analysis produced forecasts that were marginally closer to actual crude oil prices than either DOD's current method or most other private organizations' forecasts, and only in a few cases did the private organizations produce forecasts that were closer to actual costs than DOD's current method. DOD selected its current method as its preferred forecasting approach over the DOE and 38 private forecasting alternatives. According to the DOD report, DOD chose to continue to use its current rate setting method because it believes none of the alternative forecasting methods produced significantly more accurate results. Specifically, DOD did not believe that the margin of difference between forecasts based on its current method and alternative approaches was significant enough to warrant a change.

In assessing DOD's comparative analysis, we found limitations on the scope of the analysis due to the lack of available historical forecast data. Specifically, DOD included 18 months of data or less in each of the comparative scenarios it analyzed and the scenarios did not involve forecasts from the same time period DOD used to set its budget request. According to DOD officials, historical forecasting data were not available to conduct a more extensive multiyear comparison or to replicate the time-frame in which the fiscal year 2006 budgeted bulk fuel rate was set. DOD officials agreed that had it been available, these additional data would have produced a more ideal comparison. Consequently, based on the results of the analysis that DOD was able to conduct with the data available and given the volatile crude oil market, we agree that the results did not provide a compelling reason for DOD to adjust its rate setting approach and that DOD's current forecast based on OMB's guidance for crude oil prices is a reasonable approach. In order for DOD to conduct a more robust and extensive analysis, it would need to begin capturing and maintaining the necessary forecast data now to conduct such analyses in the future.

Background

DOD is the largest federal consumer of energy, accounting for over 92 percent of the petroleum-based energy consumed by the federal government. DOD bulk fuel pricing is based on OMB's guidance for crude oil prices. DOD uses three components in establishing its budgeted bulk fuel price. The first component is the price for crude oil, the second component is the added expense for refining the crude oil, and the third component is a factor to account for DOD's overhead costs associated with transportation and storage of the fuel. To estimate the cost of crude oil, the Council of Economic Advisors, the Department of the Treasury, and OMB, referred to as the Troika, jointly prepare a set of economic assumptions for agencies to use in preparing their overall budgets. From these economic assumptions, OMB directly provides DOD the crude oil price projections it uses in setting its bulk fuel price. In developing the crude oil price projections, the Troika uses oil price projections coming from the prices in the futures market for West Texas Intermediate crude oil in the New York Mercantile Exchange. For the 2007 budget, futures prices projected 5 years ahead were used in developing crude oil price projections. DOD and its customers use refined oil products, such as jet fuel and diesel fuel, and as such DOD

has to include in its bulk fuel budget prices the additional cost of refining the fuel above crude oil projections. This component is estimated using a statistical technique that analyzes the historical data relationship between crude oil prices and refined oil prices.⁵ Finally, DOD adds an overhead factor that reflects transportation and storage costs of the petroleum products to DOD. When comparing DOD's current method for setting bulk fuel prices to alternative methods, the refining crude oil expense and overhead factor should not be considered. Specifically, DOD's refining crude oil expense and overhead costs have to be added to any forecast DOD used to set fuel prices, and are unique factors to DOD. Consequently, DOD's cost for crude oil (the first component) is what is comparable to other forecasts for oil.

DOD Identified and Evaluated Alternative Crude Oil Forecasts

In meeting its legislative requirement, DOD identified and evaluated alternative crude oil forecasts by other federal departments and forecasts from 38 private forecasting organizations. DOD evaluated these different forecasts by conducting a comparative analysis of four different scenarios, in which DOD reported that only one method produced slightly better estimates than its current method. However, DOD believed that the improvement was marginal and, along with the limited scope of its analysis due to the data limitations, did not warrant a change from DOD's current methodology.

DOD Evaluated Federal Agencies' and Private Organizations' Crude Oil Forecasts

In its report, DOD evaluated crude oil forecasts used by other federal departments and agencies. DOD solicited information from several federal departments and agencies as to what method they used to forecast crude oil. DOD received responses from eight departments and agencies: the Departments of Commerce, Energy, Justice, and State, the U.S. Postal Service, U.S. Customs and Border Protection agency, General Services Administration, and Federal Bureau of Investigation. Of the eight respondents, DOD evaluated each approach and determined seven did not have a forecast method that would meet its needs. Of these seven, one agency used DOD's forecasts, another did not have a forecast method in place and the remaining five did not have crude oil forecast methods that DOD believed would accommodate the size and complexity of DOD's fuel requirement. Consequently, DOD concluded that only one agency—DOE, which uses EIA forecasts—had a forecast that warranted further evaluation.

In addition to evaluating the methods used by other departments and agencies to forecast crude oil prices, DOD conducted research to determine which private organizations had experience in forecasting energy-related commodities. DOD determined that 38 private organizations had forecasts for crude oil prices that could be included in its comparative analysis.

⁵The statistical approach used for the 2007 budget and earlier budgets was regression analysis. A DOD energy official indicated that they are examining different statistical methods to look at this relationship in the future.

DOD's Report Included a Comparative Analysis of Four Scenarios to Evaluate Crude Oil Forecasts

To evaluate the different crude oil forecast, DOD's report included a comparative analysis of four different scenarios. DOD compared its OMB-based forecast, DOE's EIA forecast, and up to 38⁶ other private economic forecasting organizations' crude oil forecasts to EIA actual price data to determine which method came closest to predicting actual crude oil prices. DOD's report included four different comparison scenarios that compared June 2005 forecasts to actual rates for (1) the average price for the first quarter of fiscal year 2006, (2) the average price for the third quarter of fiscal year 2006, (3) the average price for the entire 2006 calendar year, and (4) each of the six quarters from the fourth quarter of fiscal year 2005 to the first quarter of fiscal year 2007. The results of these four scenarios follow.

The first scenario compared OMB's, EIA's, and 38 private organizations' June 2005 forecasts to EIA's actual crude oil price of \$60.00 per barrel for the first quarter of fiscal year 2006. Table 1 shows that 1 private organization's forecast and the EIA forecast performed better—were closer to the actual price—than the OMB forecast for this time period, and 37 of the 38 private organizations had forecasts that performed below—were farther away from the actual price— than OMB's forecasts.

⁶According to DOD officials, they were not able to obtain forecasts for each of the 38 private organizations for each scenario DOD evaluated because the historic forecasting data were not always available. Therefore, the number of private organizations compared in each scenario varies.

Table 1: Comparison of Forecasts from OMB, EIA, and 38 Private Organizations in June 2005 to the EIA Actual Price Using the Average of the First Quarter of Fiscal Year 2006

Dollars per barrel

Organization	June 2005 forecasts	Difference between June 2005 forecast and actual price of \$60.00
Private organization A forecast	57.10	(2.90)
EIA forecast	55.00	(5.00)
OMB forecast	53.43	(6.57)
37 other private organizations' forecasts	Ranging from 32.00 to 53.00	(28.00 to 7.00)

Source: DOD data.

The second scenario compared OMB's, EIA's, and 28 private organizations' June 2005 forecasts to EIA's actual price of \$70.41 per barrel for the third quarter of fiscal year 2006. Table 2 shows that 3 private organizations' and the EIA forecast performed better than the OMB forecast for this time period and 25 of the 28 private organizations had forecasts that performed below OMB's forecasts.

Table 2: Comparison of Forecasts from OMB, EIA, and 28 Private Organizations in June 2005 to the EIA Actual Price Using the Average of the Third Quarter of Fiscal Year 2006

Dollars per barrel

Organization	June 2005 forecasts	Difference between June 2005 forecast and actual price of \$70.41
Private organization A forecast	59.30	(11.11)
Private organization B forecast	55.00	(15.41)
Private organization C forecast	54.00	(16.41)
EIA forecast	53.58	(16.83)
OMB forecast	52.80	(17.61)
25 other private organizations' forecasts	Ranging from 37.00 to 52.80	(33.41 to 20.41)

Source: DOD data.

The third scenario compared OMB's, EIA's, and 13 private organizations' June 2005 forecasts to EIA's actual price of \$66.02 per barrel for calendar year 2006. Table 3 shows that 1 private organization's forecast and the EIA forecast performed better than the OMB forecast for this time period and 12 of the 13 organizations had forecasts that performed below OMB's forecasts.

Table 3: Comparison of Forecasts from OMB, EIA, and 13 Private Organizations in June 2005 to the EIA Actual Prices for Calendar Year 2006

Dollars per barrel

Organization	June 2005 forecasts	Difference between June 2005 forecast and actual price of \$66.02
Private organization C forecast	55.00	(11.02)
EIA forecast	54.23	(11.79)
OMB forecast	52.58	(13.44)
12 other private organizations' forecasts	Ranging from 41.80 to 51.25	(24.22 to 14.77)

Source: DOD data.

The fourth scenario compared forecasts of OMB, EIA, and 1 private organization from the fourth quarter of fiscal year 2005 to the first quarter of 2007 to EIA actual prices for each of those quarters. As shown in table 4, the EIA forecast performed better than the OMB forecast for this time period, and the private organization's forecasts performed below both OMB's forecasts and EIA's forecasts.

Table 4: Comparison of Forecasts from OMB, EIA and 1 Private Organization to the EIA Actual Prices for the Fourth Quarter of Fiscal Year 2005 to the First Quarter of 2007

Dollars per barrel

	EIA actual price	EIA forecast	OMB forecast	Private organization D forecast
4th Quarter 2005	63.19	52.83	52.68	52.50
1st Quarter 2006	60.00	55.00	53.43	53.00
2nd Quarter 2006	63.27	54.00	53.24	52.00
3rd Quarter 2006	70.41	53.58	52.80	50.00
4th Quarter 2006	70.42	54.33	52.37	49.00
1st Quarter 2007	59.98	55.00	51.76	48.00

Source: DOD data.

The overall results of DOD's four comparative analyses show that EIA forecasts produced forecasts that were closer to the actual price than OMB's forecasts in each scenario⁷ and 3 of the 38 private organizations outperformed OMB and EIA forecasts in individual comparison scenarios; however, no private organization consistently outperformed either OMB or EIA in all scenarios.

DOD Selected Its Preferred Approach Based on Results of Its Comparative Analysis

DOD selected its current method—based on OMB's forecasts—as its preferred bulk fuel rate setting approach because it concluded that its comparative analysis showed that results using OMB's forecasts were comparable to or better than the alternative forecasts it evaluated. Based on the comparative analysis performed, DOD concluded that because the results showed only marginal improvement (1.92 percent difference)

⁷ The eliminated scenario compared the average price for the entire 2006 fiscal year for OMB's, EIA's and 1 private organization's forecasts. This comparison also showed that EIA's June 2005 forecast was more accurate than OMB's forecast by 1.92 percent.

in using EIA's forecast over OMB's forecast and since no private organization consistently outperformed OMB forecasts in all scenarios, it did not warrant a change from DOD's current methodology. DOD also reported that inaccurate forecasts are pervasive in the current economic conditions based on market volatility. Thus, DOD concluded that changing forecasting sources or methods may not provide more realistic estimates for DOD at this time.

Our Assessment Showed Data Limitations Constrained DOD's Comparative Analysis, but Current Fuel Rate Setting Approach Seems Reasonable

In assessing DOD's comparative analysis, we found that lack of available historical forecast data limited the scope of DOD's analysis. DOD included 18 months or less of data in each of the comparative scenarios it conducted. An economist in DOD's Defense Energy Support Center, who performed the analysis, agreed that a thorough evaluation of a group's long-term forecasting performance should include several different time periods. However, according to DOD officials, DOD was not able to obtain historical forecasting data to perform comparisons prior to June 2005 because these data are not retained by private forecast organizations. Consequently, DOD used June 2005 forecasts to predict crude oil prices for the various fiscal year 2006 scenarios. However, DOD set its fiscal year 2006 budgeted fuel prices in December 2004, 6 months earlier than the forecasts DOD used in the analyses. When DOD set its fuel rate in December 2004, the forecast it used predicted fuel costs 10 to 21 months into the future (December 2004 to October 2005 through September 2006). Most of the scenarios DOD included in its analysis did not predict far enough into the future to replicate what DOD does each year when it sets its budgeted fuel rates—for example, scenario one only predicted 3 months into the future. In addition, OMB's December 2004 forecast for crude oil was \$40.45 a barrel, which was \$12.98 a barrel lower than the June 2005 OMB forecast DOD used in scenario one. The closer the forecast is to the actual time-frame being estimated, the easier it is to predict a more accurate forecast. The DOD economist we spoke with agreed that it would have been a more meaningful analysis to use December 2004 forecasts, but again stated that forecasts were not available from EIA or private forecasting organizations for that time-frame. In fact, the EIA forecast data that DOD used in the analysis are only available from the month starting the forecast to the end of the next calendar year. For example, in December 2004, EIA forecasted data only through December 2005—which would have been insufficient to provide a basis for DOD in establishing fiscal year 2006 rates. According to DOD officials, the timing of the EIA forecast data does not match up to the time-frame when DOD has to set its rates for budgeting purposes.

Consequently, based on the results of the analysis that DOD was able to conduct with the data available, we agree that the results did not provide a compelling reason for DOD to adjust its rate setting approach at this time. Because of DOD's decision to retain its current approach, we reviewed the basis for OMB's forecast to determine if it is based on reasonable assumptions. OMB's forecast is based on the futures market of crude oil. Using futures' prices for crude oil seems like a reasonable approach because buyers and sellers are actually making purchases and sales based on their

ideas and information about the future price of crude oil. The futures price for crude oil for a particular date would reflect the interaction between buyers and sellers and the best estimate for the price of crude oil at that time. Barring more extensive analysis that might provide additional information to consider in selecting an alternative forecast, we believe that DOD's current method for producing fuel rates is a reasonable approach. In order for DOD to conduct a more robust analysis, it would need to begin capturing and maintaining the necessary forecast data now to conduct such analysis in the future.

Agency Comments

DOD officials reviewed a draft of this report and had no comments.

We are sending copies of this report to the Senate and House Armed Services Committees. We also will make copies available to others upon request. In addition, this report will be available at no charge on GAO's Web site at <http://www.gao.gov>.

If you have any questions concerning this report, please contact me at (202) 512-9619 or pickups@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this assignment were Bonita P. Anderson, Renee S. Brown, Laura L. Durland, Julia Matta, Charles W. Perdue, and Jeanett H. Reid.



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