

GAO

Report to the Subcommittee on
Readiness, Committee on Armed
Services, House of Representatives

March 2008

DEFENSE MANAGEMENT

Overarching Organizational Framework Needed to Guide and Oversee Energy Reduction Efforts for Military Operations



Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE MAR 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE Defense Management. Overarching Organizational Framework Needed to Guide and Oversee Energy Reduction Efforts for Military Operations				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Government Accountability Office, 44 G Street NW, Washington, DC, 20548				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 49	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Highlights of [GAO-08-426](#), a report to the Subcommittee on Readiness, Committee on Armed Services, House of Representatives

Why GAO Did This Study

The Department of Defense (DOD) relies heavily on petroleum-based fuel for mobility energy—the energy required for moving and sustaining its forces and weapons platforms for military operations. Dependence on foreign oil, projected increases in worldwide demand, and rising oil costs, as well as the significant logistics burden associated with moving fuel on the battlefield, will likely require DOD to address its mobility energy demand. GAO was asked to (1) identify key efforts under way to reduce mobility energy demand and (2) assess the extent to which DOD has established an overarching organizational framework to guide and oversee these efforts. GAO reviewed DOD documents, policies, and studies, and interviewed agency officials.

What GAO Recommends

GAO is recommending that DOD establish an overarching organizational framework for mobility energy to improve the department's ability to guide and oversee mobility energy reduction efforts. To establish such a framework, DOD should designate an executive-level Office of the Secretary of Defense (OSD) official to be accountable for mobility energy matters, develop a comprehensive strategic plan, and improve DOD's business processes. In addition, the military services should designate executive-level focal points to establish effective communication and coordination among OSD and the military services. DOD partially concurred with the recommendations.

To view the full product, including the scope and methodology, click on [GAO-08-426](#). For more information, contact William M. Solis at (202) 512-8365 or solisw@gao.gov.

DEFENSE MANAGEMENT

Overarching Organizational Framework Needed to Guide and Oversee Energy Reduction Efforts for Military Operations

What GAO Found

OSD, the Joint Staff, and the military services have undertaken efforts to reduce mobility energy demand in weapons platforms and other mobile defense systems. For example, OSD created a departmentwide Energy Security Task Force in 2006 that is monitoring the progress of selected energy-related research and development projects. The Joint Staff updated its policy governing the development of capability requirements for new weapons systems to selectively consider energy efficiency as a key performance parameter—a characteristic of a system that is considered critical to the development of an effective military capability. The Army is addressing fuel consumption at forward-deployed locations by developing foam-insulated tents and temporary dome structures that are more efficient to heat and cool, reducing the demand for fuel-powered generators. The Navy has established an energy conservation program to encourage ships to reduce energy consumption. The Air Force has developed an energy strategy and undertaken initiatives to determine fuel-efficient flight routes, reduce the weight on aircraft, optimize air refueling, and improve the efficiency of ground operations. The Marine Corps has initiated research and development efforts to develop alternative power sources and improve fuel management.

While these and other efforts are under way and DOD has identified energy as one of its transformational priorities, DOD lacks elements of an overarching organizational framework to guide and oversee mobility energy reduction efforts. In the absence of an overarching organizational framework for mobility energy, DOD cannot be assured that its current efforts will be fully implemented and will significantly reduce its reliance on petroleum-based fuel. GAO found that DOD's current approach to mobility energy lacks (1) a single executive-level OSD official who is accountable for mobility energy matters; sets the direction, pace, and tone to reduce mobility energy demand across DOD; and can serve as a mobility energy focal point within the department and with Congress and interagency partners; (2) a comprehensive strategic plan for mobility energy that aligns individual efforts with DOD-wide goals and priorities, establishes time frames for implementation, and uses performance metrics to evaluate progress; and (3) an effective mechanism to provide for communication and coordination of mobility energy efforts among OSD and the military services as well as leadership and accountability over each military service's efforts. GAO also found that DOD has made limited progress in incorporating fuel efficiency as a consideration in its key business processes—which include developing requirements for and acquiring new weapons systems. DOD has established new organizational frameworks to address other crosscutting issues, such as business systems modernization and corrosion control and prevention. Establishing an overarching organizational framework for mobility energy could provide greater assurance that DOD's efforts to reduce its reliance on petroleum-based fuel will succeed and that DOD is better positioned to address future mobility energy challenges—both within the department and as a stakeholder in national energy security dialogues.

Contents

Letter		1
	Results in Brief	2
	Background	4
	Departmental and Military Service Efforts Are Under Way to Reduce Mobility Energy Demand	8
	DOD Has Not Established an Overarching Organizational Framework to Guide and Oversee Mobility Energy Reduction Efforts	15
	Conclusions	26
	Recommendations for Executive Action	27
	Agency Comments and Our Evaluation	28

Appendix I	Scope and Methodology	32
-------------------	------------------------------	-----------

Appendix II	Select Recommendations from DOD-Sponsored Studies on Mobility Energy Reduction	36
--------------------	---	-----------

Appendix III	Comments from the Department of Defense	39
---------------------	--	-----------

Appendix IV	GAO Contact and Staff Acknowledgments	44
--------------------	--	-----------

Tables		
	Table 1: Selected Energy-Related Research and Development Projects Being Monitored by DOD’s Energy Security Task Force	9
	Table 2: DOD Energy/Fuel Roles and Responsibilities	16
	Table 3: Actions DOD Has Taken to Address Selected Recommendations from DOD-Sponsored Studies on Mobility Energy Reduction	37

Figures

Figure 1: Three-Mile Backup of Fuel Delivery Trucks and Other
Supply Vehicles Inside Afghanistan along the Northern
Passage from Pakistan (February 2007)

6

Figure 2: A Line of Tanker Trucks Loading Fuel in Kuwait

7

This is a work of the U.S. government and is not subject to copyright protection in the United States. It may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.



United States Government Accountability Office
Washington, DC 20548

March 13, 2008

The Honorable Solomon P. Ortiz
Chairman
The Honorable J. Randy Forbes
Ranking Member
Subcommittee on Readiness
Committee on Armed Services
House of Representatives

The Department of Defense (DOD) is the nation's single largest consumer of energy and relies heavily on petroleum-based fuel for mobility energy—that is, the energy required for moving and sustaining its forces and weapons platforms for military operations. U.S. military forces, for example, require vast quantities of fuel to operate combat and support vehicles; generate power at forward-deployed locations; and move troops, equipment, and supplies. In 2007, more than 55 million gallons of fuel, on average, were supplied by DOD each month to support the U.S. forces in Iraq and Afghanistan. Mobility energy accounts for about three-fourths of DOD's total energy consumption.¹ DOD incurs billions of dollars each year in fuel costs, and these costs have been rising in recent years as oil prices have increased. Moreover, high fuel requirements on the battlefield can place a significant logistics burden on military forces; limit the range and pace of operations; and add to mission risks, including exposing convoys to attack.

This report responds to a request by the Subcommittee on Readiness, House Committee on Armed Services, that we assess DOD's efforts to reduce its reliance on petroleum-based fuel. Specifically, the objectives of this review were to (1) identify key departmental and military service efforts that have been undertaken to reduce demand for mobility energy and (2) assess the extent to which DOD has established an overarching organizational framework to guide and oversee these efforts.

We conducted work at the Office of the Secretary of Defense (OSD); the Joint Staff; the headquarters of the Army, Air Force, Navy, and Marine

¹Energy consumed at fixed installations, referred to as facility energy, accounts for most of DOD's remaining energy use.

Corps; and the Defense Logistics Agency. To identify key departmental and military service efforts to reduce mobility energy demand, we reviewed documentation on the objectives and status of ongoing initiatives. In assessing the extent to which DOD has established an overarching organizational framework for mobility energy, we analyzed DOD and military service policies and other documents and reviewed relevant DOD-sponsored studies. We also discussed mobility energy issues with agency officials to gain their perspectives. We conducted our review from September 2007 through March 2008 in accordance with generally accepted government auditing standards. Details on our scope and methodology are contained in appendix I.

Results in Brief

OSD, the Joint Staff, and the military services have undertaken a number of efforts to reduce mobility energy demand. For example:

- OSD established a departmentwide Energy Security Task Force that, among other things, is monitoring the progress of selected energy-related research and development projects. OSD also has begun a pilot program for assessing the full energy costs of new weapons systems rather than just the cost of the fuel itself as part of the acquisition process.² Moreover, in 2007, the Deputy Secretary of Defense included energy in DOD's list of the top 25 transformational priorities for the department, as part of its initiative to pursue targeted acquisition reforms.
- The Joint Staff updated its policy governing the development of capability requirements for new weapons systems to require that energy efficiency be selectively considered as a key performance parameter.³
- The Army is addressing fuel consumption at forward-deployed locations by developing foam-insulated tents and temporary dome structures that are more efficient to heat and cool and therefore could reduce the demand for fuel-powered generators at these locations.
- The Navy has established an energy conservation program aimed at encouraging ships to reduce energy consumption. It has also made ship design alterations to reduce fuel demand.
- The Air Force has developed an energy strategy and undertaken initiatives to determine fuel-efficient flight routes, reduce the weight on aircraft, optimize air refueling, and improve the efficiency of ground operations. In

²This concept is known as fully burdened cost, which DOD defines as the total ownership cost of buying, moving, and protecting fuel in systems during combat.

³A key performance parameter is an attribute or characteristic of a system that is considered critical or essential to the development of an effective military capability.

addition, it is testing synthetic fuels in its aircraft that could partly displace the use of petroleum-based fuel.

- The Marine Corps has initiated efforts to develop alternative power sources and improve fuel management. For example, it is testing the use of hybrid power—by combining solar panel, generator, and battery energy sources—at remote sites to lessen its fuel transportation demands to forward-deployed locations.

While these and other individual efforts are under way to reduce mobility energy demand and DOD has identified energy as one of its transformational priorities, DOD lacks key elements of an overarching organizational framework to guide and oversee these efforts. Our prior work has shown that such a framework is critical to successful transformation in both public and private organizations. In the absence of an overarching organizational framework for mobility energy, DOD cannot be assured that its current efforts will be fully implemented and will significantly reduce its reliance on petroleum-based fuel. More specifically, we found that DOD's current approach to mobility energy lacks (1) top leadership, with a single executive-level OSD official—supported by an implementation team—who is accountable for mobility energy matters; (2) a comprehensive strategic plan for mobility energy that aligns individual efforts with DOD-wide goals and priorities, establishes approaches or strategies to achieve goals, and evaluates progress through performance metrics; and (3) an effective mechanism to provide for communication and coordination of mobility energy efforts among OSD and the military services as well as leadership and accountability over each military service's efforts. We also found that DOD has made limited progress in incorporating fuel efficiency as a consideration in key business processes—which include developing requirements for and acquiring new weapons systems. According to OSD and military service officials, DOD has not established an overarching organizational framework for mobility energy in part because of concerns regarding how such a framework would be implemented, how it would integrate with other existing organizational responsibilities, and how it would affect ongoing efforts to reduce mobility energy demand. However, DOD has created a management framework to oversee facility energy, which accounts for about 25 percent of the department's energy use, and has established new organizational frameworks to address other crosscutting issues, such as business systems modernization, corrosion control and prevention, contractors on the battlefield, and the defeat of improvised explosive devices. The establishment of such a framework for mobility energy could provide greater assurance that DOD's efforts to reduce its reliance on petroleum-based fuel will succeed without degrading its operational

capabilities and that DOD is better positioned to address future mobility energy challenges—both within the department and as a stakeholder in national energy security dialogues.

We are recommending that DOD establish an overarching organizational framework for mobility energy to improve the department's ability to guide and oversee mobility energy reduction efforts. To establish such a framework, DOD should designate an executive-level OSD official—with an implementation team—who is accountable for mobility energy matters; develop a comprehensive, departmentwide strategic plan; and improve DOD's business processes to fully incorporate energy efficiency considerations. In addition, we are recommending that the military services designate executive-level focal points to establish effective communication and coordination among OSD and the military services on departmentwide mobility energy efforts as well as provide leadership and accountability over their own efforts. In commenting on a draft of this report, DOD partially concurred with our recommendations. DOD's comments are reprinted in appendix III.

Background

Energy, and specifically petroleum-based fuel, will be a key issue facing the nation during the 21st century. The United States accounts for only 5 percent of the world's population but about 25 percent of the world's oil demand. The Department of Energy projects that worldwide oil demand will continue to grow, reaching 118 million barrels per day in 2030, up from 84 million barrels per day in 2005. Although countries such as China and India will generate much of this increased demand, the United States will remain the world's largest oil consumer. World oil production has been running at near capacity in recent years to meet rising consumption, putting upward pressure on oil prices. The potential for disruptions in key oil-producing regions of the world, such as the Middle East, and the yearly threat of hurricanes in the Gulf of Mexico have also exerted upward pressure on oil prices. Crude oil prices almost tripled from 2003 through the beginning of 2008, rising from \$36 a barrel to as high as \$100 a barrel.

In 2007, about 67 percent of the oil consumed in the United States was imported, and the increased energy dependence on other countries raises concern about international turmoil in the Middle East and elsewhere.⁴ In

⁴GAO, *Department of Energy: Oil and Natural Gas Research and Development Activities*, [GAO-08-190R](#) (Washington, D.C.: Nov. 6, 2007).

addition, worldwide supplies of oil from conventional sources remain uncertain. U.S. oil production peaked around 1970, and worldwide production could peak and begin to decline, although there is great uncertainty about when this might happen.⁵ Moreover, there are differences of opinion as to how long the nation can rely on petroleum-based fuel to meet the majority of its energy needs. As a result, we have previously reported that, in addition to expanding production, the United States may need to place more emphasis on demand reduction strategies as well as developing alternative or renewable energy supplies and technologies.⁶

DOD is the single largest energy consumer in the United States, and it consumes about 90 percent of the petroleum-based fuel used by the U.S. government. Jet fuel constitutes more than half of DOD's total energy consumption. Other types of petroleum-based fuels used by DOD include marine and auto diesel. According to the *Department of Defense Annual Energy Management Report* for fiscal year 2006, DOD consumed approximately 4.6 billion gallons of mobility fuels in fiscal year 2006, down from 5.17 billion gallons in fiscal year 2005. However, spending on mobility fuels increased 26.5 percent, from \$7.95 billion in fiscal year 2005 to \$10.06 billion in fiscal year 2006. DOD attributed this cost increase to the rise in fuel prices. For example, the price of jet fuel increased from \$1.70 per gallon in fiscal year 2005 to \$2.34 per gallon in fiscal year 2006. Congress, in fiscal year 2006, provided DOD more than \$2 billion in supplemental funds to cover increased fuel costs. In fiscal year 2007, DOD reported that the department consumed almost 4.8 billion gallons of mobility fuel and spent \$9.5 billion. Although fuel costs represent less than 3 percent of the total DOD budget, they have a significant impact on the department's operating costs. DOD has estimated that for every \$10 increase in the price of a barrel of oil, DOD's operating costs increase by approximately \$1.3 billion.

⁵For a discussion of issues surrounding peak oil production, see GAO, *Crude Oil: Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production*, [GAO-07-283](#) (Washington, D.C.: Feb. 28, 2007).

⁶For a more complete overview of U.S. energy challenges, see GAO, *21st Century Challenges: Reexamining the Base of the Federal Government*, [GAO-05-325SP](#) (Washington, D.C.: February 2005), and *Meeting Energy Demand in the 21st Century: Many Challenges and Key Questions*, [GAO-05-414T](#) (Washington, D.C.: Mar. 16, 2005).

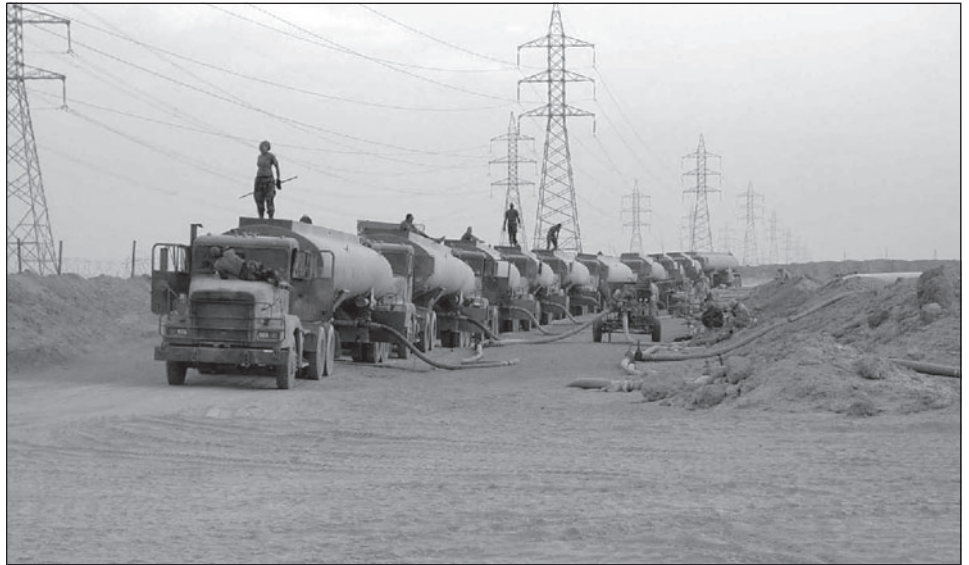
Fuel presents an enormous logistical burden for DOD when planning and conducting military combat operations. For current operations, the fuel logistics infrastructure requires, among other things, long truck convoys that move fuel to forward-deployed locations while exposed to the vulnerabilities of operations, such as enemy attacks (see figs. 1 and 2). Army officials have estimated that about 70 percent of the tonnage required to position its forces for battle consists of fuel and water. An armored division can use 600,000 gallons of fuel a day, and an air assault division can use 300,000 gallons a day. In addition, combat support units consume more than half of the fuel the Army uses on the battlefield. Aircraft also burn through fuel at rapid rates; a B-52H, for example, burns approximately 3,500 gallons per flight hour. Of the four military services, the Air Force consumes the greatest amount of petroleum-based fuels.

Figure 1: Three-Mile Backup of Fuel Delivery Trucks and Other Supply Vehicles Inside Afghanistan along the Northern Passage from Pakistan (February 2007)



Source: Headquarters, Marine Corps.

Figure 2: A Line of Tanker Trucks Loading Fuel in Kuwait



Source: DOD.

DOD has existing policies and organizational responsibilities for managing energy commodities, including petroleum, natural gas, coal, and electricity, to support peacetime and wartime missions and to permit successful and efficient deployment and employment of forces. Its overarching policy directive on managing energy commodities and related services establishes policy on standardizing fuels, minimizing inventory levels, maximizing use of alternative fuel sources from host nations and commercial sources, and privatizing energy infrastructure at military installations.⁷ The Defense Energy Support Center, within the Defense Logistics Agency, finances fuel purchases through a defense working capital fund. The military services purchase fuel from the Defense Energy Support Center using funds appropriated for their operation and maintenance accounts. Various DOD components have a role in planning for fuel demand and managing fuel storage and delivery.

⁷DOD Directive 4140.25, *DOD Management Policy for Energy Commodities and Related Services* (Apr. 12, 2004). Other fuel-related policy documents include DOD Directive 5101.8, *DOD Executive Agent for Bulk Petroleum* (Aug. 11, 2004); DOD Manual 4140.25-M, *DOD Management of Bulk Petroleum Products, Natural Gas and Coal* (Jun. 12, 2002); and Joint Chiefs of Staff, Joint Pub. 4-03, *Joint Bulk Petroleum and Water Doctrine* (May 23, 2003).

DOD has been exploring issues surrounding its reliance on petroleum through a number of studies sponsored by various offices within OSD. In 2001, the Defense Science Board issued the results of its study on improving the fuel efficiency of weapons platforms, in response to a tasking from the Under Secretary of Defense for Acquisition, Technology, and Logistics.⁸ In 2006, the Office of the Director, Defense Research and Engineering, sponsored a study by The JASONs, an independent defense advisory group under The MITRE Corporation, to assess ways to reduce DOD's dependence on fossil fuels.⁹ Under the sponsorship of the Office of Force Transformation and Resources, within the Office of the Under Secretary of Defense for Policy, LMI issued a 2007 report on an approach to establishing a DOD energy strategy.¹⁰ During the period in which we were conducting our review, the Defense Science Board, at the direction of the Under Secretary of Defense for Acquisition, Technology, and Logistics, issued a new report on DOD's energy strategy.¹¹ These studies have been supplemented by internal DOD reviews and other efforts, such as informational forums at the National Defense University, to explore fuel reduction strategies.

Departmental and Military Service Efforts Are Under Way to Reduce Mobility Energy Demand

OSD, the Joint Staff, and the military services have made efforts to reduce mobility energy demand for DOD's forces and in weapons platforms. At the department level, OSD and the Joint Staff have several efforts under way to begin to incorporate fuel efficiency considerations in DOD's requirements development and acquisition processes. In addition, each of the military services has its own initiatives under way to reduce mobility energy demand. The discussion that follows highlights several key efforts and is not intended to be a comprehensive listing of all fuel reduction efforts.

⁸Defense Science Board Task Force on Improving Fuel Efficiency of Weapons Platforms, *More Capable Warfighting Through Reduced Fuel Burden* (January 2001).

⁹The JASONs, *Reducing DOD Fossil-Fuel Dependence*, JSR-06-135 (September 2006).

¹⁰LMI, *Transforming the Way DOD Looks at Energy: An Approach to Establishing an Energy Strategy*, Report FT602T1 (April 2007).

¹¹Defense Science Board Task Force on DOD Energy Strategy, *More Fight—Less Fuel* (February 2008).

OSD and the Joint Staff Have Begun to Address Mobility Energy Demand

Department officials from several offices within OSD and the Joint Staff have initiated efforts to address mobility energy demand. In 2006, OSD created the DOD Energy Security Task Force to address energy security concerns. The task force’s integrated product team, which includes representatives from the military services; defense agencies; the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics; the Office of the Under Secretary of Defense for Policy; the Office of the Principal Deputy Under Secretary of Defense (Comptroller); the Joint Staff; and OSD’s Program Analysis and Evaluation office, typically meets each month and has formed several working groups to share information and ideas on efforts to reduce fuel demand in current and future weapons platforms. The integrated product team reports to a senior steering group, consisting of principal deputy secretaries of defense and service under secretaries and assistant secretaries. Among other activities, the task force recommended funding in fiscal year 2008 for several military service-led energy-related research and development projects, and it is monitoring their progress (see table 1).

Table 1: Selected Energy-Related Research and Development Projects Being Monitored by DOD’s Energy Security Task Force

Category	Project name	Description
Air platforms	Highly Efficient Embedded Turbine Engine	Develop a variable core engine to reduce fuel consumption in unmanned aerial vehicles, transport aircraft, and other aircraft.
	Small Heavy Fueled Engine	Extend the duration of unmanned aerial vehicle engines from 3-4 to 6-8 hours to increase fuel efficiency and reduce the logistics tail by using a single battlefield fuel; plan to apply to mobile ground power generators.
	Long-Range Unmanned Aerial Vehicles	Extend flight time of unmanned aerial vehicles for up to 6-7 days for increased fuel efficiency and savings over conventional surveillance and reconnaissance platforms.
Ground vehicles	Fuel-Efficient Ground Vehicle Demonstrator	Identify opportunities in fuel-efficient technologies to build a virtual vehicle that will demonstrate decreased fuel consumption in a tactical vehicle without decreasing performance or capability.
Power systems	Fuel Cell Research	Develop and demonstrate compact and mobile fuel cell systems to provide onboard power generation for increasing power demands and to reduce battery weight.
	Transportable Hybrid Electric Power Supply	Provide hybrid electric power generators to reduce diesel fuel usage and resupply requirements.
	Hybrid Intelligent Power	Automate generators on the battlefield to turn on and off as needed to minimize fuel use and reduce maintenance needs, personnel requirements, and power interruptions.

Source: DOD.

In addition to focusing on research and development initiatives, DOD has recognized a need to factor energy efficiency considerations into its

acquisition process. In 2007, the Deputy Secretary of Defense included energy in DOD's list of the top 25 transformational priorities for the department, as part of its initiative to pursue targeted acquisition reforms. Also, in April 2007, the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics established a DOD policy to include the fully burdened cost of fuel—that is, the total ownership cost of buying, moving, and protecting fuel in systems during combat—for the acquisition of all tactical systems that create a demand for energy.¹² To incorporate the fully burdened cost of energy into acquisition decisions, OSD initiated a pilot program that includes three systems: the Army and Marine Corps' Joint Light Tactical Vehicle, the Navy's new CG(X) cruiser, and the Air Force's Next-Generation Long-Range Strike aircraft. To further facilitate the implementation of this policy, OSD's Program Analysis and Evaluation office developed a methodology for assessing the fully burdened cost of fuel and completed its initial analyses of the first system, the Joint Light Tactical Vehicle, last fall. According to the DOD policy, the results of the pilot program are expected to be used as the basis for implementation across all relevant acquisition programs.

In another initiative, the Joint Staff added language to its guidance in May 2007 requiring that an energy efficiency key performance parameter be selectively considered in the development of capability requirements for new systems.¹³ The guidance defines a key performance parameter as an attribute or characteristic of a system that is considered critical or essential to the development of an effective military capability. For example, a survivability key performance parameter is applicable for manned systems designed to enhance personnel survival when employed in an asymmetric threat environment. In general, a key performance parameter represents a system attribute that is so significant that failure to meet its minimum threshold could be a reason for DOD or the military services to reevaluate the concept or system or terminate the program.

In response to the work conducted by the DOD Energy Security Task Force, the Joint Staff has also been directed to lead an assessment of simulator capability and capacity across the department. This effort is

¹²Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics Memorandum, "Fully Burdened Cost of Fuel Pilot Program," April 10, 2007.

¹³Joint Chiefs of Staff Instruction 3170.01F, *Joint Capabilities Integration and Development System* (May 1, 2007), and Joint Chiefs of Staff Manual 3170.01C, *Operation of the Joint Capabilities Integration and Development System* (May 1, 2007).

expected to analyze whether the increased use of simulators could substitute for live training without degrading operational capability. The study will also identify barriers to implementation and needed policy changes.

Army Is Examining Ways to Reduce In-Theater Fuel Demand

The Army has begun a number of efforts to reduce mobility energy demand. These activities include undertaking initiatives to reduce fuel consumption in theater, determining the total costs of delivering fuel, and developing an Army energy strategy. The Army, through the office of the Army Rapid Equipping Force, created the Power Surety Task Force in 2006 to address a joint urgent operational needs statement from a U.S. commander in Iraq that called for alternative energy sources to reduce the amount of fuel transported to supply power generation systems at forward-deployed locations. The Power Surety Task Force aims to foster the development of projects and programs that are deployable within 18 months. Two of the Power Surety Task Force's initiatives—foam-insulated tents and temporary biodegradable dome structures that are more efficient to heat and cool—are expected to reduce the number of generators required to produce power at forward-deployed locations. Another initiative is the development of a transportable hybrid electric power station, which uses wind, solar energy, a diesel generator, and storage batteries to provide reliable power with fewer fuel requirements. According to Army Rapid Equipping Force officials, the power station could potentially replace about half of the current generators at forward-deployed locations. Moreover, they estimated that annual savings in Iraq from some of these initiatives could be at least \$1.7 billion, and that other benefits could include a reduction in the number of trucks required in supply convoys, potentially saving lives and reducing vehicle maintenance requirements. We did not validate the Army Rapid Equipping Force's cost savings estimate.

Another ongoing Army activity is its effort to determine the total costs of delivered energy for Army systems. The Army's "Sustain the Mission Project" was started in 2004 to institutionalize a fully burdened cost methodology in the Army. The methodology uses existing Army and DOD databases, metrics, and processes to calculate the fully burdened cost of fuel and to facilitate "what if" analyses for different assumptions and scenarios. It is also aimed at enabling decision makers to perform cost-benefit analyses of investments in alternative energy and weapons systems technologies. The Army has scheduled a demonstration of this tool in late March 2008.

The Army will also sponsor a study that officials expect will lead to the development of a tactical fuel and energy strategy for the future modular force. The contract for the 1-year study was expected to be awarded in 2008. Army officials told us that they plan to update the Army's energy regulation following completion of the study. The current regulation focuses on facility energy, but according to Army officials, the updated version is expected to include mobility fuel as well.

Navy Has Established an Energy Conservation Program and Other Mobility Energy Reduction Initiatives

The Navy has established a shipboard energy conservation program and has undertaken other initiatives to save fuel on ships. The energy conservation program has both training and award components to encourage ships to reduce energy consumption. Training materials and activities include a shipboard energy conservation manual, a pocket guide to assist commanders with energy-saving activities, energy audits of ships to show commanders how energy can be saved, and energy conservation seminars and workshops. Awards are given quarterly to ships that use less than the Navy's established baseline amount of fuel, and fuel savings achieved during the quarter are reallocated to the ship for the purchase of items such as paint, coveralls, and firefighting gear. The ship energy conservation program receives \$4 million in funding annually, and Navy officials told us that they achieved \$124.6 million in cost avoidance in fiscal year 2006. They said that some other benefits of this program include more available steaming hours, additional training for ships, improved ship performance, reduced ship maintenance, and conservation of resources.

The Navy has undertaken other mobility energy reduction efforts as part of its ship energy conservation program, such as ship alterations. Two key ship alterations are the use of stern flaps and the modification of boiler boxes. A stern flap alters the water flow at the stern to reduce a ship's resistance and increase fuel efficiency. According to Navy officials, preliminary tests of stern flaps on guided missile destroyers showed an annual fuel reduction of 3,800 to 4,700 barrels, or about 6 to 7.5 percent per ship, which DOD estimated would result in potential savings of almost \$195,000 per year per ship. Boiler box modifications for amphibious assault ships, one of the Navy's largest fuel-consuming ships, are expected to decrease the amount of fuel expended by 2 percent per ship. Navy officials told us that this alteration has been approved and that most alterations would be completed in fiscal year 2009. According to Navy officials, once all alterations are completed in fiscal year 2011, this effort could potentially save approximately \$30 million per year, depending on the price of fuel. We did not validate these potential savings.

Air Force Has Implemented an Energy Strategy and Begun Mobility Energy Reduction Initiatives

In 2005, the Air Force implemented an energy strategy that consists of three components: reducing demand, increasing supply, and changing the culture. At the time of our report, the Air Force was in the process of updating its instructions and directives to reflect its energy strategy and to establish an overarching Air Force energy policy. In addition, the Air Force has identified and begun to implement initiatives aimed at reducing mobility energy demand and increasing fuel efficiency, aligning these initiatives with its energy strategy. Four key initiatives are as follows:

- **Direct routing.** This initiative intends to reduce flight time and fuel consumption by flying the most fuel-efficient flight routes and altitudes.
- **Weight reduction.** This initiative intends to decrease excess weight on an aircraft without adversely affecting mission capability. Three categories that are being considered are taking unused items off the aircraft, taking fewer of the items that are needed, and looking at mission-critical items that could be designed differently, for example, with lighter materials. According to Air Force officials, every 100 pounds of weight equate to 1.6 million pounds of fuel, or \$686,000 per year across its fleet of mobility aircraft.
- **Air refueling optimization.** With this initiative, the Air Force intends to change the flight planning process to limit air refueling to only when it is mission essential.
- **Efficient ground operations.** This initiative intends to reduce fuel burn during ground operations. Some actions include reducing warm-up time and taxiing on fewer engines.

In addition to these demand-reduction initiatives, the Air Force is pursuing efforts to increase supply through the research and testing of new technologies, as well as renewable and sustainable resources. Through the Air Force's synthetic fuel initiative, jet fuels made from alternative energy sources, such as coal, natural gas, and biomass, are being evaluated for use in military aircraft with the goal of reducing future fuel costs and ensuring fuel availability. The Air Force completed initial testing of a synthetic blend of fuel in the B-52H bomber and certified the use of this fuel blend for this aircraft in August 2007. The service has begun testing on the C-17 cargo aircraft, the B-1 bomber, and the F-22 fighter, with certification expected in 2008. Air Force officials said that they expect the entire fleet to be certified to fly on the synthetic blend of fuel by 2011.

However, our prior work has highlighted challenges associated with the development and adoption of alternative energy sources.¹⁴

Finally, the Air Force aims to create a culture that emphasizes energy considerations in all of its operations. Air Force officials told us that this component of their strategy has multiple elements, including focused leadership, training, educational curricula, and communication.

Marine Corps Is Studying Technologies to Reduce Fuel Consumption

The Marine Corps has taken steps to reduce its fuel usage by initiating research and development efforts to develop alternative power sources and improve fuel management. For example, it is testing the use of additional alternators in certain vehicles to provide onboard power capabilities, which could reduce the use of petroleum-based fuel and the number of generators needed on the battlefield. Another initiative involves providing hybrid power—by combining solar panel, generator, and battery energy sources—at remote sites to lessen fuel transportation demands to forward-deployed locations. The Marine Corps expects to begin testing this initiative in October 2008.

In addition, the Office of Naval Research is leading efforts for the Marine Corps to develop decision support tools that process and analyze data and improve fuel management in combat. Examples include sensors for fuel containers to measure the amount of remaining fuel and onboard vehicle sensors that automatically generate a requirement when additional fuel is needed.

¹⁴ [GAO-07-283](#).

DOD Has Not Established an Overarching Organizational Framework to Guide and Oversee Mobility Energy Reduction Efforts

While DOD and the military services have several efforts under way to reduce mobility energy demand, DOD lacks key elements of an overarching organizational framework to guide and oversee these efforts. As a result, DOD cannot be assured that its current efforts will be fully implemented and will significantly reduce its reliance on petroleum-based fuel. While DOD has identified energy as one of its transformational priorities, DOD's current approach to mobility energy lacks (1) top leadership, with a single executive-level OSD official—supported by an implementation team with dedicated resources and funding—who is accountable for mobility energy matters; (2) a comprehensive strategic plan for mobility energy; and (3) an effective mechanism to provide for communication and coordination of mobility energy efforts among OSD and the military services as well as leadership and accountability over each military service's efforts. In the absence of a framework for mobility energy that includes these elements, DOD has made limited progress in incorporating fuel efficiency as a consideration in its key business processes—which include developing requirements for and acquiring new weapons systems—and in implementing recommendations made in department-sponsored studies.

DOD's Current Management Approach to Mobility Energy Lacks Key Elements of an Overarching Organizational Framework

DOD's current approach to mobility energy is decentralized, with fuel oversight and management responsibilities diffused among several OSD and military service offices as well as working groups. More specifically, we found its approach lacks key elements of an overarching organizational framework, including a single executive-level OSD official—supported by an implementation team—who is accountable for mobility energy matters, a comprehensive strategic plan, and an effective mechanism for departmentwide communication and coordination. Our prior work on organizational transformations has found such a framework to be critical to successful transformation in both public and private organizations.¹⁵ In addition, it is important to note that DOD has a history of creating organizational frameworks to address other crosscutting issues.

¹⁵GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, [GAO-03-669](#) (Washington, D.C.: July 2, 2003).

Responsibilities for Fuel Oversight and Management Are Diffused throughout Various DOD Offices and Working Groups

DOD’s policies for energy management assign oversight and management responsibilities to several different offices without providing a single focal point with total visibility of, or accountability for, mobility energy reduction efforts across the department. Table 2 outlines various roles and responsibilities for fuel management and oversight.

Table 2: DOD Energy/Fuel Roles and Responsibilities

Office	Responsibilities
Under Secretary of Defense for Acquisition, Technology, and Logistics	Serve as the DOD senior energy official. Establish policies, grant waivers, and approve changes in the management of energy commodities.
Deputy Under Secretary of Defense (Logistics and Materiel Readiness)	Serve as the DOD central administrator for mobility energy policy with overall management responsibility for petroleum and other commodities.
Deputy Under Secretary of Defense (Installations and Environment)	Serve as the DOD central manager for facility energy policy on DOD installations.
Director, Defense Research and Engineering	Lead the DOD Energy Security Task Force.
DOD Comptroller	Establish financial policies and guidance for the management of energy commodities and related services, in coordination with the Under Secretary of Defense for Acquisition, Technology, and Logistics.
Defense Logistics Agency/Defense Energy Support Center	Serve as the executive agent for bulk petroleum and execute fuel-related materiel management responsibilities.
Chairman, Joint Chiefs of Staff	Review operations plans and contingency plans to ensure that fuel requirements are addressed; identify fuel reporting requirements and other information for theater contingency requirements.
Combatant commanders’ joint petroleum offices	Carry out combatant commander responsibilities for fuel distribution within a theater of operations.
Secretaries of the military departments	Operate the petroleum facilities under their cognizance, control fuel stocks in coordination with the Defense Logistics Agency, compute wartime fuel demands based on combatant commanders’ operational and contingency plans.

Source: GAO analysis of DOD policies.

As table 2 shows, DOD policies do not assign responsibility for fuel reduction considerations—either singly or jointly—to any of the various offices involved in fuel management. While DOD directives designate the Under Secretary of Defense for Acquisition, Technology, and Logistics as the department’s senior energy official, with responsibility for establishing policies, granting waivers, and approving changes in the management of energy commodities, including petroleum, the extent to which this official

provides comprehensive guidance and oversight of fuel reduction efforts across the department is unclear.¹⁶ Moreover, DOD has charged the Office of the Deputy Under Secretary of Defense (Logistics and Materiel Readiness) to serve as the DOD central administrator for mobility energy policy with overall management responsibility for petroleum and other commodities. We found that although this office plays an active role in maintaining DOD policy on energy supply issues and participates in other department-level fuel-related activities, its primary focus has not been on departmentwide fuel reduction efforts.

At the military service level, we found that the Air Force and the Army have established working groups to address fuel reduction and other energy issues. For example, the Air Force has established a senior focus group of high-level Air Force officials to address both mobility and facility energy issues. The senior focus group has created several working groups to address specific energy issues, such as aviation operations, acquisitions and technology, and synthetic fuels, as well as advisory groups on strategic communication, critical infrastructure protection, and financing. The Army also has established an energy working group to facilitate the discussion of energy issues across the service, including how to address rising fuel costs. The group meets each month to share information and identify issues across the Army. At the time of our review, the Army was in the process of establishing a senior steering group of high-level Army officials that would meet to discuss mutual energy concerns. While the Navy and Marine Corps have not established similar formal working groups, officials from both military services told us that they participate in internal meetings on fuel reduction issues.

DOD Has Not Designated a Single Executive-Level Official for Mobility Energy

While DOD has begun to increase management attention and has identified energy as a transformational priority, it has not designated a single executive-level OSD official—supported by an implementation team—who is accountable for mobility energy matters across the department. Our prior work has shown that top-level leadership and an implementation team with dedicated resources and funding are key elements of an overarching organizational framework. Furthermore, leadership must set the direction, pace, and tone and provide a clear, consistent rationale that brings everyone together behind a single mission.¹⁷ The Under Secretary of

¹⁶DOD Directive 4140.25, and DOD Directive 5134.01, *Under Secretary of Defense for Acquisition, Technology, and Logistics* (Dec. 9, 2005).

¹⁷[GAO-03-669](#).

Defense for Acquisition, Technology, and Logistics, as the senior DOD energy official, is responsible for management of energy commodities, but this individual also has a broad range of other responsibilities that include, among other things, matters relating to the DOD acquisition system, research and development, systems engineering, logistics, installation management, and business management modernization. Therefore, this individual's primary focus has not been on the management of mobility energy efforts. Moreover, from a broader perspective, the extent to which the Under Secretary of Defense for Acquisition, Technology, and Logistics has set a direction for the various OSD and military service offices involved in mobility energy is unclear.

In addition, DOD's Energy Security Task Force was formed in 2006 to address long-term departmental energy security requirements, such as DOD's reliance on fossil fuels, but we found that the task force has been unable to develop policy or provide guidance and oversight of mobility energy issues across the department. As indicated in its charter, the task force's integrated product team is required to develop a comprehensive DOD energy strategy and an implementation plan. Among other deliverables, the team's charter also requires it to define DOD's energy challenge, create a compendium of energy-related works, and perform a strategic assessment of energy. While the task force has taken steps to identify and monitor the progress of selected mobility energy reduction projects across the department, it has not yet completed an energy strategy or implementation plan, as well as other responsibilities. Furthermore, OSD officials told us that while the task force has briefed the Deputy Secretary of Defense's advisory group on its recommended projects, it does not have a "seat at the table" in departmental discussions at the Deputy Secretary of Defense level or at other executive levels, such as the Joint Requirements Oversight Council, the Defense Acquisition Boards, or the 3-Star Group within DOD's Planning, Programming, Budgeting, and Execution process.¹⁸

DOD also does not have an implementation team in place, with dedicated resources and funding, for mobility energy issues. For example, the officials who lead DOD's Energy Security Task Force's integrated product

¹⁸The 3-Star Group within DOD's Planning, Programming, Budgeting, and Execution process includes members from OSD's Director of Program Analysis and Evaluation; OSD's under secretaries of defense; the Joint Staff Director for Structure, Resources, and Assessment; and the military services' 3-Star programmers. This group addresses major issues and presents decision options to the Secretary of Defense.

team do so as an extra responsibility outside of their normal work duties. Other DOD officials said that the task force provides a good forum for sharing energy ideas across the department, but lacks adequate staff to carry out specific actions. Furthermore, a task force participant told us that it can be difficult to find time to attend meetings while balancing other duties. The task force also does not receive any dedicated funding to pursue department-level energy priorities. Our prior work on the Government Performance and Results Act of 1993 (GPRA)¹⁹ emphasizes the importance of relating funding to performance goals. The establishment of a dedicated funding mechanism for corrosion, for example, enabled DOD to fund high-priority corrosion reduction projects, which resulted in savings of more than \$753 million during a 5-year period.²⁰ Without a long-term funding mechanism, DOD may not be able to ensure that mobility energy reduction efforts receive sustained funding over a period of years.

Moreover, DOD may not be well positioned to serve as a focal point on mobility energy within the department, with Congress, and with the Department of Energy or other interagency partners. During a military energy security forum held at the National Defense University in November 2007, representatives from various DOD offices presented energy as an area that is significant to a breadth of issues ranging from force protection to global stability to the security of DOD's critical infrastructure. They also noted that DOD has the potential to play multiple roles with respect to energy, including consumer, market leader, educator/motivator, oil infrastructure protector, and warfighter supporter. These concerns, coupled with an increased national and congressional interest in reducing fossil fuel dependence and exploring alternative energies, will likely necessitate an increased leadership focus on long-term energy issues, both within DOD and in its role as a stakeholder in interagency and national dialogues. The Energy Independence and Security Act of 2007,²¹ for example, requires a variety of national-level

¹⁹GPRA (Pub. L. No. 103-62, (1993)) is the centerpiece of a statutory framework that Congress put in place during the 1990s to help resolve the long-standing management problems that have undermined the federal government's efficiency and effectiveness and to provide greater accountability for results. For additional information, see GAO, *Agency Performance Plans: Examples of Practices That Can Improve Usefulness to Decisionmakers*, [GAO/GGD/AIMD-99-69](#) (Washington, D.C.: Feb. 26, 1999).

²⁰GAO, *Defense Management: Opportunities Exist to Improve Implementation of DOD's Long-Term Corrosion Strategy*, [GAO-04-640](#) (Washington, D.C.: June 23, 2004).

²¹Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 933 (2007).

DOD Has Not Yet Developed a Comprehensive Mobility Energy Strategic Plan

actions, including that the President submit to Congress an annual report on the national energy security of the United States. It also requires DOD to examine energy and cost savings in nonbuilding applications, including an examination of savings associated with reducing the need for fuel delivery and logistical support. In addition, the John Warner National Defense Authorization Act for Fiscal Year 2007 directs DOD to improve the fuel efficiency of weapons platforms.²²

DOD has not yet developed a comprehensive strategic plan for mobility energy. Our prior work has found that strategic planning is a key element of an overarching organizational framework.²³ According to GPRA, key elements of a strategic plan include a comprehensive mission statement, goals and objectives, approaches or strategies to achieve those goals and objectives, and methods and timelines for evaluating progress. In addition, we have previously identified other elements that would enhance the usefulness of a strategic plan, including the development of outcome-oriented performance metrics and an alignment of activities, core processes, and resources to support mission-related outcomes.

DOD has taken some steps to lay the foundation for mobility energy strategic planning. According to OSD officials, DOD has begun to incorporate mobility energy issues into its *Guidance on the Development of the Force*, a department-level strategic planning document. In addition, the Office of the Deputy Assistant Secretary of Defense for Policy Planning, within the Office of the Under Secretary of Defense for Policy, is analyzing future energy concerns for the United States and the international security environment and highlighting their implications for the department. DOD officials said that the analysis is expected to provide information for consideration in the development of future strategic planning documents. We also observed that the DOD Energy Security Task Force has begun efforts to define goals that eventually may be incorporated into a DOD energy security strategic plan. OSD officials told us that the task force's intent is to complete this strategic plan by May 2008. However, current DOD strategic planning documents, such as the

²²Pub. L. No. 109-364, § 360 (2006), states that it shall be DOD's policy to improve fuel efficiency of weapons platforms, consistent with mission requirements, in order to enhance platform performance, reduce the size of fuel logistics systems, reduce the burden high consumption places on agility, reduce operating costs, and dampen the financial impact of volatile oil prices.

²³GAO, *Agencies' Strategic Plans Under GPRA: Key Questions to Facilitate Congressional Review*, [GAO/GGD-10.1.16](#) (Washington, D.C.: May 1997).

DOD Does Not Have an Effective Mechanism for Communication and Cross-Service Coordination of Mobility Energy Reduction Efforts

National Military Strategy and the most recent *Quadrennial Defense Review*,²⁴ do not address mobility energy reduction. Furthermore, until DOD fully develops and implements a comprehensive strategic plan for mobility energy, it cannot be certain that mobility energy reduction efforts align with the department's energy mission or strategic goals to ensure that they are appropriately prioritized, or know whether critical gaps or duplication of efforts exist.

DOD does not have an effective mechanism to facilitate communication and coordination of mobility energy reduction efforts among OSD and the military services. Our prior work has shown that a communication strategy involves creating shared expectations and reporting related progress.²⁵ While DOD's Energy Security Task Force aims to identify key players within the energy field, its current structure does not ensure departmentwide communication of fuel reduction efforts, particularly among the military services, which are responsible for most of these efforts. More specifically, during our observation of a task force monthly meeting, we found that although this venue provides for some sharing of information, the generally less than 2 hours allotted for each monthly meeting does not allow for effective coverage of the spectrum of DOD's mobility energy issues. Moreover, we noted that although the task force's senior steering group includes, among others, the service under secretaries and assistant secretaries; the Director, Defense Research and Engineering; and several principal deputy under secretaries of defense, it only meets two to three times a year. Furthermore, with the exception of the Air Force, none of the other military service members on the senior steering group have primary responsibility for mobility energy reduction efforts within their services. Without executive-level focal points, the military services may not be well positioned to effectively coordinate on mobility energy reduction efforts across the department or provide leadership or accountability for efforts within their services.

In addition, we found a lack of cross-service coordination concerning mobility energy reduction initiatives. Army officials told us that they were

²⁴The *National Military Strategy*, signed by the Chairman of the Joint Chiefs of Staff, is guided by the goals and objectives contained in the present *National Security Strategy* and serves to implement the Secretary of Defense's *National Defense Strategy*. The *Quadrennial Defense Review*, prepared by the Secretary of Defense every 4 years, assesses the nature and magnitude of the political, strategic, and military risks associated with executing the missions called for under the *National Defense Strategy*.

²⁵[GAO-03-669](#).

unaware of Navy research on fuel reduction metrics, while Air Force officials said that they do not routinely discuss aviation fuel reduction initiatives with their Army counterparts, even though both military services are concerned about aircraft fuel consumption. OSD officials said that while several separate groups are making efforts to reduce fuel consumption, the efforts are often not shared or integrated. Moreover, OSD officials told us that DOD generally lacks incentives to reward the military services for reducing fuel consumption and faces challenges in addressing departmental cultural barriers—such as the traditional view that fuel is simply a commodity and that energy efficiency is not an important consideration for warfighting. Without an effective mechanism to facilitate communication of mobility energy reduction efforts between OSD and the military services, DOD cannot be certain that these efforts are effectively coordinated throughout the department or consistent with DOD’s energy priorities and goals. On a broader level, DOD may not be well positioned to respond to congressional or other agencies’ requests for information on mobility energy.

DOD Has a History of Creating Organizational Frameworks to Address Other Crosscutting Issues

Many OSD, military service, and other DOD officials with whom we spoke expressed the need for an overarching organizational framework to address mobility energy throughout the department. Some officials from OSD suggested that an ideal organizational framework would bring together the various offices within OSD and the military services involved in fuel reduction efforts and establish business practices, analytic methods, and technology investments that take into account strategic risks associated with energy. Some military service officials acknowledged that departmental oversight is needed but told us that they fear such oversight might take resources away from their own mobility energy reduction initiatives. Similarly, some OSD officials said they are concerned that establishing a permanent mobility energy office or similar framework could impose additional bureaucratic layers and slow progress on mobility energy reduction initiatives.

We noted that DOD has established new organizational frameworks to address other crosscutting issues, such as business systems modernization, corrosion control and prevention, contractors on the battlefield, and the defeat of improvised explosive devices. While we did not evaluate the strengths or weaknesses of these organizational frameworks as part of this review, they nonetheless provide DOD examples to consider in determining how best to establish an overarching organizational framework for mobility energy. For example, the Business Transformation Agency, which addresses business systems modernization, involves top DOD leadership by operating under the Office of the Under

Secretary of Defense for Acquisition, Technology, and Logistics but reporting directly to the Deputy Under Secretary of Defense for Business Transformation. DOD has also created a management framework to oversee facility energy, which accounts for about 25 percent of the department's energy use. Specifically, it has designated a senior agency official, the Deputy Under Secretary of Defense for Installations and Environment, with the responsibilities for meeting federal mandates regarding energy reduction at installations. The department has also created a working group charged with implementing the mandates.

In addition, DOD established an Energy Policy Council in 1985 to provide coordinated review of DOD energy policies, issues, systems, and programs.²⁶ In the instruction outlining the requirements of this council, DOD assigned responsibilities to various departmental offices and designated the then Deputy Assistant Secretary of Defense (Logistics and Materiel Management) as council chair. DOD also called for clearly identified focal points to address energy matters within each military department. When we asked about the status of the council, OSD officials said that they did not believe it still existed. This now-defunct Energy Policy Council could also serve as an example of an organizational framework for mobility energy that provides for sharing of information among the military services.

Absence of an Overarching Organizational Framework Does Not Position DOD to Effectively Address Mobility Energy

In the absence of an overarching organizational framework, DOD is not well positioned to fully incorporate fuel efficiency considerations into its key business processes or to fully implement recommendations from DOD-sponsored studies on fuel reduction.

DOD Has Not Yet Fully Incorporated Fuel Efficiency Considerations into Its Key Business Processes

DOD has not yet fully incorporated fuel efficiency considerations into key departmental business processes, such as its requirements development and acquisition processes for new weapons platforms and other mobile defense systems. DOD's process to develop requirements, known as the Joint Capabilities Integration and Development System, is a multistep process that involves identifying what military capabilities the department needs to accomplish its tasks. Once the capabilities are identified, DOD's

²⁶DOD Instruction 5126.47, *Department of Defense Energy Policy Council*, Under Secretary of Defense for Acquisition, Technology, and Logistics (Dec. 2, 1985).

acquisition process produces equipment that can meet those requirements. DOD-sponsored studies on fuel reduction, such as the 2007 LMI report, note that the requirements development and acquisition processes provide opportunities for DOD to consider energy efficiencies while considering capabilities. Moreover, the 2001 Defense Science Board report noted that fuel efficiency benefits are not currently valued or emphasized in DOD's requirements development and acquisition processes. While DOD has recently begun to take some steps to integrate fuel considerations into these processes, these considerations are not factored in a systematic manner and cannot be fully applied.

For example, DOD's requirements development process does not systematically include energy efficiency considerations, and the capability gap assessments associated with the process do not include fuel-related logistics, thus leaving these types of issues to be resolved after systems are fielded. As described earlier, in May 2007, the Joint Staff established an energy efficiency key performance parameter that would require fuel considerations during capabilities development. However, because DOD has not developed a methodology to determine how best to employ the energy efficiency key performance parameter, implementation of this key performance parameter remains uncertain.

DOD has also taken steps to inform its acquisition process with its pilot program to determine the fully burdened cost of fuel for three mobile defense systems. While the pilot program represents a step toward providing visibility over the total logistics costs associated with delivered fuel and DOD has set a fall 2008 deadline to issue guidance for applying the fully burdened cost of fuel in acquisition programs, DOD has not yet developed an approach for determining how it would incorporate this information into its acquisition decision-making process. Moreover, the 2008 Defense Science Board report presented some concerns about how fully burdened costs are being calculated. Specifically, the report cited a concern that the analysis focused on peacetime costs and did not adequately consider wartime costs, even though the fully burdened cost analysis is intended to be a wartime capability planning factor. Until the pilot program is completed and the results are assessed, DOD is not in a position to apply a fully burdened cost analysis to its acquisition process. Thus, the department is unable to promote greater visibility over its acquisition decisions or more fully consider the operational and cost consequences of the fuel burden on the logistics infrastructure.

Other key DOD business processes, such as those that address repair, recapitalization, and replacement of mobile defense systems also present

opportunities to incorporate fuel efficiency measures during system upgrades. However, OSD officials told us that the department generally makes decisions about system upgrades without regard to fuel efficiency, including the fully burdened cost, in part because such decisions require greater up-front costs. Although DOD recognizes that by reducing energy demand it can provide its forces greater flexibility and reduce their dependence on the logistics infrastructure, some OSD officials told us that DOD's budget process promotes a short-term outlook and does not encourage the purchase of fuel-efficient systems or upgrades that may initially cost more but could reduce life cycle and logistics costs over the long term. Moreover, the 2008 Defense Science Board report noted that DOD's lack of tools to assess the operational and economic benefits of fuel efficiency technologies is a major reason why DOD underinvests in the development and deployment of these technologies. In addition, OSD officials told us that DOD does not systematically assess how making fuel efficiency upgrades to systems would affect other logistics issues—for example, how reducing the weight of an Army vehicle would affect the amount of fuel the Air Force transports to the battlefield for that vehicle. Such assessments, they said, may reveal further enhancements in warfighting capabilities.

DOD Has Been Slow to Implement Recommendations from Department-Sponsored Studies on Fuel Reduction

In the absence of an overarching organizational framework, DOD has made limited progress in implementing recommendations from department-sponsored studies by organizations such as the Defense Science Board, The JASONs, and LMI that have urged an expansion of efforts to reduce dependency on petroleum-based fuel. These studies confirmed that, for many reasons, continued heavy reliance on petroleum-based fuel poses a significant problem for DOD. For example, LMI reported that DOD's increasing fuel demand furthers the nation's reliance on foreign energy sources and limits the department's ability to establish a more mobile and agile force. The studies found a need to focus more DOD management attention on mobility energy matters and recommended actions aimed at, among other things, improving the fuel efficiency of weapons platforms, eliminating institutional barriers that bear upon the department's decisions regarding fuel efficiency, and developing a long-term mobility energy strategy that would lead to reduced consumption of petroleum-based fuel.

DOD has not taken a formal position on these recommendations, and implementation, in some cases, would require significant changes throughout the department that could generate institutional resistance. One study, for example, called for creating a unified energy governance structure in order to alter DOD's "energy culture." During our review, we

found that DOD had taken some steps toward implementing some of the recommendations, such as initiating a pilot program for determining the fully burdened cost of delivered fuel and adding a requirement for an energy efficiency key performance parameter in its Joint Staff policy manual. However, other recommendations, such as establishing a governance structure for mobility energy, have not been implemented (see app. II for our summary of the recommendations in DOD-sponsored studies and the actions DOD has taken on those recommendations). The 2008 Defense Science Board report noted that the recommendations made by the 2001 Defense Science Board report are still open and remain viable. An overarching organizational framework could better position DOD to address these and other fuel reduction recommendations in a more timely and effective manner. Moreover, a framework for mobility energy could provide greater assurance that DOD's efforts to reduce its reliance on petroleum-based fuel will succeed without degrading its operational capabilities and that DOD is better positioned to address future mobility energy challenges.

Conclusions

DOD continues to face rapidly increasing fuel costs and high fuel requirements that have placed a significant logistics burden on its forces. In light of these and other challenges associated with mobility energy, DOD has begun to increase its management attention on reducing its reliance on petroleum-based fuel. Increased national focus on the United States' dependence on foreign oil, projected increases in the worldwide demand for oil, and uncertainties about world oil supplies will likely require DOD to further increase its focus on long-term energy issues, both within the department and as a stakeholder in interagency and national dialogues. However, DOD will have difficulty addressing mobility energy challenges in the absence of an overarching organizational framework. Without such a framework, DOD is not well positioned to effectively guide and oversee mobility energy reduction efforts from a departmentwide perspective to ensure that efforts are appropriately prioritized; identify critical gaps or duplication of efforts; and address long-term, large-scale energy issues. In particular, no individual at the executive level within OSD has been designated to be accountable for mobility energy and set the direction, pace, and tone to reduce mobility energy demand across the department. Other elements of an overarching organizational framework include a comprehensive strategic plan and executive-level focal points at the military services to provide for effective coordination. In addition, until DOD takes steps to further incorporate energy efficiency considerations into its business processes, the department is unable to promote greater visibility in its decision making or fully consider the

effects of fuel on the logistics infrastructure. With a mobility energy overarching organizational framework in place, DOD would be better positioned to reduce its significant reliance on petroleum-based fuel and to address the energy challenges of the 21st century.

Recommendations for Executive Action

To improve DOD's ability to guide and oversee mobility energy reduction efforts, we recommend that the Secretary of Defense direct the Deputy Secretary of Defense to establish an overarching organizational framework by taking the following three actions:

- Designate an executive-level OSD official who is accountable for mobility energy matters and sets the direction, pace, and tone to reduce mobility energy demand across the department; improve business processes to incorporate energy efficiency considerations as a factor in DOD decision making; coordinate on energy issues with facility energy officials; act as DOD's focal point in interagency deliberations about national energy concerns; and lead the department's potential transition from petroleum-based fuel to alternative fuel sources. This official should be supported by an implementation team with dedicated resources and funding.
- Direct the executive-level mobility energy official to lead the development and implementation of a comprehensive departmentwide strategic plan for mobility energy. At a minimum, this strategic plan should set forth mobility energy goals and objectives, time frames for implementation, and performance metrics to track and evaluate progress.
- Ensure that OSD takes the following steps to fully incorporate energy efficiency considerations into DOD's requirements development and acquisition processes:
 - Develop a methodology to enable the full implementation of an energy efficiency key performance parameter in DOD's requirements development process.
 - As part of its efforts to complete DOD's fully burdened cost of fuel pilot program, develop an approach for incorporating this cost information into the acquisition decision making process.

Furthermore, to establish effective communication and coordination among the executive-level OSD mobility energy official and the military services, we recommend that the Secretary of Defense direct the Secretaries of the Army, Navy, and Air Force and the Commandant of the Marine Corps to designate an executive-level official within each of their military services to act as a focal point on departmentwide mobility energy efforts as well as provide leadership and accountability over their own efforts.

Agency Comments and Our Evaluation

In its written comments on a draft of this report, DOD partially concurred with all of our recommendations. Based on DOD's comments to our draft report, we made minor modifications to our report, including our first recommendation. Technical comments were provided separately and incorporated as appropriate. The department's written comments are reprinted in appendix III.

In response to our recommendation that the Secretary of Defense direct the Deputy Secretary of Defense to designate an executive-level OSD official who is accountable for mobility energy matters across the department, DOD acknowledged that there is a need to view and manage its energy challenges in a new, more systematic manner. DOD's response stated that DOD Directive 5134.01 (Dec. 9, 2005) provides the Under Secretary of Defense for Acquisition, Technology, and Logistics oversight and policy-making authority on DOD energy matters. However, it is clear from our review, including discussions with department officials, that neither the Under Secretary nor any official from this office is providing comprehensive oversight and policy guidance for mobility energy across the department. Instead, we found that DOD's current approach to mobility energy is decentralized, with fuel oversight and management responsibilities diffused among several OSD and military service offices (see table 2 of this report) as well as working groups. DOD does not assign responsibility for fuel reduction considerations—either singly or jointly—to any of the various offices involved in fuel management. DOD's response stated that its authorities and responsibilities are consistent with those used for overseeing other significant crosscutting issues. However, as we noted in our report, DOD has established new organizational frameworks to address other crosscutting issues, such as business systems modernization, corrosion control and prevention, contractors on the battlefield, and the defeat of improvised explosive devices. Moreover, DOD has established a focal point for facility energy, the Deputy Under Secretary of Defense for Installations and Environment, within the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, even though facility energy accounts for about 25 percent of DOD's total energy consumption. Mobility energy accounts for about three-fourths of its total energy consumption, but there is not an equivalent focal point. Key energy issues—including rising fuel costs, worldwide energy demand, and the high fuel burden during operations—underscore the importance of energy to DOD and will likely require sustained top leadership attention. DOD stated that significant mobility energy efforts are currently under way that will provide for better management of mobility energy. While we acknowledge that DOD has begun to increase management attention on mobility energy issues by

creating the DOD Energy Security Task Force, the department does not have an implementation team, with dedicated resources and funding, for mobility energy issues. As we noted in our report, the task force's current structure does not ensure departmentwide communication of fuel-reduction efforts, particularly among the military services, which are responsible for most of these efforts. Based on DOD's response to our first recommendation, we made minor modifications to the recommendation to emphasize that DOD should designate an executive-level OSD mobility energy official—supported by an implementation team—who is accountable for mobility energy matters and who sets the direction, pace, and tone to reduce mobility energy demand across the department. This official should also improve business practices to incorporate energy considerations as a factor in DOD decision making; coordinate on energy issues with facility energy officials; act as DOD's focal point in interagency deliberations about national energy concerns; and lead the department's potential transition from petroleum-based fuel to alternative fuel sources. Without such an official to provide this leadership, DOD is not well positioned to address mobility energy challenges.

In response to our recommendation that the Secretary of Defense direct the Deputy Secretary of Defense to direct the executive-level mobility energy official to lead the development and implementation of a comprehensive departmentwide strategic plan for mobility energy, DOD indicated that the Under Secretary of Defense for Acquisition, Technology, and Logistics is overseeing the development of a DOD energy security strategic plan which will be reported to the Deputy's Advisory Working Group in May 2008. We believe that this is a step in the right direction. As we noted in this report, until DOD fully develops and implements a comprehensive strategic plan for mobility energy—that sets forth mobility energy goals and objectives, time frames for implementation, and performance metrics to track and evaluate progress—DOD will not be able to ensure that mobility energy reduction efforts align with the department's energy mission or strategic goals to ensure that they are appropriately prioritized, or to know whether critical gaps or duplication of efforts exist.

In response to our recommendation that the Deputy Secretary of Defense ensure that OSD takes steps to fully incorporate energy efficiency considerations into DOD's requirements development process by developing a methodology to enable the full implementation of an energy efficiency key performance parameter, DOD stated that it plans to address how and when it will implement such a methodology in its forthcoming DOD energy security strategic plan. However, this plan does not yet exist.

Because DOD is linking the development of a methodology for an energy efficiency key performance parameter to this plan, the implementation of the key performance parameter remains uncertain. Thus DOD cannot ensure that energy efficiency considerations are factored into its requirements development process in a systematic manner. In addition, in response to our recommendation that DOD develop an approach for incorporating the information from its fully burdened cost of fuel pilot program into its acquisition process, DOD stated that it is developing a plan on how best to assess fuel efficiency relative to the costs and operational capabilities of its weapons systems. Again, until this plan is completed, DOD is not in a position to apply a fully burdened cost analysis to its acquisition process. Thus, the department is unable to promote greater visibility over its acquisition decisions or more fully consider the operational and cost consequences of the fuel burden on the logistics infrastructure.

In response to our recommendation that the Secretary of Defense direct the Secretaries of the Army, Navy, and Air Force and the Commandant of the Marine Corps to designate an executive-level official within each of their military services to act as a focal point on departmentwide mobility energy efforts as well as provide leadership and accountability over their own efforts, DOD stated that it will address this issue after it has briefed the DOD energy security strategic plan to DOD senior leaders in May 2008. However, as we noted in this report, a lack of cross-service coordination concerning mobility energy reduction initiatives currently exists. By waiting to address this issue, the department cannot be certain that the mobility energy efforts of the military services are consistent with the department's energy priorities and goals. Designating executive-level military service focal points would provide improved leadership and accountability over their own efforts as well as increased coordination across the department.

We are sending copies of this report to the Secretary of Defense; the Deputy Secretary of Defense; the Under Secretary of Defense for Acquisition, Technology, and Logistics; the Secretaries of the Army, Navy, and Air Force; the Commandant of the Marine Corps; and the Director, Office of Management and Budget. We will also make copies available to others on request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

Should you or your staff have any questions concerning this report, please contact me at (202) 512-8365 or solisw@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 report are listed in appendix IV.

A handwritten signature in black ink, appearing to read 'W. Solis', with a long horizontal flourish extending to the right.

William M. Solis
Director
Defense Capabilities and Management

Appendix I: Scope and Methodology

To address our objectives, we focused our work on the Department of Defense's (DOD) mobility energy issues related to fuel demand for operations. We did not address supply issues, fuel for nontactical vehicles, or DOD facility energy management, except to briefly describe the organizational structure DOD employs to manage energy issues at its fixed installations.

To identify key departmental and military service efforts that have been undertaken to reduce demand for mobility energy, we obtained and reviewed documentation from the Office of the Secretary of Defense (OSD), the Joint Staff, and the military services on their key mobility energy reduction efforts. These documents included briefings, policies, directives, military service studies, and associated paperwork on the specific efforts. We also interviewed cognizant departmental and military service officials who identified and provided the documentation for key efforts. At the department level, we spoke with officials involved with the DOD Energy Security Task Force, including members of the integrated product team and working groups, to obtain information about the task force's goals, accomplishments, and challenges as well as the specific service mobility energy initiatives it has chosen to monitor. We also interviewed OSD and Joint Staff officials to obtain information on their efforts to incorporate energy efficiency considerations into DOD's requirements development and acquisition processes. At the military service level, we interviewed officials to determine how each military service is approaching its specific mobility energy reduction efforts, its progress to date, and what challenges it faces in reducing mobility energy demand. We did not validate the cost estimates provided by the services for their initiatives. To obtain a broad perspective of the energy issues, we attended two defense-related conferences that focused on national security energy concerns and their potential implications for DOD.

To assess the extent to which DOD has established an overarching organizational framework to guide and oversee mobility energy efforts, we reviewed and analyzed DOD documentation, such as policies and directives, DOD-sponsored fuel-related studies, and legislation, and interviewed officials from OSD, the Joint Staff, and the military services. In doing so, we examined DOD's key business processes, such as its requirements development and acquisition processes, and determined the extent to which fuel efficiency is systematically considered in these processes. We also identified key elements of an overarching organizational framework based on our prior work and the Government Performance and Results Act of 1993 to determine the extent to which DOD's current structure incorporated or lacked these key elements. We

interviewed officials at OSD and the military services to obtain their perspectives on DOD's current approach to mobility energy, including the extent to which the DOD Energy Security Task Force is developing policy and providing guidance and oversight of mobility energy issues across DOD. We also attended a meeting of the Energy Security Task Force's integrated product team to observe the format, content, participants, and dialogue of a typical meeting. In addition, we asked the officials about what benefits and consequences they saw with the existing department-level involvement (or lack thereof) in mobility energy issues. We also identified management frameworks DOD has created to address other crosscutting issues, such as business systems modernization, corrosion control and prevention, contractors on the battlefield, the defeat of improvised explosive devices, and facility energy. We did not evaluate the strengths or weaknesses of these organizational frameworks or their specific applicability to mobility energy. We also reviewed DOD-sponsored studies published since 2000 on reducing fuel demand in DOD's mobile defense systems, focusing on studies that made recommendations specific to departmentwide mobility energy issues. After an initial literature search and discussions with DOD officials and other researchers, independent of DOD, we ultimately selected four studies to include in our review. We interviewed coauthors from each of these studies to gain a better understanding of their objectives, scopes, and methodologies and their perspectives on the issues covered in their reports as well as other department-level mobility energy concerns. Two team members consolidated the recommendations related to mobility energy from these studies and analyzed them for similarities. They combined those that were similar, rephrased the wording while keeping the intent, and categorized the recommendations into common themes. Through their review of documentation and interviews with DOD officials, they then summarized the actions taken on each of the recommendations. A third team member independently reviewed the results, and discussed any discrepancies with the other team members to reach agreement on the appropriate themes and actions taken.

We coordinated our work at the following DOD offices:

Office of the Secretary of Defense

- Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics
 - Systems Engineering and Developmental Test and Evaluation
 - Office of the Director, Defense Research and Engineering

- Office of the Deputy Under Secretary of Defense, Logistics and Materiel Readiness
- Office of the Under Secretary of Defense Comptroller/Chief Financial Officer
- Office of the Under Secretary of Defense for Policy
 - Office of the Deputy Assistant Secretary of Defense for Policy Planning
 - Office of the Deputy Assistant Secretary of Defense for Forces Transformation and Resources
- Director of Program Analysis and Evaluation

Chairman, Joint Chiefs of Staff

- Logistics (J4)
- Operational Plans and Joint Force Development (J7)
- Force Structure, Resources, and Assessment (J8)

Department of the Army

- Army Deputy Chief of Staff (G4)
- Assistant Secretary of the Army for Acquisition, Logistics, and Technology
- U.S. Army Combined Arms Support Command
- Army Rapid Equipping Force

Department of the Navy

- Office of the Chief of Naval Operations
- Naval Sea Systems Command
- Office of Naval Research
- Headquarters, Marine Corps

Department of the Air Force

- Office of the Deputy Assistant Secretary of the Air Force for Environment, Safety and Occupational Health
- Logistics, Installations and Mission Support (A4/7)
- Strategic Plans and Programs (A8)
- Conduct Air, Space, and Cyber Operations

Other DOD Components

- United States Joint Forces Command
- Defense Logistics Agency/Defense Energy Support Center

We conducted our review from September 2007 through March 2008 in accordance with generally accepted government auditing standards.

Appendix II: Select Recommendations from DOD-Sponsored Studies on Mobility Energy Reduction

Over the past 7 years, DOD has commissioned several studies to explore ways to reduce its fuel consumption. We reviewed recommendations applicable to mobility energy in the following three DOD-sponsored studies:

- Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden*, January 2001
- The JASONs/The MITRE Corporation, *Reducing DOD Fossil-Fuel Dependence*, September 2006
- LMI, *Transforming the Way DOD Looks at Energy: An Approach to Establishing an Energy Strategy*, April 2007

We also reviewed the recommendations from the 2008 Defense Science Board report on DOD's energy strategy. However, we did not include those recommendations in our analysis because the report was issued in February 2008, and the department could not be expected to have taken action on the recommendations at the time we issued this report.

We summarized the recommendations, grouped them into common topics, and obtained information on DOD actions taken on each of them. Table 3 presents a summary of our analysis.

Table 3: Actions DOD Has Taken to Address Selected Recommendations from DOD-Sponsored Studies on Mobility Energy Reduction

Topic/recommendation	Source	DOD action taken
Technology upgrades/system redesigns		
Consider fuel efficiency when making science and technology and system design investments.	<i>More Capable Warfighting Through Reduced Fuel Burden</i> by the Defense Science Board	The Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics initiated a pilot program to assess the fully burdened cost of fuel in three mobile defense systems, and the Joint Staff established an energy efficiency key performance parameter. Full implementation of both efforts could provide insight on how to include energy considerations in system design. Moreover, according to OSD officials, DOD's acquisition process currently undervalues energy efficiencies. Thus, investments may not be adequate.
Upgrade the engines of the M1-Abrams tank, the B-52 bomber, and other applicable systems with modern fuel-efficient engine technology.	<i>Reducing DOD Fossil-Fuel Dependence</i> by The JASONs/The MITRE Corporation	DOD provided recommendations to the military services for consideration and implementation.
Reduce weight of armored and tactical vehicles, with modern vehicle designs, structures, and materials.	<i>Reducing DOD Fossil-Fuel Dependence</i> by The JASONs/The MITRE Corporation	The Ground Fuel-Efficient Vehicle Demonstrator, an initiative funded in fiscal year 2008, will examine fuel-efficient technologies and equipment for ground vehicle programs.
Develop a DOD-wide system to track vehicle and fuel use patterns. Use the data to develop DOD-wide fuel efficiency metrics in decisions to upgrade system designs.	<i>Reducing DOD Fossil-Fuel Dependence</i> by The JASONs/The MITRE Corporation	The military services have some systems or reporting mechanisms for capturing fuel consumption. However, as a department, DOD has not developed metrics for fuel consumption.
Assess options for expanding the use of unmanned vehicles by considering more fuel-efficient designs.	<i>Reducing DOD Fossil-Fuel Dependence</i> by The JASONs/The MITRE Corporation	In fiscal year 2007, the Office of the Director, Defense Research and Engineering, initiated the Long Endurance Unmanned Aerial Vehicle program, which is intended to increase the amount of time an unmanned aerial vehicle could stay in the air without refueling.
Strategic planning		
Develop tools to track and account for the total costs of fuel, including delivery and logistics costs.	<i>More Capable Warfighting Through Reduced Fuel Burden</i> by the Defense Science Board <i>Reducing DOD Fossil-Fuel Dependence</i> by The JASONs/The MITRE Corporation	The Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics initiated a pilot program to assess the fully burdened cost of fuel in three mobile defense systems. However, the program has not been implemented for all systems.
Increase simulator use.	<i>Reducing DOD Fossil-Fuel Dependence</i> by The JASONs/The MITRE Corporation	In August 2007, the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics directed a study to assess whether the increased use of simulators could substitute for live training without degrading operational capability. An implementation plan has been drafted and a working group has been established.

**Appendix II: Select Recommendations from
DOD-Sponsored Studies on Mobility Energy
Reduction**

Topic/recommendation	Source	DOD action taken
Integrate the military services' fuel requirements into logistics war games and analytic tools instead of assuming that fuel supplies will be adequate.	<i>More Capable Warfighting Through Reduced Fuel Burden</i> by the Defense Science Board <i>Reducing DOD Fossil-Fuel Dependence</i> by The JASONs/The MITRE Corporation	DOD incorporated energy considerations into the annual Unified Engagement exercise, but it is not a standard consideration in DOD's war-gaming processes.
Include fuel efficiency as a key performance parameter in DOD's requirements process.	<i>More Capable Warfighting Through Reduced Fuel Burden</i> by the Defense Science Board	The Joint Staff has established an energy efficiency key performance parameter. However, DOD has not developed a methodology to fully implement this requirement.
Engage in long-term planning for future fuel sources, production, and use.	<i>Reducing DOD Fossil-Fuel Dependence</i> by The JASONs/The MITRE Corporation	DOD has not developed a comprehensive strategic plan for mobility energy.
Increase the use of commercial aviation fuels; consider the local production of military fuels from commercial aviation fuels outside of the United States.	<i>Reducing DOD Fossil-Fuel Dependence</i> by The JASONs/The MITRE Corporation	The Air Force has conducted one study examining this issue, and the Defense Energy Support Center is proposing an additional study to better understand the logistical impacts of using commercial aviation fuels.
Incorporate energy considerations (use and logistics requirements) into DOD's key corporate decision making processes: strategic planning; analytic agenda; joint concept and joint capability development; acquisition; and planning, programming, budgeting, and execution.	<i>Transforming the Way DOD Looks at Energy: An Approach to Establishing an Energy Strategy</i> by LMI	While DOD has made some efforts to address energy efficiency in its requirements development and acquisition processes, these efforts are in the early stages.
Leadership and oversight		
Adopt a new framework to promote energy efficiency, including alternate energy sources, to those areas (1) consuming the most fuel (aviation forces), (2) requiring the most logistics support, or (3) having the most negative effect on the warfighter.	<i>Transforming the Way DOD Looks at Energy: An Approach to Establishing an Energy Strategy</i> by LMI	The DOD Energy Security Task Force has selected military service initiatives to monitor that address energy efficiency in selected areas, but DOD has not developed an overarching organizational framework for mobility energy.
Provide leadership that incentivizes fuel efficiency throughout DOD.	<i>More Capable Warfighting Through Reduced Fuel Burden</i> by the Defense Science Board	OSD officials told us that DOD generally lacks incentives to reward the military services for reducing fuel consumption and faces challenges in addressing departmental cultural barriers—such as the traditional view that fuel is simply a commodity and that energy efficiency is not important to warfighting.
Establish a governance structure with policy and resource oversight to focus DOD's energy efforts.	<i>Transforming the Way DOD Looks at Energy: An Approach to Establishing an Energy Strategy</i> by LMI	DOD has not established an overarching organizational framework to provide oversight for mobility energy.

Source: GAO analysis of DOD information.

Appendix III: Comments from the Department of Defense



ACQUISITION,
TECHNOLOGY
AND LOGISTICS

OFFICE OF THE UNDER SECRETARY OF DEFENSE
3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

FEB 20 2008

Mr. William M. Solis
Director, Defense Capabilities and Management
U.S. Government Accountability Office
441 G Street, N.W.
Washington, DC 20548

Dear Mr. Solis:

This is the Department of Defense (DoD) response to the GAO draft report, GAO-08-426, "DEFENSE MANAGEMENT: Overarching Organizational Framework Needed to Guide and Oversee Energy Reduction Efforts for Military Operations," dated February 5, 2008 (GAO Code 351082). Detailed comments on the report recommendations are enclosed.

The Department of Defense partially concurs on the GAO's findings and recommendations. In principle, the Department agrees there is a need to view and manage DoD energy supply and demand challenges in a new, more systemic manner. However, current DoD Directives are clear on where the authority and responsibility lie on the issues surrounding mobility energy. DoD Directive 5134.01 (Dec 9, 2005) puts oversight and policymaking authority on the DoD energy matters the GAO raised under the authority of the Under Secretary of Defense for Acquisition, Technology and Logistics. The Under Secretary's staff is leading a Department-wide effort to develop a comprehensive DoD Energy Security Strategic Plan ready to be delivered to senior DoD leaders this May. Further, the Department has dedicated resources and senior-level attention to implementing an Energy Efficiency Key Performance Parameter, underpinned by maturing and applying the Fully Burdened Cost of Fuel construct to its requirements and acquisition tradespace analysis and decision-making.

The Department appreciates this opportunity to comment on this draft report.

Sincerely,

Kristen J. Baldwin
Acting Director
Systems and Software Engineering

Enclosure:
As stated



GAO DRAFT REPORT – DATED FEBRUARY 5, 2008
GAO CODE 351082 /GAO-08-426

**"DEFENSE MANAGEMENT: Overarching Organizational Framework Needed to Guide
and Oversee Energy Reduction Efforts for Military Operations"**

**DEPARTMENT OF DEFENSE COMMENTS
TO THE RECOMMENDATIONS**

RECOMMENDATION 1: The GAO recommends that the Secretary of Defense direct the Deputy Secretary of Defense to establish an overarching organizational framework by designating an executive-level OSD official with the responsibility and authority to guide and oversee efforts and develop policy, among other things, to reduce mobility energy demand across the Department; improve business processes to incorporate energy considerations as a factor in DoD decision making; coordinate on energy issues with facility energy officials; act as DoD's focal point in interagency deliberations about national energy concerns; and lead the Department's potential transition from petroleum-based fuel sources to alternative fuel sources. This official should be supported by an implementation team with dedicated resources and funding.

DOD RESPONSE: Partially concur. In principle, the Department concurs that there is a need to view and manage DoD energy supply and demand challenges in a new, more systematic manner. The direct cost of mobility fuels, the indirect (yet substantial) cost of our fuel delivery logistics, the operational vulnerability of our logistics forces to insurgent forces and other threats, and our prioritization of science and technology (S&T) and acquisition investments seeking greater energy efficiency are issues of increasing importance. However, significant efforts are currently underway that will provide the Department's senior leaders new analytic tools, business process changes and S&T energy efficiency investments recommendations for better managing DoD mobility energy across the enterprise.

These efforts, particularly those of the DoD Energy Security Task Force (ESTF), which is now developing a comprehensive Energy Security Strategic Plan for the DoD, will be delivered to the Deputy Secretary's Advisory Working Group in May 2008. The work of the ESTF will provide new insights and recommendations to DoD's decision-makers for the governance of mobility energy issues across the Department. This work is informed by operational experience in the field, including from Operations Enduring Freedom and Iraqi Freedom, as well as the independent analysis and perspective of the 2008 Defense Science Board (DSB) Task Force on Energy Security. This task force, which contained a strong balance of seasoned former national security leaders, including a former Secretary of Defense and of Energy, a former CIA Director, and retired senior flag officers, as well as professional energy and energy efficiency experts, took a hard look at DoD risks and possible solutions related to energy. The 2008 DSB Task Force on Energy Security was a consensus document and identified the many and difficult challenges the Department must now take on. In this case, consensus was not the result of watering down the findings, but rather, solid agreement on the risks and underappreciated factors that go into planning for DoD energy supply and demand.

Further, addressing the governance issues the GAO report raises, current DoD Directives are clear on where the authority and responsibility lie on the issues surrounding mobility energy. DoD Directive 5134.01 (Dec 9, 2005) puts oversight and policymaking authority on DoD energy matters under the authority of the Under Secretary of Defense for Acquisition, Technology and Logistics, particularly in sections 3, 3.24, 3.26, E2.1.1.7, E2.1.1.8, E2.1.1.28, E2.1.1.29 and E2.1.1.30. These authorities and responsibilities are consistent with those used for overseeing many other significant cross-cutting DoD capability development and management issues.

The Under Secretary of Defense (AT&L) oversees three senior executives with policy-making and oversight roles on different aspects of mobility energy. The Deputy Under Secretary of Defense for Acquisition and Technology (DUSD (A&T)) oversees the system acquisition process, and has the authority to provide guidance, as needed, to the Components on how the acquisition tradespace is considered, both from a platform and capability perspective. The DUSD (A&T) organization is working within the OSD staff, Joint Staff and Service force planning and requirements communities to ensure fuel demand, fuel logistics and all related matters are given more appropriate consideration in the acquisition tradespace to reduce energy demand. This includes maturing a construct known as the "Fully Burdened Cost of Fuel (FBCF)" and applying the FBCF principles and methodology to the current Energy Efficiency Key Performance Parameter (KPP) in the Joint Capabilities Integration and Development System. This is the process by which materiel and non-materiel solutions to documented capability gaps are identified and framed for the acquisition and other communities to solve. This work will serve as a basis for the Department's senior leaders to assess DoD mobility fuel demand from a portfolio perspective (force application, force protection, etc.) and not just from a platform perspective. This approach is consistent with and supportive of the Deputy Secretary's management agenda. Taking a portfolio perspective will better inform risk analysis within the Defense program and raise the understanding of the value of energy efficiency investments relative to DoD mission success.

The Deputy Under Secretary of Defense for Logistics and Materiel Readiness (DUSD (L&MR)), has the authority to serve as the central administrator of the policies that govern how fuel is supplied to our operational forces, as well as the planning and purchase of all varieties of operational fuel, through the Defense Energy Support Center, a Defense Logistics Agency (DLA) field activity. The DUSD (L&MR) and DLA are beginning to look at the defense logistics implications of biofuels and other synfuels to the force on behalf of the Under Secretary.

The Director, Defense Research and Engineering has responsibility for managing the entire defense science and technology budget and its priorities, including the oversight of Service investments. Significant basic science and applied science work is going into mobile power generation, more efficient materials and engines, light-weight structural materials and alternative operational fuels. While these investments are focused on their potential benefits to DoD operational capability, there is strong historical precedent for DoD science and technology investments advancing the state of the art and sparking commercial innovation.

Finally, the Under Secretary of Defense (AT&L) chairs the DoD Energy Security Task Force. This broadly based group is supported from membership from across the DoD. While this group initially focused on sharing energy-related information within the Department, it's mandate has expanded as its staff and members craft the DoD Energy Security Strategic Plan that has been

directed through Deputy Secretary-level guidance for May 2008 completion. Consistent with the Department's own assessments and the DSB Task Force findings, the ESTF is leading and building the proper teams of OSD, Joint staff and Component stakeholders to address DoD processes and practice shortfalls that have created some gaps cited by the GAO. Energy-related technology priorities are also considered by the group and given additional resources based on the ESTF endorsement. Through monthly meetings, the ESTF website and a monthly speaker series, the group has widened the circle of interest in energy issues in DoD and its related interagency, industry and policy communities. The leadership of the ESTF also coordinates its efforts with the wider DoD Installation and Environment community implementing Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management". At the current state of understanding of DoD's mobility fuel challenges, this outreach approach is adequate for fostering the right discussions and identification of solutions to DoD leaders and staff.

As relevant technology ideas, needed process changes, operational vulnerability concerns or commercial fuel price growth arise from our on-going analysis and interaction, the Office of the Under Secretary of Defense (AT&L) will serve as both a clearinghouse for addressing the issues, and as the Departmental leader in implementing actionable solutions.

RECOMMENDATION 2: The GAO recommends that the Secretary of Defense direct the Deputy Secretary of Defense to establish an overarching organizational framework by directing the executive-level mobility energy official to lead the development and implementation of a comprehensive Department-wide strategic plan for mobility energy. At a minimum, this strategic plan should set forth mobility energy goals and objectives, time frames for implementation, and performance metrics to track and evaluate progress.

DOD RESPONSE: Partially concur. The USD (AT&L), as the DoD executive lead for energy and as supported by the DoD Energy Security Task Force, is overseeing development of a DoD Energy Security Strategic Plan which will be reported out to the Deputy's Advisory Working Group in May of 2008. This plan will provide a DoD-wide strategic construct for considering mobility energy challenges and inefficiencies, as well as for setting goals, objectives, analytic frameworks, actionable metrics and implementation timing for further assessments and execution. The plan is described in context to the management framework described in the DoD Response to Recommendation 1.

RECOMMENDATION 3: The GAO recommends that the Secretary of Defense direct the Deputy Secretary of Defense to establish an overarching organizational framework by ensuring that OSD develop a methodology to enable the full implementation of an energy efficiency key performance parameter in DoD's requirements development process.

DOD RESPONSE: Partially concur. The Department agrees that further clarification of roles and targets may be needed, but the authorities and responsibility to do so already exist under the Under Secretary of Defense (Acquisition, Technology and Logistics) explained in the DoD response to Recommendation 1. Further, the Department will address the pace and required steps for maturing and then implementing the fully burdened cost of fuel analytic methodology currently under development, within the DoD Energy Security Strategic Plan. This foundational

analytic work has received significantly more attention over the past six months, and its broader inclusion within the major strategic processes of the Department is indeed a Top 25 Transformational priority for the Department. By taking this methodology through the standard DoD vetting processes, we can ensure the rigor needed to formally implement this is present. After this vetting, it will underpin the Energy Efficiency Key Performance Parameter within the Joint Capabilities Integration and Development System.

RECOMMENDATION 4: The GAO recommends that the Secretary of Defense direct the Deputy Secretary of Defense to establish an overarching organizational framework by ensuring that, as part of its efforts to complete DoD's fully burdened costs of fuel, pilot program, OSD develop an approach for incorporating this cost information into the acquisition decision making process.

DOD RESPONSE: Partially concur. As the report states, efforts are underway to look at the implications of the fully burdened cost of fuel and the logistics implications of delivering fuel for DoD operations in the force planning, requirements generation and acquisition processes. It is ill-advised to focus on the acquisition process alone, as the force planning and requirements processes inform the acquisition process on the value of various qualities desired, which add up to provide, along with well trained personnel, a capability. This capability is provided at an agreed cost and within a certain schedule. Hence, a prioritization towards fuel efficiency must be addressed within certain constraints. Lacking a clearer demand signal, there is little analytical basis for making trades between various qualities, technologies or design options at the acquisition phase. As it is stated in the Department's response to Recommendations 1, a work plan is in development on how best to assess the value of greater fuel efficiency from the operational capability and cost perspectives in DoD equipment and platforms.

That said, significant science and technology investments have also been made, partially directed from the inputs of the Energy Security Task Force, to address the energy efficiency of platforms and hence, operational units.

RECOMMENDATION 5: The GAO recommends that the Secretary of Defense direct the Secretaries of the Army, Navy and Air Force and the Commandant of the Marine Corps to designate an executive-level official within each of their Services to act as a focal point on Department-wide mobility energy efforts as well as provide leadership and accountability over their own efforts.

DOD RESPONSE: Partially concur. The issue of governance and oversight of energy matters within the Military Departments will be raised once the DoD Energy Security Strategic Plan is briefed to DoD senior leaders in May 2008. Until that time, it is inappropriate to pre-judge the deliberative work currently going into that Plan.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

William M. Solis, (202) 512-8365 or solisw@gao.gov

Acknowledgments

In addition to the contact named above, Thomas Gosling, Assistant Director; Karyn Angulo; Alissa Czyz; and Marie Mak made major contributions to this report.

GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's Web site (www.gao.gov). Each weekday, GAO posts newly released reports, testimony, and correspondence on its Web site. To have GAO e-mail you a list of newly posted products every afternoon, go to www.gao.gov and select "E-mail Updates."

Order by Mail or Phone

The first copy of each printed report is free. Additional copies are \$2 each. A check or money order should be made out to the Superintendent of Documents. GAO also accepts VISA and Mastercard. Orders for 100 or more copies mailed to a single address are discounted 25 percent. Orders should be sent to:

U.S. Government Accountability Office
441 G Street NW, Room LM
Washington, DC 20548

To order by Phone: Voice: (202) 512-6000
TDD: (202) 512-2537
Fax: (202) 512-6061

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm

E-mail: fraudnet@gao.gov

Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Ralph Dawn, Managing Director, dawnr@gao.gov, (202) 512-4400
U.S. Government Accountability Office, 441 G Street NW, Room 7125
Washington, DC 20548

Public Affairs

Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, DC 20548