

Fiscal Year 2014 Operational Energy Annual Report



June 2015

**Office of the Under Secretary of Defense for Acquisition,
Technology and Logistics**

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Introduction

This report fulfills the Operational Energy Annual Report requirement in section 2925(b) of title 10, U.S.C for FY 2014. It includes information on operational energy demands, progress in implementing the *Operational Energy Strategy*, investments in alternative fuels, and support to contingency operations.

President Obama established the Office of the Assistant Secretary of Defense for Operational Energy Plans and Programs (OASD(OEPP)) in June 2010, both to reflect the relationship between energy security and national security as well as to honor Congress’s call to establish an operational energy office at the Department of Defense (DoD). By statute, operational energy is defined as “energy required for training, moving, and sustaining military forces and weapons platforms for military operations,” and includes energy used by ships, aircraft, combat vehicles, and tactical power generators. The mission of OEPP is to improve military effectiveness while lowering risks and costs to the Department. Since being established more than four years ago, OEPP has achieved considerable progress by:

- Promoting institutional change within the Department;
- Supporting current operation and energy innovations; and
- Building operational energy consideration into the future force

In FY 2014, the Department consumed an estimated \$14 billion of operational energy, with more than 54 percent of that purchased outside of the United States. In FY 2015, the Department estimates it will spend just over \$14 billion to provide almost 91 million barrels of operational energy for military operations, training, and readiness.

Table 1: DoD Operational Energy Summary

	OE Demand	OE Cost
FY14	87.4 million barrels	\$14.0 Billion
FY15 (est.)	90.6 million barrels	\$14.1 Billion

Released in March 2014, the 2014 Quadrennial Defense Review (QDR) emphasized the 21st century defense priorities outlined in the 2012 Defense Strategic Guidance while recognizing the effects of reduced resources for our forces. Even with reduced resources, the QDR charged the Department to maintain technological superiority in areas most critical to meeting current and future military challenges. To date, our technological superiority has allowed largely unfettered power projection and sustainment. However, our advantages against near-peer competitors are waning and we must adapt our equipment, training, and concepts to reflect operations in contested environments. In fact, the QDR noted how adapting our use of energy can help overcome anti-access/area-denial threats, and that investments in energy innovation “make us a

stronger and more effective fighting force.”¹

As a Department, we must find new and creative ways to sustain current capabilities and establish asymmetric advantages, even as we deal with more limited resources. Innovation in operational energy – reducing demand, diversifying our supplies, and building energy considerations into the future force – will enable new capabilities and concepts that employ our resources to greater strategic effect and respond more directly to emerging threats.

Institutionalizing Operational Energy

Throughout FY 2014, the Department made steady progress in integrating operational energy considerations into decision-making and business processes. In addition to operational energy being a component of the 2014 QDR, the Department issued an overarching defense energy policy, revised doctrine, refined and applied the energy Key Performance Parameter (KPP) in capabilities development, supported component commands with Rapid Fielding Initiatives, and participated in multiple service wargames.

On April 16, 2014, the Department issued DoD Directive 4180.01, *DoD Energy Policy*. As the Department’s first overarching defense energy policy in over 20 years, this new Directive provides a common energy framework to guide the full range of defense energy activities, including operational energy, facilities energy, and energy-related elements of mission assurance. The Directive also codifies responsibilities for implementing the energy policy across the Office of the Secretary of Defense (OSD), the Joint Staff, Combatant Commands, Military Services, and Defense Agencies.

In particular, the Directive establishes that it is DoD policy to “enhance military capability, improve energy security, and mitigate costs in its use and management of energy.”² To these ends, DoD will:

- Improve energy performance of current systems
- Expand and diversify energy supplies and sources, including renewable energy sources and alternative fuels
- Ensure that energy analyses are included in DoD requirements, acquisition, and planning, programming, budgeting, and execution (PPBE) processes
- Educate and train personnel in valuing energy as a mission essential resource

“Energy improvements enhance range, endurance and agility, particularly in the future security environment where logistics may be constrained”

2014 QDR

The Defense Operational Energy Board (DOEB), co-chaired by the ASD(OEPP) and the Joint

¹ This document is available at: http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf

² This document is available at: http://www.dtic.mil/whs/directives/corres/pdf/418001_2014.pdf

Staff Director for Logistics, continued to serve as one of the primary mechanisms for coordinating and reviewing Department initiatives and sharing lessons learned. The DOEB met three times in FY 2014; the first meeting was a FY 2013 meeting that was delayed due to the government shutdown in October 2013. Through these proceedings, the DOEB directed Service briefings on the planned inclusion of operational energy in Title X wargames (pre-game briefs) as well as lessons learned on the role of operational energy in wargames (post-game briefs). In addition, the DOEB discussed the need to conduct energy supportability analyses to inform the threshold and objective values of energy KPP in new programs. The DOEB will continue to meet on a semi-annual basis to provide oversight and coordination for energy initiatives across the Department.

On 16 October 2013, the Director of the Joint Staff signed an updated version of Joint Publication 4.0, *Joint Logistics*. This keystone document “sets forth joint doctrine for the activities and performance of the Armed Forces of the United States in joint operations and provides the doctrinal basis for the conduct of joint logistics.”³ The revision included noteworthy changes, such as introducing the term “operational energy” for the first time in DoD’s joint doctrine.

“Operational Energy – The energy required for training, moving, and sustaining military forces and weapons platforms for military operations”

Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*

Thus, the official DoD definition of “operational energy” is now codified in JP 1-02, the DoD dictionary.⁴

The Services also made significant progress integrating operational energy into operational decision-making processes. For example, the Navy’s Incentivized Energy Conservation Program (i-ENCON) and Aviation Energy Conservation Program (Air ENCON) were established as a means to develop fuel-saving procedures for Fleet-wide dissemination and implementation. In FY14, Navy Fleet operators took ownership of these programs, further demonstrating the cultural shift that is occurring to increase focus on procedures and behaviors that save energy in order to enhance operational capability. In addition, the Navy continued to champion culture change initiatives through training, education, and outreach initiatives. In FY 2014, the Navy launched its “Energy Warrior” digital application for Apple and Android mobile devices to enhance energy awareness and facilitate innovation and collaboration.

In FY 2014, the Air Force continued to support initiatives for improving fuel use across both mobility and combat air force. In particular, the Air Force instituted policies that reduce

³ This document is available at: http://www.dtic.mil/doctrine/new_pubs/jp4_0.pdf

⁴ This document is available at: http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf

minimum fuel reserves required onboard aircraft and provided aircrews with technology, similar to that in use by commercial airlines, for determining optimal flight profiles that account for aircraft configuration and atmospheric conditions. In addition, the Air Force has seen positive results from efforts to foster an energy aware culture. For example, individual units have instituted initiatives for scheduling and airspace revisions that increased training productivity and improved the use of energy in training.

The Army and Marine Corps continue to partner on developing applications to monitor energy uses at contingency bases, giving leaders, Soldiers and Marines the ability to make energy-informed decisions. Early results indicate such an approach has the potential to reduce fuel consumption at forward base locations by up to 50 percent.

The Department also continued to showcase the intent and progress being made in operational energy. The OEPP website (<http://energy.defense.gov>) provided regular blog postings on emerging topics, including the Energy KPP and Fully Burdened Cost of Energy (FBCE) along with monthly operational energy highlights. In February 2014, we described on our website the trade-offs of natural gas as a fuel for military vehicles and explained how operational energy is derived from the overall volumes of liquid fuel purchased and used by the Department. As part of a continuing series, OEPP released and posted on our website an infographic in May 2014 that described the role of energy in Joint military operations, and illustrated how operational energy has contributed to both military defeat and success.

Supporting Current Operations

The Department used rapid fielding initiatives to realize near-term operational energy gains at the tactical edge, and continued to address emerging warfighter energy requirements and fuel efficiency needs with both materiel and non-materiel solutions.

Throughout the U.S. Central Command (USCENTCOM) area of responsibility, Department activities included:

- **Force Provider Support in Iraq:** After a request from the component command to address power challenges, the Army's Project Manager for Expeditionary Energy and Sustainment Systems (PM-E2S2) provided material and non-material support to combat operations in Iraq. PM-E2S2 delivered more energy efficient Force Provider (rapidly deployable base camp module consisting of a Latrine, Shower, Kitchen, Tent, and generator) systems to support 150 troops at three different locations sourced from Army Prepositioned Stocks. The camps were established by members of the technical assistance team on the ground that supported the installation, training, and sustainment of the new camps.

- PM E2S2 Support Missions in Afghanistan: In September, 2013 the Department also completed the Operation Dynamo mission to provide energy and basing solutions for forward-deployed locations in Afghanistan. Between July 2012 and September 2014, Operation Dynamo teams provided improved energy-efficient power and shelter solutions to 67 remote sites, greatly improving their mission effectiveness, and then supported their sustainment, training and retrograde. For FY 2015, the PM E2S2 will continue to support the sustainment and retrograde of these systems.
- US Army Central (ARCENT) Site in United Arab Emirates: Equipped existing units at Camp Red Leg with expanded Force Provider kits to support 600 soldiers including microgrid and energy efficient power generators which improved the quality of life for the soldiers and reduced the overall sustainment of the camp.
- USCENTCOM Forward in Jordan: PM-E2S2 conducted power and infrastructure assessments for three separate sites. They delivered and installed new energy efficient equipment for reducing the sustainment burden and increasing power reliability.

The Department also supported the Army Space and Missile Defense Command (SMDC) site in Qatar. Specifically, the Department addressed power reliability concerns by conducting site power assessment prior to SMDC accepting site operational control from the Missile Defense Agency.

In support of U.S. Africa Command (USAFRICOM), the Department improved energy use at multiple sites, including:

- Support to Operation United Assistance in Liberia and Senegal, West Africa: When responding to an emergency medical crisis, deployed forces recognized the need for quickly deployable, energy efficient and reliable solutions for force basing. In response, PM E2S2 provided 25 Force Provider modules, which provided energy efficient base operation support to approximately 3450 personnel. Camps were established by a technical assistance team that provided installation, training, sustainment, and retrograde.
- US Army Africa (USARAF) Contingency Command Post in Italy: Delivered newly designed and created Tactical Power and Environmental Control (TPEC) systems to USARAF HQ to equip their new deployable command post.
- US Air Force Africa (USAFAF) Site in Niamey, Niger: After USAFAF requested assistance with addressing power reliability issues at an expeditionary airbase, PM E2S2 and the Rapid Equipping Force performed a power and infrastructure assessment. The

team returned to install new energy efficient power equipment that resulted in increased operational readiness. In addition, the new energy solutions improved the quality of life, returned combat capability to the mission commander, and reduced fuel consumption by one-third.

- US Army Africa (USARAF) Exercise in Senegal: PM-E2S2 at the request of the component command provided energy efficient Force Provider Expeditionary modules to support approximately 200 US warfighters near Thies, Senegal.

Moving to the Western hemisphere, the Department provided support to other unified combatant commands.

- U.S. Army Alaska (USARAK) Soldier Enhancement Program (SEP) in Alaska: Conducted an evaluation of improved arctic tents and cargo sleds in support of USARAK's expanding mission in the Arctic. Test and evaluation scheduled to continue through the winter of 2015.
- U.S. Marine Corps Commanders Energy Readiness Program Marine Corps Air Ground Combat Center (MAGCC), Twentynine Palms, California: Conducted an evaluation of the impact of behavior and practices on fuel and energy in order to increase operational reach of the force. Identified the need to increase commanders' visibility over their energy use, and requirements for decision tools, and metering and monitoring of gear. Evaluation scheduled to continue through FY 2015.
- US Marine Corps Large Scale Exercise, MAGCC, Twentynine Palms, California: Provided 1st Marine Expeditionary Brigade command element real time visibility of power production and generator performance, enabling decisions to optimize cantonment power production for the Brigade Headquarters Group. In addition determined behavior changes that resulted in significantly improved fuel management and increased operational reach, and that metering and monitoring of gear informs behavior of both individuals and units. Experimentation with decision tools scheduled to continue through FY 2015.
- US Army 249th Engineering Battalion Tactical Assessment-Energy Infrastructure Systems, USSOUTHCOM, Soto Cano Air Base, Honduras: Performed comprehensive electrical system and infrastructure inspection of both the low and high voltage systems of the site to ascertain the condition and possible maintenance and/or repairs that needed to be performed on Soto Cano Air Base's electrical distribution system.

Shaping the Future Force

Along with promoting institutional change and supporting current operations, the Department continued to incorporate operational energy into future force development. Innovation in operational energy science and technology, alternative fuels testing and certification, and adaptation of the requirements and acquisition processes each contribute to the long-term energy performance of the force.

Operational Energy Capability Improvement Fund (OECIF)

Through the OECIF, ASD(OEPP) supported longer-term improvements in operational energy performance in FY 2014. The OECIF funds multi-year science and technology programs, managed by the Services, focusing on under addressed operational energy needs. The fund also aims to create institutional change and improve decision making regarding operational energy within the Department.

Since FY 2012, OECIF has funded an evolving series of programs, as shown in Table 2. By the end of FY 2014, significant progress has been shown in the programs started in FY 2012. For example, technologies developed by a joint Army and Air Force advanced shelter system program can reduce shelter system power consumption by more than 50 percent. A program for contingency base technologies in tropical regions combined improved shelters, environmental control units (ECUs), and lighting with advanced temperature controls to achieve similar savings. Two other programs led by the Army and the Navy (in cooperation with the Advanced Research Projects Agency-Energy) are improving the energy efficiency of ECUs.

Start Year	Focus
FY 2012	Reducing energy load at <u>expeditionary outposts</u> , with an emphasis on energy efficient shelters and cooling
FY 2013	Using <u>consortia</u> to involve a wide variety of organizations to persistently attack key operational energy problems
FY 2014	Analytical <u>methods and tools</u> for considering operational energy in DoD planning and decision processes

In FY 2013, the Department proposed the use of consortia as venues for non-traditional organizations inside and outside of government to cooperate on specific operational energy challenges. The four consortia programs established in FY 2013 focus on soldier and small unit power; expeditionary outpost energy modeling, planning and control; reducing aircraft aerodynamic drag; and developing open standards for tactical microgrids. In one example, the Soldier and Small Unit Power program is taking a comprehensive systems engineering approach to reducing the weight, type, and number of batteries carried by dismounted troops and small units. Another program is researching engineered surfaces and materials for drag reduction to improve fuel consumption, range, and payload capacity of legacy mobility aircraft.

Through the six new programs started in FY 2014, OECIF focused on analytical methods and tools to consider operational energy issues throughout DoD's various planning, requirements, and management processes. In one program, the Marine Corps will lead a multiservice team developing an expeditionary energy module for the Synthetic Theater Operations Research Model (STORM) campaign analysis tool. U.S. Pacific Command (USPACOM) also will lead a program to insert operational energy factors into the Joint Operational Planning Process. A third program will develop energy-related cost/benefit and analytical tools for the airlift and aerial refueling fleets. All of these programs are consistent with OECIF's goal of building lasting institutional change within the Department.

Alternative Fuel Initiatives

DoD alternative fuel activities are guided by two primary sources. Overall, DoD Directive 4180.01, *DoD Energy Policy*, states that DoD will “[d]iversify and expand energy supplies and sources, including renewable energy sources and alternative fuels.”⁵ More specifically, the Department's memorandum *Alternative Fuels Policy for Operational Platforms*, released in 2012, lays out a process to coordinate testing and certification activities; sets criteria for field demonstrations that require use of a new fuel beyond the certification process; and establishes criteria for ongoing bulk fuel purchases to meet our operational requirements beyond certification and demonstration activities, which includes the condition that alternative fuels be compatible (“drop-in”) and cost - competitive with petroleum fuels.⁶ Consistent with this policy, the Department supported alternative fuel initiatives associated with testing and evaluation, bulk procurement, and fuel production support.

- **Testing and Evaluation.** In FY 2014, the Services focused the majority of their alternative fuels efforts on testing and evaluating the use of “drop-in” alternative fuels in aircraft, ships, tactical vehicles, and support equipment. These efforts enable the Services to utilize a range of fuels produced from widely available non-petroleum feedstocks, in anticipation that these fuels will become commercially available and cost-competitive with conventional fuels. As commercially viable alternative fuels eventually enter the DoD energy supply chains, testing and evaluation ensures that the Department will be able to use these commercial alternative fuels with no effect on the mission.
- **Bulk Procurement.** Reflecting the progress in qualifying alternative fuels, Defense Logistics Agency (DLA) Energy's bulk fuel solicitations now accept blends that contain drop-in alternative fuels. In December 2013, the Navy and the Department of

⁵ This document is available at: http://www.dtic.mil/whs/directives/corres/pdf/418001_2014.pdf

⁶ This policy is available at:

http://energy.defense.gov/Portals/25/Documents/Blog/20120705_Alternative_Fuels_Policy_for_Operational_Platforms.pdf

Agriculture (USDA) also announced a “Farm-to-Fleet” partnership initiative to facilitate the supply of domestically produced biofuels to the Navy. Under this initiative, the USDA offered an incentive of \$0.72 per unblended gallon of qualifying biofuels in the May 2014 Inland/East/ Gulf Coast solicitation (SP0600-14-R-0061). Specifically, DLA Energy requested F-76 and JP-5 blends containing 10-50 percent qualifying drop-in alternative fuels within the total provided volume of 138 and 255 million gallons, respectively, for deliveries starting in April 2015. DLA Energy did not receive any proposals that were technically feasible.

- Production Support. DoD also is participating in an interagency initiative to support the development of cost-competitive advanced drop-in alternative fuels for military and commercial use. Led by OSD Manufacturing and Industrial Base Policy, the Defense Production Act (DPA), Advanced Drop-in Biofuels Production Project is a partnership with the private sector and the Departments of Energy and Agriculture. In August 2014, three companies each received \$70 million in DPA Phase 2 awards (\$210 million in total) to construct commercial-scale fuel production facilities; this funding will be matched by the private sector investments of approximately \$700 million. After finalizing site permits and financing contracts, projects are anticipated to break ground in 2015.

In response to a provision in Public Law 113–6 of FY 2013, the Air Force also funded \$20 million in research on the production of drop-in coal-derived jet fuel that is cost-competitive and produces fewer greenhouse gas emissions than petroleum-based jet fuel. The Air Force partnered with the Department of Energy (DOE) Fossil Energy office to issue a funding opportunity announcement in August 2013 and complete the review of concept papers and detailed applications throughout FY 2014.

Cooperation with the Department of Energy

In FY 2010, the Department and the DOE signed a Memorandum of Understanding (MOU) to “strengthen and broaden” existing collaboration.⁷ In FY 2014, initiatives fostered by the MOU included:

- Hybrid Energy Storage Module (HESM): This program aims to develop modular hybrid energy storage modules with high power and energy densities that address long endurance and rapid charge/discharge needs for forward operating bases, aircraft power

⁷ This document is available at <http://energy.gov/sites/prod/files/edg/news/documents/Enhance-Energy-Security-MOU.pdf>

management, and future shipboard weapons systems. In FY 2014, source selection for the aircraft and shipboard demonstration units was completed.

- Advanced Vehicle Power Technology Alliance (AVPTA): The Army's Tank-Automotive Research, Development and Engineering Center (TARDEC) and the DOE Vehicle Technologies Office (VTO) administer the AVPTA. The partnership was formed to address critical ground vehicle challenges in efficient power and energy systems for lightweight to super-heavy platforms. VTO and TARDEC staff coordinated six topics in the 2014 VTO Funding Opportunity Announcement.
- U.S. Marine Corps MAGTF Power and Energy Investment Model: The Marine Corps Expeditionary Energy Office continues to work with DOE's Sandia National Lab to analyze battlefield power requirements, and assess the value of alternative energy sources and energy storage on mission capabilities. This partnership is helping inform the power portfolio for future Marine Corps ground forces.
- DOE Advisors at Combatant Commands: DOE Energy Advisors are assigned to USPACOM, USCENTCOM and USAFRICOM helping to integrate energy into planning, exercises, programs, and engagements.
- Workshop on Tactical Unit Energy Independence: In December 2013, DoD and DOE held a workshop focusing on potential collaboration in batteries, wearable solar, fuel cells, and microgrids.

Operational Energy in Force Development

While the Department can adapt near-term energy use in operations and invest in selected technologies, changing the longer-term energy needs of the future force require a more comprehensive approach. To do so, the Department is increasing the role of energy in requirements and acquisition decision-making. First, operational energy constraints and opportunities continued to gain more visibility in Department wargames. As this trend continues, the Department will better understand how energy demand on the battlefield affects warfighting, and be better able to identify possible changes or trade-offs in future platforms, concepts of operations, and force structure that improves effectiveness, capabilities, and cost. For example, the Navy conducted its first Logistics Centric Game in many years, and explored the effects of degraded logistics capabilities, including disruptions to fuel supply and distribution, on combat operations. To validate the initial results, the Navy intends to repeat this wargame. DLA also conducted a strategic energy game to assess the ability to obtain and deliver fuel to meet the Combatant Commander's needs. This game identified issues that need to be

addressed related to repositioning of war reserve stock and forward precision positioning of fuel.

The Joint Staff J-4 and OEPP also continued to assess the Services compliance with use of the energy KPP in new systems. Specifically, OSD and the Joint Staff collaborated with Service energy and requirements offices to improve how the energy KPP is assessed and how to conduct the needed energy supportability analyses. The Services are developing analytical tools, techniques, and products to better inform requirements development and force structure decisions. In some cases, due to the status of the program, the Service will conduct energy supportability analysis after the approval of the requirements document with the understanding that the analysis will be presented later to the Joint Requirements Oversight Council.

As programs move from requirements to acquisition, OEPP continued to act as an advisor to the Defense Acquisition Board (DAB), chaired by the Department's Acquisition Executive. In FY 2014, there were over 20 DAB chaired acquisition program reviews with an equal number of preparatory meetings. In that capacity, OEPP continued to bring operational energy issues to the attention of the DAB, reviewing documents (such as Acquisition Decision Memoranda, Acquisition Strategies, and Acquisition Program Baselines) and recommending changes before signature.

Conclusion

In his forward to the 2014 QDR, Secretary of Defense Chuck Hagel stated that, "Staying ahead of security challenges requires that we continue to innovate, not only in technologies we develop, but in the way U.S. forces operate. Innovation – within the Department and working with other U.S. department and agencies and with international partners – will be center stage as we adapt to meet future challenges."⁸

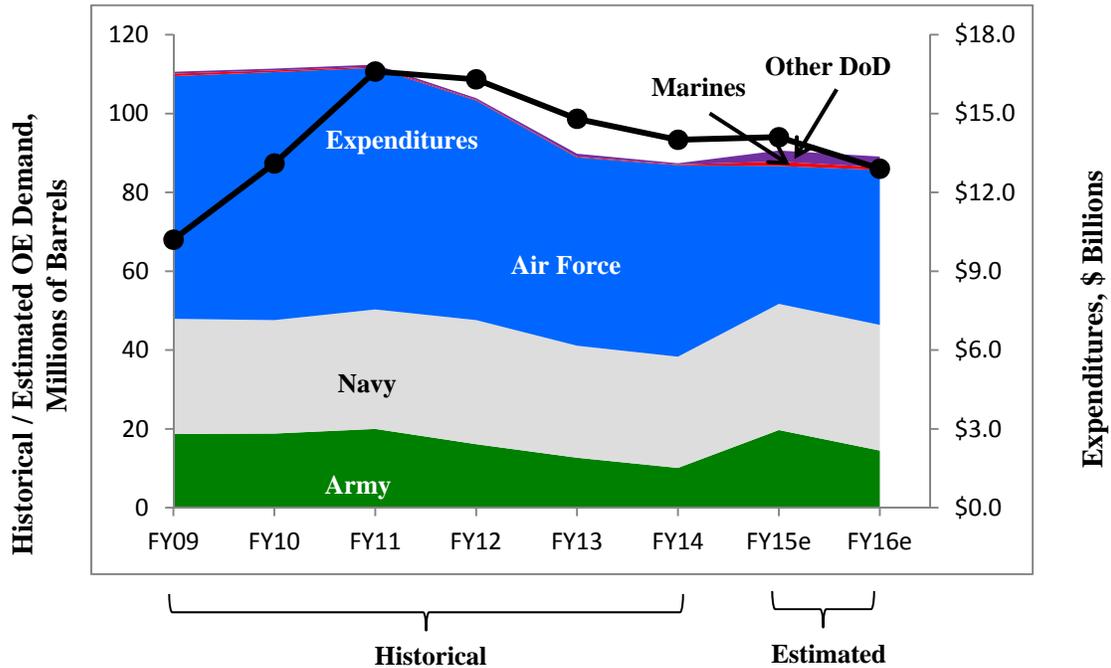
In line with this approach, the Department's activities in 2014 demonstrate the full range of innovations now underway in how we generate, use, and plan to use energy. We are making progress as logisticians, planners, and operators begin to treat energy as a constrained and vulnerable commodity that may not always be available in a combat environment. As energy continues to affect our operations, plans, and materiel development programs, we must make energy a permanent and lasting component of Department decision-making. The Department greatly appreciates the continued support of Congress to help us achieve the operational energy mission in support of warfighters around the globe.

⁸ This document is available at: http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf

Appendix A: Historical and Estimated Demand for Operational Energy

The figure and table below describe the historical demand for operational energy in FYs 2009 – 2014, estimated demand for operational energy in FYs 2015 – 2016, and total expenditures to purchase that fuel. Historical operational energy demand is based on net sales of selected liquid fuels by DLA to the Services, while future operational energy demand estimates are based on the FY 2016 President’s Budget. Expenditures for operational energy are estimated using the average fuel sales price for the specific fuel provided to the customer at the point of sale, and include procurement and overhead costs. This price does not reflect additional costs imposed on the Department for force protection, storage, and transportation beyond the point of sale. As a purchaser of fuel on the open market, the Department is subject to the same price volatility experienced by commercial consumers.

Figure 1: DoD Operational Energy Demand, FY 2009 – FY 2016⁹



⁹ Updated analysis of expenditures may lead to different results from previous Operational Energy Annual Reports. Expenditures are not adjusted for inflation; data on historical demand may not capture final end use nor account for fuel transfers between the Services (e.g. most Marine Corps Aviation fuel is included under the Navy); and Historical and Estimated Demand include Base and Overseas Contingency Operations (OCO) funding, and purchases using Transportation Working Capital Fund (TWCF). FY 2013/14 Marine Corps operations in Afghanistan are reflected in total Department use and cost but are not reflected in Marine Corps totals.

Table 3: DoD Operational Energy Demand by Service

		FY09	FY10	FY11	FY12	FY13	FY14	FY15e	FY16e
Operational Energy Demand, Million Barrels	Army	18.7	18.8	20	16.1	12.7	10.1	19.7	14.5
	Navy	29.2	28.8	30.3	31.5	28.4	28.2	32.0	31.9
	Air Force	61.6	62.9	61.3	55.7	47.8	48.6	35.0	39.3
	Marine Corps	0.6	0.4	0.3	0.2	0.2	0.2	1.1	0.7
	Other DoD	0.5	0.5	0.5	0.4	0.7	0.3	2.8	2.7
	Total Demand	110.6	111.4	112.4	103.9	89.8	87.4	90.6	89.1
	Expenditures, \$ Billions	\$10.2	\$13.1	\$16.6	\$16.3	\$14.8	\$14.0	\$14.1	\$12.9

Appendix B: Assessment of Fiscal Year 2014 President’s Budget Operational Energy Initiatives

The Department assessed the Fiscal Year 2014 President’s Budget against the three goals of the *Operational Energy Strategy*:

- Reduce Demand
- Diversify Supply
- Adapt the Future Force

The method used to assess initiative investments included joining with the Director, Cost Assessment and Program Evaluation (D,CAPE) to evaluate operational energy investments within the Program Budget Review cycle. Next, the Acting ASD formed a Certification Advisory Working Group (CAWG) with representatives from OASD(OEPP), the Office of Under Secretary of Defense (Comptroller), CAPE, The Joint Staff, and the Services to validate operational energy initiatives and provide recommendations on the adequacy of resourcing the goals of the Operational Energy Strategy. This assessment is found in Table 6. Objectives adequately funded are rated green, marginally funded are amber, and inadequately funded as red. Green ratings indicate objectives funded to a level allowing services to make adequate progress for the fiscal year, not that the objective is complete.

Table 4 shows the DoD operational energy initiative funding by Service throughout the FYDP (FY14 – FY18).

Table 4. DoD Operational Energy Initiatives by Service (\$ Millions, FY14 PB)

	FY14	FYDP	Percent
Army	\$614.5	\$3,918.1	39%
Navy	\$357.4	\$1,830.1	19%
Marines	\$70.3	\$358.1	4%
Air Force	\$1,561.9	\$3,435.2	35%
Defense-Wide	\$62.8	\$261.3	3%
Total	\$2,557.3	\$9,802.8	100%

Table 5 summarizes DoD’s operational energy investments by goal. Future force investments appear to be disproportionately lower, but it is more difficult to identify and assess these initiatives and they tend to be lower or implicit costs. That does not mean they have less effect, and indeed, these investments ultimately drive investments across major accounts, such as RDT&E and procurement.

Table 5. DoD Operational Energy Initiatives by Goal (\$ Millions, FY14 PB)

	FY14	FYDP	Percent
Reduce Demand	\$2,314.5	\$8,400.6	86%
Diversify Supply	\$229.7	\$1,366.4	14%
Adapt the Future Force	\$13.2	\$35.8	0%
Total	\$2,557.3	\$9,802.8	100%

Table 6 is the assessment of Service initiatives against the goals of the *Operational Energy Strategy*.

Table 6. Assessment

Operational Energy Objectives	Army	Navy	Marines	Air Force
Reduce Demand				Y/G
Diversify Supply				
Adapt to Future Force	Y/G	Y/G		Y/G

Specific concerns include:

- **Army:** Insufficient investment in an integrated Modeling and Simulation tool which evaluates effects on combat capability resulting from enemy attacks on logistic forces. In addition the Army has not identified a transition partner to provide for the continued sustainment and improvement of the Fully Burdened Cost tool.
- **Navy:** Limited investment in Modeling and Simulation tools like the Navy’s Synthetic Theater Operations Research Model (STORM), which can inform energy tradeoffs in requirements development and acquisition program performance criteria.
- **Air Force:** Limited investments on upgrades to legacy fixed wing aircraft. In addition, limited investments in the development/implementation of STORM, which can inform energy tradeoffs in requirements development and acquisition program performance criteria.

Appendix C: Assessment of FY 2014 President’s Budget Operational Energy Initiatives
Table 7. Army FY14 Operational Energy Initiatives (\$000)

ORG	OE Program Title	OE Project Description	Objective	OE Initiative Code	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Army	Combat Vehicle and Automotive Technology	This project designs, develops, and evaluates a variety of innovative enabling technologies in the areas of vehicle concepts, virtual prototyping, electrical power, thermal management, propulsion, mobility, survivability, vehicle diagnostics, and fuels.	Reduce Demand	Research	2040	02	0602601A	3815	1004	840	10,100
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	5964	7979	990	29,606
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	3956	3592	2,879	17,098
Army	Aviation Advanced Technology	Matures and demonstrates components, subsystems and systems for rotorcraft (both manned and unmanned) that provide, improved aircraft & occupant survivability, reduced maintenance & sustainment costs, and greater performance through improved rotors, and drive.	Reduce Demand	Research	2040	03	0603003A	0	0	0	13,416
Army	Aviation Advanced Technology	Matures and demonstrates power system technologies through design, fabrication, and evaluation of advanced engine components in order to improve the performance of turbine engines for rotorcraft. This project supports Army modernization.	Reduce Demand	Research	2040	03	0603003A	8149	9909	8,276	28,299
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	5099	4402	3,533	16,988
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	2118	831	2,084	13,112
Army	Combat Vehicle and Automotive Technology	This project designs, develops, and evaluates a variety of innovative enabling technologies in the areas of vehicle concepts, virtual prototyping, electrical power, thermal management, propulsion, mobility, survivability, vehicle diagnostics, fuels.	Reduce Demand	Research	2040	02	0602601A	4730	1971	2,419	7,564
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	2436	2315	2,407	10,883
Army	In-house Laboratory Independent Research	Basic S&T at RDECs that are associated with power and energy technologies.	Reduce Demand	Research	2040	01	0601101A	1202	1199	1,220	6,265

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	3220	2291	0	10,670
Army	Combat Vehicle & Automotive Advanced Technology	This project matures, integrates, and demonstrates vehicle electronics hardware such as computers, sensors, communications systems, displays, and vehicle command/control/driving mechanisms as well as vehicle software to enhance crew performance.	Reduce Demand	Research	2040	03	0603005A	2435	2351	3,009	16,675
Army	Improved Aircraft Engine	More efficient helicopter engine - ITEP enters TD in FY13 - Army expects a 25% fuel reduce from current Blackhawk/Apache engines.	Reduce Demand	Research	2040	07	0203744A	0	72300	79,100	713,000
Army	Joint Light Tactical Vehicle	More efficient light vehicle - JLTV EMD effort expected to reap a 17-22% savings over the UAH.	Reduce Demand	Research	2040	05	0216300A	0	100	100	7,500
Army	Combat Vehicle and Automotive	This project designs, develops, and evaluates a variety of innovative enabling technologies in the areas of vehicle concepts, virtual prototyping, electrical power, thermal	Reduce Demand	Research	2040	02	0602601A	2112	5006	3,115	13,073
Army	Improved Large Generator	Improved large gen sets -R&D effort for large gen sets to reduce consumption by 21%.	Reduce Demand	Research	2040	05	0203744A	4199	9692	3,833	6,421
Army	Combat Vehicle and Automotive Technology	This project funds the National Automotive Center (NAC), which was chartered by the Secretary of the Army to conduct shared government and industry (dual use) technology programs to leverage commercial investments in automotive technology research and development.	Reduce Demand	Research	2040	02	0602601A	10191	10356	10,956	57,250
Army	Aviation Advanced Technology	Matures and demonstrates components, subsystems and systems for rotorcraft (both manned and unmanned) that provide, improved aircraft & occupant survivability, reduced maintenance & sustainment costs, and greater performance through improved rotors, and drive.	Reduce Demand	Research	2040	03	0603003A	3877	5051	6,204	14,190
Army	Combat Vehicle and Automotive Technology	This project designs, develops, and evaluates a variety of innovative enabling technologies in the areas of vehicle concepts, virtual prototyping, electrical power, thermal management, propulsion, mobility, survivability, vehicle diagnostics, and fuels.	Reduce Demand	Research	2040	02	0602601A	0	1247	1,141	1,141
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	3873	2030	894	2,579
Army	Close Combat Tactical Trainer	Simulators for ground combat vehicle collective training.	Reduce Demand	Research	2040	05	0604780A	0	4252	832	3,707
Army	Aviation Combined Arms Tactical Trainer	Simulators for aviation asset collective training.	Reduce Demand	Research	2040	05	0604780A	0	2581	3,828	20,177
Army	Reduce-Hybrid 1-2 Transportable Wind Solar	Solar Microgrid As A Fuel Saving Solution.	Reduce Demand	Research	2040	02	0602705A	4558	3689	3,964	3,964
Army	Improved Small Generator	Improved small gen sets -R&D effort for small gen sets to reduce consumption by 21%.	Reduce Demand	Research	2040	05	0203744A	0	0	0	19,459

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Army	Mobile Tactical Refueling System	More efficient fuel distribution in the battlespace.	Reduce Demand	Research	2040	04	0604804A	0	700	700	700
Army	Weapons & Munitions Advanced Technology	Matures and demonstrates advanced technologies for future High Energy Laser (HEL) weapons technology. The major effort under this project is the phased approach for mobile high power solid state laser (SSL) technology demonstrations that are traceable.	Reduce Demand	Research	2040	03	0603004A	1705	3145	3,247	6,075
Army	Weapons & Munitions Advanced Technology	This project matures, integrates and demonstrates protection and survivability technologies such as active protection systems (APS), advanced vehicle armors, blast mitigation and occupant safety devices to address both conventional and asymmetric threats.	Reduce Demand	Research	2040	03	0603004A	0	0	0	5,744
Army	Improved Small Generator	Improved small gen sets -R&D effort for small gen sets to reduce consumption by 21%.	Reduce Demand	Research	2040	05	0604804A	0	0	0	44,784
Army	Combat Vehicle and Automotive Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	2500	1700	530	530
Army	Combat Vehicle Improvement	More efficient Abrams - R&D effort to improve Abrams fuel efficiency by 3%.	Reduce Demand	Research	2040	07	0203735A	1800	1800	3,500	10,400
Army	Combatting Terrorism, Technology Development	This project demonstrates technologies with high payoff potential to address current technology shortfalls or future force capability gaps. Efforts include hybrid electric power technologies to reduce use of fossil fuel generators.	Reduce Demand	Research	2040	03	0603125A	4672	4909	4,997	10,073
Army	Combatting Terrorism, Technology Development	This project demonstrates technologies with high payoff potential to address current technology shortfalls or future force capability gaps. Efforts include hybrid electric power technologies to reduce use of fossil fuel generators.	Reduce Demand	Research	2040	03	0603125A	0	0	0	15,754
Army	Aviation Advanced Technology	Matures and demonstrates power system technologies through design, fabrication, and evaluation of advanced engine components in order to improve the performance of turbine engines for rotorcraft. This project supports Army modernization.	Reduce Demand	Research	2040	03	0603003A	0	0	0	17,109
Army	Aviation Technology	Design and evaluate rotary wing technology for manned and unmanned Army/DoD aircraft. Areas of research include enhanced rotor efficiencies, and improved engine performance.	Reduce Demand	Research	2040	02	0602211A	0	0	0	7,372
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	1149	1036	1,079	11,715
Army	Aviation Technology	This project investigates engine, drive train and airframe enabling technologies such as multifunctional materials and fluid mechanics.	Reduce Demand	Research	2040	02	0602211A	2543	2651	2,886	15,449
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	2750	2172	2,953	6,681

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Reduce Demand	Research	2040	03	0603005A	0	0	0	11,894
Army	Aviation Technology	Design and evaluate rotary wing technology for manned and unmanned Army/DoD aircraft. Areas of research include enhanced rotor efficiencies, and improved engine performance.	Reduce Demand	Research	2040	02	0602211A	3542	3065	3,097	6,180
Army	Force Provider	Base Camp Integration Laboratory (BCIL) / Net Zero / Zero Footprint	Reduce Demand	Research	2040	05	0604804A	1069	667	921	6,191
Army	Force Provider	BCIL / Net Zero / Zero Footprint	Reduce Demand	Research	2040	04	0604804A	1474	1801	1,323	8,017
Army	Combat Vehicle Improvement	More efficient Bradley - R&D effort to improve Bradley fuel efficiency by 3%.	Reduce Demand	Research	2040	07	0203735A	0	9100	9,100	26,600
Army	Warfighter Advanced Technology	Matures, demonstrates and integrates light weight and multifunctional materials and components to provide effective personal protection, electronics connectivity and mission specific equipment while reducing physical weight, cognitive burden and sustainment.	Reduce Demand	Research	2040	03	0603001A	0	0	1,681	6,447
Army	Electronics & Electronic Devices	Research, development, and evaluation of high-power electronic components, materials, and technologies with applications in compact and efficient power conversion, conditioning, and management sub-systems; energy storage and conversion devices; radio frequency.	Reduce Demand	Research	2040	02	0602705A	478	0	0	13,442
Army	Defense Research Sciences	This project conducts research in support of advanced military vehicle technology with emphasis on advanced propulsion, sophisticated vehicle dynamics and simulation, and advanced track and suspension concepts.	Reduce Demand	Research	2040	01	0601102A	577	606	612	3,159
Army	Defense Research Sciences	This project fosters research to increase the performance of small air-breathing engines and power-trains to support improved system mobility, reliability, and survivability for air and/or ground vehicles; and ultimately serve to reduce the logistics cost.	Reduce Demand	Research	2040	01	0601102A	1528	1716	1,734	8,819
Army	Defense Research Sciences	This project fosters research to increase the performance of small air-breathing engines and power-trains to support improved system mobility, reliability, and survivability for air and/or ground vehicles; and ultimately serve to reduce the logistics cost.	Reduce Demand	Research	2040	01	0601102A	2412	2495	2,522	12,819
Army	Defense Research Sciences	This project fosters extramural basic research to create and exploit new scientific discoveries and technology breakthroughs, primarily from universities, that will improve the Army's transformational capabilities. Current technologies are unable to	Reduce Demand	Research	2040	01	0601102A	2462	2600	2,584	13,454
Army	Defense Research Sciences	This project fosters extramural basic research to create and exploit new scientific discoveries and technology breakthroughs, primarily from universities, that will improve the Army's transformational capabilities. Current technologies are unable to meet.	Reduce Demand	Research	2040	01	0601102A	6734	5992	5,680	29,699
Army	Ballistics Technology	This project considers energetics technologies.	Reduce Demand	Research	2040	02	0602618A	3351	4525	3,674	20,588

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Army	Combat Vehicle Improvement	More efficient Abrams - The Abrams APU will generate an overall fuel savings of 3%.	Reduce Demand	Direct	2033	01	0211702A	0	0	0	7,300
Army	Advanced Medium Mobile Power Source - SKIDS	Improved medium gen sets - Purchase of the improved medium gen sets using 21% less fuel.	Reduce Demand	Direct	2035	03	0216300A	0	16747	62,979	322,858
Army	Advanced Medium Mobile Power Source - PUPPS	Improved medium gen sets - Purchase of the improved medium gen sets using 21% less fuel.	Reduce Demand	Direct	2035	03	0216300A	0	33983	38,413	387,433
Army	Combat Vehicle Improvement	More efficient Bradley - The Bradley improved transmission generate an overall fuel savings of 3%.	Reduce Demand	Direct	2033	01	0211702A	0	0	0	200,700
Army	Force Provider	Improved Force Provider - Purchase of liners, shades, LED lighting, micro-grids and waste water re-use systems to reduce fuel savings by 50% and water by 75%.	Reduce Demand	Direct	2035	03	0216300A	0	5100	9,900	9,900
Army	Improved Large Generator	Improved large gen sets - Purchase of the improved large gen sets using 21% less fuel.	Reduce Demand	Direct	2035	03	0216300A	0	0	0	38,267
Army	Force Provider	Force Provider MoDS - Purchase of liners, shades, micro-grids and LED lighting to reduce fuel savings by 50%.	Reduce Demand	Direct	2035	03	0216300A	0	4900	34,200	155,600
Army	Tactical Fuels Manager Defense (TFMD)	Provides an automated accounting tool that allows for enterprise wide visibility of petroleum consumption, stock availability and identification of potential illegal activities at forward operating locations.	Reduce Demand	Direct	2020	04	0702829A	1400	1200	1,200	4,800
Army	Heaters and IECU	More efficient Environmental Control Units.	Reduce Demand	Direct	2035	03	0604804A	10109	10700	17,300	89,700
Army	Joint Light Tactical Vehicle	More efficient light vehicle - JLTV EMD effort expected to reap a 17-22% savings over the UAH.	Reduce Demand	Indirect	2035	01	0216300A	0	0	0	166,200
Army	Common Driver Trainer	Simulator for multiple TWVs.	Reduce Demand	Indirect	2035	01	0216300A	0	12064	18,382	45,516
Army	Aviation Simulator	Simulator for the Chinook Helicopter.	Reduce Demand	Indirect	2031	01	0210104A	0	61500	12,300	65,100
Army	Aviation Simulator	Simulator for the Blackhawk Helicopter.	Reduce Demand	Indirect	2031	01	0210101A	0	12700	10,600	54,500
Army	Close Combat Tactical Trainer	Simulators for ground combat vehicle collective training.	Reduce Demand	Indirect	2035	03	0219900A	0	19984	30,063	141,475
Army	Aviation Simulator	Simulator for the Apache Helicopter.	Reduce Demand	Indirect	2031	01	0210100A	0	31200	32,700	136,300
Army	Aviation Combined Arms Tactical Trainer	Simulators for aviation asset collective training.	Reduce Demand	Indirect	2035	03	0219900A	0	10977	34,913	164,526
Army	Electronics & Electronic Devices	Identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	1194	988	740	740
Army	Electronics & Electronic Devices	Identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	625	0	0	22,728
Army	Electronics & Electronic Devices	Identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	0	0	0	11,001

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Army	Warfighter Advanced Technology	Matures, demonstrates and integrates light weight and multifunctional materials and components to provide effective personal protection, electronics connectivity and mission specific equipment while reducing physical weight, cognitive burden and	Expand Supply	Research	2040	03	0603001A	0	0	0	3,454
Army	Electronics & Electronic Devices	Research, development, and evaluation of high-power electronic components, materials, and technologies with applications in compact and efficient power conversion, conditioning, and management sub-systems; energy storage and conversion devices;	Expand Supply	Research	2040	02	0602705A	0	1699	1,799	8,798
Army	Combat Vehicle and Automotive Technology	This project designs, develops, and evaluates a variety of innovative enabling technologies in the areas of vehicle concepts, virtual prototyping, electrical power, thermal management, propulsion, mobility, survivability, vehicle diagnostics, and fuels.	Expand Supply	Research	2040	02	0602601A	3300	3205	2,761	14,290
Army	Combat Vehicle & Automotive Advanced Technology	This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles.	Expand Supply	Research	2040	03	0603005A	2527	3159	2,585	15,835
Army	Combat Vehicle and Automotive Technology	This project designs, develops, and evaluates a variety of innovative enabling technologies in the areas of vehicle concepts, virtual prototyping, electrical power, thermal management, propulsion, mobility, survivability, vehicle diagnostics, and fuels.	Expand Supply	Research	2040	02	0602601A	0	0	2,387	12,269
Army	Combat Vehicle and Automotive Technology	This project designs, develops, and evaluates a variety of innovative enabling technologies in the areas of vehicle concepts, virtual prototyping, electrical power, thermal management, propulsion, mobility, survivability, vehicle diagnostics, and fuels.	Expand Supply	Research	2040	02	0602601A	2966	1919	1,903	12,971
Army	Warfighter Advanced Technology	Matures, demonstrates and integrates light weight and multifunctional materials and components to provide effective personal protection, electronics connectivity and mission specific equipment while reducing physical weight, cognitive burden and	Expand Supply	Research	2040	03	0603001A	0	0	0	7,157
Army	Electronics & Electronic Devices	This project designs and evaluates electronics and electronic components and devices for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) applications and battlefield power and energy applications.	Expand Supply	Research	2040	02	0602705A	0	0	2,809	14,085
Army	Electronics & Electronic Devices	This project identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	0	0	907	4,402
Army	Electronics & Electronic Devices	Research, development, and evaluation of high-power electronic components, materials, and technologies with applications in compact and efficient power conversion, conditioning, and management sub-systems; energy storage and conversion devices; radio frequency.	Expand Supply	Research	2040	02	0602705A	0	596	629	12,084
Army	Electronics & Electronic Devices	Research, development, and evaluation of high-power electronic components, materials, and technologies with applications in compact and efficient power conversion, conditioning, and management sub-systems; energy storage and conversion devices; radio frequency.	Expand Supply	Research	2040	02	0602705A	2412	2526	2,544	13,024

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Army	Electronics & Electronic Devices	This project identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	1107	1250	1,345	6,913
Army	Electronics & Electronic Devices	Identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	0	0	0	12,057
Army	Electronics & Electronic Devices	Identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	0	0	935	935
Army	Electronics & Electronic Devices	Identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	0	0	0	2,539
Army	Electronics & Electronic Devices	Identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	1042	6305	5,921	12,054
Army	Electronics & Electronic Devices	Identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	0	0	1,053	1,053
Army	Electronics & Electronic Devices	This project identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02	0602705A	0	0	1,237	6,046
Army	Electronics & Electronic Devices	Research, development, and evaluation of high-power electronic components, materials, and technologies with applications in compact and efficient power conversion, conditioning, and management sub-systems; energy storage and conversion devices; radio frequency.	Expand Supply	Research	2040	02	0602705A	2704	1173	1,128	6,351
Army	Warfighter Advanced Technology	Matures, demonstrates and integrates light weight and multifunctional materials and components to provide effective personal protection, electronics connectivity and mission specific equipment while reducing physical weight, cognitive burden and sustainment.	Expand Supply	Research	2040	03	0603001A	0	0	1,252	8,223
Army	Combat Vehicle & Automotive Advanced Technology	This project assesses the impact of using emerging alternative fuels in tactical/combat vehicles, tactical generator sets, and other deployable assets. This project also identifies and addresses potential changes needed in fuel specifications.	Expand Supply	Research	2040	03	0603005A	0	0	7,500	15,000

ORG	OE Program Title	OE Project Description	Objective OE	Treas Initiative Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Army	Combat Vehicle and Automotive Technology	This project funds the National Automotive Center (NAC), which was chartered by the Secretary of the Army to conduct shared government and industry (dual use) technology programs to leverage commercial investments in automotive technology research and development.	Expand Supply	Research	2040	02 0602601A	3702	5894	4,083	21,553
Army	Combat Vehicle and Automotive Technology	This project funds the National Automotive Center (NAC), which was chartered by the Secretary of the Army to conduct shared government and industry (dual use) technology programs to leverage commercial investments in automotive technology research and development.	Expand Supply	Research	2040	02 0602601A	0	0	0	2,988
Army	Defense Research Sciences	Research includes nanoelectronic devices; sensors, emissive nonlinear and nanophase electrodes, and electronic materials; thin heterostructure systems; battery materials, thermoelectric devices, photovoltaic and thermal photovoltaic devices.	Expand Supply	Research	2040	01 0601102A	1970	2034	2,035	12,278
Army	Defense Research Sciences	This project fosters extramural basic research to create and exploit new scientific discoveries and technology breakthroughs, primarily from universities, that will improve the Army's transformational capabilities. Current technologies are unable to meet.	Expand Supply	Research	2040	01 0601102A	2707	2602	2,610	13,720
Army	Defense Research Sciences	This research on future generations of sensors exploits large scale electromagnetic models on target and clutter scattering behavior, digital and image processing modules and algorithms, beam propagation and material modeling of nonlinear optical effect.	Expand Supply	Research	2040	01 0601102A	2988	3068	3,113	15,995
Army	Electronics & Electronic Devices	This project designs and evaluates electronics and electronic components and devices for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) applications and battlefield power and energy applications.	Expand Supply	Research	2040	02 0602705A	0	0	1,193	5,803
Army	Electronics & Electronic Devices	Identifies, advances, and enhances emerging power generation, energy storage, and power management components and software. This project funds research in electrochemistry, energy conversion, and signature suppression technologies.	Expand Supply	Research	2040	02 0602705A	4379	3717	1,982	1,982
Army	Ground Soldier systems	Reduces Soldier Load - R&D dollars to improve battery output, reduce weight, and recharge them from alt energy sources.	Expand Supply	Direct	2040	05 0604827A	25484	5054	9,914	9,914
Army	Ground Soldier systems	Reduces Battery Rqt - Funds equipment for recharging batteries thru alt energy sources, buys improved batteries and funds more efficient chargers.	Expand Supply	Direct	2035	03 0211700A	0	12700	16,800	80,800
Army	Modular Fuel System (MFS)	More efficient fuel distribution in the battlespace.	Expand Supply	Direct	2035	03 0216300A	0	23500	34,000	163,600
						Total Army OE			614,490	3,918,080

Appendix C: Assessment of FY 2014 President’s Budget Operational Energy Initiatives
Table 8. Navy FY14 Operational Energy Initiatives (\$000)

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Maritime S&T		Reduce Demand	Research	1319	01	0601103N	812	0	0	0
Navy	Maritime S&T		Reduce Demand	Research	1319	01	0601103N	312	0	0	0
Navy	Maritime S&T		Reduce Demand	Research	1319	01	0601103N	231	750	750	2,535
Navy	Maritime S&T	Explore design concepts for advanced power distribution, including multifunctional power controllers, electronic decoupling concepts, adaptive and reconfigurable power technology, and high power switching and pulse forming	Reduce Demand	Research	1319	01	0601153N	2567	2506	2,602	13,406
Navy	Maritime S&T	Fundamental studies and physics-based models of evaporative cooling, including heat transfer and critical heat flux.	Reduce Demand	Research	1319	01	0601153N	2002	1942	2,005	10,282
Navy	Maritime S&T	Provide design tools for high performance, efficient, low signature hull forms and propulsors and optimize integration of the hull-propulsor as a system.	Reduce Demand	Research	1319	01	0601153N	5500	5500	5,500	27,500
Navy	Maritime S&T		Reduce Demand	Research	1319	01	0601153N	2080	2637	2,715	13,742
Navy	Aviation S&T		Reduce Demand	Research	1319	01	0601153N	0	0	2,050	9,692
Navy	Maritime S&T		Reduce Demand	Research	1319	01	0601153N	165	0	0	0
Navy	Maritime S&T		Reduce Demand	Research	1319	01	0601153N	92	170	170	248
Navy	Maritime S&T		Reduce Demand	Research	1319	01	0601153N	1168	3420	3,442	17,388
Navy	Maritime S&T		Reduce Demand	Research	1319	02	0602114N	2450	7127	5,818	14,971
Navy	Aviation S&T	Identify and mature critical, relevant variable/adaptive cycle system technologies for the next generation carrier-based aircraft that combine high performance with fuel efficiency.	Reduce Demand	Research	1319	02	0602123N	11318	11786	7,674	14,400
Navy	Maritime S&T	A consortium of virtually linked academic institutions with hardware-in-the-loop capability coupled with physics based models for system design, testing, and validation.	Reduce Demand	Research	1319	02	0602123N	10714	10533	10,365	53,172
Navy	Maritime S&T	Develop high reliability, high efficiency, affordable, power dense electrical components.	Reduce Demand	Research	1319	02	0602123N	383	0	0	0
Navy	Maritime S&T	Development of a power dense electric actuator system for submarine control surfaces featuring quiet motor topologies, EMA sensorless control, and integrated sensors to support condition based maintenance.	Reduce Demand	Research	1319	02	0602123N	144	0	0	0

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Maritime S&T	Development of a power management controller and bi-directional power converter to reduce whole system dynamic reaction time, improve partitioning from propulsion to ships service and warfighting loads, increase power density, and enable new energy storage.	Reduce Demand	Research	1319	02	0602123N	292	0	0	0
Navy	Maritime S&T	Explore design concepts for advanced power distribution, including multifunctional power controllers, electronic decoupling concepts, adaptive and reconfigurable power technology, and high power switching and pulse forming networks.	Reduce Demand	Research	1319	02	0602123N	4643	4635	0	0
Navy	Maritime S&T	Explore design concepts for advanced power distribution, including multifunctional power controllers, electronic decoupling concepts, adaptive and reconfigurable power technology, and high power switching and pulse forming networks.	Reduce Demand	Research	1319	02	0602123N	919	914	911	4,781
Navy	Maritime S&T	Provide design tools for high performance, efficient, low signature hull forms and propulsors and optimize integration of the hull-propulsor as a system.	Reduce Demand	Research	1319	02	0602123N	2475	2313	2,278	11,710
Navy	Maritime S&T		Reduce Demand	Research	1319	02	0602123N	1000	1000	1,000	5,000
Navy	Maritime S&T		Reduce Demand	Research	1319	02	0602123N	1264	5598	7,146	36,303
Navy	Maritime S&T		Reduce Demand	Research	1319	02	0602123N	583	0	0	0
Navy	Maritime S&T	Develop a pitch-adapting composite submarine propeller with a flexible tip for pitch adaptation, and blade-to-hub joint for modularity and replace ability.	Reduce Demand	Research	1319	02	0602123N	1060	0	0	0
Navy	Aviation S&T		Reduce Demand	Research	1319	02	0602123N	8170	9074	9,417	43,995
Navy	Maritime S&T		Reduce Demand	Research	1319	02	0602123N	350	1216	1,247	6,448
Navy	Maritime S&T		Reduce Demand	Research	1319	02	0602123N	0	0	4,327	20,719
Navy	Maritime S&T		Reduce Demand	Research	1319	02	0602123N	2558	0	0	0
Navy	Maritime S&T	Develop a compact axial-flow waterjet (21-22 MW size) and demonstrate on a Littoral Combat Ship (LCS).	Reduce Demand	Research	1319	02	0602236N	80	0	0	0
Navy	Aviation S&T	Develop innovative materials and processes for selected turbine engine components including fan, compressor, combustor, turbine and exhaust nozzle sections.	Reduce Demand	Research	1319	02	0602236N	3382	0	0	0
Navy	Maritime S&T	Develop and demonstrate affordable electronics technology for future radar and electronic attack. This effort specifically enables components where COTS will not meet the stressing mission requirements.	Reduce Demand	Research	1319	02	0602271N	1549	0	0	0

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Expeditionary S&T	A system to give the operational commander and logistics planners a real-time view of both fixed and mobile fuel assets in the Amphibious Objective Area.	Reduce Demand	Research	1319	02	0602750N	1452	571	0	0
Navy	Maritime S&T	Develop a pitch-adapting composite submarine propeller with a flexible tip for pitch adaptation, and blade-to-hub joint for modularity and replace ability.	Reduce Demand	Research	1319	02	0602750N	0	400	0	259
Navy	Maritime S&T		Reduce Demand	Research	1319	02	602750N	1967	2912	2,974	6,638
Navy	Maritime S&T		Reduce Demand	Research	1319	02	0602750N	822	878	1,371	2,139
Navy	Maritime S&T	Develop and demonstrate a common scalable architecture for naval and mobile expeditionary systems. Array developed and System Integration FY12; Final test and demonstration in FY13; Transition to PEO IWS FY14.	Reduce Demand	Research	1319	02	0602750N	2481	2432	0	0
Navy	Maritime S&T		Reduce Demand	Research	1319	02	0602782N	0	489	501	2,595
Navy	Maritime S&T		Reduce Demand	Research	1319	03	0603114N	12500	5547	5,981	13,244
Navy	Maritime S&T	Development of a power dense electric actuator system for submarine control surfaces featuring quiet motor topologies, EMA sensorless control, and integrated sensors to support condition based maintenance.	Reduce Demand	Research	1319	03	0603123N	507	0	0	0
Navy	Aviation S&T	Identify and mature critical, relevant variable/adaptive cycle system technologies for the next generation carrier-based aircraft that combine high performance with fuel efficiency.	Reduce Demand	Research	1319	03	0603123N	0	3489	9,718	35,398
Navy	Maritime S&T	Develop a pitch-adapting composite submarine propeller with a flexible tip for pitch adaptation, and blade-to-hub joint for modularity and replace ability.	Reduce Demand	Research	1319	03	0603123N	1440	0	0	0
Navy	Aviation S&T	Design and develop advanced components and models using the technologies developed under Turbine Engine Materials Research. The advanced components are integrated into advanced demonstrator engines and validated through testing.	Reduce Demand	Research	1319	03	0603236N	8091	0	0	0
Navy	Maritime S&T	Develop and demonstrate affordable electronics technology for future radar and electronic attack. This effort specifically enables components where COTS will not meet the stressing mission requirements.	Reduce Demand	Research	1319	03	0603271N	3266	0	0	0
Navy	Maritime S&T	Develop and demonstrate a common scalable architecture for naval and mobile expeditionary systems. Array developed and System Integration FY12; Final test and demonstration in FY13; Transition to PEO IWS FY14.	Reduce Demand	Research	1319	03	0603673N	5586	3018	1,616	1,616
Navy	Maritime S&T	Develop high reliability, high efficiency, affordable, power dense electrical components.	Reduce Demand	Research	1319	03	0603673N	3145	0	0	0

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Maritime S&T	Development of a power management controller and bi-directional power converter to reduce whole system dynamic reaction time, improve partitioning from propulsion to ships service and warfighting loads, increase power density, and enable new energy storage	Reduce Demand	Research	1319	03	0603673N	980	0	0	0
Navy	Maritime S&T	Develop a pitch-adapting composite submarine propeller with a flexible tip for pitch adaptation, and blade-to-hub joint for modularity and replace ability.	Reduce Demand	Research	1319	03	0603673N	0	2000	2,400	3,518
Navy	Maritime S&T		Reduce Demand	Research	1319	03	0603673N	1361	0	0	0
Navy	Maritime S&T		Reduce Demand	Research	1319	03	0603673N	844	2417	3,742	11,147
Navy	Expeditionary S&T	A system to give the operational commander and logistics planners a real-time view of both fixed and mobile fuel assets in the Amphibious Objective Area.	Reduce Demand	Research	1319	03	0603673N	3157	429	0	0
Navy	Maritime S&T	Develop a compact axial-flow waterjet (21-22 MW size) and demonstrate on a Littoral Combat Ship (LCS).	Reduce Demand	Research	1319	03	0603673N	88	800	0	0
Navy	Maritime S&T		Reduce Demand	Research	1319	03	0603673N	351	739	2,071	4,215
Navy	Aviation S&T	Design and develop advanced components and models using the technologies developed under Turbine Engine Materials Research. The advanced components are integrated into advanced demonstrator engines and validated through testing.	Reduce Demand	Research	1319	03	0603673N	0	10342	5,182	5,182
Navy	Aviation S&T	Develop innovative materials and processes for selected turbine engine components including fan, compressor, combustor, turbine and exhaust nozzle sections.	Reduce Demand	Research	1319	03	0603673N	0	700	5	5
Navy	Gas Turbine Online Waterwash	This is a "hot water" water wash system for CG 47 and DDG 51 class ships, that is, a system for cleaning gas turbine engines without going off-line. This minimizes number of necessary crank washes, improves starter life expectancy, and minimizes engine deficiencies.	Reduce Demand	Direct	1810	01	0204228N	600	1400	1,400	7,097
Navy	ENCON Calibrated Functional Baseline Model	The T-AKE ENCON Calibrated Function Baseline is a model of the ship's energy usage. Once calibrated through audit data input, the model serves as an accurate and flexible tool to generate baseline energy usage profiles for various missions, and load-outs.	Reduce Demand	Direct	4557	04	0408042N	990	690	640	5,237
Navy	Energy Conservation Broad Agency Announcement	Military Sealift Command's Energy Conservation (ENCON) Broad Agency Announcement (BAA) is intended to solicit industry, academia, and government agencies to discover new, cost-effective, and innovative ways of using energy through new equipment or technology.	Reduce Demand	Direct	4557	04	0408042N	5010	0	3,166	12,572
Navy	Intelligent HVAC (OPLOG)	By automating plant control systems, matching plant generation to demand, and using Variable Air Volume design, T-AKE HVAC&R plants can be made efficient through a range of conditions and still retain the full maximum capacity.	Reduce Demand	Direct	4557	04	0408042N	1750	1750	1,119	9,165

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Cargo / Bunker Flow Monitoring	This effort will install Coriolis mass flow meters on MSC ships which correct for density, temperature, and air entrainment, and measure flow to an accuracy of around 0.01% error. This will reduce fuel costs from inaccurate recording.	Reduce Demand	Direct	4557	04	0408042N	1860	1100	1,151	4,419
Navy	Plant Flow Monitoring	This fuel metering technology corrects for density, technology, and air entrainment and can thereby measure flow to an accuracy of around 0.01% error. This enables operators to analyze fuel and speed performance and optimize throttle settings for best effort.	Reduce Demand	Direct	4557	04	0408042N	1300	1200	768	4,486
Navy	LM2500 Efficiency Implementation	The LM2500 R&D Program will modify the engine controller; reduce leak paths in the LM2500 compressor; reduce flow losses in the air intake and exhaust ducts; improve hot section; improve depot repair standards; investigate energy recovery strategies.	Reduce Demand	Direct	1810	01	0204228N	0	0	0	44,591
Navy	Digital Fuel Controls	Testing of fuel fill and transfer control systems did not result in significant fuel savings. Funding for this initiative was cut in POM-14.	Reduce Demand	Direct	1810	01	0204228N	7500	4985	0	0
Navy	Allison 501K Improvements	The 501K34 and 501K17 SSGTG improvement program will leverage the Air Force T56 Series 3.5 upgrade for the C130H fleet of aircraft gas turbines.	Reduce Demand	Direct	1810	01	0204228N	2400	2400	2,400	12,123
Navy	Advanced Hull Coatings	An easy-release hull coating system allows surface combatants with long pier-side periods to shed hull bio-fouling once underway. This technology is currently achieving fuel savings for MSC ships and the commercial shipping industry.	Reduce Demand	Direct	1804	01	0204228N	0	2400	0	0
Navy	Solid State Lighting (CRUDES)	Replacement of existing incandescent lighting fixtures on surface combatants with LED lights that will increase efficiency and operate for a much longer service life.	Reduce Demand	Direct	1810	01	0204228N	3500	3500	3,626	19,846
Navy	Integrated Condition Assessment System (ICAS)	The Integrated Condition Assessment System (ICAS) enables review of hull, mechanical, and electrical data ashore. It consists of software, portable data terminals (PDTs), and workstations. ICAS will interface with the Energy Dashboard under develop.	Reduce Demand	Direct	1810	01	0204228N	0	3392	2,077	7,821
Navy	Combustion Trim Loop	Fully Digital Forced Draft Blower monitoring and control system replaces obsolete systems on LHA/LHD-class ships and improves fuel economy.	Reduce Demand	Direct	1804	01	0204411N	400	400	400	600
Navy	Propeller Coatings	An easy-release propeller coating system allows amphibious ships with long pier- side periods to shed propeller bio-fouling once underway. This technology is currently achieving fuel savings for MSC ships and the commercial shipping industry.	Reduce Demand	Direct	1804	01	0204411N	500	500	600	2,015
Navy	Stern Flaps (Amphibs)	Develop and install stern flaps on LHD 1 and LSD 41/49 class ships. A stern flap was previously modeled and designed for LHD 8 and is directly applicable to LHD 1 class ships. LSD 41/49 would utilize same basic design as LHD 1.	Reduce Demand	Direct	1804	01	0204411N	2400	2400	3,200	9,684
Navy	Solid State Lighting (Amphibs)	Replacement of existing incandescent lighting fixtures on amphibious ships with LED lights that will increase efficiency and operate for a much longer service life.	Reduce Demand	Direct	1810	01	0204411N	1800	2900	3,400	17,179
Navy	Expeditionary Foam Shelter Structure	This program will field inflatable bladders or other types of an inexpensive form on which to spray foam, preserving tents for expeditionary forces.	Reduce Demand	Direct	1810	05	0203425N	0	0	0	2,700

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Expeditionary Foam Shelter Structure	This program will field inflatable bladders or other types of an inexpensive form on which to spray foam, preserving tents for expeditionary forces.	Reduce Demand	Direct	1810	05	0204455N	0	0	0	13,660
Navy	Improved Environmental Control Unit	Replacement of Environmental Control Units (ECUs) with units that incorporate variable speed fan drives and multi-frequency drive components which are more energy efficient.	Reduce Demand	Direct	1810	05	0204455N	1000	2000	648	5,348
Navy	Integrated Generator and ECU	The Integrated Trailer-ECU-Generator (ITEG), an integrated HMMWV towable unit that supports highly mobile command and control systems and other forward-deployed operations centers and activities, provides greater performance with lower energy requirements.	Reduce Demand	Direct	1810	05	0204455N	1400	1000	0	2,512
Navy	Energy Auditing and Energy Management Planning	MSC will manage and conduct energy audits to analyze energy usage onboard ships, facilitate and optimize energy reduction methods, and analyze the alternatives to reduce energy costs.	Reduce Demand	Direct	4557	02	0408042N	3970	2789	2,413	15,842
Navy	Navy Energy Utilization Reporting Service (NEURS) Plus	NEURS Plus is an updated version of the Navy Energy Use Reporting System (NEURS) that will include shore power data and improves accuracy, accountability, and ease of reporting.	Reduce Demand	Direct	4557	02	0408042N	520	250	250	1,255
Navy	Operations Route Planning Optimization Tool	The Operations Route Planning Optimization Tool (ORPOT) is a Fleet shore-based system that provides real-time interactive weather routing, current surface information, and fuel management to enhance operational efficiency.	Reduce Demand	Direct	4557	02	0408042N	4270	3200	1,500	5,518
Navy	Hull Performance Monitoring	The Hull Performance Monitoring System measures shaft torque and horsepower, speed over ground and speed through the water, wind speed and direction, ship course, trim and draft, and sea state to assess hull performance and provide maintenance and operations.	Reduce Demand	Direct	4557	02	0408042N	3250	3250	3,250	7,907
Navy	Intelligent HVAC	By automating plant control systems, matching plant generation to demand, and using Variable Air Volume design, T-AKE HVAC&R plants can be made efficient through a range of conditions and still retain the full maximum capacity.	Reduce Demand	Direct	4557	02	0408042N	0	1800	3,600	10,983
Navy	LMSR Alternative ROS Shore Steam Heating/Hotel Service	The installation of an electrical vertical package boiler eliminates the need for steam supplied from shore for Bob Hope-class LMSRs. When LMSRs are berthed in port, the ship's hot water is supplied by steam normally generated from an auxiliary boiler.	Reduce Demand	Direct	4557	02	0408042N	720	720	220	440
Navy	LMSR Lighting Upgrade	This energy initiative is to replace sodium and mercury vapor lighting to both reduce energy and minimize hazardous material generation.	Reduce Demand	Direct	4557	02	0408042N	1770	1770	2,220	7,458
Navy	Magnet Coupled Variable Speed Drives	Magnet Coupled Variable Speed Drives (MCVSD) can be used onboard LMSRs in reduced operating status (ROS) to allow reduced output or air from a fan or fluid from a pump by varying the speed of the motor, leading to reduced energy consumption.	Reduce Demand	Direct	4557	02	0408042N	2900	900	300	1,505
Navy	Propeller Upgrade	Modifications such as boss-caps and reduced blade cross-sectional area are anticipated to reduce fuel consumption associated with propulsion.	Reduce Demand	Direct	4557	02	0408042N	500	500	500	2,509

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Ship's Engine Automation Upgrade	Replacement engine automation technology for Bob-Hope class LMSRs will optimize engine performance by correcting the load profile to eliminate cavitations and improve engine efficiency, reduce slip, and provide a far more fuel efficient system.	Reduce Demand	Direct	4557	02	0408042N	800	400	400	400
Navy	Shore Power Management/Monitoring System	A Shore Power Monitor stores energy and power quality data including cumulative kWh, peaks, and several power quality metrics. The compiled data enables MSC to monitor and manage shore power usage and implement appropriate energy conserv.	Reduce Demand	Direct	4557	02	0408042N	1870	1880	1,900	1,900
Navy	Energy Auditing and Energy Management Planning (OPLOG)	MSC will manage and conduct energy audits to analyze energy usage onboard ships, facilitate and optimize energy reduction methods, and analyze the alternatives to reduce energy costs.	Reduce Demand	Direct	4557	04	0408042N	980	1511	1,143	9,498
Navy	Nuclear Studies	Initiatives to identify improvements to the power and energy density of the nuclear propulsion plant that will reduce ship weight and volume impacts and reduce nuclear powered ship acquisition costs, in the event that the Navy identifies warfighting capability.	Reduce Demand	Direct	1319	04	0603570N	2000	2100	0	0
Navy	Electric Ships Office Efficiency Initiatives	Advanced gas turbine to provide better fuel efficiency, meet requirements for advanced sensors and future weapons, reduce weight, and lower life cycle costs. Potentially, DDG-51 Flight III ships could be forward fit with three GTG rather than four.	Reduce Demand	Direct	1319	04	0603573N	2000	11359	11,607	19,572
Navy	Electric Ships Office Efficiency Initiatives	ESO assumes responsibility for developing Next Generation Integrated Power System (NGIPS) technology aboard Navy Ships to provide smaller, simpler, more affordable, and more capable power systems. Supported initiatives include Energy Storage for Single Generator.	Reduce Demand	Direct	1319	04	0603573N	10500	8241	6,593	20,243
Navy	Fleet Readiness R&D Program	FRR&DP focuses on technologies that can be quickly transitioned to increase energy efficiency and reduce maintenance costs. Includes T&E of various initiatives, as well as Smart Voyage Planning Decision Aid and Energy Dashboard. SVPDA is software for Naval operations.	Reduce Demand	Direct	1319	04	0603724N	17494	8851	7,695	64,386
Navy	Air Energy Conservation Program	Develop, implement and sustain Aircraft Energy Conservation Program Office to identify, validate, disseminate and incentivize energy conservation best practices within the Naval Aviation community. Targets include culture, fueling, and mission plan.	Reduce Demand	Direct	1319	04	0603724N	1500	2200	1,484	7,420
Navy	Aviation Energy Conservation RDTE	This initiative will optimize the fuel efficiency of the F-35 air vehicle with attention to the PTMS Pre-Flight Operational Mode, GPS Approach Capability, CTOL /CV Nozzle Optimization, and Subsystem Standby Modes. These technologies will be forward fit	Reduce Demand	Direct	1319	04	0603724N	0	0	2,627	32,947
Navy	Aviation Energy Conservation RDTE	This initiative will optimize the fuel efficiency of the F-35 engine with various technologies, including Advanced Technology HPC, Optimized Turbine Cooling, Advanced Technology HPT, Turbine Clearance Control, and Fuel Burn Optimized Control Mode.	Reduce Demand	Direct	1319	04	0603724N	19800	13661	18,877	58,156

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Hybrid Electric Drive RDTE	An electric motor attached to the main reduction gear of DDG-51-class ships allows for electric propulsion mode resulting in improved fuel economy.	Reduce Demand	Direct	1319	05	0604567N	16006	16425	18,040	79,750
Navy	Hybrid Electric Drive Implementation	An electric motor attached to the main reduction gear of DDG-51-class ships allows for electric propulsion mode resulting in improved fuel economy.	Reduce Demand	Direct	1810	01	0708017N	0	0	17,000	206,560
Navy	Shipboard Incentivized Energy Conservation Program	The Shipboard Incentivized Energy Conservation Program (i-ENCON) provides ships with operational techniques to reduce fuel consumption. Naval Sea Systems Command provides ships with the necessary training, tools and guidance that help to increase ships' capabilities.	Reduce Demand	Direct	1804	04	0708017N	500	500	600	3,011
Navy	LCAC Efficiency Improvements		Reduce Demand	Indirect	1319	07	0204413N	0	0	3,130	10,572
Navy	Aviation Energy Conservation RDTE	The Joint Mission Planning System (JMPS) will take into account aircraft performance and current environmental data to provide optimal altitude and airspeed combinations for a given route.	Reduce Demand	Indirect	1319	04	0603724N	300	600	736	2,208
Navy	Aviation Energy Conservation RDTE	The aircraft energy conservation RDTE project identifies, evaluates, validates and advocates for implementation of energy savings initiatives for legacy aircraft by engaging technical experts from across Naval aviation, other services, and allies.	Reduce Demand	Indirect	1319	04	0603724N	2000	2800	4,680	56,053
Navy	Simulator Upgrades	The Navy Aviation Simulator Master Plan (NASMP) identified capability (fidelity) and capacity upgrades required to maximize T&R simulation for F/A 18 A/C, F/A-18E/F, EA-18G, MH-60R/S, and E-2C aircraft given fiscal, technological, and minimum flight time.	Reduce Demand	Indirect	1506	07	0804743N	64000	64000	66,030	368,343
Navy	Maritime S&T		Expand Supply	Research	1319	01	0601103N	2423	1249	0	0
Navy	Maritime S&T		Expand Supply	Research	1319	01	0601103N	567	0	0	0
Navy	Maritime S&T		Expand Supply	Research	1319	01	0601103N	495	1500	1,500	5,010
Navy	Maritime S&T		Expand Supply	Research	1319	01	0601103N	1460	0	0	0
Navy	Expeditionary S&T	Conduct fundamental research to identify and investigate suitable materials for energy storage (e.g. advanced polymer, composite dielectric film, multi-layer glass-ceramic composite).	Expand Supply	Research	1319	01	0601153N	526	2607	2,700	13,923
Navy	Fuels S&T	Accelerate the adoption of biofuels and blended logistic fuels by supporting Navy certification process, understand and mitigate the impact of emerging fuels on naval power systems and opns.	Expand Supply	Research	1319	01	0601153N	1250	1250	1,250	6,250
Navy	Maritime S&T	Conduct fundamental research to identify and investigate suitable materials for energy storage (e.g. advanced polymer, composite dielectric film, multi-layer glass-ceramic composite).	Expand Supply	Research	1319	01	0601153N	1953	1895	1,969	10,128
Navy	Maritime S&T	Conduct fundamental research to identify and investigate suitable materials for energy storage (e.g. advanced polymer, composite dielectric film, multi-layer glass-ceramic composite).	Expand Supply	Research	1319	01	0601153N	2110	2700	2,800	14,390

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Maritime S&T	Conduct fundamental research to identify and investigate suitable materials for energy storage (e.g. advanced polymer, composite dielectric film, multi-layer glass-ceramic composite).	Expand Supply	Research	1319	01	0601153N	1950	1805	1,870	9,634
Navy	Maritime S&T	Elucidate/optimize marine microbes and mechanisms responsible for electron transfer to anodes (in sediments) and cathodes (in overlying water) and configure electronics to allow practical powering of low-power devices.	Expand Supply	Research	1319	01	0601153N	713	700	700	1,900
Navy	Fuels S&T		Expand Supply	Research	1319	01	0601153N	0	300	300	1,500
Navy	Maritime S&T	Conduct fundamental research to identify and investigate suitable materials for energy storage (e.g. advanced polymer, composite dielectric film, multi-layer glass-ceramic composite).	Expand Supply	Research	1319	01	0601153N	1829	0	0	0
Navy	Expeditionary S&T		Expand Supply	Research	1319	01	0601153N	169	170	85	85
Navy	Fuels S&T		Expand Supply	Research	1319	01	0601153N	170	170	85	85
Navy	Maritime S&T		Expand Supply	Research	1319	01	0601153N	150	150	0	0
Navy	Maritime S&T		Expand Supply	Research	1319	01	0601153N	130	135	0	0
Navy	Maritime S&T		Expand Supply	Research	1319	01	0601153N	172	0	0	0
Navy	Expeditionary S&T	Develop and demonstrate a modular, compact, high temperature fuel cell system that provides highly efficient, yet silent power for military vehicle and towable APU applications.	Expand Supply	Research	1319	02	0602123N	2810	0	0	0
Navy	Fuels S&T	Determine the viability of alternative fuels derived from biomass and waste sources for naval gas turbine and diesel engine opns.	Expand Supply	Research	1319	02	0602123N	2000	2000	2,000	10,000
Navy	Expeditionary S&T		Expand Supply	Research	1319	02	0602123N	1500	1200	1,000	5,000
Navy	Expeditionary S&T		Expand Supply	Research	1319	02	0602123N	1000	1000	1,000	5,000
Navy	Fuels S&T		Expand Supply	Research	1319	02	0602123N	2500	2500	2,500	12,500
Navy	Maritime S&T		Expand Supply	Research	1319	02	0602123N	0	4756	4,852	20,816
Navy	Fuels S&T		Expand Supply	Research	1319	02	0602236N	0	0	0	600
Navy	Maritime S&T		Expand Supply	Research	1319	02	0602236N	792	750	750	3,250
Navy	Maritime S&T	Develop high endurance power and air-independent propulsion for UUVs.	Expand Supply	Research	1319	02	0602747N	3500	4300	6,900	25,600

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
Navy	Maritime S&T		Expand Supply	Research	1319	02	0602747N	1493	1622	1,638	8,572
Navy	Expeditionary S&T		Expand Supply	Research	1319	02	0602750N	1874	1756	1,442	3,119
Navy	Maritime S&T		Expand Supply	Research	1319	02	0602750N	0	0	1,114	8,449
Navy	Expeditionary S&T	Development of lunchbox-sized, JP-8 fueled 500-1000W power generation technologies and modular power conversion technologies to provide power to range of USMC applications.	Expand Supply	Research	1319	03	0603673N	1466	0	0	0
Navy	Expeditionary S&T		Expand Supply	Research	1319	03	0603673N	805	1982	2,196	6,965
Navy	Maritime S&T		Expand Supply	Research	1319	03	0603673N	0	0	1,236	12,101
Navy	Onboard Vehicle Power		Expand Supply	Direct	1810	05	0204455N	0	0	3,459	11,246
Navy	Alternative Fuels Program	This program develops technical data through the execution of laboratory, component, engine, fuel system, and weapon system tests, which evaluates the effects of changes in fuel chemistry and properties on the performance and reliability of Naval ship.	Expand Supply	Direct	1319	04	0603724N	16000	11194	7,649	66,226
							Total Navy OE			357,363	1,830,088

Appendix C: Assessment of FY 2014 President's Budget Operational Energy Initiatives
Table 9. Marine Corps FY14 Operational Energy Initiatives (\$000)

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code Element	Program	FY2012	FY2013	FY2014	FYDP
USMC	Portable Electric Energy And Water Purification	Hybridization and microgrid concepts for small (3KW to 10KW) power sources, alternative JP-8 and waste to electric conversion technologies, energy efficient electronic devices (radios), and robust high-lifecycle mechanical energy storage systems. ,	Reduce Demand	Research	1319	03	0603640M	1100	3802	3,500	20,671
USMC	Portable Electric Energy and Water Purification	Metal-air Batteries, JP-8 fuel cells, Electrochemical ultracapacitors, Wearable power distribution, Kinetic and Solar Energy Harvesting, Energy efficient small unit water purification technologies (filtration, desalination, sanitation).	Reduce Demand	Research	1319	02	0602131M	1845	1430	1,279	6,936
USMC	Squad Electric Power Network (SEPN)	Squad Electric Power Network seeks to develop a lightweight, Marine-portable system capable of accepting multiple or a variety of energy inputs that can charge/power electrical devices worn or employed by a Marine to include common battery	Reduce Demand	Research	1319	03	0603640M	250	250	0	0
USMC	Fuel Efficient MTVR FNC Transition	Through analysis, modeling and simulation, hardware development, integration, test, and evaluation, the Fuel Efficient Medium Tactical Vehicle Replacement (MTVR) FNC program will select, bench test, and integrate a suite of affordable fuel eff.	Reduce Demand	Indirect	1319	07	0206624M	1355	1500	2,411	11,609
USMC	Fuel Efficient MTVR FNC Transition	Through analysis, modeling and simulation, hardware development, integration, test, and evaluation, the Fuel Efficient Medium Tactical Vehicle Replacement (MTVR) FNC program will select, bench test, and integrate a suite of affordable fuel eff.	Reduce Demand	Indirect	1109	05	0702808M	0	0	201	8,765
USMC	Enhance Environmental Control Unit	Family includes ECUs. Portfolio is horizontal/vertical configured MC Standard air conditioners. ECUs range from 9,000 to 120,000 BTUs for 50/60/400HZ. Procurement of EECU will reduce fossil fuel consumption.	Reduce Demand	Indirect	1109	06	0502514M	762	4199	1,424	7,758
USMC	Enhance Environmental Control Unit	Family includes ECUs. Portfolio is horizontal/vertical configured MC Standard air conditioners. ECUs range from 9,000 to 120,000 BTUs for 50/60/400HZ. Procurement of EECU will reduce fossil fuel consumption.	Reduce Demand	Indirect	1106	01	0206624M	12	8	201	607
USMC	Enhance Environmental Control Unit	Family includes ECUs. Portfolio is horizontal/vertical configured MC Standard air conditioners. ECUs range from 9,000 to 120,000 BTUs for 50/60/400HZ. Procurement of EECU will reduce fossil fuel consumption.	Reduce Demand	Indirect	1109	06	0206315M	1207	0	10,577	56,993
USMC	Enhance Environmental Control Unit	Family includes ECUs. Portfolio is horizontal/vertical configured MC Standard air conditioners. ECUs range from 9,000 to 120,000 BTUs for 50/60/400HZ. Procurement of EECU will reduce fossil fuel consumption.	Reduce Demand	Indirect	1319	07	0206624M	0	2998	1,998	4,539
USMC	Shelters, Shelter Liners, Lighting upgrades	Improved R-values for GP Medium; decrease number of shelters by replacing 10- man Arctic with 15-man Arctic shelter; procure more efficient Space Heater Arctic. Also includes efforts to procure next generation lighting.	Reduce Demand	Indirect	1106	01	0203761M	0	7536	7,530	37,796

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
USMC	Shelters, Shelter Liners, Lighting upgrades	R&D for future shelter systems and USMC lighting solution of the future.	Reduce Demand	Indirect	1319	07	0206623M	0	450	300	1,290
USMC	Small Unit Water Purifiers	Technology upgrades to increase potable water output while reducing system energy demands in order to provide expeditionary point of production water at mid to small forward operating bases. This will reduce resupply efforts.	Reduce Demand	Indirect	1109	06	0206315M	0	2000	5,100	9,300
USMC	Advance Mobile Medium Power Sources	The Family of Mobile Power Equipment is a family-of-systems to continuously procure, update, and replenish approximately 19,000 items of Mobile Tactical Power Generation & Distribution Equipment to include 22 different TAMCNs.	Reduce Demand	Indirect	1319	07	0206624M	0	2500	1,000	2,500
USMC	Advance Mobile Medium Power Sources	The Family of Mobile Power Equipment is a family-of-systems to continuously procure, update, and replenish approximately 19,000 items of Mobile Tactical Power Generation & Distribution Equipment to include 22 different TAMCNs.	Reduce Demand	Indirect	1106	01	0702808M	45	193	201	607
USMC	Advance Mobile Medium Power Sources	The Family of Mobile Power Equipment is a family-of-systems to continuously procure, update, and replenish approximately 19,000 items of Mobile Tactical Power Generation & Distribution Equipment to include 22 different TAMCNs.	Reduce Demand	Indirect	1109	06	0206315M	6246	11190	8,750	34,854
USMC	Field Autoclave	Upgrades the 40 year old M-138 Field Sanitizer to more efficient model.	Reduce Demand	Indirect	1106	01	0203761M	0	1011	0	0
USMC	Field Autoclave	Upgrades the 40 year old M-138 Field Sanitizer to more efficient model.	Reduce Demand	Indirect	1109	06	0206315M	0	1660	1,790	1,790
USMC	Fuel Efficient MTRV FNC Transition	Through analysis, modeling and simulation, hardware development, integration, test, and evaluation, the Fuel Efficient Medium Tactical Vehicle Replacement (MTRV) FNC program will select, bench test, and integrate a suite of affordable fuel efficiency.	Reduce Demand	Indirect	1106	01	0206315M	0	0	1,000	28,135
USMC	Next Generation SPACES, GREENS	Advanced Power Sources is a family of small power devices to provide portable electric power for legacy and future weapons, optics, sensors, medical, intelligence and communications systems. The Family consists of multiple suites.	Expand Supply	Direct	1319	07	0206624M	0	4000	1,514	4,934
USMC	SPACES, GREENS, RPAs	O&M funding for APS portfolio SPACES, GREENS, on board pwr mgmt, radio pwr adapters).	Expand Supply	Direct	1106	01	0206624M	228	1	137	287
USMC	SPACES, GREENS, RPAs	O&M funding for APS portfolio SPACES, GREENS, on board pwr mgmt, radio pwr adapters).	Expand Supply	Direct	1106	01	0203761M	0	599	930	3,603
USMC	SPACES, GREENS, RPAs	O&M funding for APS portfolio SPACES, GREENS, on board pwr mgmt, radio pwr adapters).	Expand Supply	Direct	1106	03	0804771M	0	103	136	537

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
USMC	SPACES, GREENS, RPAs	Procurement of APS family of systems (Greens, Spaces, battery management, on board power, radio power adapters).	Expand Supply	Direct	1109	06	0206211M	2919	12000	13,360	78,870
USMC	Expeditionary Energy Office	USMC Senior Official for Operational Energy, Plans and Programs. Tasked by CMC to Analyze, develop, and direct the Marine Corps' energy strategy in order to optimize expeditionary capabilities across all Warfighting functions.	Future Force	Direct	1106	04	0902498M	4272	4593	4,448	22,988
USMC	Experimental Forward Operational Base (ExFOB)	Semi-Annual process to evaluate and deploy technologies to support Marine Corps Expeditionary Energy Strategy goals of increased combat effectiveness and reduced dependence on liquid logistics on the battlefield.	Future Force	Direct	1319	07	0206313M	2403	2448	2,489	12,776
							Total Marine OE			70,276	358,145

Appendix C: Assessment of FY 2014 President's Budget Operational Energy Initiatives
Table 10. Air Force FY14 Operational Energy Initiatives (\$000)

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code Element	Program Code Element	FY2012	FY2013	FY2014	FYDP
USAF	Materials	Develop and predict behavior and life of SiC/SiC ceramic disk composites for ADVENT and HEETE engine demonstrators.	Reduce Demand	Research	3600	02	0602102F	4100	4200	8,200	29,600
USAF	Materials	Develop new materials and architectures for advanced energy and power devices.	Reduce Demand	Research	3600	02	0602102F	0	2900	2,800	14,400
USAF	Materials	Enable higher engine cycle efficiencies through improved alloys, process and life prediction methods for engine disks.	Reduce Demand	Research	3600	02	0602102F	7700	0	0	0
USAF	Defense Research Sciences	Optimizing efficiency through computational data decisions with regard to which data to absorb, when it should be absorbed, and how it should be absorbed.	Reduce Demand	Research	3600	01	0601102F	900	1100	1,000	5,000
USAF	Defense Research Sciences	Determine if carbon nanostructures may lead to the discovery of highly efficient photovoltaics, thermoelectrics, and new super conductors.	Reduce Demand	Research	3600	01	0601102F	5100	6900	6,000	30,000
USAF	Battlespace Knowledge Development and Demonstration	Develop Memristor and CMOS technologies to improve energy efficient computing.	Reduce Demand	Research	3600	03	0603788F	0	0	0	1,750
USAF	Aerospace Vehicle Technologies	Develop light weight composite structures to reduce weight, manufacturing cost and are air worthiness certifiable.	Reduce Demand	Research	3600	02	0602201F	3100	4400	5,200	13,700
USAF	Aerospace Vehicle Technologies	Enhance system capability and reduce fuel burn with advanced air vehicle designs.	Reduce Demand	Research	3600	02	0602201F	25800	6600	9,800	51,100
USAF	Aerospace Vehicle Technologies	Develop technologies to integrate very high bypass ratio engines and open rotor engine designs into advance aircraft configurations.	Reduce Demand	Research	3600	02	0602201F	8400	4300	4,000	38,900
USAF	Aerospace Vehicle Technologies	Develop formation flight strategies to minimize mission fuel burn.	Reduce Demand	Research	3600	02	0602201F	0	0	2,200	4,400
USAF	Aerospace Vehicle Technologies	Develop fuel burn reduction technologies for the legacy and future fleets.	Reduce Demand	Research	3600	02	0602201F	4500	12100	12,900	60,100
USAF	Aerospace Propulsion	Mature ADVENT technologies and accelerate EMD with preliminary design and risk reduction.	Reduce Demand	Research	3600	02	0602203F	11100	47400	22,000	25,300
USAF	Aerospace Propulsion	Develop multi-design point engine technologies that automatically adjust fan and core airflow for fuel efficiency at all flight conditions.	Reduce Demand	Research	3600	02	0602203F	11500	14800	800	4,000
USAF	Aerospace Propulsion	Develop 10X propulsion capability for small engines that increase thrust to weight and decrease specific fuel consumption.	Reduce Demand	Research	3600	02	0602203F	300	0	1,500	7,500
USAF	Aerospace Propulsion	Develop fuel efficient large fan/jet propulsion technologies supporting extreme endurance and range.	Reduce Demand	Research	3600	02	0602203F	6000	4100	11,700	38,200

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
USAF	Aerospace Propulsion	Develop an integrated suite of efficient, mission adaptive, robust electrical and thermal management systems to reduce aircraft energy demand.	Reduce Demand	Research	3600	02	0602203F	23900	23300	21,000	99,800
USAF	Aerospace Propulsion	Develop advanced aircraft subsystem components for on-demand subsystems.	Reduce Demand	Research	3600	02	0602203F	0	0	0	15,600
USAF	Aerospace Propulsion	Develop an integrated suite of efficient, mission adaptive, robust electrical and thermal management systems to reduce aircraft energy demand.	Reduce Demand	Research	3600	02	0602203F	5900	6800	6,800	27,200
USAF	Dominant Information Sciences and Methods	Demonstrate significant , information processing size, weight, and power performance gains using 3D chip stacking with logic-on-logic integration.	Reduce Demand	Research	3600	02	0602788F	330	300	300	750
USAF	Dominant Information Sciences and Methods	Develop CMOS compatible methods to fabricate energy efficient hybrid circuits and systems.	Reduce Demand	Research	3600	02	0602788F	800	200	200	750
USAF	Dominant Information Sciences and Methods	Develop Memristor and CMOS technologies to improve energy efficient computing.	Reduce Demand	Research	3600	02	0602788F	1020	970	1,250	2,250
USAF	Dominant Information Sciences and Methods	Develop revolutionary quantum computing processors.	Reduce Demand	Research	3600	02	0602788F	950	390	520	520
USAF	Dominant Information Sciences and Methods	Develop an attack resilient energy efficient processor.	Reduce Demand	Research	3600	02	0602788F	900	1100	1,100	1,100
USAF	Advanced Materials for Weapon Systems	Demonstrate SiC/SiC ceramic disk composites for ADVENT and HEETE engine demonstrators.	Reduce Demand	Research	3600	03	0603112F	1500	300	0	6,300
USAF	Advanced Materials for Weapon Systems	Demonstrate advanced high temperature materials for risk reduction of ADVENT technologies that accelerate EMD preliminary design and risk reduction.	Reduce Demand	Research	3600	03	0603112F	0	21500	2,000	2,000
USAF	Advanced Materials for Weapon Systems	Demonstrate improved alloys, process and life prediction methods for engine disks.	Reduce Demand	Research	3600	03	0603112F	2200	1300	0	0
USAF	Aerospace Technology Development/Demonstration	Demonstrate design technologies for risk reduction of ADVENT technologies that accelerate EMD preliminary design and risk reduction.	Reduce Demand	Research	3600	03	0603211F	0	42000	20,000	20,000
USAF	Aerospace Technology Development/Demonstration	Demonstrate technologies to integrate very high bypass ratio engines and open rotor engine designs into advance aircraft configurations.	Reduce Demand	Research	3600	03	0603211F	100	1100	2,500	2,500
USAF	Aerospace Technology Development/Demonstration	Demonstrate formation flight strategies to minimize mission fuel burn.	Reduce Demand	Research	3600	03	0603211F	3200	400	0	9,200
USAF	Aerospace Technology Development/Demonstration	Demonstrate light weight composite structures to reduce weight, manufacturing cost and are air worthiness certifiable.	Reduce Demand	Research	3600	03	0603211F	15500	6100	2,700	33,800

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
USAF	Aerospace Technology Development/Demonstration	Demonstrate Technologies to reduce aircraft drag and improve fuel burn.	Reduce Demand	Research	3600	03	0603211F	4600	12200	12,900	60,100
USAF	Aerospace Propulsion and Power Technology	Demonstrate advanced aircraft subsystem components for on-demand subsystems.	Reduce Demand	Research	3600	03	0603216F	5300	3000	7,500	44,600
USAF	Aerospace Propulsion and Power Technology	Demonstrate decreased energy storage weight for battlefield airman by 50%.	Reduce Demand	Research	3600	03	0603216F	400	0	0	0
USAF	Aerospace Propulsion and Power Technology	Mature ADVENT Technologies and accelerate EMD with preliminary design and risk reduction.	Reduce Demand	Research	3600	03	0603216F	0	68100	66,000	150,800
USAF	Aerospace Propulsion and Power Technology	Demonstrate multi-design point engine technologies that automatically adjust fan and core airflow for fuel efficiency at all flight conditions.	Reduce Demand	Research	3600	03	0603216F	29700	20500	0	0
USAF	Aerospace Propulsion and Power Technology	Demonstrate fuel efficient large fan/jet propulsion technologies supporting extreme endurance and range.	Reduce Demand	Research	3600	03	0603216F	0	0	0	96,300
USAF	Aerospace Propulsion and Power Technology	Develop 10X propulsion capability for small engines that increase thrust to weight and decrease specific fuel consumption.	Reduce Demand	Research	3600	03	0603216F	5200	1900	6,000	31,600
USAF	Human Effectiveness Applied Research	Develop and demonstrate interactive toolset for live virtual training.	Reduce Demand	Research	3600	03	0603456F	2100	2500	2,300	9,000
USAF	Battlespace Knowledge Development and Demonstration	Develop and demonstrate significant size, weight, and power performance gains using 3D chip stacking.	Reduce Demand	Research	3600	03	0603788F	100	0	0	0
USAF	Battlespace Knowledge Development and Demonstration	Develop an attack resilient energy efficient processor.	Reduce Demand	Research	3600	03	0603788F	200	0	0	0
USAF	Expeditionary Energy Technology	RDT&E effort to develop deployable phase-change material (PCM)-equipped systems designed to pre-cool or pre-heat incoming air to environmental control units.	Reduce Demand	Research	3600	05	0604617F	0	0	800	2,400
USAF	Expeditionary Energy Technology	RDT&E effort to develop autonomous, in-shelter smart control systems for expeditionary structures.	Reduce Demand	Research	3600	05	0604617F	0	0	1,200	3,600
USAF	KC135	This is a fuel efficiency initiative for updating the KC 135 ACARS standard message set for fuel analysis. The modification is ongoing. Once completed the AMC Fuel Efficiency Office will track and analyze fuel usage.	Reduce Demand	Direct	3400	02	0401218F	0	2300	1,955	2,455
USAF	KC-135s	CFM Propulsion Upgrade Program (C-PUP) inserts modern technology into F-108 engine. Initiative will change/upgrade the high pressure (HP) turbine nozzle, turbine shroud assembly, turbine blades and compressor blades/vanes.	Reduce Demand	Direct	3400	02	0401218F	0	29016	23,300	97,700

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
USAF	AMC Command & Control	Procured COTS Mission Indexed Flying (MIF) software for KC-10, & KC-135 fleets to use inflight to reduce fuel consumption by flying optimum altitudes and speeds; also procured for C-17 and C-5 fleets using TWCF funds.	Reduce Demand	Direct	3400	02	0401840F	0	45	37	189
USAF	AMC Command & Control	ACFP Overlay (from USTC/CC speech) Other improvements such as the Advanced Computer Flight Planning overlay, reduce the excess fuel carried which increases the amount of cargo the aircraft can carry -- again lowering the cost to the taxpayer.	Reduce Demand	Direct	3400	02	0401840F	0	45	37	37
USAF	C-5 Airlift Squadrons	This is a fuel efficiency initiative for updating the C-5 ACARS standard message set for fuel analysis. The modification is ongoing. Once completed the AMC Fuel Efficiency Office will track and analyze fuel usage.	Reduce Demand	Direct	3010	05	0401119F	7600	6362	0	0
USAF	Expeditionary Energy Technology	RDT&E effort to develop BEAR microgrid system to manage power load, allow renewable energy sources and reduce fuel required to operate expeditionary tent cities.	Reduce Demand	Direct	3600	05	0604617F	0	0	1,700	5,100
USAF	C17	This is a fuel efficiency initiative for updating the C-17 ACARS standard message set for fuel analysis. The modification is ongoing. Once completed the AMC Fuel Efficiency Office will track and analyze fuel usage.	Reduce Demand	Direct	3010	07	0401130F	0	3500	1,500	1,500
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	8490	876	0	0
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	16075	1745	0	0
USAF	Vehicles & Support Equipment - Guard	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502844F	182	56	112	1,329
USAF	Vehicles & Support Equipment - Guard	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502844F	1465	1708	1,754	12,363
USAF	Vehicles & Support Equipment - Guard	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502844F	0	0	120	1,047
USAF	Vehicles & Support Equipment - Guard	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502844F	0	324	541	3,829
USAF	Vehicles & Support Equipment - Guard	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502844F	4440	404	1,709	6,022
USAF	Vehicles & Support Equipment - Guard	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502844F	3898	310	1,847	13,905

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
USAF	Vehicles & Support Equipment - Mobility	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0402834F	641	0	0	0
USAF	Vehicles & Support Equipment - Mobility	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0402834F	480	432	0	0
USAF	Vehicles & Support Equipment - Mobility	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0402834F	183	9	0	0
USAF	Vehicles & Support Equipment - Mobility	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0402834F	0	824	0	0
USAF	Vehicles & Support Equipment - Mobility	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0402834F	1227	1012	0	0
USAF	Vehicles & Support Equipment - Mobility	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0402834F	1962	1017	0	0
USAF	Vehicles & Support Equipment - Mobility	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0402834F	2929	300	0	0
USAF	Vehicles & Support Equipment - Mobility	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0402834F	2948	318	0	0
USAF	Replacement Vehicle/Equipment	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702831F	0	0	3,734	34,416
USAF	Replacement Vehicle/Equipment	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702831F	0	0	13,177	95,923
USAF	Replacement Vehicle/Equipment	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702831F	0	0	12,042	110,615
USAF	Replacement Vehicle/Equipment	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702831F	0	0	9,715	84,743
USAF	Replacement Vehicle/Equipment	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702831F	0	0	11,102	81,419
USAF	Replacement Vehicle/Equipment	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702831F	0	0	8,626	60,047
USAF	Replacement Vehicle/Equipment	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702831F	0	0	6,159	20,856
USAF	Replacement Vehicle/Equipment	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702831F	0	0	12,444	103,514
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	4132	796	0	0

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	4132	796	0	0
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	15196	14944	0	0
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	17109	1398	0	0
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	32	4749	0	0
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	16736	6568	0	0
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	52	0	0	0
USAF	Vehicles & Support Equipment - General	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0202834F	9614	6116	0	0
USAF	Vehicles & Support Equipment - Reserve	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502834F	50	14	57	583
USAF	Vehicles & Support Equipment - Reserve	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502834F	897	1033	1,051	7,478
USAF	Vehicles & Support Equipment - Reserve	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502834F	0	174	1,926	16,845
USAF	Vehicles & Support Equipment - Reserve	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502834F	0	193	323	3,016
USAF	Vehicles & Support Equipment - Reserve	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502834F	0	1048	2,354	14,202
USAF	Vehicles & Support Equipment - Reserve	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502834F	0	1314	3,017	18,513
USAF	Vehicles & Support Equipment - Reserve	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502834F	968	90	276	1,027
USAF	Vehicles & Support Equipment - Reserve	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0502834F	547	43	253	1,883

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
USAF	Vehicles and Support Equipment - Supply	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702834F	161	20	0	0
USAF	Vehicles and Support Equipment - Supply	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702834F	0	52	0	0
USAF	Vehicles and Support Equipment - Supply	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702834F	1360	0	0	0
USAF	Vehicles and Support Equipment - Supply	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702834F	-529	0	0	0
USAF	Vehicles and Support Equipment - Supply	Federal Fleet Performance - acquire the smallest, most fuel-efficient vehicles necessary to fulfill the AF mission.	Reduce Demand	Indirect	3080	02	0702834F	2401	184	0	0
USAF	C-5 Airlift Squadrons	Fuel efficiency was not the primary driver for the RERP modification and with only 21 aircraft modified at this point there is not enough data to predict savings in the out years.	Reduce Demand	Indirect	3010	05	0401119F	1073234	1238805	1,153,900	1,488,649
USAF	Materials	Accelerate materials design/development/test cycle for energy efficient aircraft design.	Expand Supply	Research	3600	02	0602102F	3000	7100	8,100	23,000
USAF	Materials	Develop high energy density capacitor materials.	Expand Supply	Research	3600	02	0602102F	1100	1200	1,300	1,300
USAF	Defense Research Sciences	To develop new methods to slit and store hydrogen, turn CO2 into fuels using solar energy and to produce hydrogen with photosynthetic molecules.	Expand Supply	Research	3600	01	0601102F	6100	4300	2,000	6,000
USAF	Space Technology	Develop solar cells for space power generation that are 33% - 37% efficient.	Expand Supply	Research	3600	03	0603401F	1400	1400	1,400	6,900
USAF	Defense Research Sciences	Develop "self-powered" load-bearing structures with integrated energy harvest/storage capabilities, and to establish new multi-functional design rules.	Expand Supply	Research	3600	01	0601102F	6600	5900	6,000	30,000
USAF	Defense Research Sciences	Develop highly efficient >40% solar cells.	Expand Supply	Research	3600	01	0601102F	4900	4600	4,700	25,800
USAF	Defense Research Sciences	To develop detailed and reduced mechanisms for the combustion of surrogates of petroleum fuels.	Expand Supply	Research	3600	01	0601102F	2900	900	500	2,500
USAF	University Research Initiative	To develop new methods to slit and store hydrogen, turn CO2 into fuels using solar energy and to produce hydrogen with photosynthetic molecules.	Expand Supply	Research	3600	01	0601103F	6100	4300	2,000	6,000

ORG	OE Program Title	OE Project Description	Objective	OE Initiative	Treas Code	BA Code	Program Element	FY2012	FY2013	FY2014	FYDP
USAF	University Research Initiative	Develop carbon nanostructures for new logic gates, highly efficient photovoltaics, thermoelectrics, and fuel cells.	Expand Supply	Research	3600	01	0601103F	3900	3900	3,000	15,000
USAF	University Research Initiative	To develop self powered load-bearing structures with integrated energy harvest/storage capabilities.	Expand Supply	Research	3600	01	0601103F	1800	1000	400	400
USAF	University Research Initiative	To develop detailed and reduced mechanisms for the combustion of surrogates of petroleum fuels.	Expand Supply	Research	3600	01	0601103F	2900	1500	0	0
USAF	Human Effectiveness Applied Research	Develop airman level heating and cooling technologies.	Expand Supply	Research	3600	02	0602202F	200	160	0	0
USAF	Aerospace Propulsion	Evaluate advanced fuels for performance, environmental impact and system operations.	Expand Supply	Research	3600	02	0602203F	4200	4500	4,300	25,500
USAF	Aerospace Propulsion	Decrease energy storage weight for battlefield airman by 50%.	Expand Supply	Research	3600	02	0602203F	2800	300	0	0
USAF	Space Technology	Develop solar cells for space power generation that are 33% - 37% efficient.	Expand Supply	Research	3600	02	0602601F	4600	4600	4,200	21,400
USAF	Aerospace Propulsion and Power Technology	Demonstrate fuels for performance, environmental impact and system operations.	Expand Supply	Research	3600	03	0603216F	4800	3100	2,000	19,900
USAF	ManTech	Accelerate manufacturing produce ability of >33% efficient solar cells.	Expand Supply	Research	3600	03	0603680F	2400	3400	4,100	11,900
USAF	ManTech	Accelerate manufacturing produce ability of efficient solar cells.	Expand Supply	Research	3600	03	0603680F	0	0	0	6,300
							Total Air Force OE			1,561,938	3,435,225

Appendix D: Alternative Fuels Initiatives

This section is in response to the following requirement for the Operational Energy Annual Report as outlined in section 2925(b) of title 10, United States Code: *A description of the alternative fuel initiatives of the Department of Defense, including funding and expenditures by account and activity for the preceding fiscal year, including funding made available in regular defense Appropriation Acts and any supplemental Appropriation Acts.*

Table 11. Initiatives to Model and Develop Biomass Feedstocks and Biofuel Production Capabilities

Service	Program Title	Initiative Title	Description	Treasury Code (TC)	Budget Activity (BA)	Budget Line Item	Program Element (PE)	FY14 Funding (,000)
Navy	Force Protection Applied Research	Energy Efficiency & Alternative Energy Technologies - Biofuels	Determine the viability of alternative fuels derived from biomass and waste sources for naval gas turbine and diesel engine operations	1319	02	0000	0602123N	\$2,000
SubTotal								\$2,000

Table 12. Initiatives to Test and Evaluate Alternative / Non-Petroleum Fuels for Use in Military Fuel Systems¹⁰

Service	Program Title	Initiative Title	Description	Treasury Code (TC)	Budget Activity (BA)	Budget Line Item	Program Element (PE)	FY14 Funding (,000)
Air Force	Australia Alternative Fuels Research		Explore the combustion characteristics of alternative jet fuels relative to a traditional JP-8 jet-fuel.	3600	02		0602203F (Note: PE# contributes only \$6.3K towards total cost of AF effort)	\$178.5
Air Force	Sweden Alcohol-To-Jet Fuel Processing and Performance		Develop the Alcohol-To-Jet (ATJ) aviation fuel process, produce a sufficient quantity of ATJ fuel to satisfy program requirements, and establish ATJ test and analysis requirements to enable a flight demonstration of a Gripen aircraft using a 50/50 blend of ATJ and JP-8.	TBD	TBD		0603923D8Z (Note: PE# contributes only \$1M (57%) towards total cost of AF effort)	\$1,750
Army	Aviation Technology	Fuel Qualification and Certification Efforts	Assess the impact of using emerging alternative fuels in aviation platforms and identify changes in fuel specifications to implement alternative fuels into Army aviation systems.	2040	02	EM8	0602211A	\$20
Army	Combat Vehicle and Automotive Advanced Technology	Fuel Qualification and Certification Efforts	Assess the impact of using emerging alternative fuels in tactical/combat vehicles and other deployable assets, and will identify changes needed in fuel specifications to implement alternative fuels into Army systems.	2040	02	H77	0602601A	\$1,260
Navy	Mobility Fuels	Alternative Fuels Test and Qualification	Develop technical data through the execution of laboratory, component, engine, fuel system, and weapon system tests, which evaluates the effects of changes in fuel chemistry and properties on the performance and reliability of Naval ship, aircraft, and fuel distribution systems.	1319	04	0838	0603724N	\$9,149
SubTotal								\$12,357.5
Total Budgeted / Obligated in FY 2014								\$14,357.5

¹⁰ These initiatives include the procurement of alternative fuels to support testing and evaluation activities.

Appendix E: Recommended Changes in Organization or Authority

At this time, the Department has no recommendations for changes in organization or authority.