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Statement by

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Introduction

Chairwoman Shaheen, Ranking Member Ayotte, and distinguished members of the Subcommittee, thank you for the opportunity to discuss my office in the Department of Defense, Operational Energy Plans and Programs (OEPP). Today, the Department faces continued operational energy challenges as our defense posture adjusts to meet the rapidly-changing global security environment. The dynamic global energy landscape adds to our strategic challenges and opportunities. I will provide some perspective on those issues, along with an update of our progress and some information on the President's Fiscal Year (FY) 2015 Budget Request as it relates to operational energy.

Mission of OEPP

Established in 2010, my office's primary purpose is to strengthen the energy security of U.S. military operations. Specifically, the office's mission is to help the Military Services and Combatant Commands improve military capabilities, cut costs, and lower operational and strategic risk through better energy planning, management, and innovation. By statute, operational energy is defined as the energy required for training, moving, and sustaining military forces and weapons platforms for military operations. In June 2011, the Department released "Energy for the Warfighter: The Department of Defense Operational Energy Strategy," which set the overall direction for energy use in the Department: to assure reliable supplies of energy for 21st century military operations. It outlines three ways to meet that goal: reducing the demand for energy; expanding and securing the supply of energy; and building energy security into the future force.

These goals are especially important as we build a military force that is prepared and postured for a complex, global security environment, "capable of simultaneously defending the homeland; conducting sustained, distributed counterterrorist operations; and in multiple regions, deterring aggression and assuring allies through forward presence and engagement," as the Secretary of Defense called for in the 2014 Quadrennial Defense Review (QDR). The QDR also directly connects energy to capability, noting that, "Energy improvements enhance range, endurance, and agility, particularly in the future security environment where logistics may be constrained." To these ends, OEPP has achieved considerable progress by supporting current operations and energy innovation, building operational energy considerations into the future force, and promoting institutional change within the Department.

Changing Energy Landscape

DoD's efforts to transform our own energy use are occurring as the global energy landscape rapidly changes. Here at home, the significant surge of domestic oil and gas production is fundamentally altering the balance of the energy markets we have known for the past 40 years. The U.S. is expected to become the world's largest producer of natural gas; around the country, massive terminals built to import natural gas are now rapidly being converted to export it.[1] Oil imports have been reduced by about 2.5 million barrels a day in just the last 5 years[2] while U.S. production is expected to increase by a further 3 million barrels per day by the end of the decade.[3] The U.S. now exports around 3 million barrels per day of refined product, an increase of more than 2 million barrels per day since 2005.[4]

This rebalance is significantly altering the flow of the global energy trade. Energy shipments from West Africa that used to cross the Atlantic are now headed to Europe or through the Indian Ocean en route to Asia. Permits to export natural gas are now being approved and by the end of the decade we can expect U.S. natural gas to be available for markets in Europe and Asia. It is not just the supply patterns that are changing. Energy demand in the developed world has leveled off. The majority of the growth in the world's energy consumption over the next decade will come from the developing world with China, India, and other non-Organization for Economic Co-operation and Development countries increasing their energy consumption 50% in the next twenty years.[5]

As imports from regions which have previously exported to the US are re-directed to new customers, our economic, political, and military relationships with those countries will evolve as well. As the Department considers base access, security cooperation and partnerships, we must be cognizant of these changing underlying economic forces.

We also see how the appearance of new energy resources is influencing the Department's strategic direction. Last year, Secretary of Defense Chuck Hagel unveiled DoD's first-ever Arctic

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[1] http://www.eia.gov/todayinenergy/detail.cfm?id=13251

[2] http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=wcrimus2&f=w

[3] http://www.eia.gov/forecasts/aeo/er/early_production.cfm, EIA Annual Energy Outlook, Early Release Overview, "U.S. production of crude oil (including lease condensate) in the AEO2014 Reference case increases from 6.5 MM bbl/d in 2012 to 9.6 MM bbl/d in 2019."

[4] http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MTPEXUS2&f=M, EIA data on U.S. exports of finished petroleum products indicates monthly U.S. exports of finished petroleum products in November 2013 was 3 million bbls/d compared to 811,000 bbls/d in November 2005.

[5] http://www.eia.gov/forecasts/ieo/world.cfm - According to EIA, non OECD countries consumption will rise from 307 quadrillion BTUs in 2013 to 460 by 2030.

Strategy and addressed the driving force behind it—global climate change. According to the U.S. Navy's Task Force Climate Change, "average Arctic temperatures have increased at almost twice the global average rate" in the past 100 years, and "in 2012, Arctic sea ice reached its smallest extent in recorded history, 1.3 million square miles." The changes in that region have opened up new areas to energy development and shipping. As the Arctic region becomes more accessible to other nations, expanded capabilities and capacity may be required to increase U.S. engagement in this region.

Changes in the climate, driven by global energy use, will affect military operations elsewhere as well. Specifically, as the 2014 QDR found, climate change can act as threat multiplier, as heat waves, drought, downpours, floods, and severe storms may significantly add to the associated challenges of instability, hunger, poverty, and even conflict. At the installation level, climate risks may disrupt training, testing, and direct support to ongoing operations. In fact, the National Intelligence Council estimates over 30 US military installations face elevated risks from rising sea levels. In the cases of severe weather events, demands on the Department for humanitarian assistance or disaster response - both within the United States and abroad - may increase as the climate changes.

However, even with all these changes, some constants remain. First, it is important to point out that most of the Department's operations occur outside the U.S, and we will continue to buy energy overseas to simplify our supply chains, limit costs, and increase flexibility for the warfighter. Second, a large proportion of global energy will continue to flow through a relatively small number of chokepoints. Today, nearly a fifth of all oil and nearly 25% of globally traded liquefied natural gas transit the Strait of Hormuz. Current and planned pipelines across the Arabian Peninsula and around the Strait would provide only limited relief in the event of a blockage and would do little to cushion any global price spike. The Strait of Hormuz will continue to pose an outsize risk to global prices for the foreseeable future -- and to prices at the pump here at home.

Indeed, the Middle East will remain a major source of oil for nations across the globe, particularly our allies in Asia. Even so, the 2014 QDR states that "competition for resources, including energy and water, will worsen tensions in the coming years and could escalate regional confrontations into broader conflicts – particularly in fragile states," in the Middle East. As long as petroleum powers our transportation sector, we may experience the economic consequences of price volatility from events in any oil-producing region. At the United Nations General Assembly this past September, the President made clear that the U.S. will continue to ensure the free flow of energy from the Middle East to the world, even as the U.S. is steadily reduces our dependence on imported oil. It is important to remember

that even as the U.S. is able to meet more of our energy needs ourselves, the price for oil and petroleum products will still be set by a global market.

The Defense Energy Challenge – Today and Tomorrow

As a critical enabler for military operations, the Department consumes significant amounts of energy executing missions around the globe. While only accounting for approximately 1.3 percent of U.S. oil and petroleum consumption in FY13, the Department is the single largest energy user in the nation. In FY13, the Department consumed almost 90 million barrels of liquid fuel at a cost of $14.8 billion, with more than 60 percent of that outside of the U.S. In FY14, the Department estimates it will consume nearly 105 million barrels of liquid fuels at a cost of $16 billion. In FY15, the Department estimates it will consume 96 million barrels of liquid fuel at a cost of approximately $15 billion.

The Department's demand for operational energy varies according to the missions assigned to the Department, as well as the equipment used in to execute those missions. Including training, exercises, and the full range of military operations, the Department uses operational energy to maintain readiness and deploy, employ and sustain forces around the globe. Year over year, operations tempo reflects unexpected demands (i.e., post-9/11 operations, humanitarian relief missions) as well as changes in the magnitude of other ongoing operations like Afghanistan.

In Afghanistan, the Department used more than 9 million barrels of liquid fuels to support Operation Enduring Freedom in FY13. In addition to the fuel provided to vehicles and aircraft, the demand for electricity on the battlefield has steadily increased over years of sustained combat operations. Combat outposts and forward operating bases are the hubs for our troops – to project power from, fight from, and live in. However, they consume tremendous amounts of energy and have, therefore, been a steady focus of recent efficiency efforts.

The reliance on diesel generators to supply battlefield and contingency base electrical power produces an unintended consequence – a growing energy sustainment burden that must be sourced, in many cases, from great distances. Unfortunately, that logistics effort consumes fuel as well. The two main fuel distribution routes into Afghanistan present daunting challenges that range from the political effort needed to sustain them, to long distance transport on unimproved roads with multiple choke points and poor weather conditions which can slow movement to a trickle, and the threat of attack from insurgents or thieves. Each of these challenges adds time, manpower, and cost to the supply process. Once the fuel reaches larger distribution points inside Afghanistan, it still needs to be deployed to a nationwide network of bases and outposts. Given the terrain and the threat, aerial distribution of

supplies, including fuel, is often used to sustain coalition efforts across Afghanistan. Delivering all of this fuel takes a toll on aircraft, vehicles and personnel. Looking further back in the supply chain, DoD has depended on political support from countries that allow our energy supplies to flow into Afghanistan through northern or southern transportation routes, which can be disrupted at any time.

The growing requirement for troop-borne capability has launched another sustainment burden – portable batteries – which represents a serious logistical challenge for the warfighter as our troops are increasingly overburdened platforms themselves. They carry gear which sends and receives data from remotely powered aircraft and far-away command posts, and integrates the information into intelligence collection, surveillance, and targeting like never before. Soldiers and Marines have scopes, sights, and radios that give them unsurpassed awareness and accuracy. But, this capability requires a steady supply of power, and for dismounted operations that means batteries, and lots of them. Consider an Army estimate that an average troop on a three-day patrol may carry up to 23 batteries weighing nearly 14 pounds. While these batteries support important capabilities, the trend of increasing weight is unsustainable from both re-supply and soldier loading perspectives. Battery resupply requirements can greatly diminish a patrol's combat radius, and soldier-carried weight already impedes mobility on the battlefield and presents a significant risk of musculoskeletal injuries.

These fuel and battery requirements also place a significant logistics burden on planners, troops, equipment, and supply lines. Reducing the demand for energy on the battlefield has a direct effect on reducing the energy logistics burden and freeing up manpower and equipment resources previously engaged in logistics tasks to operational commanders for use in generating combat power.

As we draw down forces from ongoing operations in Afghanistan and adapt to a changing security environment, the Department's use of energy will continue to be of great importance. Generally speaking, our future operating environment will include a range of threats – from homemade improvised explosive devices (IEDs) and suicide bombers to GPS-guided mines and missiles, computer viruses, and electronic warfare – that may not only characterize actual combat, but also situations short of war. At the same time, the lessons of the last 12 years have not been lost on our potential adversaries, who are increasingly developing or acquiring capabilities that threaten our ability to project and sustain this power. These asymmetric and "anti-access/area-denial" capabilities will likely target those U.S. capabilities that may be more susceptible to disruption, such as logistics, energy, and command and control.

More specifically, the President and the Secretary have emphasized that we shift our strategic focus to the Asia Pacific, a region whose security and prosperity is indispensable to our own. Promoting our interests in the area – and much of that will focus on non-military tools – means long distances, far from our own shores. For example, intra-theater lift in Afghanistan requires a fraction of the fuel that will be required for intra-theater lift in the Pacific. A cargo plane flying from Bagram to Kandahar burns around 3,000 gallons of fuel, but that same aircraft will burn around 11,500 gallons of fuel flying from Guam to Seoul and over 16,000 gallons flying from Guam to Singapore. In this environment, demands for fuel, electricity, and energy logistics – aerial refuelers and oilers, for instance – can become a limiting factor for military operations. Not only will we need extended range and endurance to operate – whether for today's relief missions in the Philippines or for other military missions – but we also will need to be interoperable with our allies and partners from an energy and logistics perspective to effectively carry out coalition operations. In fact, energy can be a positive tool for cooperating with emerging partners to help support U.S. presence and operations with U.S. forces.

Reducing Demand

Increasing combat effectiveness in current operations through reductions in fuel demand has been a significant DoD focus since OEPP's establishment in 2010. To quote the former International Security Assistance Force / U.S. Forces - Afghanistan Commander General John Allen, "Operational energy equates exactly to operational capability."[6] We aspire to achieve the most "mission per gallon" by reducing the demand for energy and decreasing the logistics effort necessary to support the warfighters. The Department has made progress, particularly at the tactical edge where fuel logistics cost the most and resupply risks are the greatest. However, DoD's fuel demand still accounts for a large percentage of the overall logistics burden and many opportunities remain to build a more efficient future force. In general, this is a huge incentive for improving our materiel capabilities and is reflected in $1.7B in FY15 and $8.3B across the Future Years Defense Program that the Services have budgeted for operational energy initiatives and efficiency improvements. That equates to 91% of the OE-related budget invested in reducing the demand for energy.

[6] ISAF/USFOR-A memo, "Supporting the Mission with Operational Energy," 11 Dec 2011

Let me sketch out some key activities to highlight the OEPP's efforts in partnership with the Combatant Commanders.

US Central Command (USCENTCOM)

The Operational Energy Division (OED) within the Joint Program Integration Office at US Forces-Afghanistan (USFOR-A) was established in 2011 with a mandate to improve operational capabilities and warfighter effectiveness by reducing our forces' reliance on liquid fuels. Staffed with technical experts, the OED continues to develop and implement materiel and non-materiel energy solutions to reduce dependence on petroleum fuels and increase operational effectiveness. OED coordinates directly with OEPP, and we maintain a close relationship to address operational energy issues and initiatives in theater. In 2012, OEPP and OED combined efforts with the Army's Program Manager – Mobile Electric Power (PM-MEP) to answer an Operational Needs Statement with $110M worth of advanced, energy efficient power generation and distribution equipment. OED and OEPP also collaborated to fund and support an operational demonstration of an advanced tactical microgrid to gather data for future microgrid technology development.

This past year, OED also provided significant support to Operation DYNAMO. Improvements in energy efficiency produce the greatest leverage at the extreme tactical edge, since the risks and costs to provision fuel there are so great and potentially so disruptive to the operational mission. In a tactical environment, electrical demand has usually been met by multiple diesel powered generators, sized for peak loads but often operating far from peak capacity and efficiency. The consequence of poor generator loading is significant fuel waste, increased maintenance effort, and decreased reliability. In an attempt to address those issues, PM-MEP, in coordination with USFOR-A OED, recently completed Operation DYNAMO I and II, which assessed the electrical supply and demand footprint at 67 forward operating locations. Mission-specific advisory teams developed more efficient power generation and distribution plans, replaced older equipment with more than 500 fuel efficient Advanced Medium Mobile Power System generators and 430 Improved Environmental Control Units, updated distribution systems to improve reliability and safety, and trained local soldiers to operate and maintain the equipment properly. This effort spotlights the value of OE advisors teamed with expert technicians and military standard equipment and their ability to become a significant combat force multiplier for operational commanders. Building on the success of its predecessors, Operation DYNAMO III is

underway now to oversee the right sizing of power assets during the drawdown in Afghanistan to ensure as we reduce our forces we continue to apply the lessons we have learned.

US Pacific Command (USPACOM)

OEPP has embraced emergent energy challenges in the Pacific and partnered with USPACOM and other key stakeholders to understand and address them.

The vast expanse of the oceans and seas that comprise USPACOM's Area of Responsibility put a premium on the ability of maritime forces to foster relations with partner nations, protect commercial and military shipping, and execute offensive operations on and from the sea. The Navy is exploring many technologies, such as Hybrid Electric Drive, stern flaps and improvements to marine-growth reducing hull and propeller coatings, to reduce fuel consumption. The Naval Postgraduate School-developed Replenishment at Sea Planner is great example of an inexpensive, in-house software solution to reduce our logistics burden. It is intended to optimize logistical transit plans and the fuel necessary for both warships and military sealift logistics vessels to prepare for and execute underway replenishment. This software tool is already in use in Fifth and Seventh Fleets and is expected to save millions of dollars in fuel costs each year.

OEPP remains engaged in the Department's ongoing efforts to improve liquid fuel delivery ashore in areas where little to no distribution infrastructure exists. I attended the Joint Logistics Over-The-Shore demonstration in Korea in April 2013. This recurring, combined US / Republic of Korea event exercises our ability to deliver fuel, supplies and equipment from ships at sea to encampments ashore where sufficient maritime port facilities do not exist. We have impressive over-the-shore fuel distribution capabilities, and yet they may be stressed in some scenarios. I am pleased that the Navy has programmed $34 million between FY13-17 to fund a replacement for an aging Offshore Petroleum Discharge System ship the *USS Petersburg*, while the Army develops the next generation of Inland Petroleum Distribution System. Each Service needs to continue to ensure that this capability can meet current and future challenges.

As the DoD operational energy strategy has evolved, OEPP and the Combatant Commanders have expanded our efforts beyond improving only US force capabilities. Teaming with partner nations to improve fuel efficiency and reduce energy demand across our combined forces benefits global cooperation and our combined security in the region. To that end, my office is currently exploring options within the Asia-Pacific region to identify and assess low-cost, high-payoff operational energy-

related security cooperation opportunities that could contribute to broader U.S. and Asia-Pacific partner policy objectives. The results are intended to inform future guidance to other Combatant Commands, USPACOM planning guidance, and to build partnership capacity activities for USPACOM, the Joint Staff, the Office of the Secretary of Defense (OSD), and interagency partners. Additionally, ongoing contingency basing energy technology demonstrations and experimentation events during joint and combined exercises, such as CRIMSON VIPER in Thailand and BALIKATAN in the Philippines, are improving our own capabilities and those of key partner nations through focused military-to-military engagements.

US Africa Command (AFRICOM)

In the US Africa Command area of responsibility, OEPP is mentoring a growing and effective headquarters staff effort to incorporate operational energy across their operations and theater security cooperation activities. The staff recently assigned its first dedicated operational energy advisor and, in addition, continues to benefit from a Department of Energy (DOE) employee serving as a liaison to advise the commander on energy issues. Additionally, my office supported the establishment of the governance structure for the command's Interagency Energy Security and Environment Working Group which considers operational energy equities in operations and exercises.

As the US increases its focus on the African continent, the Department is similarly stepping up its efforts to support the Combatant Commander across a range of operational energy issues. The austere operating environment is compounded by the lack of infrastructure which introduces a challenging sustainment picture. The Army's Rapid Equipping Force recently conducted an energy assessment of remote and urban locations supporting US forces across the Trans-Sahara region to help them increase electrical power generation, improve electrical safety, and increase drinking water production and safety. The Naval Facilities Engineering Command, in coordination with the National Renewable Energy Laboratory, completed an energy assessment at Camp Lemonnier, Djibouti. Camp Lemonnier, though an enduring site, contains some equipment more typical of contingency locations, so OEPP collaborated with the Office of the Deputy Under Secretary of Defense for Installations and Environment on energy issues at the Camp by identifying peak electrical load requirements and analyzing the energy demand impact of several new environmental control system configurations. In addition, my office recently partnered with the U.S. Agency for International Development to exchange information, establish a working forum, and begin leveraging DoD lessons learned in Afghanistan to

assist the Power Africa initiative in its mission to improve power distribution to rural villages and towns.

In general, as part of my office's focus on contingency basing, we recently helped identify measures in CENTCOM, SOUTHCOM, and AFRICOM to reduce fuel demand in contingency plans and to determine the potential operational value of that fuel demand reduction. Employing improved power generation equipment and shelter construction standards, and future fuel efficiency improvements to aerial resupply vehicles, will help operational commanders optimize in-theater fuel resupply plans as part of larger contingency planning efforts.

Operational Energy Capability Improvement Fund (OECIF)

My office is also supporting longer term innovation and change via the Operational Energy Capability Improvement Fund (OECIF). The OECIF began in FY12 with the goal of funding innovation that will improve the operational energy performance of our forces while creating institutional change within the Department. It promotes partnering and joint programs and encourages Service teaming. The programs started in FY 12 have concentrated on reducing the energy load of our expeditionary outposts. For example, there is a joint Army/Air Force program developing ways to improve the energy efficiency of soft shelters (i.e. tents), which has demonstrated improved tents and camp architectures in Kuwait, resulting in a 50% reduction in power consumption. Another program demonstrated a 54% reduction of the energy needed to cool hard shelters (i.e. containerized living units) used in Djibouti, Africa. In FY12, OECIF also started a program to demonstrate and evaluate load reduction technologies for expeditionary outposts in tropical environments – something particularly suited to our shift to the Pacific environment – by participating in exercises in Thailand, the Philippines, and elsewhere By combining upgraded environmental control units (ECUs) with light emitting diode (LED) lighting and hybrid automatic/manual controls, energy savings as high as 80% over earlier technologies have been demonstrated. The OECIF is also supporting the development of technology for more efficient ECUs, which heat and cool our deployed shelters and consume a great deal of energy, including through a partnership between the Navy and the Department of Energy's Advanced Research Projects Agency for Energy (ARPA-E).

The OECIF programs begun during FY13 emphasized establishing organizations aimed at involving a wide variety of organizations in solving our operational energy problems. OEPP encouraged the use of innovative business methods, such as consortia, to involve small businesses and

non-traditional defense contractors. For example, one of these programs, led by the Army, is focused on energy for our dismounted warfighters. Our Soldiers and Marines benefit from the world's most technologically advanced weaponry; however, this equipment can require that a warfighter carry around 14 pounds of batteries on lengthy patrols. The Army-led OECIF program is meant to comprehensively address this problem through developing better system engineering techniques and technologies to improve both the energy demand and supply in order to reduce the weight burden. Other programs begun in FY13 are developing standards for tactical microgrids to promote their interoperability and adoption, developing planning methods and control technologies for designing and running more efficient expeditionary outposts, and engineering surface coatings to reduce aircraft drag.

Most recently, for FY14, OECIF is pursuing new programs to develop the analytic methods and tools necessary to support the thorough analysis and consideration of operational energy issues throughout DoD's various planning and management processes. The basic idea is to give decision makers within the Department better ways to factor operational energy into their decisions. This focus was partly driven by our experience in the last few years and partly by observations we made during our budget certification process, where we found shortcomings in the ability of the Department to consider energy in its decisions. We are using the OECIF to help solve it, which is consistent with its goal of creating institutional change.

Increase/Assure Supply

Another element of our strategy is diversifying and securing military energy supplies to improve the ability of our forces to get the energy they require to perform their missions.

Alternative Energy and Fuels

The Department's operational energy investments are focused on meeting warfighter needs, including by diversifying the Department's supply options. One focus is on energy that can be generated or procured locally near deployments to lessen the burden on supply lines. The Services are evaluating, and, where appropriate, deploying tactical solar technologies to generate electricity on contingency bases or to recharge batteries to increase patrol range and mission duration. OEPP is assisting in these efforts by coordinating information sharing amongst the Services and between the Services and DOE, which has broad technical expertise in civilian solar technologies. Additionally, the Department is funding research in deployable waste-to-energy systems that could reduce the volume of waste requiring disposal and create and generate energy on contingency bases. Other technologies in

which the Department is investing include hydrogen-powered and solar-powered unmanned aerial vehicles, which have the potential to achieve much longer mission durations than those powered by traditional petroleum-based products.

Another component of the Department's operational energy strategy is alternative fuels. As the nation's largest consumer of energy, the Department recognizes that our military will need alternatives to petroleum to diversify sources of supply. Over the long term, the Department will need fuels derived from various feedstocks that are cost-competitive, widely available around the world, and compatible with existing equipment and storage infrastructure, as our existing fleet of ships, planes, and combat vehicles will be with us for decades to come. So the Department is investing around 2% of its operational energy funding over the next five years on alternative fuels. The Services are focusing the majority of their alternative fuels efforts on certifying aircraft, ships, tactical vehicles, and support equipment to use these emerging fuels, as they have been doing since 2006. These initiatives improve the flexibility of military operations by ensuring that our equipment can operate on a wide range of fuels when they are cost competitive and commercially available.

To create clear guidelines on the Department's alternative fuels investments both now and in the future, on July 5, 2012, the *Department of Defense Alternative Fuels Policy for Operational Platforms* was released, pursuant to Section 314 of the National Defense Authorization Act of 2012. The policy establishes coordinated, Department-wide rules to guide and streamline its investments in the development and use of alternative fuels. The policy states that the Department's primary alternative fuels goal is to ensure operational military readiness, improve battlespace effectiveness, and further flexibility of military operations through the ability to use multiple, reliable fuel sources. All Department investments in this area are reviewed during the Department's annual operational energy budget certification process.

To date, the Department has only purchased test quantities of biofuels for testing and certification purposes. These test fuels are often more expensive than commercially-available petroleum fuels because they tend to be produced at small, not-yet-commercial scale facilities using novel conversion technologies. However, the policy formalized what was already the practice for all the Military Services: that the Department will not make bulk purchases of alternative drop-in replacement fuels unless they are cost competitive with petroleum products. With this policy in place, the Department will continue to steward its alternative fuels investments towards the ultimate goal of enhancing the long-term readiness and capability of our joint force.

Because the Department does have long-lived platforms designed to use liquid fuels, there is a long-term defense interest in fuels diversification. The Department also supports a larger national goal to promote the development of low-carbon, renewable fuels. The Defense Production Act (DPA) advanced drop-in biofuels production project, led by the OSD Manufacturing and Industrial Base Policy Office, is a Department of Defense partnership with the private sector and the Departments of Energy and Agriculture, which have the lead roles for the Federal government for biofuel feedstocks and production. This project works to accelerate the development of cost-competitive advanced alternative fuels for both the military and commercial transportation sectors. The FY12 DPA funding for Phase 1 was awarded to four companies in May/June 2013 and is being used for competitive commercial-scale integrated biorefinery design efforts. Awards totaled $20.5 million, which was matched by $23.5 million in private sector funds. Reviews of Phase 2 proposals will begin in April 2014.

Securing Our Energy Supplies

There is rising concern about risks to the U.S. electric grid that powers most DoD bases, ranging from cyber-attacks to hurricanes. The risks and vulnerabilities of the U.S. electric grid and overseas electricity supplies supporting DoD facilities are not well characterized. Today, military operations can include warfighters conducting missions remotely from domestic facilities; the disruption of electric power in one location could adversely affect the outcome of a battle thousands of miles away. And, in the event of a major domestic outage, as with Hurricane Sandy, the lack of adequate power could create tension between Defense support for civilians and the Department's own needs.

We recognize the need for better information and coordination on risks to the grid and are exploring the Department's role in building resiliency into the system. To that end, OEPP and other lead offices in the OSD, in partnership with the Department of Homeland Security's Office of Infrastructure Protection, led an interagency, scenario-based workshop to gain a better understanding of how the Department would respond to a prolonged and widespread power outage in the National Capital Region that affected military bases and missions in the area. We continue to engage in discussions with utility service providers, Federal agencies and other DoD entities to address this challenge.
In addition to electrical power concerns we are also looking at the security of our liquid fuel supply. OEPP is currently examining logistical challenges generated by the vast distances and extensive operating areas present in the Asia-Pacific theater. My office is working with the Defense Logistics

Agency and the Joint Staff in studying nodes and transportation links to support modifications to the Global Petroleum Distribution System.

Building Energy Security into the Future Force

The Department continues to make strides in improving energy security for the future force. We have invested a significant amount into the development and deployment of operational energy initiatives to increase the combat effectiveness of our warfighters. Programs of note include the:

- Adaptive Engine Technology Development (AETD) program -- AETD is focused on developing a "sixth-generation" fighter engine which could provide better fuel-burn rates. At the core of the program is a move to a design with three streams of air, allowing more flexibility for the engine to operate efficiently under varying conditions. AETD's goal is to provide 25 percent greater fuel efficiency which will increase range and endurance of fighter aircraft and decrease the requirement for tanker aircraft to support AETD-equipped aircraft. This year, the Department announced a follow on program, the Advanced Engine Technology Program, to carry the engine through technology maturity risk reduction.
- Improved Turbine Engine Program (ITEP) program -- This program provides an improved engine for the Apache and Blackhawk helicopter fleets to replace the current T-700 engine. ITEP will improve operational effectiveness by giving commanders an improved aviation fleet with longer loiter time, increased altitude limits, increased payload and lower fuel and maintenance costs. The Army expects a 25 percent fuel reduction from current engine consumption levels.
- Hybrid Electric Drive (HED) program -- The Navy will begin installing HEDs in Arleigh Burke-class (DDG 51) destroyers in 2016. HED is an electric motor attached to the main reduction gear of DDG-51-class ships that allows for an electric propulsion mode resulting in improved fuel economy. Installation of an HED on a single ship has the potential to save over 5,000 barrels of fuel per year, which equates to approximately a seven percent reduction from current usage or 11 additional underway days, each year, and provides our commanders at sea improved operational flexibility.
- Medium Tactical Vehicle Replacement (MTVR) -- This effort includes developing and demonstrating a fuel efficiency improvement of 15 percent over the existing MTVR while maintaining affordability, mobility and survivability. Additionally, within this program, the Marine Corps funded the procurement of prototypes of the On-Board Vehicle Power sources to reduce fuel requirements at idle, which is the majority of the vehicle drive cycle.

We have worked with the Joint Staff and the Services to implement the Energy Key Performance Parameter (eKPP) or energy Key Support Attribute (eKSA) across all acquisition categories. This includes Acquisition Category I programs such as the Armored Multipurpose Vehicle (AMPV), Joint Light Tactical Vehicle (JLTV), DDG-51 Flight III and the Air Missile Defense Radar (AMDR), along with smaller acquisition programs such as the MTVR, Prime Power Mobile Production System, and the Force Provider -- Expeditionary Program.

In regards to shaping the requirement and acquisition systems, the Department is working to conduct operational energy analysis earlier; that will provide a greater opportunity to consider the tradeoffs and options among a more energy secure force, more effective or efficient equipment, or a more capable logistics force. The Joint Staff, the Service Energy Offices, and my office have worked together to make operational energy an integral part of the Services' Title X War Games, such as the Army's Unified Quest/Deep Futures II and the Navy's Naval Global 14, which will occur later this year. We are developing a tool to provide the war gamers timely feedback about attacks on our logistics and energy supplies. We are also working together to ensure operational energy supportability analysis is conducted during the Services' concept development, which provides a realistic energy distribution and allows simulated enemy forces to interdict our energy supplies, to more closely approximate real world conditions.

Moving forward, we must continue to fund analysis to identify which capabilities and missions to target for operational energy improvements. We have found that engaging earlier, well before Milestone A, will give us the greatest opportunity to provide greater capabilities through operational energy improvements.

Institutionalizing Operational Energy in Policy

In the long term, the Department must build operational energy considerations into the regular rhythm of how the Department operates. To begin with, the Secretary of Defense signed the Operational Energy Strategy Implementation Plan in March 2012 and identified seven targets:

1. Measure operational energy consumption;
2. Improve energy performance and efficiency in current operations and training;
3. Promote operational energy innovation;
4. Improve operational energy security at fixed installations;

5. Promote the development of alternative fuels;
6. Incorporate energy security considerations into requirements and acquisition; and,
7. Adapt policy, doctrine, professional military education, and Combatant Command activities to include operational energy.

The Department is making great progress implementing the strategy; further details are available in our Operational Energy Annual Report to Congress and budget certification reports, which are available on the OEPP website (http://energy.defense.gov/).

More recently, in June 2013, the Deputy Secretary of Defense issued "Deputy's Management Action Group Guidance for a Comprehensive Defense Energy Policy." This guidance highlighted how changes in the Department's use of energy are needed to enhance military capability, improve energy security and mitigate costs, and initiated the development an overarching DoD energy policy, to be completed this year. When complete, the policy will adapt core business processes – including requirements, acquisition, planning, programming, budgeting, mission assurance, operations, and training – to improve the Department's use and management of energy.

The Department also issued other policies over the past year to support the operational energy mission. In January 2013, the Under Secretary of Defense for Acquisition Technology and Logistics released Department of Defense Directive 3000.10, "Contingency Basing Outside the United States." In addition to outlining Department policy related to interoperability, construction standards, and other areas, the Directive specified the role of operational energy and identified a smaller logistics footprint as enabling more effective and capable contingency bases.

In addition to the strategy, guidance, and policy set forth by my office and that of OSD, the Military Services have followed with their own initiatives. In the past year, the Army and the Air Force have updated their own energy strategies while the Marine Corps issued guidance for improving the incorporation of energy into their acquisition programs. Similarly, the Navy has moved out, leading the Department with efficiency upgrades to their legacy aircraft and propulsion innovations in their ships.

Conclusion

In November 2013, Secretary Hagel stated, "DoD invests in energy efficiency, new technologies, and renewable energy sources at our installations and all of our operations because it makes us a stronger fighting force and helps us carry out our security mission."

Our vision to better manage the Department's use of energy will continue to improve military capability across all missions. As we adapt to threats and geopolitics shaped by energy, now is the time to drive long-term innovation and energy improvements into our core business processes, force structure, and planning to ensure we have the military we need to succeed in the future.

Going forward, the Department is committed to addressing how energy shapes our capabilities and operations as well as how it affects what the missions of the Department are. This past year, the Department has made great strides in reforming core business processes and decision-making, supporting current operations, and applying energy considerations to the development of the future force. All that said, institutional change within the Department is difficult, time consuming and not for the faint of heart; we appreciate this Committee's continued support of OEPP.