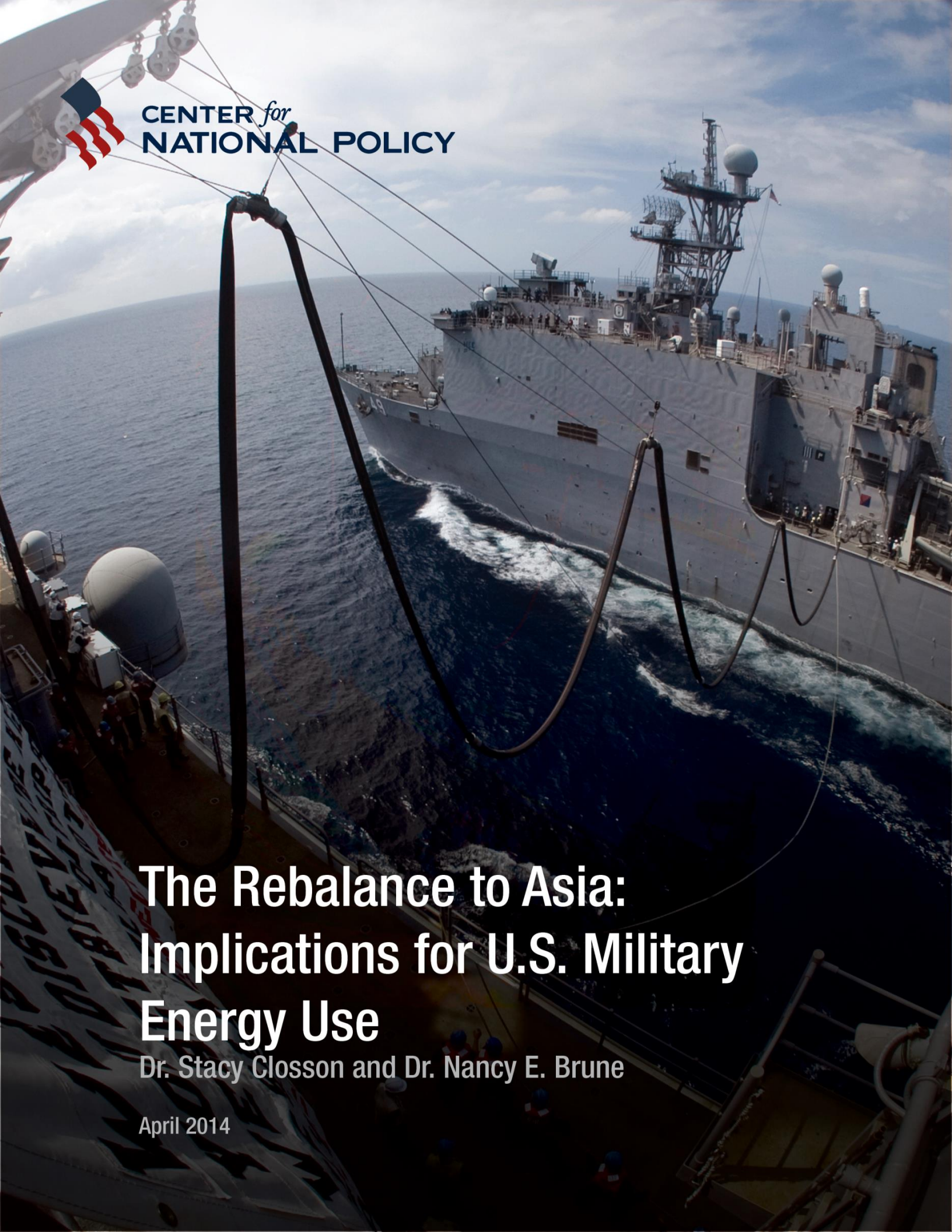

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NATIONAL POLICY

The Rebalance to Asia: Implications for U.S. Military Energy Use

Dr. Stacy Closson and Dr. Nancy E. Brune

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ABOUT THE AUTHORS

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EXECUTIVE SUMMARY

Recent experiences in Afghanistan and Iraq have reminded us that our military equipment is too heavy, our military's demand for fuel too great, and that the need to move fuel to our forces poses additional security risks to our troops.

These lessons provide a backdrop against which we acknowledge and assess the U.S. Department of Defense's (DoD) plan to substantially increase U.S. forces in the Asia Pacific, a resource poor region with the world's two fastest growing energy consumers, China and India.

Distances within the Asia Pacific region are long suggesting that efforts to get energy to troops when and where it is needed will be challenging. As opposed to wars in the Middle East, potential adversaries in the Asia Pacific region will have more sophisticated weapons, and full spectrum operations will use more energy over longer distances.

As we rebalance to this part of the world, extracting the maximum capability out of every gallon of fuel, creating more options to fuel our forces, and minimizing the risk of supply disruptions to our warfighters will require a sustained and unified effort from DoD and the military services.

Now is the time to ensure that the United States is asking the right questions of military planners and defense analysts in preparation for this new strategic reality.

1. What does a rebalance to Asia mean for military energy?
    a. *What is military energy and how are policies evolving?*
    b. *What does the rebalance to Asia entail?*
    c. *What are the consequences of these force structure shifts to military energy?*

2. How is DoD confronting the energy challenge?
    a. *What tools and policies currently exist to confront these energy challenges?*
    b. *What tools and policies could be developed to enhance the response?*

This paper identifies some of the energy issues associated with the U.S. military rebalance to Asia and proposes a set of recommendations informed by a series of expert interviews with government officials and security consultants:

- **Analytic Methods for Considering Operational Energy Use**
- **Joint Technology Repository for Operational Energy Projects**
- **Renewable Energy and Energy Efficiency for Unmanned Systems**
- **Warrior Power Executive Agent**
- **Pilot Project for Mobile Energy Saving Performance Contracts**
- **Long Term Contracting Authority for Alternative Fuels Projects**
- **Interagency Operational Energy Task Force**

WHAT DOES A REBALANCE TO ASIA MEAN FOR MILITARY ENERGY?

What is military energy and how are policies evolving?

Congress and the Department of Defense define "operational energy" as the "energy required for training, moving, and sustaining military forces and weapons platforms for military operations."[1] Approximately 75 percent of DoD's overall energy use is operational, and, despite efforts to expand the use of renewable energy and alternative fuels, the military remains heavily reliant on fossil fuels to power equipment, tactical vehicles, aircraft, naval vessels, and other platforms deployed abroad.

The wars in Iraq and Afghanistan further revealed the risks posed by our military's reliance on fossil fuels. Fuel demand for ground-based forces created tactical vulnerabilities on the battlefield as supply lines were targeted by insurgents, and units were diverted from combat missions to provide force protection for fuel convoys. Recognizing this vulnerability, DoD and the military services took dramatic steps to reduce demand and lighten the logistics footprint for these forces.[2]

Today, DoD is considering the future of operational energy supply as force requirements are shifting from land-based Marines and Army forces to more fuel intensive sea and air assets spread across the Asia Pacific, an area of operations comprising more than half the earth's surface. With greater fuel requirements, an expanded logistics tail, and challenging geopolitical dynamics, major shifts of forces to the Asia Pacific region present serious operational energy challenges.

The 2014 Quadrennial Defense Review (QDR) highlighted how DoD was confronting this challenge: "The Department has invested in energy efficiency, new technologies, and renewable energy sources to make us a stronger and more effective fighting force. Energy improvements enhance range, endurance, and agility, particularly in the future security environment where logistics may be constrained."[3]

What does the rebalance to Asia entail?

The rebalance is a multidimensional policy initiative that includes economic, diplomatic, as well as military components. The initiative includes a significant shift of military capacities from other theaters of operation to the Asia Pacific region and a restructuring of security arrangements.

The QDR identifies how the rebalance to Asia will affect force structure, weapons systems and platforms, and operations. This includes: "(1) Positioning additional forward-deployed naval forces to achieve faster response times at a lower recurring cost; (2) Deploying new combinations of ships, aviation assets, and crisis response forces that allow for more flexible and tailored support to the regional Combatant Command; (3) Developing concepts, posture and presence options, and supporting infrastructure to exploit the Department's investment in advanced capabilities; and (4) Pursuing access agreements that provide additional strategic and operational flexibility in case of crisis."[4]

Specifically, it has been estimated that after the rebalance, at least 60 percent of U.S. air and naval forces will be based throughout Asia, covering Southeast Asia, South Asia, the Indian Ocean, and Northeast Asia. For the U.S. Navy, this rebalance means a net increase of one carrier, seven destroyers, ten Littoral Combat Ships, and two submarines.[5] Four littoral combat ships will make their homeport Singapore, and the U.S. and the Philippines are discussing rotating U.S. troops more frequently and more joint exercises. A force of 2,500 Marines are to

be based in Australia and greater access of U.S. planes and ships to Australian facilities are being discussed. These forces are in addition to the 51,000 in Japan and 28,500 in South Korea.

What are the consequences of these force structure shifts to military energy?

As the U.S. rebalances to the Asia Pacific, DoD will face significant challenges to ensure that our warfighters have the energy they require to accomplish their many missions and goals. Positioning additional forward-deployed naval and air forces, moving longer distances with greater frequency will require more fuel, more suppliers, more fuel transportation vessels, and more refueling infrastructure. More troops are to be accompanied by additional intelligence and surveillance capabilities, cyber and space assets and unmanned aerial vehicles -- all of which require fuel. Given the expected size of the shifts in force structure, demands for fuel, electricity, and aerial refuelers could be a limiting factor for military operations in Asia Pacific.[6]

The rebalance to Asia is expected to coincide with the development of new, more powerful weapons systems that support power projection over a wide geographic area, placing a further burden on fuel demand. DoD analysis projects that operational fuel demand will rise by 11 percent by 2025. If DoD and the military services carry out their aggressive initiatives already in place to cut their fuel burden, operational fuel use will still rise by four percent by 2025.[7] Given these projections and regional dynamics, policymakers must give military leaders all the tools available to develop robust energy efficiency initiatives.

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HOW IS THE MILITARY CONFRONTING THE ENERGY CHALLENGE?

What tools and policies currently exist to confront these energy challenges?

Increasing the range and endurance of weapons and platforms through energy efficient operations, the military will create a stronger, more effective fighting force. Recognition of the importance of energy efficiency in military operations is reflected in DoD's energy investments for military operations. In FY13 the operational energy investment was $9 billion to improve energy use in military operations between fiscal years 2013-2017. More than 90 percent of the funds are for energy efficiency or energy performance upgrades, enabling forces to operate longer at greater distances.[8] DoD is also supporting long-term innovation through the Operational Energy Capability Improvement Fund (OECIF), launched in FY12, whose objective is to fund science and technology programs that can improve the energy performance of our expeditionary outposts.

There are hundreds of operational energy-related research and development programs underway across the services, research labs, warfare centers, and similar DoD research organizations to reduce fuel use and lighten the logistical load. The U.S. Navy is employing stern flaps, hull coatings, smart navigation, shipboard monitoring, gas turbine on-line water wash, and LED lighting to go farther on less fuel. The U.S. Air Force is implementing enhanced simulator technology to reduce the number of training sorties required, and investing in engine and airframe modifications to reduce drag and increase efficiency.

All of the military services have targets to displace conventional fuels with some alternatives; the Air Force and Navy plan to replace 50 percent of their operational energy needs with alternative fuels, if these fuels can meet four requirements.[9] The U.S. government is working to support an advanced biofuels supply chain, investing in a tri-agency effort that includes the Department of Energy's (DOE) biomass program and the US Department of Agriculture's (USDA) farm to fleet initiative. DOE's mission is to catalyze the efficient transformation of our energy system and secure U.S. leadership in clean energy technologies. USDA is authorized to engage in activities to increase production, stabilize prices, ensure adequate supplies, and facilitate the efficient marketing of agricultural commodities that serve as feedstocks. DoD has funded significant R&D projects and is investing two percent of its operational energy funding over the next five years on alternative fuels.

What tools and policies could be developed to enhance the response?

First, innovative financing mechanisms for energy efficiency technologies could bring immediate reductions in operational energy requirements without prohibitive up-front capital costs. Energy savings performance contracts (ESPCs) are already being used to reduce energy demand on military installations, and could have applications for military equipment. For example, funding for energy efficiency retrofits of legacy aircraft may be too expensive to justify, despite long-term savings. Executing an ESPC with a retrofitting contractor would allow DoD to reap the capability benefits of increased efficiency, while paying the contractor with the money saved from reduced fuel costs.

Second, authorization for long-term alternative fuels contracts of at least 10 years would provide important cost-certainty to DoD. This should provide incentives to encourage more private and public funds directed toward the research and development of alternative fuels. The research and development of alternative fuels, led by DOE/USDA will require the cooperation of more private companies, including the commercial airlines sector, as well as partners in Asia, to incentivize investors and reduce some capital risk.

Third, DoD and the military services have initiated and sponsored a number of significant programs to address energy challenges. However, greater efforts are needed to improve information-sharing across the branches and with the Office of the Secretary of Defense (OSD). A technology repository detailing ongoing research and development projects could support information sharing, and reduce redundancy, among all those working on operational energy issues within DoD.

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Fourth, institutional changes could help enhance DoD's response to its operational energy challenges. DoD's Operational Energy Strategy, released in 2011, envisions that a greater appreciation for operational energy security will result in new doctrine, new concepts of operation, or other changes in military operations.[10] Defense systems designers and military planners should account for fuel in planning and weigh trade-offs in types of operations.[11]

Fifth, DoD must not forget the lessons learned from years of ground-based combat. Our soldiers and Marines have communications equipment that gives them unparalleled command and control with a truly networked force. But in the case of dismounted forces, powering this equipment requires bulky, heavy portable batteries.

With humanitarian assistance and disaster relief missions increasing in frequency and complexity in Asia Pacific, it is integral that we reduce the logistical load of our operations, and reverse the trend of increasing weight on our troops. The Secretary of Defense should appoint an Executive Agent to align efforts across the services to manage troop-borne equipment demands.

Sixth, DoD should initiate a pilot program for research into improving the energy efficiency in unmanned aerial vehicles (UAVs). Drones have much lower energy consumption rates than manned aircraft. Significant reductions in energy use and energy costs could be realized if UAVs were used to replace manned systems used for intelligence, surveillance, and reconnaissance missions. Significant energy savings could also be realized by incorporating energy efficiency and alternative sources into UAV operations, an area of growing research.

Seventh, maximizing the capability of our forces will require acquisition professionals to better consider fuel efficiency in weapons development and acquisition, as well as innovative ideas for reducing fuel use in operations. Fuel efficiency goals must be crafted in ways that account for the future threat environment, including limited energy resources or reduced access to those resources. In order to do this, efficiency technology must be properly valued, including quantifying the challenges an inefficient system creates, and whether and how an efficient system can alleviate those challenges. Robust energy analysis can then be used to justify the time and money saved in developing efficiency solutions.

Finally, meeting the energy requirements of our growing forces in Asia Pacific will require more robust diplomacy. DoD buys fuel as close to the operation as possible, because it is expensive to move fuel long distances. The U.S. has memoranda of understanding and statements of cooperation to bolster energy cooperation with Australia, Japan, Korea, the Philippines, and Thailand. However, for the most part, the U.S. military lacks direct counterparts in these countries to discuss such issues as technology, efficiency, and alternative fuels development. An interagency operational energy task force of at least DoD, DOE, USDA, Department of State (DOS), and the U.S. Agency for International Development (USAID) should be created that designs policies and programs with our allies in the Asia Pacific region. There may also be a need for a regional partnership dedicated to addressing regional energy security issues, rather than the mostly bilateral arrangements.

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POLICY RECOMMENDATIONS

- **Pilot Project for Mobile Energy Saving Performance Contracts:** Leverage private sector financing for energy efficient upgrades to ships, planes, and other non-building assets. There would be no up-front cost to the government. Private sector investment would be paid back over time through energy efficiency savings. This could be a useful strategy where large capital costs and long paybacks prevent energy efficiency upgrades. Pilot projects should be limited in number, the amount of available funding, and time to complete.

- **Long Term Contracting Authority for Alternative Fuels Projects:** Authorize long-term contracts--up to 10 years--to enhance developers' ability to secure critical financing and recoup capital investments. Alternative fuels projects are capital investment intensive, due in part to high construction costs for production facilities. Potential alternative fuels suppliers have indicated to DoD that long term contracts of at least 10 years are necessary because production capabilities for these types of fuels are commercially underdeveloped.

- **Joint Technology Repository for Operational Energy Projects:** Create a central repository with basic information on all operational energy-related programs for DoD operational energy stakeholders who may not otherwise have visibility into outside efforts. Access to this information will enable inter-service collaboration and reduce redundant efforts.

- **Warrior Power Executive Agent:** Establish a DoD Executive Agent for warrior power to align and advance various on-going efforts across the services to measure and manage power demand from troop-borne equipment across a range of missions and conditions. A DoD Executive Agent is assigned specific responsibilities, functions, and authorities to support designated activities that involve two or more of the DoD Components.

- **Renewable Energy and Energy Efficiency for Unmanned Systems:** Authorize a pilot program for research into improving energy efficiency in unmanned vehicles- improving speed, range, endurance and exploring use of more-efficient traditional engines, hybrids, and alternate energy sources such as solar and fuel cells.

- **Analytic Methods for Considering Operational Energy Use:** Equip and train acquisition professionals to better consider fuel efficiency in weapons development and acquisition through the development of analytical methods for considering operational energy use.

- **Interagency Operational Energy Task Force:** Create an interagency operational task force should be created that designs policies and programs with our allies in the Asia Pacific region concerning mutual military energy challenges.

ENDNOTES

[1] 10 USC 138c
[2] Stacy Closson, "The Military and Energy Security: Moving the US Beyond Oil" *Energy Policy*, Vol. 61, October 2013, pp. 306-316.
[3] The U.S. Department of Defense. 2014 Quadrennial Defense Review, p. 25. http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf
[4] The U.S. Department of Defense. 2014 Quadrennial Defense Review, p. 23. http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf
[5] Robert G. Sutter, Michael E. Brown, and Timothy J. A. Adamson, with Mike M. Mochizuki and Deepa Ollapally. August 2013. Balancing Acts: The U.S. Rebalance and Asia-Pacific Stability. Elliott School of International Affairs and the Sigur Center for Asian Studies, George Washington University. http://www2.gwu.edu/~sigur/assets/docs/BalancingActs_Compiled1.pdf
[6] Sharon Burke, Assistant Secretary of Defense for Operational Energy Plans and Programs, Testimony to the Subcommittee on Readiness and Management Support, Senate Armed Services Committee, April 2, 2014.
[7] Ibid.
[8] FY13 Budget Certification Report: Energy Investments for Military Operations. http://energy.defense.gov/Reports/tabid/3018/Article/3498/fy13-budget-certification-report-energy-investments-for-military-operations.aspx
[9] Military alternative fuels must (1) 'drop-in' to military platforms, (2) produce fewer emissions than conventional fuels, (3) be available in sufficient quantities, (4) be cost-competitive with petroleum fuels, and (5) be produced from non-food-based feedstocks.
[10] U.S Department of Defense. Energy for the Warfighter: Operational Energy Strategy. May 2011. http://energy.defense.gov/Portals/25/Documents/Reports/20110614_Operational_Energy_Strategy.pdf
[11] The Operational Energy Capability Improvement Fund in FY14 supports thorough analysis and consideration of operational energy issues throughout DoD's various planning and management processes.

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