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The New Administration's Policy Should Reflect that Biofuels Cannot Meet Military Needs

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While serving as Commanding General of the First Marine Division during the invasion of Iraq, retired General James Mattis called on Department of Defense (DOD) planners to "unleash" the Marine Corps from "the tether of fuel."[1] Throughout the Iraq conflict, restricted access to fuel had slowed the advance of U.S. forces and dictated operational capabilities, prompting General Mattis's request for relief from petroleum limitations.[2]

Although fuel makes it possible for forces to operate in the air, on land, and at sea, it also ties combat units to their sources of supply, presents a vulnerable target to enemy forces, and increases the "logistics footprint" of deployed forces.[3] With the exception of nuclear-powered aircraft carriers and submarines, every tactical vehicle, aircraft, and ship depends on a ready supply of fuel for power and propulsion. The tankers, oilers, and ground supply convoys that follow America's combat forces form a logistics tail that is expensive to operate, slow to mobilize, and difficult to protect. The challenge to improving combat effectiveness, while at the same time minimizing risk, lies in finding alternative ways to provide energy unencumbered by "tethers" to deployed forces.

The Obama Administration has misapplied the sentiments of General Mattis and capitalized on the operational limitations of petroleum to promote a green energy agenda within the DOD. While advertised as a matter of national security, the Administration's push for biofuels as an alternative to oil will serve only to substitute dependencies, and will fail to provide any operational or strategic advantages. Future energy initiatives should be weighed against the contributions of weapons modernization and other defense priorities to determine funding, and should focus on enhancing military capability and reducing logistical requirements for deployed forces.

Military Biofuel Initiatives

In 2011, President Obama directed the Departments of the Navy, Energy, and Agriculture to "work with private industry to create advanced drop-in biofuels that [would] power both the Department of Defense and private sector transportation throughout America."[4] In compliance with the Administration's green energy agenda, each service has invested significant time and resources to increase the use of biofuels in accordance with the DOD's "Alternative Fuels Policy for Operational Platforms,"[5] and broader directives to "diversify and expand energy supplies and sources."[6]

The Navy has been particularly aggressive in its incorporation of biofuels. Secretary of the Navy Ray Mabus has spent the past seven years developing and parading a carrier strike group which is intended to run in large part on blend of advanced biofuels.[7] According to Mabus, the "Great Green Fleet"[8] would "usher in the next era of Navy and Marine Corps energy innovation,"[9] following a "continuation of a long Navy tradition" of energy innova-

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tion.[10] In previous cases, innovation addressed a clear military need. However, the Great Green Fleet bears little resemblance to the Navy's evolution of energy use.

The Navy's History of Energy Innovation. In 1815, the Navy began its transition from sail to coal-fired steam power, which gave more control to the crew to determine predictable routes and timing. However, coaling consumed significant time and resources and ships were tethered to their sources for coal. In the early 1900s, the Navy transitioned to oil which generated more energy pound-for-pound than coal and reduced the logistical burden on the crew, but still required relatively frequent returns to port.

Again, operational challenges led to innovation with at-sea refueling capabilities and nuclear power, which drastically reduced the need for frequent returns to port and improved the range and speed of the carrier-centric fleet. Nuclear power also revolutionized submarine warfare by expanding the capability of submarines to remain submerged for much longer periods of time and to operate silently.[11] This makes them much harder to detect and has broadened the reach of large surface combatants. Where it was applied, nuclear power effectively severed the tether that linked ships and submarines to shore-based sources of energy. Conversely, biofuels have failed to demonstrate any operational or strategic advantages over petroleum and have actually increased costs for the Navy.

Impact on Military Capability

Biofuel advocates have promoted alternative fuels as a means to mitigate the challenges of petroleum dependency, as well as "increase resilience against strategic supply disruptions [and] ensure combat effectiveness, logistical flexibility and...mitigate Anti-Access/Area Denial (A2AD) effects."[12]

1. William Fenwick, "Reducing Battlefield Fuel Demand: Mitigating a Marine Corps Critical Vulnerability," U.S. Marine Corps Command and Staff College, March 20, 2009, p. 2, http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA510304 (accessed December 21, 2016).
2. Colonel Gregory J. Lengyel, "Department of Defense Energy Strategy: Teaching an Old Dog New Tricks," The Brookings Institution, August 2007, p. 13, https://www.brookings.edu/wp-content/uploads/2016/06/lengyel20070815.pdf (accessed December 27, 2016).
3. The "logistics footprint" refers to "the size of 'in theater' logistics support needed to move and sustain a warfighting force." Defense Procurement and Acquisition Policy, "Logistics Footprint FAQs," www.acq.osd.mil/dpap/Docs/FAQs%20--%20Logistics%20Footprint%20 01-06-03.doc (accessed January 3, 2017).
4. U.S. Department of Energy, "Memorandum of Understanding Between the Department of the Navy and the Department of Energy and the Department of Agriculture," June 2011, http://energy.gov/sites/prod/files/2014/04/f14/DPASignedMOUEnergyNavyUSDA.pdf (accessed September 27, 2016).
5. The DOD's alternative fuels policy states: "Alternative fuel investments will be targeted to ensure forces are able to carry out operations using alternative sources of fuel that improve the reliability of our overall fuel supply." U.S. Department of Defense, "Alternative Fuels Policy for Operational Platforms," July 5, 2012, p. 1, http://www.acq.osd.mil/eie/Downloads/OE/Alternative_Fuels_Policy_for_Operational_ Platforms%2020120705.pdf (accessed December 21, 2016).
6. U.S. Department of Defense, "DoD Energy Policy," *Directive* No. 4180.01, April 16, 2014, p. 1, http://www.dtic.mil/whs/directives/corres/pdf/418001_2014.pdf (accessed September 27, 2016).
7. The DOD's only bulk biofuel purchase to date was a blend consisting of only 10 percent pure biofuel (the minimum percentage required to qualify for federal subsidies) and 90 percent conventional diesel. Despite substantial investments, total advanced biofuel production constitutes a negligible portion of the DOD's total fuel consumption and costs remain high. David Alexander, "Great Green Fleet Using Biofuels Deployed by U.S. Navy," Reuters, January 20, 2016, http://www.reuters.com/article/us-usa-defense-greenfleet-idUSKCN0UY2U4 (accessed December 21, 2016).
8. The "Great Green Fleet," is an allusion to President Theodore Roosevelt's Great White Fleet of the 1900s. U.S. Navy, Energy, Environment and Climate Change, "Great Green Fleet," http://greenfleet.dodlive.mil/energy/great-green-fleet/ (accessed December 21, 2016).
9. News release, "Secretaries of the Navy, Agriculture Launch Deployment of Great Green Fleet," U.S. Department of Agriculture, January 20, 2016, http://www.usda.gov/wps/portal/usda/usdamediafb?contentid=2016/01/0020.xml&printable=true&contentidonly=true (accessed January 3, 2017).
10. Andrea Watters, "Navy Tests 100-percent Advanced Biofuel," Navy News Service, October 16, 2016, http://www.navy.mil/submit/display.asp?story_id=96702 (accessed December 21, 2016).
11. U.S. Department of the Navy, "Attack Submarines—SSN," U.S. Navy Fact File, March 8, 2016, http://www.navy.mil/navydata/fact_display.asp?cid=4100&tid=100&ct=4 (accessed December 29, 2016).
12. U.S. Department of Defense, "Alternative Fuels Policy for Operational Platforms," p. 1.

Despite substantial investments in development, production, and testing, advanced biofuels have not enhanced military capability or reduced vulnerabilities associated with petroleum dependency. According to a 2011 RAND report:

> There is no direct benefit to the Department of Defense or the services from using alternative fuels rather than petroleum-derived fuels. Our analysis of forward-based production concepts indicated that none provide a compelling military benefit. In contrast, most, if not all, would increase the logistics burden on deployed units.[13]

The Obama Administration nevertheless refused to acknowledge that the operational limitations associated with petroleum are common to all combustible liquid fuels. In 2011, Secretary Mabus and Secretary of Agriculture Tom Vilsak claimed that "[o]ne in every fifty convoys in Afghanistan results in an American service member guarding that convoy becoming a casualty. Creating home grown sources of alternative fuels will improve our national security."[14]

This argument is disingenuous at best. Regardless of the energy input (be it fossil fuels, plant oils, or beef fat) both petroleum and biofuels are liquid, occupy the same volume, and must be transported to the point of use. Furthermore, since advanced biofuels and oil are of a comparable energy density, they do not provide any advantage in fuel efficiency or power output. There is no difference to the warfighter—no decrease in convoys and no less cumbersome a logistics requirement. The tether between combat forces and their sources of supply remains intact.

Impact on Energy Security

Secretary Mabus has also warned against reliance on foreign oil specifically, calling it "a significant military vulnerability."[15] This argument is also misleading. Oil is a fungible global commodity; every country that produces oil adds to a global market. To the extent that the U.S. uses more oil than it produces, it draws from "foreign oil." However, according to former commander of the Defense Logistics Agency Energy, Brigadier General Mark McLeod USAF (Ret.), the "problem is not the amount of fuel in the world," but the ability "to translate that fuel where you need it and when you need it."[16] Since the military operates far from home, it must buy fuel abroad. Domestic biofuel production does nothing to change that.

The DOD mitigates risk by purchasing fuel from a diversity of suppliers and diffusing the influence any one supplier may have on fuel cost or military operations. For example, domestic naval vessel refueling is supported by 74 overseas ports across 36 countries and jet fuel is supplied by 108 overseas locations across 96 countries.[17] Both the quantity and geographic dispersion of supply points enables the military to buy competitively priced fuel as close to its operating theaters as possible. This practice decreases the costs and risks associated with long logistics tails, and saves time and resources otherwise consumed for transportation and force protection. Thus, approximately "90% of the fuel used by a Navy Carrier Strike Group during a typical overseas deployment...is obtained overseas, from sources close to where the strike group is operating."[18]

Since practicality, not supply, drives DOD purchases of foreign oil, the DOD will continue to pur-

13. James T. Bartis and Lawrence Van Bibber, *Alternative Fuels for Military Applications* (Santa Monica, CA: RAND, 2011), p. 3, http://www.rand.org/content/dam/rand/pubs/monographs/2011/RAND_MG969.pdf (accessed January 3, 2017).
14. Ray Mabus and Tom Vilsak, "Investing in Advanced Biofuels to Create Jobs," The White House blog, August 17, 2011, https://www.whitehouse.gov/blog/2011/08/17/investing-advanced-biofuels-create-jobs (accessed January 3, 2017).
15. News release, "Obama Administration Announces New Investments to Advance Biofuels Industry and Enhance America's Energy Security," U.S. Department of Agriculture, July 2, 2012, http://www.usda.gov/wps/portal/usda/usdahome?contentid=2012/07/0217.xml&navid=NEWS_RELEASE&navtype=RT&parentnav=LATEST_RELEASES&edeployment_action=retrievecontent (accessed January 3, 2017).
16. Tanekwa Bournes, "Energy Commander Emphasizes Commercial Supply Chain at Defense Logistics Conference," Defense Logistics Agency, December 7, 2015, http://www.dla.mil/News/tabid/12178/Article/633148/energy-commander-emphasizes-commercial-supply-chain-at-defense-logistics-confer.aspx (accessed January 3, 2017).
17. U.S. Department of Defense, Defense Logistics Agency, "Fiscal Year 2014 Fact Book," pp. 34–35, http://www.dla.mil/Portals/104/Documents/Energy/Publications/E_Fiscal2015FactBookLowResolution_160707.pdf (accessed December 28, 2016).
18. Moshe Schwartz, Katherine Blakeley, and Ronald O'Rourke, "Department of Defense Energy Initiatives: Background and Issues for Congress," Congressional Research Service *Report for Congress* No. 42558, December 10, 2012, https://www.fas.org/sgp/crs/natsec/R42558.pdf (accessed January 3, 2017).

chase more than half of its petroleum from foreign suppliers, regardless of domestic fuel production of any type or any quantity.[19]

Political vs. Strategic Decision Drivers

The consumption of limited defense funding for the sake of promoting alternative fuels at a time when oil is abundant, military strength is waning, and near-term threats are growing ignores strategic realities. In the near term, priority should be given to rebuilding the military and restoring acceptable readiness levels across the services. The new Administration should take the following steps to ensure that the military's limited defense dollars go to where they will best contribute to national defense.

- **Prioritize military capability.** Future initiatives should demonstrate an operational or strategic advantage before a commitment is made to investments in alternative energy sources. Congress must weigh these decisions against the more immediately pressing need for investment in weapons modernization, procurement, training, and other defense priorities.

- **Focus on reducing logistics requirements.** To mitigate the risks of petroleum dependency, future energy initiatives should focus on reducing logistics requirements by reducing reliance on combustible liquid fuels, improving fuel efficiencies, and developing self-sustaining technologies for expeditionary forces.

- **Consider the potential of nuclear power.** A true focus on military capability should weigh all available options. The proposed nuclear-powered cruiser program in the fiscal year (FY) 2008 National Defense Authorization Act was cancelled in FY 2011 largely due to cost concerns.[20] Not only does nuclear power provide a reliable, cost-effective alternative to petroleum-derived fuels, it also provides unparalleled capability for our large surface combatants.[21]

The DOD is inarguably dependent on petroleum, but the fuel is not in short supply, and the risks and limitations associated with petroleum dependency will not be solved with a shift to biofuel. The next Administration should ensure that the military's resources advance American military capability instead of a political agenda.

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19. U.S. Department of Defense, Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, "Fiscal Year 2014 Operational Energy Annual Report," June 2015, p. 2, http://www.acq.osd.mil/eie/Downloads/OE/FY14%20OE%20Annual%20Report.pdf (accessed January 3, 2017).
20. Ronald O'Rourke, "Navy CG(X) Cruiser Program: Background for Congress," Congressional Research Service *Report for Congress* No. 34179, June 10, 2010, p. 7, https://www.everycrsreport.com/reports/RL34179.html#_Toc282768394 (accessed December 21, 2016).
21. Congressional Budget Office, "The Cost-Effectiveness of Nuclear Power for Navy Surface Ships," May 2011, p. 8, https://www.cbo.gov/sites/default/files/112th-congress-2011-2012/reports/05-12-nuclearpropulsion.pdf (accessed December 21, 2016).