Response to RADM Robert G. James (USNR Ret.)'s 2 August 2011 *Wall Street Journal* op-ed "Of Mustard Fuel and Marines"

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Naval leadership will doubtless respond formally to Dr. James's op-ed, but since he specifically cited my work, I thought *Journal* readers deserved a reply from me too. I've worked on Naval and other defense energy issues for over three decades (not one) and served on both Defense Science Board task forces on DoD energy strategy, reporting in 2001 and 2008. Navy Secretary Mabus's energy leadership and similar efforts across all Services and in the Office of the Secretary of Defense reflect the recommendations of those task forces and of similar studies by prominent retired military leaders (e.g. www.cna.org/reports/energy) and the Secretary of Defense's JASON science advisory group.

At www.usnwc.edu/Events/Current-Strategy-Forum/Current-Strategy-Forum-2011/CSF-2011-Video.aspx, the Naval War College has posted Navy Secretary Mabus's remarks at his 7–8 June 2011 Current Strategy Conference, and addresses the previous day by Chief of Naval Operations Adm. Gary Roughead, Marine Lt. Gen. G.J. Flynn, and myself. These four talks will help Dr. James to understand that the military energy revolution has nothing to do with fads or the "latest fashion" or political correctness, did not result from Executive Branch nudging, but emerged internally and straightforwardly, chiefly in President G.W. Bush's Administration, from field commanders' requirements for combat effectiveness and force protection.

I agree with Dr. James that alternative, ideally autonomous, fuels (and impliedly their efficient use) are highly desirable for expeditionary use. This is a force protector as he rightly states: oil logistics is one of the Marine Corps Commandant's biggest casualty concerns, and over a thousand U.S. Servicemembers have died in convoy attacks in the past decade, mainly hauling fuel that is mainly wasted. Convoys no longer needed can't be attacked. But saving or displacing oil in the battlespace is also a force multiplier, a force enabler, and a source of transformational realignments from tail to tooth that can ultimately reach multi-divisional scale and save many tens of billions of dollars a year. For all these reasons, from Lt. Gen. James Mattis's 2003 appeal to "unleash us from the tether of fuel" to Maj. Gen. Richard Zilmer's 2006 operational request from Anbar Province for a "self-sustainable energy solution," field commanders have eagerly pursued ways to displace oil, both through efficient use and through substitute supplies. They're starting to succeed: DoD is now probably the world's largest single buyer both of oil and of renewable energy. My 2010 article in *Joint Force Quarterly* (the magazine of the Chairman of the Joint Chiefs of Staff) at www.ndu.edu/press/lib/images/jfq-57/lovins.pdf summarizes these issues and opportunities in their strategic context.

Dr. James ridicules the Marines' potential use of a truck-mounted opportunistic converter of local biomass, such as illegal poppies that would otherwise be destroyed, into tactical fuel. His objection is that the feedstock could otherwise feed people. People don't eat poppies any more than they eat prairie grass, forest wastes, rice straw, or fielded forces' own trash. Nor do these feedstocks raise land-use issues. Indeed, U.S. forces are striving to switch Afghan farmers from growing poppies to growing food and other crops.

Even stranger are Dr. James's suggestions of using "a fold-up solar panel" to "heat a tent," or using a "giant windmill...three stories high" to run a forward operating base and "be picked up by enemy radar" (I hadn't realized the Taliban were hiding radar sets in their beards). Were he familiar with the fifth-generation expeditionary energy systems pioneered by the Marines' XFOB (Experimental Forward Operating Base) at Twentynine Palms, he'd realize their hardware choices are tactically appropriate, highly advantageous, far less conspicuous and vulnerable than fuel convoys, and being enthusiastically adopted in theater.

He then conflates expeditionary renewable sources of electricity (displacing petroleum-fueled, convoy- or airlift-supplied, high-signature gensets) with his misplaced concerns about large-scale U.S. first-generation biofuel production. They're unrelated. Military biofuel interest emphasizes long-term mobility; fueled gensets are now being displaced more by efficient use and photovoltaics, plus small-scale wind, hydro, etc. where suitable.

Dr. James cites two of my books but misrepresents their content. My 1977 book *Soft Energy Paths* (to give it the correct title) didn't propose using "domestic crops" to make "one-third of our fuel oil," nor did it advocate making biofuels from corn, grapes, hops, or any other food crops. What it actually and correctly said on p. 44 and pp. 124–125 was that farm, forest, and urban wastes could be cost-effectively converted to enough biofuel to run "an efficient U.S. transport sector" (it referred specifically to gasoline). The National Academies and many other authoritative bodies later reached similar conclusions. Dr. James's land-use figures misleadingly assume obsolete first-generation biofuels and processes, food-crop feedstocks, and inefficient vehicles; mine didn't.

He's similarly muddled about my team's 2004 Pentagon-cosponsored book *Winning the Oil Endgame*. It showed how to get the U.S. off oil, again without displacing any cropland, but it didn't propose, as Dr. James claims, "running the entire electrical grid on wind and sunshine." That book was about oil, not electricity, and the two were less than 3% related then, less than 1% today. Nor did *Winning the Oil Endgame* propose, as he states, using renewables to save biofuels and natural gas in electricity generation (which uses virtually no biofuels) to use in transport. Rather, it showed how investing in electric demand response could save power-plant natural gas to displace oil in industry and buildings (plus 1.8% in transport). The book's biofuel analysis (pp. 103–110 and 162–164), again based on woody, weedy, and waste feedstocks rather than on food crops, showed that displacing U.S. oil use

in 2025 needn't interfere with food or fiber production nor harm soil fertility, based on the land-use calculations he claims I never did and on modern agronomic evidence.

Perhaps Dr. James is anticipating Rocky Mountain Institute's detailed new synthesis *Reinventing Fire*, to be published by Chelsea Green this October. That detailed study does indeed integrate oil with electricity. It shows how to get the U.S. completely off oil *and* coal by 2050 at a $5 trillion lower present-valued cost than business-as-usual, led by business and driven by market forces. One of the keys is indeed 125–260-mpg-equivalent autos, using a breakthrough competitive strategy based on electrified, lightweight carbon-fiber vehicles. Dr. James seems skeptical of the possibility of inventing those. However, they were already invented in 1991 and designed by 2000 (e.g.www.rmi.org/rmi/Library/T04-01_HypercarsHydrogenAutomotiveTransition). Dr. James might not be aware that BMW, Audi, and VW have announced 2012–13 volume production of such vehicles, at efficiencies up to 230 mpg for VW's two-seater, and that BMW has publicly confirmed our thesis that the saved batteries pay for the carbon fiber.

Dr. James concludes: "Let's get real about the solutions. The job of the military is defending the nation." Precisely. Since he retired from the Naval Reserve a generation ago, the uniformed leadership has come to understand that comprehensive, systematic, and aggressive adoption of energy efficiency and appropriate renewables is at the core of their national-security mission. The Air Force—America's #1 or #2 airline—and the Navy, like leading civilian airlines around the world, have been prudently exploring and testing third- and fourth-generation biofuels that show promise of lower and more stable long-run prices than oil. Our 2008 Defense Science Board task force concurred.

Losing some of the military market for oil (less than 2% of U.S. oil use) may slightly incommode Mr. James's colleagues and former employers in the oil business (besides his national-security background, he was reportedly a vice president of Mobil and an economist for Conoco, but the *Journal* oddly didn't say so). But many major oil companies too are investing in advanced biofuels. Indeed, the world's biggest distributor of biofuels is Shell, whose former Chairman, Sir Mark Moody-Stuart, joined with George Shultz in writing the Forewords to *Winning the Oil Endgame*, and whose U.S. and Upstream Americas president Marvin Odum wrote a Foreword to *Reinventing Fire*.

I would therefore very respectfully suggest to Dr. James that his contributions on military energy would carry more weight if he more carefully examined what I actually wrote and what DoD is actually doing.

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