

Green Water: Can the U.S. Navy win the eco-arms race?

Foreign Policy

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With domestic oil production up, imports declining, and new oil and gas reserves being discovered, some question whether energy remains, or ever was, a security challenge and military vulnerability for the United States. The rise in oil prices back over \$100 per barrel in the wake of Egypt's political turmoil provides a sobering answer.

Even if bullish predictions about America becoming energy self-sufficient, even a net exporter, by the 2020s prove true -- a welcome development, no doubt -- energy will continue to play a key role in economic and political stability. Self-sufficiency will not insulate the United States against oil price shocks, as Egypt and, before that, Libya remind us. It also will not lessen global political and economic friction from resource competition or threats to infrastructure and distribution.

Fossil fuels, chiefly oil, account for approximately 80 percent of the world's primary energy, according to the International Energy Agency (IEA). Oil is the ultimate global commodity, often trading on speculation and rumor because of this lack of competition. Supply shocks, like those in the 1970s, have been relatively infrequent, but remain a concern for many nations. Price shocks occur too often. Pronouncements by hardliners in oil-producing states, national or transnational instability, as we've seen across North Africa and the Middle East, or threats to close vital maritime choke points or disrupt supplies in any way can cause major price swings.

Even as new discoveries and new technologies increase supply, demand is increasing even more. In the past 30 years, while U.S. oil consumption remained relatively stable, consumption in the world's two fastest-growing economies, China and India, rose four to five times. China alone doubled its oil consumption between 1990 and 2000 and then doubled it again in the last decade. By 2035, the IEA predicts world liquid fuels consumption will grow by another 40 percent.

As the world's largest fossil fuel consumer, the U.S. military sees oil price volatility having an outsized impact on its budget. The Department of Defense (DOD), which consumes 93 percent of the fossil fuels used by the federal government, spends \$15 billion each year on fuel. But in the current fiscal year and the previous two, price spikes added another \$5 billion over what was budgeted. For just the U.S. Navy and Marine Corps, every \$1 rise in a barrel of oil costs us an extra \$30 million per year. With increasing budget pressures, the Navy and our other military services have few places other than training and readiness from which to cover these "instability surcharges." That means our military flies less, steams less, and trains less. Cutbacks in ships, planes, and other procurement come next. At some point, it makes no sense to build platforms for which we cannot afford fuel. That not only impacts military effectiveness, it hurts our economy as well.

The Navy's recent energy investments do not come, as some critics suggest, at the expense of building ships or training sailors. Just the opposite: They are producing savings to help build and operate those ships and planes and prepare sailors and Marines to defend our nation by flattening our energy budget and easing the taxpayers' burden. Alternative fuels also will provide competition to dampen price spikes and hedge against supply shocks. In fact, we are already seeing returns on investments made early in the Obama administration.

Energy's impact on global security is the age-old human story of how competition for resources can create conflict. The ability of military organizations to minimize their own energy vulnerabilities or capitalize on those of an adversary is often decisive. Nazi Germany invaded the Soviet Union in 1941 in part to seize its rich Caucasus oil fields. Its war machine thirsty for fuel and with no domestic reserves, Germany also began examining alternatives, ultimately building nine plants to manufacture fuel from coal. On May 12, 1944, a single day of Allied bombing damaged or destroyed every synthetic fuel facility. Hitler's minister of armaments and munitions later said the technological war was decided on that day. Just five months later, the United States fought the Battle of Leyte Gulf, the largest naval battle in history, primarily to deny Japan access

to Southeast Asia's fuel supplies. Following its defeat off the Philippines, the Japanese Navy was forced to tie up its surviving heavy warships in port for the duration of the war due to lack of fuel.

Throughout history, nations also have used resources as a bargaining tool, even a weapon. American support for Israel in the Yom Kippur War in 1973 prompted the Organization of the Petroleum Exporting Countries to retaliate with an oil embargo. Having become a net importer, America awoke to its vulnerability, experiencing long lines at gas stations and skyrocketing fuel and heating oil prices. From Richard Nixon on, every American president has urged energy independence, although serious strides toward that goal have come only in the last few years.

Still associated with Middle Eastern instability, energy's impact on economics, politics, and security is truly global, the result of growing competition in Asia and South America and new energy exploration from the Arctic to Africa.

While visiting several African nations in June 2011 during Navy/Marine Corps partnership-building missions, I met with then-President John Atta Mills of Ghana. Like many Gulf of Guinea nations, Ghana hopes to reap significant economic benefits from offshore oil reserves. But alluding to the often politically distorting effects of natural resources, Atta Mills sagely noted that Ghana "thankfully discovered democracy before we discovered oil." Other nations blessed with valuable natural resources have seen corruption become a way of life, with resource wealth benefitting only a favored few. "Corruption," former Secretary of State Hillary Clinton says, "is often a factor in energy poverty as well as political instability."

There are also security challenges to both production and distribution. Drilling platforms, particularly offshore and in deep water, are subject to accidents, attacks, and natural disasters, requiring huge upfront investment and a regulatory system that assures private companies meet their public obligations. Many smaller and developing nations do not have the resources, and often they call on the U.S. Navy and Marine Corps to assist, calls that will come more often as

exploration and extraction reach more difficult, more remote, and more fragile environments, such as the Far North or deeper oceans. I witnessed firsthand the impacts of the Deepwater Horizon explosion and subsequent spill as I worked at President Obama's direction to develop a disaster recovery plan for the U.S. Gulf Coast.

On the distribution side, the Energy Information Agency estimates that about half the world's oil is transported by sea, moving through a handful of choke points such as the straits of Hormuz, Malacca, and Denmark; the Suez and Panama canals; and the Bab-el-Mandeb at the southern end of the Red Sea. Since the end of WWII, the U.S. Navy has patrolled the world's global maritime commons, keeping sea lanes open for peaceful commerce and transport for all, not just itself or a few allies. While this has come at no small cost to our nation, after the upheaval of two global conflicts in just the first half of the 20th century, the relative peace and prosperity of the last few generations argues the wisdom of that investment.

Still, the postwar and post-Cold War eras have been marked by smaller conflicts, asymmetric engagements, and the harmful actions of non-state actors. Maritime choke points provide rogue states and terrorists with particularly vulnerable targets, allowing them to cause potentially devastating political or economic disruption. This year's attack and hostage crisis at the natural gas facility in southern Algeria again spotlighted the potential for havoc in countries heavily dependent on oil and gas for their economies. Algeria is a prime example, with fossil fuels providing 97 percent of its exports and two-thirds of its revenue.

Dependence for their energy needs on states less sympathetic to U.S. interests also increases the possibility for shifting allegiances around the globe, even among our allies. Energy has been a key concern for Europe and many former Soviet republics in their dealings with Russia.

Tensions in the East and South China seas and competing claims for uninhabited bits of rock are in part related to possible fossil fuel reserves beneath the ocean floor.

Just as resource competition is rooted in history, so is the U.S. Navy's leadership in energy innovation. Moving from sail to coal-fired steam power in the middle of the 19th century, our ships then shifted from coal to oil at the start of the 20th, and we pioneered nuclear power in the 1950s. As the Navy prepares to meet the demands of the defense strategy announced by the president in January 2012 -- a maritime-centric strategy focused on the Western Pacific and Arabian Gulf regions -- the requirement for a global presence using innovative, low-cost, light-footprint engagements, while continuing to protect the global commons, means decreasing our reliance on fossil fuels must be at the top of our agenda.

It was clear what was coming when, in October 2009, I outlined far-reaching goals for our Navy to increase energy efficiency and ensure supply diversification:

1. Cutting our use of fossil fuels to no more than 50 percent of our total usage, both afloat and ashore, by 2020;
2. Producing at least half of shore-based energy requirements on our installations from alternative sources by 2020;
3. Cutting petroleum use by half in the Navy's 50,000-strong commercial fleet by 2015;
4. Demonstrating a Green Strike Group in local operations by 2012 and sailing it by 2016;
5. And making evaluation of energy factors mandatory when awarding contracts for systems and buildings.

The Navy's use of nuclear energy, accounting for 17 percent of our power at sea, gave us a head start on the first goal. President Obama provided another boost in March 2011, when he directed the Departments of Energy, Agriculture, and the Navy to partner with the private sector to accelerate a domestic market for advanced biofuels by providing expertise, financial investment, and purchasing power to encourage development that is cost-competitive with petroleum. The departments committed up to \$510 million -- on at least a one-to-one cost-share basis with the private sector -- to fund the construction or retrofit of multiple, geographically dispersed, commercial-scale refineries.

One vehicle for this effort is the authority in Title III of the Defense Production Act (DPA) to support industrialization of defense-critical domestic industries and materials, such as nuclear propulsion, steel, aluminum, titanium, semiconductors, beryllium, and radiation-hardened electronics. Following an official presidential determination that advanced biofuels are essential to national defense, DOD announced a DPA award in late May that committed three companies to building the capacity to produce more than 150 million gallons of drop-in, military-compatible biofuels each year at an average price of well below \$4 per gallon, a price competitive with conventional fuels at today's prices. Since that announcement, a fourth company has been added. At full production, the biofuels from these bio-refineries, when combined with conventional fuel at a 50/50 blend, hold the promise of being able to cost-effectively provide the fleet with nearly 25 percent of its annual fuel demand, providing real competition in the liquid fuels market.

As with its leadership in energy innovation, the Navy also has a history of partnering with private industry to promote business sectors and products important to our nation's military and economic security. In the 1890s, when it was building its first four steel ships, the Navy paid nearly double the going price of cheaper European steel to support domestic steelmakers. Our government's belief that it was unacceptable to rely on foreign steel for our warships helped boost American steel to lead the world, driving our rise in the 20th century as an industrial, military, and political power.

This is not the first such alternative fuel partnership. Responding to Nazi efforts to create synthetic fuel, Congress passed in 1944 the Liquid Synthetic Fuels Act, authorizing \$30 million (nearly \$392 million in 2012 dollars) to build synthetic fuel demonstration plants. The United States paid \$58 per barrel for that fuel, far above the petroleum market price at the time. Over the next decade, the government invested \$87 million (\$750 million in 2012 dollars) in alternative fuel.

Unlike previous energy transitions, this time we are seeking fuel alternatives that do not require modifications to existing platforms or supply chains, which is why increased natural gas supplies

will not help the Navy's effort. The 50/50 blends of biofuel we've tested work in all our aircraft and ships, enabling us to meet our goal to successfully operate an entire carrier strike group (the "Great Green Fleet") on alternatives during the Rim of the Pacific Exercise in July 2012. Our program also requires biofuel production not compete with food crops or exceed legal carbon emissions.

Finally, we committed not to buy operational quantities of biofuels until they were price competitive with fossil fuel. We originally projected we would reach that goal by the end of the decade. With the recent DPA announcement, if we continue our efforts, biofuels will be competitive with conventional fossil fuels by the end of this administration.

There have always been critics who challenge every new idea or new technology as too costly or too risky, questioning the effectiveness of trading a proven method or platform or an existing supply chain for an uncertain, expensive replacement. In this budget-constrained environment, cost must be a concern and we must be careful stewards of taxpayer dollars. But our first mission must be to protect our nation by assuring stability around the globe. If concerns over cost and fear of change had carried the day, we would still be using sails. We never would have built aircraft carriers nor become the only nation that launches and lands aircraft off them *day or night*. We never would have pioneered nuclear power, nor would we build nuclear carriers and submarines today, because they remain far more expensive than conventional models. We do these things because they give us a technological advantage. They make the Navy and Marine Corps better warfighters. As blacksmiths and battleship admirals prove, change is inevitable and irresistible.

Advanced biofuel prices have dropped dramatically since the Navy first purchased test amounts. Now, in concert with the effort directed by President Obama, more and more industries are investing in biofuels, helping speed the day when a competitive, American alternative to fossil fuels becomes available. Several commercial airlines -- including Alaska Airlines, Lufthansa, and the world's largest carrier, United Airlines -- have completed test flights on advanced

biofuel. More will follow as the business case for biofuel improves, a development helped along by rising oil prices and the carbon-trading scheme for commercial aviation that took effect in the European Union last year. Although international compliance has been deferred, all flights within and between EU countries and Iceland, Liechtenstein, and Norway must either fly on drop-in biofuels or pay to offset their carbon emissions. Other nations pursuing advanced biofuels like Brazil, Australia, and Singapore create the potential for increased cooperation on research, development, deployment, and increased security for our allies. Canada is examining biofuels as an alternative to power its navy, and Italy has begun an advanced biofuels testing and qualification program for its fleet.

Increased demand has also lowered prices for other energy alternatives for the Navy ashore. On three California installations, we have power purchase agreements projected cumulatively to save \$20 million. These illustrate how we will execute our one-gigawatt renewable energy strategy, announced by the president in his 2012 State of the Union address. That strategy will produce enough clean energy to power the equivalent of a quarter of a million homes annually and improve security by producing more power available independent of the U.S. grid at the same price or lower than conventional power.

Energy efficiencies are a critical component in reaching our goals. The amphibious assault ship USS *Makin Island* has a hybrid-electric propulsion system that powers the ship at low speeds while using gas turbines for less frequently used higher speeds. On its most recent deployment, the ship spent less than half its \$33 million fuel budget. The new amphibious assault ships USS *America* and USS *Tripoli* will also use this hybrid system.

Diversifying energy supplies doesn't just save money, it saves lives. A Marine Corps study found during the height of the fighting in Afghanistan that one Marine was killed or wounded for every 50 convoys. Most convoys transported fuel and water, so cutting fuel means fewer convoys and fewer casualties. In one example alone, the Third Battalion, Fifth Marines, deployed in the middle of heavy fighting in Sangin Province, cut fossil fuel use and supply requirements by 25

percent at main operating bases and up to 90 percent at combat outposts with more efficient equipment and alternative power.

This energy mission can also reaffirm American leadership in innovation. If we do not lead, we will be left behind. In the mid-1990s, the United States was a global leader in solar technology; today, it is China. China is also making major investments in biofuels, including successful tests by Air China, and plans for a ten-fold increase in production over the next decade. With oil prices rising, many importers -- like Morocco and Jordan (solar power) and Egypt and Tunisia (wind) -- are moving to alternatives, while oil exporters expand domestic alternative energy use so they can export more oil. Saudi Arabia recently announced a target of 54 gigawatts of renewable energy by 2032.

Each revolution in energy changed the nature of warfare and made the Navy stronger, more effective, and better able to defend the United States and our interests around the world. Today, we have the opportunity to be present at the creation of a new energy future, which will strengthen our national security even as it creates an engine for a new economy and provides for more stability around the globe. This opportunity cannot be undermined by present-day naysayers who refuse to envision the future, even when the path is illuminated by past successes. For 237 years, the U.S. Navy and Marine Corps have led the way, and we will again -- innovating, adapting, and emerging victorious.

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