

Secretary of the Navy Ray Mabus  
ASU Global Institute of Sustainability  
Arizona State University  
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Thank you for that introduction. It is an honor for me to be here at Arizona State today to discuss the current global situation, energy, and sustainability, from a maritime perspective. In thinking about what I would say today, I was reminded of what one Asian chief of Navy told me about the difference between soldiers and sailors. Soldiers of every country, he said, always focus on the ground. They see nothing but boundaries, which in a way leaves them stuck in the past. Sailors, no matter where they are from, look out over the ocean and see nothing but the horizon, nothing but the future.

Our future is clearly a maritime one. Because over that horizon travels most of the world's commerce. We live in the most globalized economy in the history of humankind. Today, more than 90% of trade moves by sea. Over 90% of international data transfer occurs not via satellite, but through undersea cables. Eight of every ten people on earth live within 40 miles of a coast, a critical fact to remember as sea levels rise around the globe.

Clearly, freedom of the seas and freedom of navigation are vital to our global economy and to global security. It is no coincidence that global trade, the global economy and global prosperity have risen dramatically since the end of WW II, a period in which maritime security and open sea lanes for every nation engaged in peaceful trade have been maintained by the presence of the United States Navy.

Unfortunately, increased globalization also has meant increased risks of maritime terrorism, the illegal movement of drugs, weapons, and people, and the dangers of modern piracy. These challenges of maritime crime and the threats from both state-based and non-state actors are complex, dynamic and intertwined.

So it is clear that for the next decade and beyond, our greatest opportunities for global economic advancement and many of our greatest challenges to global security will involve the maritime domain, making naval forces more important than ever.

Uniquely, naval forces offer the capability to provide presence, which really just means being in the right place, not just at the right time, but all the time. Presence helps deter potential conflicts, and it avoids escalating the situation when tensions rise. Naval presence is persistent, meaning we can stay a long time. And we don't take up one inch of anyone's soil, so we don't infringe on anyone's sovereignty. As a result, naval presence uniquely offers leaders a wide range of options, from supporting diplomacy to providing stronger measures. As my favorite recruiting poster says of the United States Navy, "sometimes we follow the storm, sometimes we ARE the storm."

As Secretary of the United States Navy, I am responsible for two of our military services: the Navy and the Marine Corps. Together, Marines and Sailors form a navy team that is also unique in how we accomplish our job. Unlike garrison forces, we are constantly deployed, in times of peace and in times of conflict, to maintain that presence around the globe. There are no

permanent homecomings for Sailors and Marines. They usually do their jobs far from home, far from family, far from us.

Our founding fathers clearly saw the importance of naval forces, enshrining the need for a Navy in our Constitution. While Congress has the power to “raise” an army, it is explicitly instructed to “maintain” a Navy. The Constitution’s authors knew that for the United States to be a player on the world stage, we required a force that could protect our commerce and national interests, both near our shores and across the globe. We had to have presence around the world.

That global perspective, that global reach, that global necessity continues today. From my distinctive vantage point overseeing our two services, I think that there are four things that make that presence possible: People, Platforms, Power and Partnerships. These have been my priorities since I took office almost five years ago. Today, I want to focus on the third of those priorities: power, and explain why energy is so important to everything that we do.

Actually, I’ve never understood why people would be surprised that the Secretary of the Navy is so concerned about energy. It seems pretty obvious to me. After all, it was the Navy that switched its source of power from sail to steam in the 19<sup>th</sup> Century, from steam to oil at the beginning of the 20<sup>th</sup> Century and we pioneered nuclear power as a propulsion source in the middle of the 20<sup>th</sup> Century. And, by the way, every single time we made one of these dramatic changes in energy there were naysayers who spoke and worked against the change.

Five years ago, shortly after I took office, I began talking about power and have continued talking and writing and acting on this ever since. It is clearly a major and pivotal issue in many

ways. Every time we fill up our car with gas we are painfully reminded of the economic implications. But my concern, which I've raised in speeches and articles and in countless discussions is also about the national and international security implications, the critical geopolitical role of energy.

As a security challenge, access to energy and fuel can be a diplomatic pressure point and can be, has been and is used as a geostrategic weapon. Consider, for example, the following: nearly 40 percent of the natural gas and a third of the oil that Europe consumes comes from Russia and over half of gas that Ukraine uses comes from that same source.

The world's energy infrastructure also offers targets for the maritime instability I talked about earlier. At the request of the Libyan government our Navy SEALs recently boarded and took control of a tanker in the Mediterranean with a cargo full of stolen oil. Monthly we hear reports of oil piracy and energy theft in the Gulf of Guinea on the west coast of Africa.

And shrinking Arctic ice is opening up new sea lanes at the top of our planet and new potential areas for resource exploration and new potential areas of friction.

Even with domestic oil production up, imports declining, and new oil and gas reserves being discovered, energy remains a security and an economic concern for the United States. Even if we were able to produce every single drop of oil or gas that America needs domestically, we cannot control the price.

Oil is the ultimate global commodity, often traded on speculation and rumor. As an example, in the aftermath of the chemical weapons attack in Syria last summer, oil prices surged to over \$107 per barrel and remained there for weeks. It is what oil traders call a “security premium.” When a crisis anywhere in the world occurs – just look at Egypt, Libya, anywhere – the price of oil spikes. Just last week, Bloomberg reported the crisis in Ukraine was creating uncertainty, which always drives up prices for commodities like oil.

Each \$1 increase in the price of a barrel of oil results in a \$30 million bill for the Navy and Marine Corps. This has huge implications across the Department of Defense and for our security. DOD is the largest single institutional consumer of fossil fuels on earth and budgets about \$15 billion each year on fuel. But in fiscal years 2011 and 2012 price spikes added another \$3 billion to the DOD fuel bill. The bills from that “security premium” can mean that we will have fewer resources for training, for operations and, if the bill gets too high, fewer platforms like ships and planes.

In addition, the cost of meeting our high fuel demand can also be measured in the lives of those guarding fuel convoys. During the height of operations in Afghanistan, we were losing one Marine, killed or wounded, for every 50 convoys transporting fuel into theater. That is far too high a price to pay.

For all of those reasons, in October 2009, I announced five energy goals for the Department of the Navy in order to improve our energy security, increase our strategic independence and sustainability, and advance our operational capabilities. The top goal commits the Department of

the Navy to generate at least one-half of its energy needs, afloat and ashore, from non-fossil fueled sources by 2020. We are going to meet these goals through a number of programs including a variety of alternative fuel initiatives and also greater energy efficiency. It will make us better at our jobs, better warfighters, and it will make us, and the world, far more secure.

Those fuel convoy statistics are one reason Marines have been some of the most aggressive leaders in sustainable energy over the past few years. You probably don't think of Marines as ardent environmentalists, but, as always, Marines are leading the way in proving that renewable energy, making energy where you are, increases combat effectiveness, and this was proven in actual combat in Afghanistan. Using their Experimental Forward Operating Base program, or ExFOB, they have developed alternative energy sources from the private commercial sector that help reduce their dependence on these fuel convoys and on traditional sources of energy like diesel fuel and batteries.

In the fall of 2010 Third Battalion, Fifth Marines deployed to Sangin, in Helmand Province. At the time, Sangin was the center of a very tough fight. But the 3/5 Marines took some items from this ExFOB process and they saw a dramatic impact. A foot patrol using small, light and packable solar panels to power their radios and GPSs instead of batteries could go for three weeks without a battery resupply, instead of every few days. Also, one company of Marines shed 700 pounds of batteries. It made them more agile and increased their potential range, but it also meant a dramatic cut in the need for resupply convoys and a cut in the number of Marine casualties guarding those convoys. Alternative energy saves lives.

Once they tested the equipment, and they tested it in the ultimate way-- combat, we turned it around and put it into production. Today it's a standard part of a Marine unit's equipment. Entire battalions in are equipped with these energy technologies like solar, LED lights for tents, and solar generators at forward operating bases. From infantry units, to sniper teams, to Special Ops units, this equipment is now used by us all over the world. Alternative energy makes the Marines better warriors.

Every two years we have the biggest naval exercise in the world Rim of the Pacific or RIMPAC exercise. Last time we had one in 2012 the entire NIMITZ Carrier Strike Group, everything from surface ships to every type of aircraft that took off from NIMITZ were flying and steaming on a 50/50 blend of biofuels and jet fuel or marine diesel. We called it the Great Green Fleet. The big news out of that exercise was that there was no news.

We bought biofuels, put it in our normal logistics chain, got it to Hawaii, put it on a logistics ship and took it to sea. We didn't change a single engine in a single aircraft or ship; we didn't even change a single setting. It was absolutely seamless, absolutely transparent. The engines, the aircraft, the ships couldn't tell the difference.

And that's one of the keys, only the source of fuel should change. Whatever replaces fossil fuels has to be a drop-in fuel. Nothing changes in any engine. And that's because we have almost all of the fleet, either at sea or being built today, that we are going to have in 2020. We have most of the aircraft that we will have in 2020. To change our engines to accommodate other fuels, like liquid natural gas, would be astronomically, prohibitively expensive.

New, more sustainable energy sources are critical. But being better about how we use fuel is important too; doing the same missions, the same things, just using less fuel. Our newest big deck amphibious ship, USS MAKIN ISLAND, is a great example. These big deck amphibs are 40,000 ton ships, only aircraft carriers are larger, and they carry 3000 Sailors and Marines. They have a MEU, a Marine Expeditionary Unit, complete with helicopters, Harriers, landing craft and all the other equipment Marines need for amphibious operations. MAKIN ISLAND is unique in that it has a hybrid propulsion system. It's got an electric power plant for speeds under 12 knots and normal diesel for speeds over 12 knots.

When MAKIN ISLAND went on deployment in 2012 it had a \$33 million fuel budget. That is normally what her sister big deck amphibs would spend during seven months or so at sea. But between the new systems and energy awareness training and conservation methods led by the crew, MAKIN only spent 18 million. They saved nearly half their fuel budget in that one deployment.

And it isn't just at sea or in combat that we're applying the lessons we're learning on sustainability. The Department of the Navy is responsible for 118,000 buildings and facilities covering over 500 million square feet of space at bases across the United States and the world. We are using solar, wind, and geothermal programs on many of those bases that are producing electricity today. We are exploring new technologies like fuel cells, hydrothermal and wave generation. We are working with pioneers on the technologies of smart-grids and micro-grids..

Here in Arizona at Marine Corps Air Station Yuma, we started installing solar panels as early as 2009.

All this is some of what we've done so far. Now let me talk to you about where we are headed in the future. Let's take a look over the horizon.

Under a Presidential Directive, the Department of the Navy is working with the Departments of Energy and Agriculture to help promote a national biofuel industry. Under the authority in Title III of the Defense Production Act (DPA), we took an important step forward with a DPA award last year to four companies which have committed to produce 160 million gallons of drop-in, military-compatible biofuels each year at an average price below \$3.50 per gallon. That is a price that is extremely competitive with what we are paying today for conventional fuels. At full production, just this amount of biofuels combined with conventional fuel at a 50/50 blend hold the promise of being able to cost-effectively provide our fleet with as much as 25% of its annual fuel demand, providing real competition in the liquid fuels market.

We also continue to develop our energy efficiency through research and development of more efficient propulsion systems, our shore-based power management technologies, and conservation measures. At our joint base in the country of Djibouti on the Horn of Africa we have recently put programs in place that are increasing efficiency and driving down fuel consumption despite increases in the number of people based there and increased electrical demand. From Hawaii to Virginia, and bases in the heart of the country like in Yuma, we are rolling out more alternative power systems and efficiency programs

At sea, our next two big-deck amphibs are the USS AMERICA, which we will commission later this year, and USS TRIPOLI which will have its keel laying this summer. Both ships will have hybrid drives like MAKIN ISLAND. The USS ZUMWALT, our newest and biggest destroyer which we christened in Bath, Maine two weeks ago, has an ALL-electric propulsion system, and we are studying hybrid systems for our future Aegis destroyers.

The Navy has a long and successful history of partnering with industry to promote business sectors and products important to our nation's military and economic security. From the development of the American steel industry to nuclear power, the Navy has helped the country develop economically while helping Sailors benefit from the cutting edge of technology to defend our nation. These programs are about diversifying fuel supplies, stabilizing fuel costs and reducing overall energy needs. We also have a long tradition of cutting edge research, some we do ourselves and some in partnership with academic institutions. Indeed, scientists and engineers right here at Arizona State University are helping Navy sail toward that next horizon of innovation.

Because power and energy are global issues, both an international security and economic challenge, we're not the only ones working on this. We're not the only ones who realize the importance of developing alternative fuels and being more efficient in energy use. Our friends and allies around the world are exploring similar projects to increase their combat effectiveness and strategic flexibility.

Three weeks ago I was in Italy where we signed a Statement of Cooperation with the Italian Navy to work together on biofuel development and integration. When the Great Green Fleet sailed at RIMPAC the Australian Navy was there with us during the exercise. The Australian Fleet Commander flew one of his helicopters over and landed on the NIMITZ and was refueled on biofuels. We signed an agreement to cooperate on the development of biofuels. When he was asked whether he was committed to the program, he said: “well I’m about to get on that helicopter, so yes.” The British Army partnered with our Marines in Afghanistan using alternative energy ExFOB equipment. Sustainability for our military forces isn’t just a United States concern; our allies are just as interested as we are. Sustainability is a global issue.

Earlier I noted how dependent Europe is on supplies of oil and gas from Russia. Well, it works both ways. Obviously Europe is a large customer for Russia, which depends on oil and gas revenues for over half of its government’s budget. Imagine the impact alternative power and conservation measures might have.

We are far down the road from where we were five years ago when I set Navy’s goals. Not doing this because it’s not instant, or because it’s not the way it’s always been done, or because there is opposition aren’t reasons for inaction; they’re excuses.

But by setting and achieving these energy goals, we will maximize our reach, maintain our global presence, and make our Navy and Marine Corps more combat capable. In short, we as a Navy and we as a Nation will have an edge. We will be stronger and less vulnerable as a Navy and as a Nation.

From the U.S. Navy: Semper Fortis, Always Courageous.

And from the U.S. Marine Corps: Semper Fideles, Always Faithful.

Thank you.