

# THE DEPARTMENT OF NAVY'S ENERGY PROGRAM

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HEARING  
BEFORE THE  
SUBCOMMITTEE ON WATER AND POWER  
OF THE  
COMMITTEE ON  
ENERGY AND NATURAL RESOURCES  
UNITED STATES SENATE  
ONE HUNDRED TWELFTH CONGRESS  
SECOND SESSION

TO

RECEIVE TESTIMONY ON SPECIFIC ENERGY AND WATER POLICIES AND  
PROGRAMS THAT THE U.S. DEPARTMENT OF NAVY IS IMPLEMENTING  
AS IT PERTAINS TO ITS OPERATIONS AND FACILITIES

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NORFOLK, VA, MARCH 12, 2012



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## **THE DEPARTMENT OF NAVY'S ENERGY PROGRAM**

**MONDAY, MARCH 12, 2012**

U.S. SENATE,  
SUBCOMMITTEE ON WATER AND POWER,  
COMMITTEE ON ENERGY AND NATURAL RESOURCES,  
*Norfolk, Virginia.*

The subcommittee met, pursuant to notice, at 2:10 p.m. at the U.S. Naval Station aboard the USS Kearsarge in Norfolk, Virginia, Hon. Jeanne Shaheen presiding.

### **OPENING STATEMENT OF HON. JEANNE SHAHEEN, U.S. SENATOR FROM NEW HAMPSHIRE**

Senator SHAHEEN. Good afternoon, everyone. I will not bang the gavel because we don't know what that will mean. But I would like to welcome all of you to this hearing of the Senate Energy and Natural Resources Subcommittee on Water and Power.

I'm Jeanne Shaheen. I'm the Senator from New Hampshire. I chair that subcommittee.

We're delighted to be here aboard the USS Kearsarge at Naval Station Norfolk to discuss the Department of the Navy's ongoing work in energy efficiency and alternative energy. I think it's important to point out that the Senate historian has told us that this will be the first Senate Committee hearing on a U.S. Navy ship since 1960. So we're making a little modern history today.

I'm pleased to be joined by my good friend from the Commonwealth of Virginia, Senator Mark Warner and our very distinguished panel of experts.

We have 2 Senator Warners here. So we're very pleased about that. We also have Senator John Warner, who will be joining us as a panelist.

I want to give special thanks to Secretary Mabus, Secretary of the Navy, for joining us today and for being here to testify and for all of your leadership in addressing the issues that we're here to talk about today.

I also want to thank Captain Jones and Rear Admiral Ann Phillips for hosting us as well.

We're really pleased, I'm particularly pleased to be aboard the USS Kearsarge because it is the fourth ship in the history of the Navy to be named after Mount Kearsarge which is in New Hampshire. I'm not quite sure how that happened, but I'm going to have to go back in history and find out which Senator made it possible to have 4 ships named after Mount Kearsarge.

But we're delighted to be here today because this ship really exemplifies many of the policy initiatives that we're going to be discussing. We had a very impressive briefing earlier this morning with so many of the initiatives that you're using on board here described in a way that we really need to get the word out. That's part of what we hoped to do with this hearing today.

By embracing a comprehensive approach to energy conservation the Kearsarge has successfully reduced its energy usage and recently received a 2011 SECNAV Energy Conservation Award.

I know we're all part of the choir here but energy efficiency is the cheapest, fastest way to address our energy needs in this country. The benefits of energy efficient technologies to our domestic economy are obvious.

They lower energy costs.

They ultimately free up capital that allows businesses to expand and our economies to grow.

It also has the potential to create thousands of new jobs and help protect our environment.

I was pleased last year to work with Senator Rob Portman from Ohio on an inter-comprehensive energy efficiency legislation. We're still hoping we can get that to the floor.

One of the things that I learned as part of that effort, again, that I know everyone here knows is that government is the biggest user of energy in America. The military is the biggest user of energy within the Federal Government. That's demonstrated by this middle circle on this chart. You can really see how energy use breaks down.

Today's hearing is going to focus on the impact of energy efficiency and renewable energy on our national security. The Department of Defense has long been interested in harnessing new forms of power to improve our Nation's combat readiness. However, the proliferation of advanced technology on the battlefield has dramatically increased our military's energy needs.

Today's service member requires an average of 22 gallons of fuel per day, an increase of 175 percent since the Vietnam War. Operations in Afghanistan alone require 20 million to 50 million gallons of fuel per month. The total cost to secure and transport fuel to the battlefield, also known as the fully burdened cost of energy, is estimated to be as high as \$40 a gallon.

Most important in 2010 there were 1,100 attacks on fuel convoys. So as you all explained to me so eloquently this morning, this is not just about cost in resources. This is about also costs in lives. The conflicts in Iraq and Afghanistan have illustrated the clear need for reform of DOD energy policies.

Since 2008 the Department has made notable progress toward that goal.

For example, the Department of the Navy, under the leadership of Secretary Mabus, has committed itself to securing 50 percent of its energy from alternative sources, reducing 50 percent of its non-tactical petroleum use and ensuring 50 percent of all Navy and Marine Corps installations produce as much energy as they consume by 2020.

The Navy is also increasingly making use of alternative energy, particularly advanced biofuels. Using alternatives to petroleum in-

cluding algae, switch grass and camelina, again, we had a very interesting demonstration of that this morning.

The Navy has already powered an F/A Team Green Hornet, a riverine command boat and several components of the first green carrier strike group, dubbed the "Great Green Fleet".

The Navy's development of advanced biofuels has the potential to dramatically improve our energy security and could lay the groundwork for wider utilization in our civilian economy.

The Marine Corps has also committed itself to reducing energy demand particularly on the battlefield.

For example, through the work of the Marine Corps Expeditionary Energy Office, a marine unit in Afghanistan, recently conducted a 3 week, foot patrol without resupplying batteries, saving them 700 pounds of battery weight over the course of the mission. Again, we got a very effective demonstration of that earlier this morning.

Now I first had my introduction to some of the work that the Navy is doing with Senator John Warner last summer, when we had the opportunity to tour the Portsmouth Naval shipyard. You know I couldn't be in Norfolk without mentioning Portsmouth, which is between New Hampshire and Maine and obviously very important to us in Maine and New Hampshire. We were able to see, firsthand, the potential to reduce operating costs and improve mission performance through more effective energy management.

Again, I was pleased to present Portsmouth Naval Shipyards with the 2011 SECNAV Energy and Water Management Award for outstanding achievement in the industrial category. So this is a continuation of learning more about those efforts that you all have underway in the Navy and throughout the military.

I look forward to further exploring many of these issues today as well as additional ways that Congress can be helpful on this important issue. I think, as I said at the outset, one of the most important things we need to do is to get the word out about the great work that is going on here. So again, thank you very much to everyone who's been involved in this visit, to the Energy Committee staff in the Senate, who helped set it up.

Now I would like to ask Senator Warner if he would like to make some opening remarks.

**STATEMENT OF HON. MARK R. WARNER, U.S SENATOR  
FROM VIRGINIA**

Senator MARK WARNER. Thank you, Madam Chairwoman.

Thank you Senator Shaheen for holding this hearing.

I am not a member of this subcommittee. But when Senator Shaheen mentioned that she was coming to Norfolk and was going to focus on some of the innovation and exciting opportunities going on in the Navy and Marines, I wanted to be here.

I wanted to also commend Senator Shaheen for her leadership in this field. She made brief mention of some legislation that she and Senator Portman put together last year. I'm proud to be a co-sponsor of as well. In terms of energy conservation, which is really the lowest hanging fruit in terms of how we can save resources, save money and lessen our dependence, particularly upon foreign oil sources.

So I want to again, thank you for your work on that piece of legislation that actually got out of committee, 18 to 3. You'd think at that kind of vote it might actually get a chance to get a vote on the floor at some point. So we're hopeful that that may come to pass at some point soon.

I also want to commend Secretary Mabus for, once again, being here in Virginia. We appreciate your leadership, your wisdom and reaffirming Norfolk as the home of our carriers on the East Coast of the United States. Something that is critically important, as you have to make the very, very tough choices as Secretary to make sure how, in these fiscally constrained times, we can do more with less.

I think your commitment to energy efficiency and the commitment Senator Shaheen mentioned in terms of trying to see if we can move the Navy's usage to 50 percent alternative fuel over the next few years is a very appropriate and worthy goal. I don't understand how some Members of Congress just don't seem to get it, that this initiative is about saving money. It's about saving lives as we've seen some of the data shown particularly from the conflicts in Iraq and Afghanistan, the amount of harm that befalls some of our troops as we have to convoy up fuels to those front lines.

So this truly is, these efforts, are about saving lives. It's, once again, about having the Navy be an innovator. There are things that you can do in terms of forward purchasing and I want to get to this in some questions coming up that really can spur innovation, not just for DOD, but across the whole energy field.

Let me also make one comment. That, Madame Chair, it's a bit intimidating to me and any member of the Virginia Congressional Delegation to be on one of our great Navy vessels when we have Senator John Warner in the audience. It was nearly 70 years ago that Senator Warner first signed up as a member of the Navy, volunteered to serve our Nation and has served our Nation in so many ways over those last, close to, 70 years both in the Navy and the Marines, as Secretary of Navy, in the U.S. Senate.

I personally am looking forward to the second panel when I'm going to get a chance to really grill him on a number of issues that I've, you know, I've been on the other side of the podium, of the grilling, from John Warner in the past. So I'm looking forward to that turn about, fair play. But it is a real, real wonderful opportunity for me. There's no one that I respect more than John Warner. His presence here today is special for all of us.

Let me simply again, we got to get on to the testimony. But I want to thank all of the sailors and the Marines, who do so much to keep us safe. God Bless you for what you do. Thank you again, for your work on this important effort as well showing again, how we can save dollars, save lives and play an incredibly important role in terms of bringing greater innovation to the very, very important field of energy.

With that, Madame Chairman, I yield back.

Senator SHAHEEN. Thank you.

Just to reassure Senator Warner. I have the gavel. So fear not. If he gets too difficult, we'll shut him down.

We have 3 panels this afternoon.

The first panel really needs no introduction, obviously. It's the Secretary of the Navy, Ray Mabus. Thank you very much, again, for being us, Mr. Secretary.

**STATEMENT OF HON. RAYMOND E. MABUS, SECRETARY OF  
THE NAVY, DEPARTMENT OF THE NAVY**

Mr. MABUS. Senator, thank you so much.

Senator Shaheen, Senator Mark Warner, I particularly am glad to be here on the Kearsarge, named for, as you pointed out, the mountain in your home State. I'm also particularly glad to be here with another Ol'Miss graduate, Senator Shaheen.

Senator Warner, you pointed out about our carriers. I'd like to make one other point. Everybody thinks we have 11 carriers in the Navy.

This is living proof that we've got 22, that our big deck amphibs perform the incredibly wide range of missions, that our other conventional carriers perform. So our carrier force is larger and more dispersed than almost anything else we have. Projects our power and protects this country in unique ways.

So first I want to thank the 2 members here and the members of your subcommittee and of the Senate for the support that you give our sailors and marines, the men and women in uniform, their families, who help us, have the best military the world has ever seen. Protecting our national interest is exactly what our efforts on reforming how we use, produce and procure energy are all about.

Before I get into just a few specifics about what we're doing I think it's important for us to understand the environment we work in. The pride that the Commandant of the Marine Corps, General Amos and the Chief of Naval Operations, Admiral Greenert and I take in leading the Navy and Marine Corps is exceeded only by the accomplishments of the brave and selfless sailors, marines and civilians that we lead. Whatever is asked of them by the American people through their Commander in Chief from Afghanistan to Libya, from assisting the stricken people of Japan to assuring open sea lanes around the world, from bringing Osama Bin Laden to final justice, to rescuing hostages wherever they may be hidden by either terrorist or pirates, they answer the call. They get the job done.

As we pivot out of 2 long ground wars it became essential to review our basic strategic posture. The new guidance developed under the leadership of the President and the Secretary of Defense and with the full cooperation of all the service secretaries and the service chiefs, responds to a very dynamic and complex, global security environment. Out of that strategy we developed a budget which is now in front of you to ensure the Navy and Marine Corps can execute this strategy while staying within the limits placed by the Budget Control Act.

The CNO, the Commandant and I are absolutely confident that the United States Navy and the United States Marine Corps are well prepared to maintain their status as the most formidable expeditionary fighting force the world has ever known. No one should ever doubt the ability, the capability or the superiority of the Navy and Marine Corps.

This new strategy focusing on the Western Pacific, the Arabian Gulf, while maintaining our global presence clearly increases demand on maritime capability. It requires the Navy and Marine Corps team that is built and ready for any eventuality. Land, under the sea, in the air, on the sea or in the vast cyber seas, and operated forward to protect American interest, to deter crisis and if necessary, to fight and win wars.

Understandably this has drawn a lot of attention to the size of our fleet. I'd like to talk about that with some, few basic facts. On 9/11 the United States Navy had 316 ships in our battle fleet. That number dropped by 33 ships over the next 7 years. Reversing that trend and rebuilding our fleet has been one of the top priorities of this Administration.

We have stabilized acquisition programs for our most important platforms, increased competition, use many more fixed price contracts, insisted on better performance and taken tougher stands against fraud, abuse and mismanagement. Despite the fiscal challenges and despite decommissioning 7 cruisers early, our ship building plan will enable us to maintain the same size fleet at the end of this 5-year period that we have today. Before the end of this decade in 2019, we will again have 300 ships in our battle fleet. I must also point out that that fleet of 2019 will have far greater capabilities than the fleet of today.

As I said the CNO, the Commandant and I are very confident that we can meet the demands of our new strategy today. But the threats we face are not static and neither is our defense strategy nor our plans to continue to build our capabilities and capacities to meet the strategy and whatever threats or requirements come over the horizon. It's exactly because we live in this ever changing, very dynamic security situation we can't be complacent about how the Navy and Marine Corps use, produce and procure energy.

Here again, regarding these efforts it's important to talk about a few facts.

Resources have always been a potential source of conflict throughout human history. Those who have abundant energy resources sometimes use that as a weapon against others. While those who lack energy supplies or have to depend on others to fulfill their needs, recognize just how vulnerable that makes them.

Today the United States controls just 2 percent of known global oil reserves. But we consume over 20 percent of all the world's oil. President Obama's, "All of the Above" energy strategy, clearly advocates doing a better job of increasing domestic oil production as much as possible. But the math is very clear. Even if we used every possible source of oil available to us, it wouldn't be enough to supply our needs.

That's why we rely so much on foreign sources of oil. Even though many of those sources of which we are absolutely dependent are in volatile or potentially volatile places on Earth. Some of those oil suppliers probably don't have our best interests at heart. We would never depend on those oil suppliers to build our ships, our aircraft, our ground equipment, but we give them a say in whether the ships sail, the aircraft fly or the ground vehicles operate because we depend on them for fuel.

Supply shocks are a real strategic vulnerability for us. Price shocks make us equally vulnerable. For every dollar increase in the price in a barrel of oil the United States Navy gets an additional \$31 million fuel bill.

Oil prices are a global commodity. Set globally in a market that's often driven by rumor and speculation which can cause price spikes that make budgeting absolutely impossible. When the Libya unrest broke out last year about this time, the price of a barrel of oil increased \$38 which increased the Navy's fuel bill by over a billion dollars.

There was only one place for us to go get that and that was out of our operations accounts which meant that we steamed less. We flew less. We trained less.

As you pointed out, Senator Shaheen, in theater fuel is also a tactical and operational vulnerability. Fuel and water are the 2 things we import the most into Afghanistan. For every 50 convoys of fuel and water a Marine is killed or wounded. That is simply too high a price to pay.

Both the Navy and the Marine Corps have to use energy more efficiently. We must lead in the development of alternative energies. If we don't we put our military readiness, we put our national security and we put the lives of our sailors and Marines at risk.

Again, as you pointed out, nearly 3 years ago, I set 5 ambitious energy goals for the Department. We're making real progress on all 5. Our efforts are already making us a lot better war fighters.

Let me give you a few examples of that progress. Some of which I know you saw earlier today.

By deploying to Afghanistan with solar blankets to charge radios and some of their other small electrical equipment the Marine patrol dropped 700 pounds of batteries from their packs and didn't have to be resupplied as often.

Less efficient generators run all the time making noise that No. 1, makes it hard for our Marines to hear things going on outside the wire.

Number 2 makes them easy for the enemy to target.

More efficient generations run less often, make less noise and are less easy to target.

More efficient means of powering our ships helps save money leaving more money for other program platforms.

Just on the Kearsarge, stern flaps, other energy saving devices, save about \$2 million a year in fuel costs.

Its sister ship, the USS Makin Island, has a hybrid electric drive which on its initial voyage from Pascagoula, Mississippi, in my home State around South America to California to San Diego, its home port, saved \$2 million in fuel at 2010 prices. That ship's ability over the—to use electric power when it's cruising at lower speeds which is most of the time for war ships, will mean over its life expectancy that in 2010 dollars it will save \$250 million in fuel costs. That's why we're testing the same hybrid technology on our guided missile destroyers.

Representatives of both the Navy and Marine Corps will follow me and will talk about specifics on what we're doing to secure greater independence, save money and save lives through our comprehensive effort to reduce energy demand and provide alternative

forms of energy ashore, afloat, in the air and on the ground. But before I finish let me mention 2 other significant initiatives undertaken by Navy at the direction of our Commander in Chief to advance the goals that I just outlined.

The first is procuring one gigawatt of renewable energy generation on or near our installations without any net cost to taxpayers by using existing third party financing mechanisms. So it's just a power purchase agreement. Joint ventures enhance use leases. While we are a sea going service Navy and Marine Corps has 3.3 million acres and 72,500 buildings. We believe leveraging these assets to promote renewable alternatives will help advantage our energy goals as well as increase clean energy jobs in America.

The second initiative symbolizes about what you both discussed, our effort to demonstrate the "Great Green Fleet" has drawn some skepticism. Although I believe that a lot of that is based on either misunderstandings or inaccuracies. Last year the Navy bought what we think is the largest purchase of biofuel ever in America to mix in a 50/50 blend with either diesel fuel or AB gas to power a demonstration of how our ships and planes can operate on alternative, liquid fuels during the largest maritime exercises on Earth, the rim of the Pacific this summer. During this exercise alternative fuel blends will be used in operational activities such as refueling aircraft on the deck of our carrier or underway replenishments.

We obviously dubbed this the "Great Green Fleet" as a reminder of Teddy Roosevelt's "Great White Fleet" which helped usher in America as a global power at the beginning of the 20th century. The "Great Green Fleet" doesn't have an environmental agenda. It's about maintaining America's military and economic leadership across the goal in the 21 century.

Now it's true that biofuel blend costs us more than conventional diesel and aviation fuels would have. But the simple economics explains why. Alternative fuels can't become competitive with oil unless there's a demand for them. But demand at commercial scale will never be possible unless there's a supply to meet that demand.

While our purchase was the largest single purchase ever, it represents just a fraction of what Navy will need. But even purchases of small amounts for our R and D efforts have shown dramatic results by lowering the cost of biofuels which cost as much today as they did 2 years ago.

One of the advantages that Navy has is our ability to help stimulate both demand and supply. That's why the President directed us to work with the Department of Agriculture and Energy to develop a plan to create a domestic, commercially viable, biofuels industry. We're making real progress on that plan which calls for a government commitment of up to \$510 million and a matching commitment at least one to one from the private sector to help build this industry to provide energy independence and American jobs.

When they were introduced, computers cost more than the typewriters they replaced. In fact, the first Apple cost in today's dollars about \$2,440. The iPad just introduced is \$499.

Smart phones, which Senator Warner knows a lot about, cost more than rotary dial landlines when they were introduced. But once the market got large enough the cost of these new tech-

nologies came down dramatically. The capabilities increased dramatically.

When anyone says we can't afford to invest in developing alternative sources of energy, my reply is we can't afford not to. We can't afford to wait until price shocks or supply shocks leave us no alternative. We can't afford to wait while other Nations get far ahead of us on energy reform. I don't want to trade one source of foreign power for another.

We can't afford to be distracted by those who offer the absolutely false choice of investing in ships or planes or investing in more secure means of powering ships and planes. If we don't have or cannot afford the energy to power those platforms, the platforms themselves may be of little value. If we develop a domestic fuel source that's less vulnerable to price shocks we'll be able to afford more ships and planes that we need.

This is not about choosing either ships or alternative fuels. This is about building ships and using alternative fuels.

To those who question why Navy would be a leader in energy innovation are that its efforts are either outside or obstructing its real mission. I would simply remind them of our history.

In the middle of the 19th century we moved from sail to coal.

Nearly 20th century we move from coal to oil.

In the 1950s we pioneered the use of nuclear.

At every one of those transitions, every single one of them, there were people who questioned the need, who challenged the cost or who simply opposed change of any kind. Those folks were wrong then. The people who question the need for change now, I believe, will be equally wrong.

For 236 years from sail to steam to nuclear, from the USS Constitution to the USS Carl Vincent, from Tripoli to Tripoli, our maritime warriors have upheld a proud heritage, protected our Nation, protected our power and provided freedom of the seas. Then, as now, our Navy and Marine Corps continue to adapt, to innovate, to assure that America comes out on top.

Thank you all.

[The prepared statement of Mr. Mabus follows:]

PREPARED STATEMENT OF HON. RAYMOND E. MABUS, SECRETARY OF THE NAVY, DEPARTMENT OF THE NAVY, AND JACKALYNE PFANNENSTIEL, ASSISTANT SECRETARY OF THE NAVY, ENERGY, INSTALLATIONS AND ENVIRONMENT

Chairman Shaheen, Senator Warner, and members of the Subcommittee, I am pleased to appear before you today to provide an overview of the Department of Navy's investment in its energy programs.

It is critically important that we reform how the Navy and Marine Corps use, produce, and procure energy, especially in this fiscally constrained environment. We must use energy more efficiently and we must lead in the development of alternative energy; otherwise, we allow our military readiness to remain at risk.

In theater, fuel is a tactical and operational vulnerability. Guarding fuel convoys puts our Sailors' and Marines' lives at risk and takes them away from what we sent them there to do: to fight and prevail, to engage and rebuild. For every 50 fuel convoys in theater, there is one Marine casualty. This is simply too high a price to pay.

President Obama's "All of the above" strategy toward sources of energy recognizes a fundamental math problem: while the United States consumes 22 percent of the world's oil, we possess just two percent of known oil reserves.

Oil prices are set on a global market often driven by speculation and rumor, leaving the Department exposed to price shocks in the global market.

Every time the cost of a barrel of oil goes up a dollar, it costs the Department an additional \$30 million in fuel costs. In FY12, in large part due to political unrest

in oil producing regions, the price per barrel of oil has risen \$38 over what was budgeted, raising Navy's fuel bill by over \$1 billion. These price spikes must be paid for out of operations, meaning our Sailors and Marines are forced to steam less, fly less, and train less.

Strategically, we are at risk because much of the fuel we use comes from volatile regions of the world. We would never buy aircraft or ships from many of the places that supply us oil because some are unstable and some do not necessarily have our best interests at heart.

The Department of the Navy is committed to implementing an energy program that enhances our national security and our military readiness by reducing our dependence on imported fossil fuels. Energy security is national security. Our energy program is comprehensive—it involves both Services and contains initiatives to reduce energy demand and provide alternative forms of energy supplies on shore, afloat, in the air, and on the ground.

Navy's leadership on energy innovation is nothing new. It was the Navy that shifted from sail to steam in the middle of the 19th Century, steam to oil in the early 20th Century, and pioneered nuclear power in the middle of the 20th Century. At each of those transitions, there were those who questioned the need, challenged the cost or simply opposed change of any kind.

#### DEPARTMENT OF NAVY GOALS AND INITIATIVES

Congress and previous administrations have recognized the imperative of energy security as demonstrated in the Energy Independence and Security Act of 2007, Energy Policy Act of 2005, and the National Defense Authorization Act of 2007 and 2010, and several executive orders. This administration has built on those actions, but the program proposed for FY13 and beyond will exceed the goals set in those previous laws because we must.

As Secretary of the Navy, I set five aggressive department-wide goals to reduce the Department's overall consumption of energy, decrease its reliance on petroleum, and increase its use of alternative energy.

The goals are:

- By 2020, at least 50% of total DON energy will come from alternative energy resources,
- By 2020, DON will produce at least 50% of shore based energy requirements from alternative resources and 50% of Department installations will be net-zero,
- DON will demonstrate a Green Strike Group in local operations by 2012 and sail the Great Green Fleet by 2016,
- By 2015, DON will reduce petroleum use in non-tactical vehicles by 50%,
- Evaluation of energy factors will be used when awarding contracts for systems and buildings.

Meeting these goals requires that the Navy and Marine Corps value energy as a critical resource across maritime, aviation, expeditionary, and shore missions and myriad investments and activities. They will all foster behaviors that will reduce the Navy and Marine Corps' overall energy requirements and technologies that can provide adequate substitutes for fossil-based energy. Two significant initiatives that will be advanced in pursuit of the goals are:

- The development of alternative liquid fuels for our ships and planes.—To meet the goal of 50% of total DON energy from alternative sources, the DON has partnered with the DOE and USDA to collectively pool \$510M to jump start commercial development of the advanced alternative fuels industry. The DON intends to use the Defense Production Act (DPA) Title III for its contribution. This effort will help to obtain the 8 million barrels of biofuel needed by 2016 to sail the "Great Green Fleet." The alternative fuel that the DON will purchase must be available at prices competitive with the conventional petroleum fuels being replaced; it must not have negative consequences for the food supplies; and it must be a "drop-in", that is, not requiring infrastructure or operational changes.
- Fostering the production of one gigawatt of renewable energy generation on DON installations.—To help meet the 50% shore alternative energy goal, the Department will, by the end of this year, design a strategy to facilitate the production and/or consumption of large-scale renewable power projects on or near Naval installations. These projects will be developed without added cost to taxpayers by using existing third-party financing mechanisms such as power purchase agreements, joint ventures and enhanced use leases. The energy from the projects will cost less or at least no more than that from conventional energy sources over their life.

## FUNDING

The Department has budgeted \$1.0 billion in FY13 and approximately \$4.0 billion across the FDYP for operational and shore energy initiatives. The funding sources are almost entirely Navy and Marine Corps O&M funds and Research, Development, Test, and Evaluation (RDT&E) dollars.

## ACHIEVEMENTS

The Department is on track to meet its goals.

Since flying the F/A18, dubbed 'The Green Hornet', at MACH 1.7 in 2010 as part of the test and certification process using a 50-50 blend of Camelina based JP-5, the Department has successfully conducted test and certification on the MH-60 Seahawk helicopter, AV-8B Harrier, E-A6B Prowler, MQ-8B Fire Scout, T-45C Gosawk, MV-22 Osprey. We also ran a Riverine Command Boat, Landing Craft Air Cushion (LCAC), Landing Craft Utility (LCU), 7m Rigid Hull Inflatable Boat (RHIB), the ex-USS Paul F Foster, and an Allison 501K turbine generator. The DON partnered with Maersk to run a large merchant ship on renewable biofuel. These tests represent real milestones that are necessary to support the use of alternative fuels to meet the goal of sailing the Great Green Fleet in 2016.

Throughout 2011 we demonstrated progress through an assortment of programs, partnerships, and initiatives. Last summer, the Blue Angels flew all six planes on biofuels during their 2-day air-show at NAS Patuxent River. The USS MAKIN ISLAND, which is currently deployed to the Pacific region, can use its electric drive 75% of the time it is operating, needing its gas turbines only when it requires top speeds. On its maiden voyage she saved \$2M over predecessor steam ships and is estimated to provide a cost avoidance of nearly \$250M over her service life. The Navy is continuing to move forward with installation of a similar system on new construction DDGs and to look at the feasibility of retrofitting the entire non-nuclear fleet with these systems in the course of routine shipyard availabilities.

Additional energy initiatives, such as propeller and hull coatings, were undertaken to make the existing inventory of ships more energy efficient. Stern flaps will reduce energy consumption, as will some combustor modifications and systems to monitor ship-wide energy use. Energy conservation programs were put in place for both ships and aircraft to educate and incentivize the Fleets to reduce energy consumption and identify inefficient activities. The future Navy will use advanced materials on propellers, energy storage and power management systems, and advanced propulsion technology to make warships more efficient while allowing them to meet their combat capability.

Last year, the Marines tested equipment that could be deployed on battlefields at their Experimental Forward Operating Bases (ExFOB) at Twenty-Nine Palms. The Third Battalion, Fifth Marines (the 3/5), deployed in Afghanistan, managed to cut fuel use and logistical support requirements by 25 percent at main operating bases and up to 90 percent at combat outposts by relying on alternative energy sources such as solar power generators and hybrid power. One three-week patrol reduced weight by 700 lbs and saved \$40,000 due to not requiring a battery resupply.

The PV-powered battery recharging technology has allowed Marine Patrols, which would normally require a battery re-supply every 2-3 days, to go three weeks without a battery re-supply, enhancing the expeditionary nature of their missions and reducing the number of dangerous re-supply missions needed.

Currently, the four most successful technologies used by the 3/5 are being deployed across all Marine Battalions in Afghanistan at a cost of \$25 million. These technologies will save more than \$50 million per year; paying for themselves in roughly six months and then continue to return a \$50 million annual savings over what we had been doing. More importantly, this equates to a reduction in the number of resupply flights by 450 or taking a total of 180 trucks off the road, reducing the number of young men and young women put in harm's way. Again, because we lose one Marine for every 50 convoys, these energy measures are not just saving money, they are saving lives.

Recently, the next phase of ExFOB deployed with the Marines from 2nd Battalion, 4th Marines. They brought renewable and energy efficient equipment that was identified during the ExFOB conducted during August 2010. The equipment targets a major battlefield power user: battalion-level command and control systems. Its capabilities include hybrid power systems and efficient air conditioning, which demonstrated an 83% savings in fuel compared to the conventional capabilities.

The Marine Corps continues to aggressively pursue technologies that will increase combat effectiveness and reduce the need for fuel, water, and battery logistics. The Marine Corps is committed to conducting two ExFOBs per year (one in 29 Palms

and one in Camp Lejeune) for the foreseeable future. The upcoming ExFOB will concentrate on wearable electric power systems and lightweight man-portable water purification systems.

Through investments in expeditionary energy the Marine Corps will stay longer, go further, at reduced risk. In 2017 the Marines will be able to operate one month longer on the same amount of fuel they use today, and they will need 208 fewer fuel trucks, thereby saving seven million pounds of fuel per year. This translates into a lighter, more agile and capable Marine Corps.

In addition to these tactical applications, the DON is pursuing energy efficiency and renewable energy projects at our facilities ashore. As noted above, we are on track to secure half of our shore energy from alternative sources. Effective programs to reduce overall consumption will be necessary to manage the denominator. But, in addition, we'll need about a gigawatt of renewable power at the bases.

Currently our bases support about 300 MW of renewable energy, 270 MW of which is from a geothermal power plant at China Lake. We are actively exploring for additional geothermal resources.

We have awarded three solar projects under our Solar Multiple Award Contracts (MAC) in the Southwest (SW) and are finalizing a similar solar MAC for Hawaii. The three solar power purchase agreements (PPAs) at China Lake, 29 Palms, and Barstow will save the Department \$20 million in total over the 20 year life of those contracts. And, in all three of these cases, we'll be paying less per kW-hour than conventional power. These projects have the added benefit of providing a measure of security from electric grid outages. The Hawaii solar MAC will install 28 MW of solar PV on DON installations, including covering the runway on Ford Island with PV, recreating the look of the runway as seen from the air.

At Marine Corps bases in Albany, GA and Miramar, CA we have partnered with the local communities to harness landfill gas to power generators. This important technology is providing 25% of the electric load in Albany and will provide up to 50% of the electric load at Miramar when done. This is one of the most effective forms of waste-to-energy and we are exploring other applicable technologies.

Where the development of wind resources would be compatible with an installation's missions, we would favor that technology. We are watching with great interest the potential exploitation of the enormous wind resource off the Atlantic coastline. As long as the wind turbines can be placed at mission-compatible sites and the electricity can be delivered to our facilities at a price competitive with the local utility source, we could be a customer.

In order to support a wide range of facility energy efficiency measures, we are aggressively conducting facility energy audits and completing installation of "smart" electric metering. By the end of this year, the over 27,000 meters installed or under contract to be installed in our existing facilities will begin providing the capability to monitor and control the amount of energy we are consuming. This will allow our energy managers to provide real-time feedback to the users and the installations' commands.

The Department continues to promote behavior and culture change through education and training, to ensure that energy management is understood to be a priority in tactical, expeditionary, and shore missions. Awareness campaigns are used to encourage personal actions that show commitment to energy program goals. The Naval Postgraduate School has added an energy program to its curriculum targeting both the Navy's and Marine Corps' most promising young Sailors and Marines as well as an executive series targeting senior civilians and flag officers. We have collaborated with the National Defense University to pilot two culture change demonstrations—at MCB Camp Lejeune and NAVSTA Mayport—to focus on raising energy awareness in civilian and military personnel.

The Department will continue to cultivate strategic partnerships to leverage our energy opportunities. By partnering with federal agencies, such as the Department of Energy, the Department of Interior, the Department of Agriculture, and the Small Business Administration, we are broadening the scope of our programs. In addition, we are working with academic institutions and private industry to bring innovative ideas and approaches to the forefront.

#### CONCLUSION

Our Nation's Sea Services continue to operate in an increasingly dispersed environment to support the maritime strategy and ensure the freedom of the seas. We must continue to transform the way we procure and consume energy.

Thank you for the opportunity to testify before you today. I look forward to working with you to sustain the war fighting readiness and quality of life for the most formidable expeditionary fighting force in the world.

For 236 years, from sail to steam to nuclear; from USS Constitution to USS Carl Vinson; from Tripoli to Tripoli; you have upheld a proud heritage, protected our nation, projected our power, and provided freedom of the seas. In the coming years, this new strategy and our plans to execute that strategy will ultimately depend on your skills, your talents and your well-being that will assure that our that our Navy and Marine Corps not only perseveres but continues to prevail.

Senator SHAHEEN. Thank you very much, Mr. Secretary.

I wonder if you could begin, if we could begin the questioning. You talked about the goals, the 5 goals that you've laid out for energy efficiency. Can you update us on where the Navy is in meeting those goals?

Mr. MABUS. The goals that you refer to, the broadest one is by 2020 at least half of all our energy will come from non-fossil fuel sources.

The other goals that we will have at least half our bases will be net zero to the grid. The fact that our non-combat, non-tactical vehicles, will reduce their fuel consumption in half by 2015. In these goals we are just in changing the kind of vehicles we buy.

We are very close to reducing that usage in half. We're beginning to build fueling stations for flex fuel vehicles for electric vehicles, for the hybrid vehicles. That while they start on our bases, we found technology then spreads to the surrounding communities and then commercially.

We've gotten one base already to net zero to the grid. In fact it's net positive to the grid. China Lake in California.

We have 120 megawatts of solar either being installed or on the drawing board and ready to be installed. We have identified things such as wind or wave action, geothermal, hydrothermal. We have tested all our aircraft now on biofuels, on 50/50 blend of biofuels. The only reason we still have to do 50/50 bio blends are that biofuels simply don't provide the lubrication yet that petroleum does. Although that's a science project issue and one that I think we'll be able to solve in the future.

We have also tested, as you pointed out, our riverine craft. We are now testing our large surface combatants on these. We have to have a drop in fuel. We're not going to change the engines on a ship like the Makin Island or on our aircraft.

But so far, the F-18 Green Hornet flew at 1.7 times the speed of sound. The Blue Angels all flew on biofuels at one of their air shows. The aircraft, the ships, have not noticed a difference.

Senator SHAHEEN. Thank you.

Senator Warner, since we have no timer, we'll just go back and forth. I'll do a question and Senator Warner will do one.

Senator WARNER. Thank you, Madame Chair. Let me also, again, thank you, Mr. Secretary, for your comments and concur with you about the need for innovation.

I, as someone who managed to eke out a living in cell phones, I think this notion of the Navy being an innovator is very important. I think you rightfully pointed out when the Navy, back in the 1950s, decided, Admiral Rickover, decided to move to a nuclear Navy. I'm sure there were naysayers. Thank God he had the vision and the political support at that point to kind of make that kind of that transition.

It's my hope as well that you'll continue to push on this. I personally believe that, and it pains me to say this a little bit as a

telecom guy, that over the next 25 years they'll be more jobs created and wealth created in the energy field than any other sector in the world. Quite candidly America in so many areas around energy is not the leader that we should be.

One of the things that you pointed out, for example here on the Kearsarge, that the stern flaps. I was anxious. I was pleased to see that the payback was literally less than a year. One of the things that I think you would be helpful for both of us and for our colleagues is as we add these innovations, if you can show us the kind of payback terms in 2 years, 3 years, 5 years, whatever payback term it would take.

I do want to get to one particular question here. One of the challenges I know we've got is when, as you look at the area around biofuels you made the mention of the point that some of the purchases, at least in the short term, were incrementally more expensive. However, if you were able to do a 5-year contract at a fixed price particularly based upon the potential volatility of oil pricing over the next number of years, I believe that could both spur innovation, give predictability to a market and help drive toward your goals.

Obviously one of the challenges in making those choices right now is the way CBO scores those kind of forward purchases. Do you have any suggestions to us on how or ideas that you may be kicking around about how we can allow you the flexibility to do future contracting, particularly on fuel purchases in a way that might be based upon more normal and traditional accounting methods?

Mr. MABUS. Yes, thank you.

To go back to what you said at first. Most of the things that we're putting on have a very short payback, particularly those in the fleet. Onshore, our projects have an average 6-year payback. But after that initial investment the energy just keeps coming at much, much reduced prices for years and years after that.

We can, today, as you pointed out, we can do fuel contracts for 5 years. But they are stored by the Congressional Budget Office as though we were paying all the money up front. We could use help in 2 areas.

One is to allow us to sign longer contracts than just 5 years. We can sign energy contracts for up to 30 years with a waiver from the Secretary of Defense. But fuel contracts are limited to 5 years. Lengthening that to give investors a longer window to get a return on their investment, to give businesses a more certain market, more stability would be a great help.

The other one is the scoring that you mentioned. We don't use this energy, all in the first year. So if it could be scored over the length of that contract instead of all at the first of that contract.

That actually fits into normal commercial accounting rules. It's a different rule that is used for the government which I know comes as a surprise to you. But that's used for the government then would be used in private industry.

So those 2 things would be a vast help in terms of meeting some of these goals.

Senator WARNER. Maybe look at fuel contracts beyond a 5-year window and again, revisiting with our friends at CBO, the scoring

process that puts all those costs in that first year rather than timing them out when you actually draw down and use the fuel. Both would be helpful tools, right?

Mr. MABUS. Yes.

Senator SHAHEEN. I want to just follow up on that a little bit because certainly I think we would agree that getting CBO to look at its scoring is very important as we think about how we can better encourage more energy efficient activities. But how do you, given the volatility of fuel costs, how do you ensure to taxpayers and to Congress that those longer term contracts are not going to lock in place increased fuel costs that are happening over time.

Mr. MABUS. You could make them variable price contracts to follow the market instead of a firm, fixed price forever. We, today, Defense Logistics Agency, which buys our fuel sets prices for that fuel yearly and sometimes more often depending on the volatility. So volatility can be provided there just like you would do in any fuel source or long term purchase that's being made today both inside the government, but particularly outside.

Senator SHAHEEN. Thank you.

Senator WARNER. So again, you could use hedging techniques that any other major purchaser would use.

Is there any way? Let me ask you one thing whether there has been any analysis done. As we saw in the aftermath of the Japanese nuclear accident, their increase then dependence upon more imported oil as their energy mix changed.

With the critical role that the United States Navy plays in keeping shipping lanes open virtually around the world. There's been lots of talk and reports sometimes out there in the popular press. Talking about, in effect, what added additional, in effect, fuel tax we all pay or oil tax we all pay that basically American taxpayers bear for the whole rest of the world. Since we, in effect, our great Navy, keeps shipping lanes free and open for, in effect, the benefit of the whole world.

Is there any kind of corollary where you could actually draw a line of increased amounts of, particularly oil coming out of the Middle East, increased shipping amounts of that oil correlating to increasing costs in terms of keeping those shipping lanes free, open and safe?

Mr. MABUS. I know there have been a couple of looks at various ways to slice it. But one of the easiest ways is simply to look at what happened when Iran simply threatened to close the Straits of Hormuz, what happened to oil prices. They spiked.

It's estimated that if Iran ever followed through on that threat that regardless of how fast we cleared it, the price of oil could go up by 40, 50 percent immediately, overnight. That would have a huge impact on our economy. It would have a huge impact on the world.

One of the things you pointed out is the American Navy, almost alone in history, when we have had naval dominance in the world, which we have since World War II, we have keep the sea lanes open for everyone. It is no accident, I think, that the economies of the world have done as well as they have because of this. Because even with the new technologies, 90 percent of all trade still goes

by sea. Ninetyfive percent of all telecommunication still go under the sea.

So keeping these sea lanes open helps not only our economy, but the entire world. What we do devote a large number of ships and assets to keeping, particularly straits where oil or large quantities of oil, like the Straits of Hormuz, open. That is simply for that commodity.

Senator SHAHEEN. You know, one of the things that I was really excited about in getting ready for today's hearing was to be able to learn more about the collaboration that's going on around the work that Navy and the military is doing with energy efficiency. I think one of the challenges we often have within government is that too much of our work is in silos and not enough of it crosses agencies because there is, in fact, so much overlap between what we do. You and the Navy have been able to develop a Memorandum of Understanding with the Departments of Energy and Agriculture to collaborate in the development of advanced biofuels, which as you pointed out, has been so much an important part of the work that's going on here.

Can you talk about how that's working? Whether there are lessons from what you've learned that you think should be shared across government?

Mr. MABUS. What is happening on that is, and I think this is a lesson that can be shared across government, is we each brought something different to the table.

No. 1, we brought sources of funds from different areas to this. Agriculture used commodity credit corporation funds, for example. Navy is using Defense Production Act.

Defense Production Act has been in existence since the early 1950s. Basically what it says is if there's an industry that defense needs that the American—in order to defend America we need that industry, that defense can invest in creating that industry. So that's one area that I think we can do.

A second area is that we each bring a different expertise. We bring operations, but we also bring the market. You know, we bring the demand side of the equation and not simply the supply side.

Agriculture brings the supply side because virtually all the biofuels, in one way or another, would affect American farmers for the better.

Energy, obviously, brings its research and development, its incredible expertise in how energy is developed.

One of the other things that I think we've learned, Senator, is that we can also collaborate with some of our private partners. The airline industry, for example, is looking at biofuels very closely. They're particularly looking now that Europe has said that planes flying from the U.S. or from anywhere into Europe will have to pay a tax on the amount of carbon that they emit on the flight.

But airlines like Federal Express, like United, have already done test flights on biofuels. They know it will work. What they are looking for is a way to get it at a commercially viable price and scale. That's one of the things that Navy can bring into this equation.

So I do think there are some attributes that this Memorandum of Understanding, that was directed by the President as Commander in Chief, can bring us.

Senator SHAHEEN. I want to follow up on that a little bit. I know Senator Warner only has one more question. I think you've raised something that is really important particularly right now. Because in the Senate we're talking about whether we're going to extend some of the tax credits to alternative energy sources like biofuels that are important to the private sector and to creating a market for these technologies.

Can you talk a little bit more about the role that you think, not only Navy, but the military can play in encouraging that private sector market for many of these technologies?

Mr. MABUS. A couple of things.

One is your chart that the Federal Government uses 2 percent of all the energy used by the United States, all the fossil fuel energy. That DOD is 90 percent of that. So we're by far the largest user of fossil fuels in the country. That's something.

A second thing is the military has long led in new technological advances. You can look at the Internet. You can look at GPS. You can even look at flat screen TVs. All started out as a military application and then migrated to the broader commercial area.

The last thing, I do think history can teach us some things. In the 1880s the American Navy was building its ships out of steel from Europe mainly from Germany and England. That steel was costing between \$150 and \$200 a ton.

The Navy decided that that was a vulnerability to be dependent on an outside source of steel. So they went to American steelmakers. They offered them \$250 a ton for their steel. They got no takers.

They offered \$300. They got no takers. They kept upping the offer until they got to \$486 a ton when they got takers to produce the steel.

Now that's almost 3 times what they were paying from Europe. But 20 years later on the eve of World War I, we were not only completely independent in terms of the steel that we were getting at very competitive prices. But second we had the greatest steel industry in the world. The military had spurred that using, at first, some above market prices. But those very quickly came down to market and made us independent in that.

I think that is a lesson there for the future.

Senator SHAHEEN. Thank you.

Senator Warner.

Senator WARNER. Mr. Secretary, I just want to, again, close with a thanks for your willingness to be bold in this field. To my mind it is not only the business right thing to do, not only short term in terms of brave men and women in the field of combat right now in terms of the lifesavings on these convoys, as we've mentioned. But I look at the fact that, as you pointed out, we consume 20 percent of the world's oil.

We have about 2 percent of the world's oil reserves.

We've seen the kind of volatility in oil pricing with some of the actions around Libya and more recently with some of the potential threats that may or may not, God willing, not arise around Iran.

Even for us and I didn't want to echo building. I'm with Senator Webb, building on work that Senator John Warner started that said, we do need to discover and take advantage of additional domestic oil and gas reserves. We have even said, I would personally even be willing to look off the coast of Virginia as long as we get a share of the revenue.

But to exploit all those domestic assets even going full bore right now, you know, short end 6 to 10 years before we saw that additional production. Again, I keep coming back to that 2 percent of the reserves versus 20 percent of the world's usage. So I absolutely believe that it is important to set these kind of bold goals of 50 percent alternative fuels, the notion of the kind of aspirational goal of a green fleet in terms of 2016.

At least this Senator, and I know Senator Shaheen has been a true leader, we want to be your ally on this. So whether it is on the CBO scoring, on trying to give you more of those out year purchasing ability, these are the kind of tools that we want to provide to make sure we've got the best Navy. But also the Navy that's going to be least subject to the kind of volatility that might take place if we continue our dependence upon foreign oil, particularly foreign oil from the Middle East.

So I thank you for those actions. Look forward to working with you.

Mr. MABUS. Thank you very much.

Senator SHAHEEN. I don't think that was a question.

[Laughter.]

Mr. MABUS. No, but I appreciated it very much.

Senator SHAHEEN. Yes, I'm sure.

I do have a final question for you because in your testimony you talk about the education and training effort to change the culture around how energy is viewed within the Navy and the military. I wonder if you could talk a little bit about how you do that. I heard this morning at the briefing some discussion about that. A recognition that we are talking about doing things differently and often there's resistance to that.

So how do you begin to change that culture in a way that makes people engage and support these efforts?

Mr. MABUS. I think the main way you do it is the way Kearsarge has done it. That is to show how well it works. To show how much better we can do our jobs by this.

The service that has embraced alternative energy with a greater enthusiasm than anybody else is the United States Marine Corps. I don't think when people think of the Marine Corps, the first thing they think of is ardent environmentalist.

So the Marines have seen that it saves lives.

The Marines have seen that it makes them better war fighters.

The Marines have seen that it helps them do their job better.

I think you change the culture just by showing that.

That Senator John Warner was a previous, incredibly distinguished, Secretary of the Navy. One of, both of our predecessors in the 1840s said that he would never turn the fleet into fire belching monsters by going away from sail. I think that the military has always shown an ability to change, an ability to adapt, an ability to innovate, that ought to be the envy of a lot of other organizations.

Particularly today in this budget constrained environment we have to show that ability.

I'm very proud, as I am of everything that the Navy and Marine Corps do, of how readily and how well they have embraced this.

Senator SHAHEEN. Thank you very much. I, as you pointed out, the Naval Post Graduate School, the National Defense University, are all including the importance of energy and energy efficiency in their curriculum. Is it time to do that for the Naval Academy as well?

Mr. MABUS. Thank you for reminding me of that. We started with the Naval Post Graduate School, which is one of the crown jewels in our military education or any education. We're not only offering a graduate degree now in energy, but we're also doing 2 week seminars for leadership and things like that.

I think the Naval Academy is well on board in terms of showing the importance in terms of showing how it will affect the people going through there, how it will affect their careers, their lives in the time that they serve the United States. But it is a whole of service approach. It's not just shipboard or just bases. It's also our educational institutions. It's everybody.

I think, again, the military has shown a willingness and an ability to be innovative and to lead. As I finish, I just want to thank you, not only for holding this hearing and for what the work that you're doing and what you've said, but also for the support that you've given to our sailors and our Marines over the years. They and their families protect us and we deserve—we owe them no less.

Thanks to the work of the 2 of you. Thanks to the work of Senator John Warner, earlier. I think that we're going a long way toward meeting the commitment that we need to lead to the people who wear the uniform of this country and keep us safe.

Thank you very much.

Senator SHAHEEN. Thank you very much, Mr. Secretary. Thank you for that compelling message about the confluence of energy and national security. It's a message that we hope we can continue to get out, not just to all of our members of the military, but to the entire Federal Government, to Congress and to the public as a whole.

So again, thank you for being with you.

Mr. MABUS. Thank you.

Senator SHAHEEN. We will now switch out Secretary Mabus for former Navy Secretary and Senator John Warner.

Senator Warner, as I will not go into a greater introduction because I think current Senator Warner did a very nice job of that that we are just so pleased that you're here. I will turn it over to you for your testimony.

**STATEMENT OF HON. JOHN WARNER, SENATOR (R-VA), RET.**

Senator WARNER. Thank you very much, Madame Chairman and my dear and good friend, Mark Warner, who succeeded me in the Senate. Saved a lot of money, didn't have to change the name on the door. There it was. What a coincidence.

Senator SHAHEEN. Or the ballot either.

Senator WARNER. But may I commend both of you for the manner in which you've conducted this hearing and the questions that

you propounded to your witnesses because having, for 30 years, been in the U.S. Senate and sitting where you've been sitting and questioning witnesses and holding hearings. Let me tell you, you've got the art in total control. Don't make any changes, the way to do it.

So I thank both of you very much for this opportunity. To my good friend, the Secretary of the Navy, we have quite a relationship between former Secretaries. It didn't make a difference which party you're from, we all basically agree it's the best job we ever had, ever will have. I feel that way about the Navy. I'll have a few words at the end to speak of the Navy.

But I've had the opportunity for the past few years to work with the—when I left the Senate, to go to the Pew Trust. It's one of a number of organizations, private sector organizations, charitable sponsored and so forth that are working on the question of energy. I urge you and your colleagues in Congress to access their work.

Many foundations such as the Pew Trust, but the Pew took a leadership. They brought me onboard to help them put together a program which simply was to take the spotlight and shine it on what men and women of the Armed Forces. Be they Army, Navy, Air Force, Marines and Coast Guard what they have done to turn 2, as we say in the military and snap 2, to help America deal with its energy problems.

There's a clear nexus between our national security and our energy security. Day by day that message is being brought home. This hearing is a perfect example.

I have to tell you, Madame Chairman, I sat here astounded when I heard you say that this was that first hearing about a ship of the Senate. There I was for 30 years and 5 before that as Secretary of the Navy I never had a hearing on a ship. Now, I ought to be reprimanded for that. But I'm glad to exceed to your record for doing that.

The Pew Trust have provided the opportunity for me and members of their staff and others to travel to the bases and installations across our country. To see exactly what the men and women in the Armed Forces are doing, want to do. It's unlimited.

There's an old saying in the Navy. Give them the tools and leave them alone and they'll solve the problem. We saw that today as we walked through the exhibits of what the fine work that they're doing here.

So I'll finish up with a few thank yous to the sailors aboard this ship and ships all across the world tonight, tomorrow and the days to come, what they're doing.

Senator Warner, I want to say something. In one of your questions you hit on an issue which I've been dealing with but as yet we haven't brought it into clear focus in the minds of the American public. Right now gas is somewhere, what, where we are, \$3.85, maybe a little below \$4 in some areas?

You shell that out per gallon. But at the same time you don't realize that you're shelling out through payment of taxes. Not that tax assesses some at the gas pump that go into the Federal system, but that's into the highways mostly.

But your income taxes, they're going to support the overall budget of the men and women of the Armed Forces. They, collectively,

largely the Navy, but collectively, they are keeping, I call it the energy lanes of transportation, primarily the sea lanes, but there are land carters, some air carters. They're keeping them open at their expense for the benefit of the economies of the free world.

If I could be presumptuous enough to encourage you to perhaps get the GAO to see if you can't write up a report. The 2 of you ask for it. Have it the clear facts so that we can explain it to the American public.

I looked at gas prices today in England, Norway. They range in between \$8 and \$11 a gallon. They're paying a very heavy tax there. We're paying, if you add up what we're paying to keep the sea lane, we're paying roughly, the equivalent of those Nations per gallon.

So the country ought to have an awakening on that issue. Your question, I thought, prompted excellent responses from the Secretary. I think he covered it.

Now I do want to make a little history today. That is it will be the shortest speech I've ever given since I was a Senator for 30 years in this State. Do it for 2 reasons.

I like to put my testimony in the record and so shape my remarks, as we say in the Senate floor, Senator, with those of the Secretary of the Navy. I thought he laid it out very well. I read his full statement beforehand. I'd like to associate myself with his excellent remarks and add the few of my own by putting it in the record.

Being brief because coming up behind me are individuals that I have been working with for these near, going on 3 years now, with the Pew foundations at endless conferences and speeches and forums and so forth across America. You, Madame Chairman, and your members of your staff very wisely chose the brightest and best minds on this subject, certainly within the Navy to come here today. So the less I say, the more time they have to say it.

Now I want to emphasize also the questions of biofuels. The Secretary received a question from the press over here which is on the minds of the Americans today. Look this defense budget is to buy more ships, more guns, more planes. Why should you be pressing forward to explore this issue of say, the advanced biofuels?

The Secretary gave a clear answer. Essentially that's been the tradition of the Department of Defense since its very beginning. We structure all of our future planning of the Department of Defense on today's technology and such technology as we can develop within the Department to show how best to improve and modernize our weapons for the future.

So this has been the role of the Department since its inception. I commend this Secretary and the Service Secretaries of the Army and the Air Force. I've worked with all of them, for the initiatives that they're taking to incentivize their respective uniform members of the Armed Services to explore innovation. Biofuels is a major innovation.

The Secretary very accurately discussed how we've got to eventually get the price of the biofuels down where they're market competitive. The airlines at which, incidentally testified before the Pew Foundation this week, had a hearing, explained that they're mov-

ing in that direction. They realize that they need to get the volume of that fuel at a cost that's market competitive.

If we join together with the private sector, military cannot do it alone. We have to join in these private agreements. The Secretary has structured this with the MOU. I do hope that Congress will work its way to supporting that MOU and perhaps others to follow.

He mentioned the Defense Production Act. That's what he's relying on. You also have the Defense Logistic Administration over here. Their limit of 5 years on basic contracts, that should be addressed.

I say these things most respectfully to the 2 of you, the active members of the Senate. Again, and I say, I know the institution of that Senate and I'm confident that with the leadership the 2 of you've shown and others of your colleagues. I know very well your Chairman of your Committee and your Ranking Member. They are Senate leaders.

You've got to help bridge this gap. It's called the Valley of Death. Where you invent something, prove that it works. The military proved the viability of drop in fuels, for example.

If you could just cross that Valley until the private sector picks up those production needs and costs. Then it's competitive. Then the military can pursue, I think, to a greater extent, its utilization of these alternative fuels.

Because the Secretary pointed it out. I've been to the Straits of Hormuz. I urge both of you to try and visit it someday.

There's a 2 mile strip in there between Oman and Iran. Now Oman is a very stable country compared to the others. But if that were shut down, it would be catastrophic, economic to all the Nations of the world, not just the United States. So I hope that you can achieve that.

I also want to point out in section 526. You're familiar with that. That was a part of a law in 2007.

I was there, voted for it, worked on it. That set certain standards for the utilization of fuel to achieve greater efficiency standards. Also to let the new innovations be developed in such a way that they do not increase the pollution that we're now experiencing, I think, at levels which are becoming more and more significant and concern to all of us in terms of our health and otherwise.

So with those brief remarks I would simply like to close by expressing my profound thanks to the Navy and the Marine Corps. Because I had the option, although it's of little consequence to wear both uniforms, the Navy in World War II, the last year and the Marine Corps during the war in Vietnam. The foundation in my life was laid by those organizations and the training and the education that they gave me.

To those young sailors out there, who may be listening to what I'm saying, I hope a few are. I say to you, you hopefully will never regret the opportunity that you've had to wear proudly the uniform of this country.

The last piece of legislation that I did as a United States Senator was team up with our colleague, Jim Webb, Senator Warner, and Frank Lautenberg and Chuck Hagel, the 4 of us, all 4 veterans, to write the new GI bill. I received my basic education from the GI bill of World War II and then a second one that I got for modest

service in Korea. That got me an engineering degree and a law degree.

Now today we broadened it so if the uniform member doesn't wish to use it, his spouse can use it. If that isn't used, then one of the children can use it because they have earned it and I just want to express my gratitude to this great Nation for the opportunities it gave me. That was a modest innovation on my part to do something for this generation and future generations.

With that I say in the Senate, I yield the floor so as you can get the real experts up there and hear them.

Now if you ask me questions, I can remain here and you can fire them to the whole panel and maybe I'll chip in or what's your pleasure.

[The prepared statement of Senator John Warner follows:]

PREPARED STATEMENT OF HON. JOHN WARNER, SENATOR (R-VA), RET.

I am honored to be here in my home state at a base I know so well from the days I had the honor to serve the considerable number of military installations and private sector industrial infrastructure throughout Virginia, first as Secretary of the Navy and then, for 30 years a member of the Senate Armed Services Committee.

Senator Shaheen, you were a well-informed host as we toured Portsmouth Naval Shipyard together last summer studying their energy plans, and I am pleased that you wisely selected a naval vessel as the site of this important Senate hearing. The Navy is making critical advancements in the area of energy innovation. We are very honored to have Secretary of Navy Mabus, a very committed leader, testify today.

When I completed my 5th Senate term, I was desirous of continuing my service with the men and women of the Armed Forces. As such, I have been proud to work with the Pew Charitable Trusts. Together as we launched the Pew Project on National Security, Energy and Climate, a project to highlight the critical link between national security and energy security.

Whether in my role as Secretary of the Navy or on the Armed Services Committee, I have seen first-hand the ingenuity and commitment of our uniformed men and women, and their civilian counterparts working with them, to meet America's toughest challenges. The armed services' approach to energy innovation is clearly at the forefront of initiatives across America.

The American public needs to learn more about the great advancements being made in energy by the Department of Defense. Pew is proud to highlight their work to the American public.

One of the Pew Project's initial endeavors we worked on together was to assemble the four branches of the military, active and retired, with expertise in energy for an event we hosted in September 2009. This event spurred the first Pew report on DoD, Reenergizing America's Defense, published in April 2010. More recently, as a follow up, in September 2011 Pew issued a second report, From Barracks to the Battlefield, Clean Energy Innovation and America's Armed Forces. These reports were widely disseminated.

In preparation for our second report, the Pew Project team and I visited several military installations that are very active in adopting clean energy technologies, improving energy efficiency, saving taxpayer dollars and lessening risks to our troops. All in all, we have logged more than 30,000 miles, visiting more than 20 states.

As the Chairwoman knows, at the historic Portsmouth Naval Shipyard, uniformed and civilian personnel are working to increase the base's energy security by building LEED certified buildings, using cogeneration technology, and using solar power as backup for communications systems. At Fort Bragg, we toured the actual implementation of the initiatives that are part of an Army-wide "Net Zero" goal to reduce energy consumption, increase energy efficiency, and increase the use of renewable and alternative energy sources. Various initiatives across the four branches of the military are resulting in financial savings and serve as a model for other military bases—and in some instances, adjacent civilian communities.

I also had the greatest pleasure in visiting Quantico, where I had served many years ago. I saw first-hand some of the technologies they have innovated in order to make the Marines more energy efficient in forward deployed missions.

Our nation is heavily dependent on imported foreign oil. The consequences of that dependence are experienced not only here at home, but by the brave men and

women in uniform serving on their bases and stations and particularly those serving on foreign deployments.

Under the strong leadership of former secretary of defense Robert Gates, and now Secretary Leon Panetta and the three Service Secretaries, the Department of Defense is exercising effective internal policies and practices, especially setting aggressive energy-efficiency goals to lessen our dependence and to enhance our nation's energy security.

The bottom line is that the four branches of the military need our nation's full support to continue to innovate. American's military preparation, for the present and the future, is predicated on innovation.

Since we are here to talk specifically about the Navy though, I would like to note that the Navy is on the leading edge across all initiatives, especially when it comes to the development and use of biofuels. Navy scientists and engineers have developed great expertise in assessing both the advantages—and even the limitations—of biofuels. Their research and development has proven the concepts of “drop in fuels” in aircraft and ships.

There are two policy issues that I would like to address that pertain to biofuels. The first is the policy referred to as “Section 526” a provision in the Energy Independence and Security Act of 2007. Under Section 526, the Department of Defense and other federal agencies are not permitted to purchase fuels that are less efficient than conventional petroleum fuels.

DoD is the largest U.S. consumer of energy, and Section 526 has been an important catalyst in its efforts to reduce our reliance on foreign oil and find alternatives such as advanced biofuels to increase energy independence and security.

Last year, there were numerous attempts in both the appropriations and authorization process to repeal Section 526. DoD rightfully opposed revisions to 526. Let the current law remain intact; it's working as Congress intended.

Another issue of critical importance to the continued advancement of biofuels is allowing a Memorandum of Understanding between the Navy, the Department of Energy and the U.S. Department of Agriculture to go forward. Under this MOU, DoE and USDA can co-invest with industry in the construction or retrofit of multiple commercial facilities in order to promote the private sector production of bio-based jet fuel at a viable commercial level. Such a partnership on biofuels between these agencies allows the strengths of each to be realized in a more efficient and effective manner and sends a strong market signal to future private investors that biofuels will play a pivotal role in our nation's energy security through the 21st Century.

The importance of advanced biofuels to the Navy cannot be underestimated. Some facts that I would like to share:

- Since October 2009, oil prices have risen on average from \$76 to \$89 per barrel, but over that time have fluctuated between \$74 and \$110 per barrel, in part due to political unrest in unstable regions. As I have been told by the Department of Defense, this variability creates \$1.1 B budgeting uncertainty for the Navy, representing 7% of net FY10 DLA Energy fuel sales.<sup>1</sup>
- Based on Department of Energy projections, this volatility will be an ongoing problem. In any budget climate, this level of uncertainty creates instability with the operating and training budgets.
- In addition to lessening volatility concerns, alternative fuels can provide a long-term cost advantage. A recent analysis shows that the DoD and commercial airline industry combined could potentially avoid approximately \$39 billion to \$165 billion in total fuel costs by 2030 if commercial scale alternate fuel production becomes available at market prices competitive with other fuels.

Madame Chairman, I applaud the Naval personnel in Tidewater for making advances in energy innovation and for appearing here today to share their findings, their priorities and their policy needs in order to continue down the path they are on. I yield now to your questions and look forward to hearing the perspectives of the next panel of witnesses.

Thank you.

Senator SHAHEEN. I actually would like to ask you one question.  
Senator WARNER. Fire at will, Gridley.

<sup>1</sup>\$1.1B / \$15.361 B. \$15.361 B taken from DLA Energy FY10 Fact Book, page 24. Internet WWW at URL: <http://www.desc.dla.mil/dcm/files/Fact%20Book%20FY10%20Final%20Web.pdf>. Accessed 7 October 2011.

Senator SHAHEEN. Senator Warner will ask one question. We will certainly include your full testimony for the record.

Senator WARNER. Good.

Senator SHAHEEN. Then we will release you and get the third panel up.

Senator WARNER. That's fine. But I'm going to sit here and listen to them just like you will.

Senator SHAHEEN. Great.

I wonder if you would just expand a little bit on your comments about section 526 because as you point out, it is that section of the Energy Independence and Security Act of 2007 which says that the alternative fuels that we purchase should be at least as clean as conventional fuels derived from petroleum.

Senator WARNER. Right.

Senator SHAHEEN. I think it's that, at least as clean, that is maybe getting some questions and some criticism right now.

So I wonder if you could talk about why you think that piece is important that it should be at least as clean?

Senator WARNER. First and foremost it was passed in 2007 and industry, the private sector, primarily have relied on that as being the law of the land. Made investments and moved ahead in accordance with the goals of that law.

If you pull the plug on it now, they'll have lost what they've in some instances have invested. Now I know the pressures from where it's coming to change that. I respect that.

Senator Warner and I are proud to represent a State which is referred to one of the major States in the country for production of coal. There is a process by which you can take coal and possibly render it in a manner in which it can be incorporated. But I think if you look at the cost of it and perhaps an affluent that may come as a consequence of the process and utilization, it would bump up against those regulations.

But we have an obligation, the Congress, when we pass a law, when the private sector invests and relies upon it, leave it alone. Give it a chance to prove itself. So I urge you most strongly to leave it as is.

Senator SHAHEEN. Thank you very much, Senator. I totally agree with you.

Senator Warner.

Senator WARNER, Madame Chairman, let me first of all, again, thank you one more time because, you know, by holding this hearing on this ship, first such hearing held since 19?

Senator SHAHEEN. Sixty.

Senator WARNER. Yes, 1960. The new Senator Warner has now done something that the 30-year veteran Senator Warner never did. So I'm glad I've got that to lord over you finally.

Senator WARNER. Yes, you do. Yes, you do. That's good. You earned it.

Senator SHAHEEN. I guess you owe me.

Senator WARNER You're a man of courage and you take on the tough jobs in that Congress and do the very best you can to achieve working relationships.

Senator WARNER. I won't even remind all of our listeners here that you were actually an electrician's mate as you first started.

Senator WARNER. That's right, third class.

Senator WARNER. Third class.

Senator WARNER. The most important promotion I've ever received in my life was that one red stripe. I still have it and it's right in my library, that little red stripe. May it ever be.

Senator WARNER. I also thought it was extraordinarily important you pointed out that just as it is incumbent upon our military to continue to develop next generation weapons that it's been the legacy of our military forces to always be about innovation. The activities that Secretary Mabus has been advocating. You've been advocating. You know, is that next step in innovation.

One thing, just as an aside, as someone who spent a career helping companies grow, this question of so called, Valley of Death. How we move from that innovative idea to the point where it becomes fully commercial. There's legislation that actually Senator Shaheen and I are working on now that's got broad bipartisan support in terms of capital formation helping these startup companies which over the last 20 years have been at where about 80 percent of the job growth has come in this country. Hopefully since neither one of us got the memo that we're supposed to take Presidential election years off in the Congress. So we actually hope to move that legislation shortly.

One of the things I'd hope you'd just spend a moment more on is that this really is about national security, energy efficiency, making our Navy be more innovative about its use and conservation of energy. You know, how can we do a better job of driving that point home that you don't even have to get to the whole environmental issues? You just need to do this purely in terms of making our Nation safer.

How can we do a better job of convincing our colleagues that this is an area where we should be able to come together?

Senator WARNER. Senator, that's the key question. The answers I wish were clearer. But my answer would be if we accept the assumption that's there a linkage.

The Secretary made the case. I think I've made my case between national security and energy than why shouldn't our budget put that emphasis that energy requires to move ahead with innovation and sets legislation as needed. I remember 19—wait a minute, 2008, Joe Lieberman, Senator Lieberman and I put in that one combined energy climate bill. It's the only bill that has gotten through the Senate structure of committee, adopted by the committee, got to the floor and was debated for 4 or 5 days.

The leadership, in a respectful way, came and said, look, you're going to have to have 60 votes. Can you show them? We could not show at that time the 60 votes.

So I'm hopeful someday Congress will pass a, one of those words, comprehensive bill on a whole range of energy directives because our country is waiting desperately for it. The other world, if you look at the say, 20 strongest economic Nations in the world, you will find that two-thirds of them have in place a legislative or governmental process to foster energy. Notably, China and India and I can go on and explain the other countries.

If America doesn't have it our industrial base has to sort of sit on the sidelines and not make those investments that are nec-

essary because there is not a legislative direction that Congress will do this, but won't do that. Will do this, but won't do that. At least they know what the ball field looks like if they had a comprehensive plan.

So I say it respectfully to where I was privileged to work those many years. You can do it. You will do it eventually. I hope soon.

Thank you very much.

Senator WARNER. Thank you, Senator Warner.

Senator SHAHEEN. Thank you very much. Very well said. We appreciate your being here.

Senator WARNER. I think I made a record of a short speech. That's true.

[Laughter.]

Senator SHAHEEN. We will now call on our third panel. While they're coming up to their seats I will just introduce them.

We have on the third panel, Tom Hicks, who is the Deputy Assistant Secretary of the Navy for Energy.

We have Vice Admiral Phillip Cullom, who is the Deputy Chief of Naval Operations for Fleet Readiness and Logistics.

We have Colonel Bob Charette, who is the Director of the U.S. Marine Corps Expeditionary Energy Office.

Major General Kessler, the Commander of the Marine Corps Installations Command.

Rear Admiral Townsend Alexander, who is the Commander of the Navy, Mid-Atlantic Region.

So again, thank you very much to all of you for joining us this afternoon. I know we are going to have a few minutes of brief testimony from each of you before we open it up for questions. So I will actually begin I think with Colonel Charette. We'll move down the panel in order.

They're telling me that protocol says Mr. Hicks should go first.

**STATEMENT OF THOMAS HICKS, DEPUTY ASSISTANT SECRETARY OF THE NAVY, ENERGY, DEPARTMENT OF THE NAVY**

Mr. HICKS. OK.

Senator SHAHEEN. You know, I'm not big on protocol.

[Laughter.]

Senator SHAHEEN. I have to say which is so, but I'm learning. So forgive me.

Mr. HICKS. No worries. Thank you.

Having lived in your fine State for 3 years and been a resident of the Commonwealth of Virginia the last 20, I just wanted to say I have a special infinity for the leadership that both of you provided.

Senator SHAHEEN. Thank you.

Mr. HICKS. Continue to support the DOD, the Navy and indeed, our energy efforts that we are very pleased to be able to talk to you about today.

Also I'd like to recognize your leadership on the Alliance to Save Energy, Chair. Senator Warner, I realize that you're the incoming Chair of that. I don't know if we have a continuity of operations issue, but I think we've got it underway.

Also, thank you, Senator Warner, for your provisions that you put into the 2012 NDAA. I think that's certainly things that are very well timed and very supportive of where we're going.

I'm pleased to appear before you today and to provide an overview of the Department of Navy's investment in the operational and shore energy. The Department of the Navy's FY 2013 budget request includes \$1 billion and \$4 billion across the Future Years Defense plan for these energy initiatives. We're on track and intend to meet the energy goals set forth by Congress and the Secretary of the Navy.

We understand that energy is an essential resource for our Navy and Marine Corps requirements. Our use of new energy technologies and resources will allow us to reduce our dependency on fossil fuels that negatively impact our economy, harm the environment and reduce our vulnerability to price volatility. In efforts to meet Congress's renewable energy goals and the Department of Navy's goal of producing 50 percent of our shore energy from alternative sources, we are developing a strategy to identify and execute large scale renewable projects. We will use existing third party financing mechanisms to avoid any cost to taxpayers over the life of those contracts.

Our base or our installations support over 300 megawatts of renewable energy. We have awarded contracts recently for 3 solar projects in the southwest, power purchase agreements. These power purchase agreements in China Lake, 29 Palms and Barstow will save the government \$20 million over the course of those contracts. From Day 1 when we produce—when we received power from each of those power purchase agreements it will be cheaper than conventional power. Over the life of those contracts it will be cheaper than the rate of escalation for conventional power.

Operationally we are in the final stages of testing all of our ships and aircraft on ready drop in fuels, 50/50 blends and in fact, we have tested all of our manned and unmanned aircraft. Our Marine Corps tested equipment that could be deployed in theater at their experimental fort operating base at 29 Palms. These technologies and many that you have seen here on display today have cut their fuel use requirements by 25 to as much 90 percent at outposts by relying on alternative energy sources like solar power, generators and hybrid power.

As we implement these initiatives, we are working with NPS and the National Defense University, as you noted Senator Shaheen, on a study to reduce energy consumption across the Navy and the Marine Corps installations by changing behavioral attitudes toward energy consumption. The goal of all of these efforts is to get every sailor, every Marine, every civilian, every dependent to really value energy and energy efficiency and to be more efficient and more effective in using the energy.

In closing your support of the Department's FY 2013 budget will ensure we have the best resources to provide our Navy and Marine Corps to meet the challenges of the future. In closing I'd just say, thank you for the opportunity to talk before here today. I look forward to answering the questions that you may have.

Thank you.

Senator SHAHEEN. Thank you very much. My staff has now got me in protocol order. So hopefully I will do this right.

Vice Admiral Cullom.

**STATEMENT OF VICE ADMIRAL PHILIP CULLOM, DEPUTY CHIEF OF NAVAL OPERATIONS, FLEET READINESS AND LOGISTICS, DEPARTMENT OF THE NAVY**

Vice Admiral CULLOM. Chairman Shaheen, Senator Warner, and members of the Committee staff, it's an honor to have the opportunity to appear before you today to discuss Navy's energy program. A program aimed at enhancing our energy security and sustaining our naval readiness for the long haul. Both ashore and afloat our plan is to have more secure sources of energy to do our mission and to be more Spartan or frugal in what we use.

Make no mistake. It's from the combination of both alternatives and efficiency that our use of energy can be turned from a vulnerability that the likes of al Qaeda attempt to exploit into a combat capability multiplier. Having been at the tip of the spear as both an engineer and a war fighter for over 30 years I understand all too well that energy is a critical enabler of war fighting capability.

During the Kosovo conflict in 1998 as Commanding Officer of the USS Destroyer Mitscher, I conducted combat operations in the Adriatic Sea. Mitscher was the only asset in the area with Tomahawk strike capability needed for the mission at hand. At the outset, we had to refuel every 4 to 5 days which took me off station for 8 to 12 hours for every refuel.

During that time the required capability was simply not available to the combatant commander and the President. Working with my crew to operate as efficiently as possible, we were eventually able to stretch this period to city by a couple of days. But we lacked technology investments that could have markedly increased our time in the launch box, the true measure of our combat effectiveness.

Maximizing the combat capability of our platforms through energy efficiency and energy innovation is what Navy's energy program is about. Our fiscal year 2013 budget reflects this focus with 95 percent of operational energy investment devoted to efficiency. Importantly in this fiscally constrained environment energy efficient technologies and practices also reduce operating costs over the life cycle of our ships and aircraft.

Some initiatives pay back within 5 years or even in the first year. Others will take longer to pay back. But we are committed to making smart investments now that reduce total ownership costs in the decades ahead.

The President's budget 2013 supports implementation and refit of several technologies on existing surface combatants, amphibious ships and logistic ships just as we see here. As we pursue solutions for existing systems we are also injecting efficiency into acquisition of new systems for new ships and aircraft. As well as funding R and D to support midterm gains for ships and aircraft.

I'd like to thank the Commanding Officer and crew of the Kearsarge for showing a dedication to energy conservation during their recent deployment and support of operations Enduring Freedom and Odyssey Dawn. Being the first large deck amphibious ship to

be retrofitted with a stern flap and one of the first to receive the modification for improved boiler burn combustion, Kearsarge served as an early adopter of new technologies, technologies that combined to save nearly 8,000 barrels of fuel per year, the fourth fuel. That amounts to real increases in endurance, range as well as a sizable reduction in life cycle costs.

The details Secretary Mabus and Deputy Assistant Secretary Hicks provided regarding the progress of alternative fuels reflects our clear belief that it is a primary responsibility of the service to execute a risk mitigation strategy against the real and growing danger posed by over reliance on a single source of liquid fuels at sea or a traditionally sourced grid ashore. Both jeopardize our ability to complete critical missions during peacetime as well as during contingency operations. We must have an off ramp from petroleum and a more secure grid. Alternative ensure mission resilience, mitigate cost risk and today in remote expeditionary environments saves the lives of sailors and Marines.

In closing I'll say that the most important part of our program won't necessarily show up in a budget. Much like my Kosovo sea story changing the way we think about and consume energy, our energy ethos, is still profoundly important. We are and must continue aggressively developing a generation of warriors who take a Spartan approach to energy consumption.

We are driving this change through formal education, in the training pipeline and on the deck plate. Naval post graduate school has its first Master's candidates half way through their first year. A fleet wide message was sent to all ships early this year announcing that energy would be a part of their annual battle efficiency award.

Our fleet and Force Master Chiefs under the Master Chief Petty Officer of the Navy have formed a Senior Enlisted Executive Steering Committee to advise taskforce energy. Our special operators, the Navy Seals, are deploying forces, who are working toward a goal of Net zero water and Net zero energy. With contributions from every sailor, at every level we will achieve our energy vision so that we remain partisil potents, ready and able.

Thank you for the opportunity to testify before you today. I look forward to your questions.

Senator SHAHEEN. Thank you very much, Vice Admiral Cullom.

I should point out that we are on a tight time table. If we were on Senate time we'd be fine, but since we're on military time, we don't have a lot of leeway. So we have only about 20 minutes left. I will ask Rear Admiral Townsend—or Rear Admiral Alexander if you could go next.

Thank you.

**STATEMENT OF REAR ADMIRAL TOWNSEND ALEXANDER,  
COMMANDER, NAVY REGION MID-ATLANTIC, DEPARTMENT  
OF THE NAVY**

Rear Admiral ALEXANDER. Thank you, Madame Chair Shaheen, Senator Warner, members of the Committee staff. It's my pleasure to speak to you regarding the Navy's installations energy program.

I serve as Commander of the Navy's Mid-Atlantic region with responsibility for shore installation management within a 13 State

area that stretches from North Carolina to the Canadian border. My responsibility as Regional Commander is to operate the Navy's shore installations and ensure that our fleet, our sailors and our families have the quality, support and services ashore that they deserve. Every day the Navy consumes approximately 20,000 megawatt hours of electricity.

Beyond the strategic significance the energy demands of the Navy create constraints both at the operational and at the ashore levels. Vulnerabilities associated with the commercial grid present a growing risk to shore support for operational forces particularly during the same emergencies that would call upon our full range of capabilities. The Navy is dedicated to ensuring that mission critical assets ashore remain resilient to outages. Energy efficiency, viable alternative energy sources and smart grid technology for use on base are key to securing critical infrastructure.

The Navy has long been an adopter of new energy practices and technologies. We continue that transformation today. Since the establishment of the Shore Energy Office in the early 1980s to administer efficiency and conservation efforts in response to Federal and Department of Defense mandates energy intensity ashore, that is the amount of energy consumed per square foot, has been reduced significantly.

The Navy is the largest producer of alternative energy in the Federal Government where geothermal production commenced at Naval Air Weapon Station China Lake in 1987. This plant with a full capacity of 270 megawatts provides reliable, renewable power to 300,000 households in California. Other investments include wind turbines and solar arrays at Navy bases across the country.

The Navy is also investing in leading edge technologies such as ocean thermal energy conversion and waste to energy. Energy efficiency combined with the right alternative energy technologies will enable some of our installations to eliminate reliance on grid power that is become net zero energy consumers. Such investments along with the advanced grid in energy shore technologies will further enhance our energy security.

In pursuing distributed renewable generation opportunities, the Navy faces many of the same challenges that all organizations face to include transmission capacity limits, local economic impacts, environmental compatibility and power storage technology. An investment in advanced monitoring ashore will enable greater energy efficiency and wider adoption of alternative energy. Efforts in these areas must ultimately be measured against a strategic imperative of improving critical infrastructure protection.

The loss of critical asset to shore, even temporarily, would seriously hinder Navy operations. We are vulnerable to the commercial electric grid which may experience outages from natural disasters, accidents and physical and cyber attack. Navy installations are working to ensure maximum resiliency with comprehensive contingency planning. We are working to protect our infrastructure from attack and we are exploring viable alternative energy solutions for back up and base power generation systems to protect our critical infrastructure.

Finally the success of our ashore energy policy requires the dedication of all members of the Navy to contribute to a culture that

understands and values energy as a strategic resource. Thank you. I look forward to your questions.

Senator SHAHEEN. Thank you.

General Kessler.

**STATEMENT OF MAJOR GENERAL JAMES KESSLER, COMMANDER, MARINE CORPS INSTALLATIONS COMMAND, U.S. MARINE CORPS**

Major General KESSLER. Madam Chair, Senator Warner, it's my pleasure to be able to speak to you today regarding the Marine Corps Installations Energy program. The Marine Corps has taken significant action to reduce energy and water consumption and expand the use of renewable energy on our installations. Although we have made solid progress we have more to accomplish to fully comply with legislative mandates to drive down energy costs, to increase energy security and to best support Marine Corps readiness.

The Commandant has declared energy a top priority for the Marine Corps. This is reflected in our bases to battlefield energy strategy which provides the Commandant's vision for both expeditionary and installation energy management. As it applies to installations, the Commandant's intent is to ensure a secure, reliable and affordable energy supply, reduce life cycle operating costs of Marine Corps installations and support our Nation's efforts to reduce greenhouse gas emissions, environmental impacts and dependence on foreign oil.

For energy intensity or consumption per square foot, the Energy Independence and Security Act of 2007 requires all Federal agencies to reduce 3 percent per year. For the Marine Corps that's the equivalent to turning off Marine Corps air station Miramar California every year. To make it even more challenging, the mandate doesn't account for the Marine Corps extremely lean, efficient starting point or baseline.

For new construction the Marine Corps has adopted the U.S. Green Building Council's LEED ratings system. By following LEED's integrated process for sustainable design we have recently brought online the most energy efficient buildings the Marine Corps has ever had.

For existing facilities we are making an unprecedented level of investment including our PB'13 budget request of \$161 million to improve energy efficiency on Marine Corps installations. This funding will specifically be targeted to installed more efficient heating, cooling and ventilation systems, improve the thermal envelopes of our buildings with better insulation, windows and reflective roofing and implement energy management systems to automatically adjust temperatures, shed loads and adjust lighting. Our focused approach to energy efficiency will bring the Marine Corps into compliance, reduce utility costs and improve energy security.

Turning our attention to renewable energy. When the Energy Policy Act of 2005 became law the Marine Corps really didn't have any renewable energy on our installations. Since then we have made a concerted effort to apply both appropriated and third party funding to develop renewable energy sources. We now have a growing portfolio of solar electric, solar thermal, landfill gas and wind energy. In all of our renewable energy projects we consistently

sought the most cost effective technologies available in the market at the time. As a result of these efforts the Marine Corps will comply with the EPACT 2005 requirements for renewable energy by the end of this year.

While we have enjoyed limited success, meeting the more aggressive renewable energy goals established in NDAA 2007 will require a much more comprehensive approach. We will need to execute larger scale projects requiring a level of investment that will readily exceed our budgetary limits. Accordingly we plan to partner with the private sector for third party financing for cost effective renewable energy.

We have a number of diverse planning efforts underway including landfill gas as well as waste to energy, geothermal and biomass projects. With all of these large scale renewable projects, we will carefully evaluate the impact on readiness, cost effectiveness, energy security and legislative compliance to make smart decisions for the Marine Corps. Since we cannot manage what we do not measure, energy meter projects have been a high priority for the past several years.

The Marine Corps is on track to complete metering for electricity by October 2012. Knowing when and where energy is consumed is critical for effective energy management. This metered data will be provided to all installation and unit leaders to establish clear accountability for energy use.

Reducing petroleum consumption is another critical component of the Marine Corps energy strategy. Each year we continue to increase the number of alternative fueled vehicles in our fleet, reducing our use of traditional petroleum products. We have a diverse vehicle fleet including a significant number of E85 electric hybrid and compressed natural gas vehicles as well as a couple of demonstration sites for hydrogen fueled vehicles.

Energy and water use directly affects readiness and the quality of life on Marine Corps installations. The Marine Corps has an all inclusive approach to energy. We are making energy a priority for everyone and cultivating an energy ethos for all hands.

I thank you for your shared interest in this very important matter. I look forward to your questions.

Senator SHAHEEN. Thank you very much.

Colonel Charette.

**STATEMENT OF COLONEL ROBERT CHARETTE, DIRECTOR,  
U.S. MARINE CORPS EXPEDITIONARY ENERGY OFFICE, U.S.  
MARINE CORPS**

Colonel CHARETTE. Yes, Madame Chairwoman. Thank you, Senator Warner. Thank you for having us in the Committee.

It sounds like everything has been said from all our talking points. So I'm going to yield back. I will just say that I would recommend, take a look at our expeditionary energy strategy, bases to battlefield. It says exactly where we intend to go. Why we're going there.

I will yield back and I'd like to hear your questions to get to what's on your mind.

Thank you.

Senator SHAHEEN. Thank you very much. Thank you especially, for the briefing earlier today. It was very impressive to see what the Marines are doing out in the field on operations.

Mr. Hicks, I'm going to begin with you. The Federal Tax Code provides really important incentives to try and encourage the development of clean energy. They've been referenced already.

Senator Warner talked about it.

Secretary Mabus talked about it.

Those credits are about to expire. While I realize that the military and the Federal Government can't take direct advantage of those renewable energy tax credits. The fact is they do go a long way toward incentivizing private sector businesses to do the kind of work that the Navy and other branches in the military benefit from.

So can you talk about what concerns you might have if these tax credits expire and the businesses that they encourage are affected by that?

Mr. HICKS. Absolutely. Thank you.

Those credits, I think, go right toward our ultimate competitiveness. I think the 3 power purchase agreements that I referenced before where we're receiving benefits and \$20 million over the course of those 20-year contracts, would have all been upside down and would not have been returning that value to the government were those production tax credits not exist.

So I think their value cannot be underestimated. As you look at certain technologies whether it's solar or wind, where there's more and more emphasis on buy America. To couple that with production tax credits, I think, is something that can really help and grow and sustain an industry here. Hopefully avoid some of the things we've seen in the past where industries have moved offshore, moved to Europe, moved to Germany, where we can actually build these industries here in the United States.

So I think it goes right to our ultimate competitiveness and ultimate bottom line. Thank you.

Senator SHAHEEN. Thank you.

Senator WARNER. Admiral Cullom, you've got obviously one of the most important jobs in the Navy, the question of readiness. I just want to ask you straight out. Can we achieve our readiness goals while implementing an energy efficiency strategy?

Vice Admiral CULLOM. Senator, absolutely. In fact, I think we need it to be able to keep ourselves ready. We're oftentimes tempted, I think, to look to the very short term, quarterly profit and loss or an annual statement. But I think in the—for us in the military, we are charged with looking for the long haul, the long term.

To be able to be ready for the long term, in the long haul, we have to look to an energy program that prepares us for that day. The volatility will eat us alive. Eventually we will have no readiness. We will not be able to get our ships underway if we are continually buffeted and subject to the volatility that we clearly, I think, anticipate.

Senator WARNER. I think that's a really significant answer since the question of readiness clearly one of the most strategically important issues you have to deal with. We have to try to assess and obviously I concur with your answer. But appreciate it.

Senator SHAHEEN. Colonel Charette, can you talk a little bit about the procurement process? One of the things that I was really interested in when you were showing me the various new energy sources that are being used out in the field was who's making those. One of the questions we get a lot from businesses in our States is an opportunity to bid on government procurement, to go through the procurement process to bid on contracts.

So can you talk about how that's working as you're looking at these energy efficiency efforts? How you look at small and medium sized businesses and how they participate in this contracting process?

Colonel CHARETTE. Ma'am, I'm not an acquisitions professional. I mean, so the intricacies sometimes I don't have that. So I'd be remiss. I do know that we have some small set asides for small business.

As far as what we do, everything has to be fully advertised on Federal Biz Ops. When we do talk to smaller companies we get quite a bit and larger companies. Monitoring Fed Biz Ops and engage with our offices.

We're easy to get a hold off. We're on the Internet. Our Marine Corps systems command has a very proactive small business organization where they promote small businesses. It's just really, some of it is just getting in contact with somebody.

A lot of times that's what our office facilitates is putting those companies in touch with the right people inside the Marine Corps, the Office of Naval Resource or another service that we may not be working on a project, but maybe the other services are. So we're happy to talk to whoever you have or to somebody that needs to get in touch with, we'll facilitate that, Ma'am.

Senator SHAHEEN. Thank you.

Would anybody else like to add anything?

Vice Admiral CULLOM. I'll just add a few thoughts.

One, as it relates to small businesses. One of the things we heard quite clearly a few years ago from small businesses was being able to find those opportunities that Colonel Charette mentioned in Fed Biz Ops. It's a very voluminous exercise for folks and very cost intensive for small businesses.

So what the Navy did, initiated more than a year ago, was a program called Green Biz Ops. We went through and filtered out the opportunities, the energy and green opportunities and sustainable opportunities and made those available on our website. We since, through an MOU with the Small Business Administration, have worked with them.

They have actually stood up their green portal to apply that same idea in a much more elegant and better way throughout the whole of government with the Navy being the first user of that, if you will. So that's one of the great areas.

We also have contracts like our \$50 million contract out in Hawaii. 100 percent set aside for small businesses and annually I think \$370 million through our Navy SBIR program focused on small, clean tech companies.

Senator SHAHEEN. OK. Thank you.

Senator WARNER. Let me ask. I think this will be for you, Mr. Hicks, but maybe somebody else wants to jump in. It really builds upon Senator Shaheen's question.

You know, one of the things we got into the recent DOD reauthorization bill was a requirement that DOD work with DOE to make sure that there's kind of, in effect a list of the most current energy saving products so that MIL-CON can look at that list in an active way. Sense the private sector is constantly moving forward in this area. How do we make sure that list is going to be constantly updated as we look at MIL-CON projects that they are taking advantage of what's out there in the marketplace?

Mr. HICKS. I think one of the great areas would be to continue to work with DOE and in fact, U.S. EPA on their Energy Star designation. That's something that we apply and put in all of our contracts that, you know, we're applicable. Where we can get those technologies with that designation we go out and search for those.

I think there's other things that we can do. Perhaps Admiral Cullom could shed some light on how we can look at more efficient, not just within MIL-CONs, but also outside in our broader acquisitions of ships and aircraft.

Vice Admiral CULLOM. Senator, what I would add to that is that we have worked very hard with ARPA-E. Because they have some just amazing projects underway that are taking things from nascent ideas to take it up to that point of prototyping. But oftentimes they find themselves not able to necessarily have an industry partner at the other end that can be able to take it.

Yet we can oftentimes find that there's a military capability for one or more of the projects that they have. So we kind of serve to help bring them across that Valley of Death. So that's a perfect way that we can latch up with Department of Energy's ARPA-E projects.

Senator WARNER. Thank you.

Didn't I also hear General Kessler that you've said that you actually were using LEED certification on certain—

Major General KESSLER. We are, yes, Senator. I would address that probably in 2 different ways.

One, of course, is with MIL-CON as we pursue the efficiencies that come with LEED certification but also as we look to improve the energy envelope of existing facilities where we work on HVAC systems or replacing windows and the ability to respond to those innovations that are out in the market today.

Senator WARNER, I just would hope that we would have, I mean, you may have some ideas you could share with us on how we make sure that that list. This is such a fluid area where things are changing so quickly that you guys have got the most current stuff, most current processes and procedures on that list.

Senator SHAHEEN. I want to follow up a little bit on that, the LEED certification and the actual efficiencies within buildings. I think, General Kessler, you talked about this. Rear Admiral Alexander, I know you've also been involved in this.

Am I correct that we're not doing anything around military housing at this point in terms of energy efficiencies? Can you talk about what the priority is as you think about how you determine what we should be looking at for those building efficiencies?

Major General KESSLER. I'll start first, I guess. The vast majority of our housing today is through our public/private venture or PPV. So in all of those that is up to our partner as they construct those houses.

However, one of the initiatives we have pursued and we're pursuing this alongside with the Navy is what's called a resit program where we actually meter each of those houses. In that process what we do is we go through a very long strategic communications plan with the family members that live in the housing and then a mock billing period. So much like we all experience out in town where you're responsible for your energy consumption, we are now instituting a program where our families living aboard bases in PPV housing are also responsible for their energy consumption.

We establish a band about the mean where if they're within that band, they either don't get a rebate nor do they receive a bill. However, if they're above that mean, above 10 percent above the mean, they get a bill for that difference. But if they're conservative in their use of energy and they're 10 percent below the mean, they get a rebate.

What this does is it helps to build, once again, that energy ethos and helps all of our Marines and sailors and their families realize that the consumption of energy is of strategic interest to us all. So we are, in fact, doing some things within our housing.

Senator SHAHEEN. How has that been received by your families?

Major General KESSLER. We've done 2 pilot sites so far. We did a pilot site with the Navy in Hawaii. The Marine Corps also did a separate pilot site in Beaufort. There was some initial questions, perhaps some consternation initially.

But what we have found is that for those families that participated in those 2 pilots, very well received. Which is why that strategic communication piece up front is so important. Once they understand the process, to date, have all come on board completely.

Senator SHAHEEN. Thank you.

Did you want to add to that?

Rear Admiral ALEXANDER. Ma'am, I would only second what General Kessler said. But also from the Navy perspective, as he said, the vast majority of our homes are done through a public/private venture. It's certainly in our partnership's best interest in the new construction to incorporate to the maximum extent possible, energy efficiencies in the design and the construction.

We've seen that. I saw that personally in new homes that were built in Hawaii where solar hot water systems were incorporated into the design of each home. So where environmentally it makes sense to do that, our partners are certainly doing that.

You know the rent that our residents pay in those partnerships also pays their utility bills. Then the partnership pays the provider. So it's certainly in the partnership's interest from a financial standpoint to reduce the cost of utilities as much as possible.

We're very engaged. I am a little familiar with the pilot program in Hawaii. I would echo the comments that I think initially there was, perhaps, a little skepticism. But we went to great efforts to not only educate our families up front and to be honest with them about what we were doing and why we were doing it.

I think once our families became educated and aware of the challenges that the partnership was facing, by and large they're fully on board and support the program.

Senator SHAHEEN. That's great.

Senator Warner.

Senator WARNER. Admiral Alexander and I actually worked on some of these housing issues and appreciate the progress we're making on that hearing in the Norfolk area.

I guess I would simply just add, I know our time is running about up. But that the more we can really measure as I think one of the folks testified. We need these metrics. We need to demonstrate this kind of return on investments.

I mean, you bring an enormous amount of credibility. As we see these actions that you all take whether it's on the corsage of in terms of the military families across the board all of the various ways we're trying to become more energy efficient to utilize some of these new alternative fuels. Utilize some of these new alternative energy sources.

You really help us build the case because you can bring the credibility on these return on investment that really is unparalleled. That helps us with some of our colleagues who still need some convincing.

So again, Madame Chair, I really appreciate the opportunity to be here and yield back.

Senator SHAHEEN. Colonel Charette, I tried to give you the first word, now I'm going to give you the last word because I want you to—we had a conversation earlier today where I asked you about the Marines who are out in the field and how they felt about using renewable energy as they were in combat. You gave me, what I thought, was a great response to that. So maybe you could, again, talk about what you've heard from folks out in the war theater about what—how they feel about new renewable energy sources.

Colonel CHARETTE. It's, I think one of the neatest things that we were talking about, Ma'am, was the fact that the Marines like the fact that they don't have to call higher headquarters for batteries or fuel anymore. You know, at this remote petrol bases it's more about that self sufficiency and having to rely on that line of, you know, that sustainment line. So if you're more self sufficient on the battlefield and you don't have to call higher headquarters for batteries, now you can spend more time focusing on the enemy. You can actually focus on the job at hand vice worrying about if you're going to have enough power to power the systems you need.

So it's pretty fascinating. It goes back to the point before about changing behaviors. Some of this is we just haven't done it for 236 years.

Senator SHAHEEN. Thank you. Thank you all very much. Thank you to all of you who have attended today.

To Captain Jones, who is hosting us and the men and women of the USS Kearsarge, we thank you for your service to the country. We look forward to continuing to support you in your mission.

Thank you all very much.

The hearing is closed.

[Whereupon, at 4:09 p.m. the hearing was adjourned.]

## APPENDIX

### RESPONSES TO ADDITIONAL QUESTIONS

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#### RESPONSES OF HON. RAYMOND E. MABUS TO QUESTIONS FROM SENATOR BINGAMAN

##### MILITARY BIOFUELS MOU—NAVY FUNDING

In August 2011, the Administration announced a \$510 million Memorandum of Understanding (MOU) between the Secretaries of Energy, Navy, and Agriculture to assist the deployment of advanced drop-in hydrocarbon biofuels that can meet Department of Defense specifications and power both military and commercial transportation sectors.

*Question 1.* Why are advanced, drop-in biofuels well-suited to meet military requirements?

Answer. Drop-in, advanced alternative fuels are well-suited to meet military demands because they can be handled and used in the exact same manner as the conventional petroleum-derived fuels that they replace. No modifications or additions to infrastructure or tactical platforms are needed and no changes in operational procedures or platform performance occur. Therefore, the operator is free to conduct the mission with no concern of special characteristics or considerations that must be given to the fuel used, and the Navy does not have to spend additional efforts and funds on new or different infrastructure to handle these fuels.

The need to find cost competitive alternative fuels has never been greater. Unrest in Libya, Iran and elsewhere in the Middle East drove up the price of a barrel of oil by \$38, which increases Navy's fuel bill by over \$1 billion. Because every \$1 rise in a barrel of oil is effectively a \$30M unbudgeted bill to the Navy, in FY12 the Navy is facing a greater than \$900M additional fuel cost because the price has risen faster than that estimated when the budget was passed. These price increases force us to cut our training and readiness budget, meaning our Sailors and Marines steam less, fly less and train less.

*Question 2.* Last year, the Department put out a Request for Information (RFI) around this initiative, seeking detail from industry about its ability to deliver safe, effective, and cost-competitive advanced biofuels for military use. I understand that the Department received over 100 responses to this RFI. What has the Department learned from these responses? Do the responses indicate that the initiative is likely to be a success in deploying advanced biofuels plants and refineries?

Answer. The DON received over 100 responses to the RFI. Navy learned the extent of the options available in terms of regional feedstocks and various pathways (i.e., thermochemical, biochemical, hybrid) that are ready to be placed into commercial-scale production across the US and all US territories and protectorates. There are certainly more viable, commercial-scale approaches than the effort will have funding to see to fruition. The DON expects that following the implementation of DPA Title III effort there will be multiple integrated biorefineries that will produce fuels for the DON at commercial scale at prices competitive with petroleum.

*Question 3.* In FY12, Congress added \$150 million above the budget request for Defense Production Act Title III activities. When and how will the Department determine how this funding will be allocated?

Answer. The Navy's FY13 budget request includes \$70 million for the DPA initiative. In FY12, Navy has a commitment from DOD and DPA to use \$100 million of the \$150 million added to the budget to complete Navy's commitment to the MOU.

*Question 4.* The FY13 budget request includes \$70 million in DPA funding for advanced drop-in biofuels production. Does the Department believe this request, in addition to funding that may be available in FY12, will fully meet the DoD's portion of funding under the MOU or will additional funding be requested in subsequent years?

Answer. If the Department of Navy receives \$100 million for the advanced drop-in biofuels production project as a part of the DPA Title III initiative, and an

additional \$70 million is appropriated in the FY13 DON budget, this would comprise the full DON commitment of \$170 million to the DPA Title III program.

*Question 5.* Does the Department intend to release a Broad Agency Announcement or a Request for a Proposal for this initiative in FY12, and if so, when can we anticipate that will occur?

Answer. An industry roundtable is tentatively planned for May 18, 2012. A special notice for a Broad Agency Announcement (BAA) has been released, and a formal BAA should be released during the summer of 2012.

*Question 6.* Switching to biofuels may help to advance the Navy's objectives of becoming energy secure and independent, however, producing biofuels requires orders of magnitude more water to produce than traditional fossil fuels. Have you done an analysis of the water usage and how biofuels will impact supplies of water? How about impacts on food stocks? Are trade-offs required and how does the Navy prioritize natural resource management in these cases if trade-offs are required?

Answer. The Navy has not conducted independent analyses of the water- and food-related impacts of biofuel production. However, the Navy approach to alternative fuels is informed by expert assessments of these issues, such as the findings from the National Research Council colloquium "Water Implications of Biofuel Production in the United States" (2008) and various Department of Energy studies.

Water use is a genuine environmental consideration to weigh, in determining a given biofuel technology's suitability for a given site in question. For Fischer Tropsch-based processes using nonrenewable feedstocks, water is used in three major phases of the operation: process water, boiler feed water, and cooling water as well as any water used in cultivation of the feedstocks. For biorefineries, water is utilized in irrigation of feedstocks and in processing and conversion of the feedstocks into finished products.

The majority of the water consumption in the biofuel development is within irrigation of feedstocks. However, according to findings from a NRC Colloquium "Water Implications of Biofuel Production in the United States (2008)," water consumption is poorly characterized and highly variable. Factors that play into feedstock water consumption include: location of feedstock agriculture activities, current water availability in a particular location, type of crop being grown and what crop is being displaced, whether the impact of energy feedstocks in overall agricultural production, and irrigation practices vs. feedstock needs met through rainfall.

There is more to the discussion on water consumption than a simple metric which will follow, but coal to liquids through Fischer Tropsch processes consumed in a range of 5:1 to 7:1 in gallons of water compared to Coal-to-Liquid (CTL) fuel output. Cellulosic biofuel from switchgrass and forest wood residue using no irrigation water and only precipitation can be optimized to operate between 1.9:1 to 9.8:1 consumptive water to fuel produced. Algal oil has widely varying water consumption values. Cultivating algae in open ponds can lead to high water usage, driven by atmospheric evaporation. Total process water use would vary based on the pathway used to refine the algal oil into a finished fuel product. It is important to note that most algal processes assume the use of saltwater or waste water (i.e. non-potable water) for algal growth, so that algal oil production water usage will not compete with irrigation. Using a closed photobioreactor or simply placing a greenhouse enclosure on the pond would greatly reduce evaporative losses and lower process water consumption.

In a DOE/NETL 2006 study, the researchers evaluated CTL plant placement by analyzing maps of coal rich areas and their proximity to water sources and also evaluated associated water demands in those regions. Water usage issues must include constraints that are often region-specific. Surface and groundwater withdrawals in the Western U.S. will compete with crop and livestock irrigation. CTL plants in the Illinois Basin and Pennsylvania/West Virginia regions will compete with thermoelectric power generation and public supply requirements for water. All of these regions have both surface water resources and active coal mining operations.

For biofuels, the NRC concluded that increased agricultural production will probably not alter the national landscape of water use. However, depending on the crops utilized, where they are grown, and associated increase in agricultural production could stress local and regional water resources. The Navy continues to monitor this issue and seeks to minimize water-related impacts of its efforts. According to an Argonne National Lab 2009 study, California, Idaho, Colorado, and Nebraska account for half of U.S. irrigation withdrawals. These are also likely areas that have highly stressed water resources. Consideration of impacts on water usage is a critical point for evaluation of projections considered under this effort. The exact decision matrix for considering tradeoffs required

The Navy also has a goal that feedstocks cannot impact food production. Any effort in our program must have a transition plan if they use food-related feedstocks (e.g. soy oil, corn starch, sugarcane), to ultimately use feedstocks that have no impact on food production. In this area, there are no tradeoffs to be made. A process or pathway that permanently competes with and/or impacts food production will not be considered for long term use by the Navy.

#### LONG-TERM CONTRACTING

In recent years, Members on both sides of the aisle have been working on legislative authority for the Department of Defense to enter into long-term contracts for alternative fuel purchases. However, each of the legislative proposals brought forward has hit a roadblock because of the way the Congressional Budget Office (CBO) calculates the score. Specifically, CBO believes that such a contract must be fully budgeted in the first year to account for the government's commitment over the life of the contract.

*Question 7.* The FY12 NDAA requires the Department to submit to Congress a report on its current authority for multiyear contracts and additional authorities needed. Do you believe additional authority is needed for the Department to enter into long-term contracts for alternative fuels?

Answer. The Department of the Navy supports longer-term contract authority than the current 5-year limit allows. The responses to our 2011 Request for Information (RFI) for the Defense Production Act Title III advanced biofuels effort reveal that 10-15 year authority would encourage private investment in advanced biofuels and bring costs per gallon down. The current CBO and OMB interpretation that biofuels contracts be fully budgeted in the first year of the contract also needs to be revised. Budgeting for 10-15 years worth of fuel, especially given the 2020 goal of 8 million barrels of biofuels to be used by the Navy each year, is unrealistic in any fiscal environment. It is more practical, and in keeping with other energy efforts, that the first year's budget incur only the cost of the first year of fuel deliveries, plus termination liabilities (if any). Each subsequent year would need only the incremental amount of fuel budgeted.

*Question 8.* Do you believe that a long-term contract mechanism will help address not just military requirements for fuel but also fuel price volatility and the upward trajectory of the price of oil?

Answer. Long-term contract mechanisms can be used to lock in pricing conditions that do not correlate directly with oil prices, so that the prices paid under these long-term contracts would not have the same volatility as oil prices in the spot markets. The Navy has received proposals from multiple companies positioned in different areas of the biofuels supply chain for long-term pricing formulas for biofuels that are not pegged directly to petroleum prices. These pricing formulas could potentially be affected by rises in petroleum prices; albeit not at a 1:1 ratio. Therefore, the Navy has reason to believe that with proper contract structuring, biofuels delivered under long-term contracts can be less volatile than petroleum bought in the spot market.

DON/DOD efforts that lead to a nationwide adoption of advanced biofuels may exert some relief from the vagaries of oil prices, and is a step in the right direction for the nation as a whole in terms of price instability and oil price trajectory. Domestically produced advanced biofuels will offer a measure of energy security not currently available to petroleum supplies, because the supply of domestically produced biofuels would not be affected by the closure of foreign supply chokepoints, such as the Strait of Hormuz.

*Question 9.* In May 2010, the Department submitted language to Congress addressing long-term contract authority for alternative fuels for inclusion in the FY11 NDAA. Does the Department still support authorization of long-term contract authority for alternative fuels in the NDAA? Is there a reason that no request for long-term contract authority was made in the FY13 budget? Does the Department plan to send to Congress additional proposals for the FY13 NDAA? If so, when?

Answer. The Department supports long-term contracting authority for alternative fuels and feels that long-term contracting authority needs to be structured to provide for an individual year's payment obligations to be appropriated in that same year's budget.

The DOD has submitted a legislative proposal which is under consideration at the Office of Management and Budget (OMB). DOD is working with OMB to ensure the proposal is consistent with overall administration priorities.

*Question 10.* It is my understanding that long-term authority for renewable energy projects exists for the DoD. Why is this different from biofuel purchasing? Can you provide some examples of where long-term contracting has been used and suc-

ceeded? Are there instances of long-term contracting that have not worked to the Navy's benefit?

Answer. The Navy really needs long-term authority for renewable energy projects, it has been crucial to the Navy's ability to meet its renewable energy goals while simultaneously providing energy savings to the Navy. A long-term contract allows an energy services provider to ensure the value of his/her project and obtain financing to undertake the project; it also gives the Navy some surety on future energy prices, ideally at a discount to existing rates.

Renewable energy projects are conducted under 10 USC § 2922(a); this authority does not extend to fuels for tactical use. Also, CBO and OMB currently interpret renewable energy projects as operating leases, which can be paid for on a yearly basis. These agencies view biofuels contracts as capital leases, which must be fully budgeted in the first year. Navy awarded a 20-year power purchase authority (PPA) contract for installing 13.8MW of solar arrays at NAWS China Lake under 10 USC 2922a. The project will save the Navy \$13M as compared to electric power purchased from the grid over the contract term. A similar PPA is being developed for DON and Army bases on Oahu. For these renewable projects long term authority (within the life of the equipment) is essential to achieve a reasonable payback period. The Navy has reaped savings and achieved renewable goals through the use of Energy Savings Performance Contracts (ESPCs), Utility Energy Service Contracts (UESC), and Base Operations Support (BOS) contracts. These typically extend for the life of the equipment in question or up to 20 years.

The Navy does not have examples of long-term alternative energy contracts that have not benefited the Navy.

#### ONSHORE ENERGY AND WATER EFFICIENCY EFFORTS

*Question 11.* In his State of the Union Address, President Obama announced that the Department of Defense will make one of the largest commitments to clean energy in history. The Department of the Navy will purchase 1 Gigawatt of renewable energy, or as the Navy has stated, "the equivalent of powering a quarter of a million homes", from available technologies such as solar, wind, geothermal, ocean energy, and waste-to-energy. How does the Navy propose to achieve this goal and what is the timeline?

Answer. Following the State of the Union Address, the Secretary of the Navy chartered the 1 Gigawatt Task Force (1GW TF), with the expressed mandate of developing a strategy by which the Department of the Navy (DON) can develop 1GW of renewable energy, in support of the broader DON energy goal of 50% of all shore power coming from alternative resources by 2020. The 1GW TF will focus on large-scale renewable energy projects that use existing third-party financing mechanisms such as power purchase agreements (PPAs), joint ventures (JVs), enhanced use leases (EULs), utility energy service contracts (UESCs), and energy saving performance contracts (ESPCs).

The 1GW TF strategy is due to the Assistant Secretary of the Navy (Energy, Installations and Environment) by the end of fiscal year 2012. The 1GW TF will examine all Navy and Marine Corps installations for their potential to support large (multi-megawatt) renewable energy projects, identify obstacles or constraints—regulatory, technical; and determine which projects are most technically feasible and economically viable.

*Question 12.* Cost savings can be achieved by implementing energy and water efficiency upgrades to new and existing buildings and facilities. Is the Navy actively installing smart meters to monitor energy use and/or implementing existing "green plumbing codes" to achieve water savings? Are there any other examples of onshore efficiency upgrades that the Navy would like to highlight here?

Answer. Yes, the Navy is currently deploying an Advanced Metering Infrastructure (AMI), which is also referred to as Smart Meters that will capture up to 95 percent of the electrical consumption and 75 percent of the water consumption at DoN Installations worldwide. At its completion, Navy and Marine Corps will have installed more than 28,000 smart meters on its facilities.

- The Navy continuously focuses on increasing efficiency and reducing consumption by conducting energy audits, which result in development of project proposals for energy reduction and increased efficiency. The Navy projects planned for FY12, FY13 and FY14 are expected to maintain the Navy's downward trend in energy consumption.
- The lists below are sample of projects submitted for funding in FY12 and FY13 using the energy Return On Investment tool (eROI). In FY12, 147 projects were funded, which will save the Navy 1,200,176 MBtu annually with an average

Payback of 4.46 years. In FY13, the Navy plans to fund 196 projects, this will save the Navy a total of 2,633,404 MBtu with an average Payback of 3.2 years.

- Examples of projects planned for funding in FY12 and FY13:
  - Energy recycle filter backwash water and water plan at NAS Lemoore
  - Replace plumbing fixtures in 12 buildings at NAVSTA Pearl Harbor
  - Installation of high efficiency plumbing fittings and fixtures in several buildings at NAS Fallon
  - Installation of a transpired solar wall (uses solar energy to heat and ventilate indoor spaces) at NAS Oceana
  - HVAC and lighting improvements at CBC Gulfport
  - Building optimization and retro commissioning in NAS Kingsville
  - Centralized irrigation at NAVSTA Pearl Harbor

*Question 13.* What steps is the Navy taking to conserve/recycle/reuse water on its bases? For example, are there any large-scale grey water collection and reuse facilities on any of the onshore permanent bases?

Answer. The Navy implements Department Of Energy's (DOE) Water best management practices. We strive to include water conservation in as many projects as we can. In addition, we set aside Energy Conservation Investment Program (ECIP) funding each year to implement water conservation projects.

The Navy has no grey water collection systems, but we do have several reuse facilities at NAS Jacksonville, FL and Dam Neck, VA. The system uses recycled grey water for cooling purposes among other things.

#### RESPONSES OF HON. RAYMOND E. MABUS TO QUESTIONS FROM SENATOR WYDEN

##### BUY AMERICAN PURCHASING REQUIREMENTS

*Question 14.* Many military facilities that are installing renewable energy capacity are using foreign manufactured technologies, such as Chinese solar panels, rather than seizing the opportunity to support technologies manufactured in America. This raises the concern that while rightly seeking to reduce the United States' reliance on foreign oil, the Department of Defense might be encouraging a shift towards an undue reliance on foreign sourced renewable technologies. The Fiscal Year 2011 National Defense Authorization Act imposes obligations on the Department of Defense to meet Buy American requirements when buying solar panels. What is the Department of the Navy doing to implement these requirements in its purchasing practices?

Answer. The Department of the Navy is committed to ensuring Buy American Act (BAA) requirements are met for renewable energy procurement. Based upon contract level compliance with BAA and a sampling of projects at the time of this question, all solar panels purchased by the Navy have met BAA requirements.

The Federal Acquisition Regulation clause requiring compliance with the BAA is placed in all applicable Navy contracts. Contract awardees provide product submittals during the design and construction phase to certify compliance with the provisions of the Act.

##### NON-DIRECT PURCHASES

*Question 15.* What further steps is the Department of the Navy taking to ensure that other non-direct purchases of renewable energy technologies, including power purchase agreements, comply with the spirit of the Buy American requirements, and support American manufactured renewable energy technologies?

Answer. The Department is committed to ensuring Buy American requirements for renewable energy procurement are met by the Navy and Marine Corps. Within the Secretariat, The Assistant Secretary of the Navy for Energy, Installations and the Environment has established a Shore Energy Policy Board tasked with coordinating development of policy and guidance for DON energy related matters, ensuring the services comply with all applicable federal laws and policies.