

**OVERSIGHT HEARING ON EPA'S WORK WITH
OTHER FEDERAL ENTITIES TO REDUCE POLLU-
TION AND IMPROVE ENVIRONMENTAL PER-
FORMANCE**

JOINT HEARING
BEFORE THE
SUBCOMMITTEE ON GREEN JOBS
AND THE NEW ECONOMY
AND THE
SUBCOMMITTEE ON OVERSIGHT
OF THE
COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ONE HUNDRED TWELFTH CONGRESS
SECOND SESSION

MARCH 27, 2012

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ONE HUNDRED TWELFTH CONGRESS
SECOND SESSION

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C O N T E N T S

Page

MARCH 27, 2012

OPENING STATEMENTS

Sanders, Hon. Bernard, U.S. Senator from the State of Vermont	1
Inhofe, Hon. James M., U.S. Senator from the State of Oklahoma	3
Whitehouse, Hon. Sheldon, U.S. Senator from the State of Rhode Island	8
Boozman, Hon. John, U.S. Senator from the State of Arkansas	9
Carper, Hon. Thomas R., U.S. Senator from the State of Delaware	111
Sessions, Hon. Jeff, U.S. Senator from the State of Alabama, prepared statement	130

WITNESSES

Gillespie-Marthaler, Leslie, Senior Advisor, Office of Research and Development, U.S. Environmental Protection Agency	10
Prepared statement	12
Response to an additional question from Senator Carper	15
Responses to additional questions from:	
Senator Inhofe	16
Senator Sessions	20
Senator Crapo	22
Kidd, Richard G. IV, Deputy Assistant Secretary for Energy and Sustainability, U.S. Army	24
Prepared statement	26
Responses to additional questions from Senator Boxer	35
Response to an additional question from Senator Carper	38
Responses to additional questions from:	
Senator Inhofe	40
Senator Sessions	43
Hicks, Thomas W., Deputy Assistant Secretary for Energy, U.S. Navy	48
Prepared statement	50
Responses to additional questions from:	
Senator Boxer	58
Senator Carper	61
Senator Inhofe	63
Senator Sessions	67
Geiss, Kevin T., Ph.D., Deputy Assistant Secretary for Energy, U.S. Air Force	76
Prepared statement	78
Response to an additional question from:	
Senator Boxer	93
Senator Carper	94
Responses to additional questions from:	
Senator Inhofe	95
Senator Sessions	98

**OVERSIGHT HEARING ON EPA'S WORK WITH
OTHER FEDERAL ENTITIES TO REDUCE
POLLUTION AND IMPROVE ENVIRON-
MENTAL PERFORMANCE**

TUESDAY, MARCH 27, 2012

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON GREEN JOBS AND THE NEW ECONOMY,
SUBCOMMITTEE ON OVERSIGHT,
Washington, DC.

The Subcommittees met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Building, Hon. Bernard Sanders (Chairman of the Subcommittee) presiding.

Present: Senators Sanders, Carper, Whitehouse, Inhofe, and Boozman.

**OPENING STATEMENT OF HON. BERNARD SANDERS,
U.S. SENATOR FROM THE STATE OF VERMONT**

Senator SANDERS. The Committee will come to order.

Thank you for being with us for what I think is going to be an extraordinarily interesting and important hearing. This hearing is a product of two Subcommittees, Senator Whitehouse's Subcommittee and mine, and we thought it made sense to do a joint hearing. We are delighted that Senator Boozman and Senator Inhofe are here as well. Perhaps other members will be coming.

As I think our panelists know, we thank them very much not only for the work they are doing but for being here this morning.

There is somewhat of a debate in the U.S. Congress and in the U.S. Senate which I expect you may hear of today about the nature of global warming. There are some who believe that global warming is not real; there are some who believe that global warming is not significantly caused by human activity; and there are some of us who very strongly disagree with those who think not only that global warming is real, but we believe that global warming is causing very significant problems to our planet today and is costing us huge amounts of money in terms of dealing with extreme weather disturbances.

Senator Whitehouse and I just last month had a very interesting hearing with representatives of the insurance industry, of all people. These are not card carrying members of the environmental community. They simply have to pay the bills when we have floods, droughts, tornadoes, and hurricanes. They say these things are erupting far more than they were in the past; they are costing us

a lot of money, and Congress is going to have to deal with the issue.

Today, we are focusing on the role of the United States military in terms of dealing with global warming. Let me simply say that assessments from our own intelligence community—CIA and others—show “A climate change could have significant geopolitical impacts around the world contributing to poverty, environmental degradation, and the further weakening of fragile governments.” In other words, if you have more droughts, if you have more floods, if people don’t have enough food to eat, if you are seeing migrations of people, this causes international instability which is of some concern, to say the least, to the U.S. military.

Furthermore, the military investing in energy efficiency and sustainable energy is not just about reducing greenhouse gas emission. This is a very important point to make. It is about military strategy as well. It is about protecting our soldiers in the field.

According to the Army Environmental Policy Institute 1 out of every 24 fuel resupply convoys in Afghanistan resulted in a casualty—1 out of every 24. In Iraq estimates show that 1 of every 8 soldiers killed was protecting a fuel convoy, moving fuel in hostile regions resulting in casualties. These fuel convoys are by definition targets for our enemies, and that is why the marines have developed innovative solar powered operating bases that can store energy with battery technology. In Afghanistan two fuel bases ran on solar energy exclusively for a 7-month period.

While some here may put down solar or sustainable energy, some in the Congress, we know that for the military solar is about reducing risks to our troops. It is about saving lives.

Sustainable energy investments by the military also benefit the taxpayer. The Department of Defense is the largest consumer of energy in America and I believe in the entire world with a fuel bill for petroleum alone of over \$17 billion in 2011. It is no wonder that the military sees reducing reliance on costly fossil fuels—imported in some cases from hostile, unstable nations—as a priority. That is why it is good news, in my view, when the Air Force tested a 50 percent biofuel blend for jet fuel and the Navy tested a 50 percent algae blend in a destroyer. I congratulate them for moving forward in these areas.

There is also huge potential for savings at bases. DOD manages facilities with total square footage three times larger than Walmart. In Vermont I worked with our National Guard to fund the installation of over 1.45 megawatts of solar photovoltaic energy which is saving the National Guard about \$250,000 a year in energy costs.

We know we can do that on more bases around the country. Some years ago I went to Nellis Air Force Base, and they have a huge PV system there which is working as I understand very well in Nevada. Also, we know the Army is working with the EPA to develop bases that are net zero energy consumers by increasing efficiency and generating renewable energy onsite.

I commend the U.S. military for taking a leadership role in sustainable energy. It is right for our soldiers, for our national security, and for our environment.

Senator Boozman.

Senator BOOZMAN. With your permission, Mr. Chairman, I would like to defer to our Ranking Member who is running back and forth between here and Armed Services.

Senator SANDERS. Without objection.

Senator INHOFE. Thank you.

I may have a way, Mr. Chairman, for you to just get rid of me.

Senator SANDERS. Not at all, Jim.

**OPENING STATEMENT OF HON. JAMES M. INHOFE,
U.S. SENATOR FROM THE STATE OF OKLAHOMA**

Mr. INHOFE. If you will allow me to do something rather unusual, to go ahead and have time for an opening statement and then make a comment I was going to make. During his opening statement he can respond to it, and I can go back down to Armed Services. That would kind of double my time then I am out of here.

I have a great deal of respect for the Chairman. He and I disagree on this whole idea, and I have looked at it, and in fact I even wrote a book about it which I hope you will read at some point, that it may be that you and others believe that all this global warming stuff is taking place, and the world is coming to an end. If you just look in the last 100 years, 1895 to 1925, it was a cooling period, and everyone said another ice age was coming. Then from 1925 to 1945 it was another global warming and everyone got hysterical. From 1945 to 1975 there was another cooling spell. Then it went into the current one, and now it is cycling around, and it is getting cooler. We all understand that.

Here is the interesting thing. The largest surge in emissions of CO₂ took place after World War II in 1945. That precipitated not another 30 years of warming but of cooling. It is kind of interesting.

The comment I would make and just drop the subject of global warming is the vast majority of the members of the House and the Senate, talking about the House and the Senate even back when the majority were Democrats, don't agree with that. They don't agree with the position stated by the Chairman because we have had a chance to vote on this several times. The most votes they can get in the U.S. Senate right now might be 25 out of 100.

I would like to comment because something happened I noticed this morning, a news report that Obama and the EPA are going to be announcing today the global warming regulations at new power plants. This is at a time when everyone is all concerned about the price of gas at the pumps. It is alarming they would put forward more costly global warming regulations that will, as the President had promised, in his words, "ensure energy costs will necessarily skyrocket."

Specifically, these new rules will have a devastating impact on coal-fired power plants, political rights that this rule promises to change the way the U.S. gets its power. The Sierra Club hopes that it will mean we will never have another coal-fired power plant built. That may happen because this only talks about new coal plants.

The rule is proof that President Obama's latest rhetoric on an all of the above approach to energy is simply lip service to helping his reelection chances as gas prices skyrocket. Yet this rule clearly

shows that the Administration remains committed to a war on affordable energy that has been happening, and it is happening now.

I want to serve notice that we had to do the same thing on Utility MACT, that if this rule is finalized, it is written in the Federal Registry, I will do a CRA, Congressional Review Act on this. I think if nothing more—particularly right now when everyone is concerned about the high price of gas, you can't take energy and divide it. Energy is energy, and it competes. Fuel switching causes an increase in gas prices. I think it is important for everyone to be on record on this. I think the Chairman would agree with this.

The one thing I was going to point out was the Chairman mentioned the Air Force started this program of 50-50. That happened to be with Fischer Tropsch which was a Tulsa, Oklahoma, operation. I was very much involved in that. We started using that, first of all, I say to you, Mr. Chairman, in B-52s, and we ended up with all of our fleet. It worked very well.

However, when they had the 526 come in, saying you could not exceed the footprint of fossil fuels, the cost is just incredible. I would say that perhaps the Under Secretary of the Navy might want to respond to this, if you decided the cost would be, and I have the breakdown here, under the great green fleet, it needs 8 million barrels of biofuel by 2020. That is 336 million gallons. EIA just last month said the kerosene type fuel's spot price was \$3.26 a gallon, the cost of recent algae fuel procurement project, a biofuel, is \$15 a gallon. You take the difference between conventional and biofuel blend, the difference is \$3.9 billion.

I would just ask that you look at what you can do with \$3.9 billion at a time we are making cuts that amount to half a trillion dollars over the next decade. If sequestration comes in it is going to be even worse. I don't know if anyone doesn't agree it adds disaster to our military.

With the same amount of money you could buy 19 more F-35s, buy 46 more SM-3 Block 1B interceptors at \$2 billion apiece. I have a long list that I am going to ask be made a part of the record during these comments.

I say this to Mr. Hicks—as you are responding to this, maybe talk about the alternatives, what you could do to better defend America for this amount of money. You might have some comments. If you can't do it without having time to look at it, do it for the record. If we could do that, Mr. Chairman, I would appreciate it very much.

[The referenced information follows:]

SUPPLEMENTAL INFORMATION

According to EIA, Kerosene-Type Jet Fuel, an approximation of some fuels the Navy utilizes, was trading at \$3.26 a gallon on March 20, 2012. The recent biofuel blend the Navy used cost \$15 gallon. If the Navy ends up using the full 8 million barrels of biofuel they need to power the “Great Green Fleet,” by 2020 it will cost about \$3.9 billion (reoccurring) more than what conventional fuel would. **If the Navy decided not to do this, the following projects could be funded:**

- Buy 19 more F-35s at \$3.4B
- Buy 46 more SM-3 Block 1B interceptors at \$0.2B (President cut FY13 procurement of SM-3 Block IB from 62 to 29. The Joint Capability Mix II study completed by U.S. Strategic Command indicates that combatant commanders require over 300 SM-3 missiles in order to mitigate the risk posed by the proliferation of ballistic missile threats. There are less than 100 SM-3 missiles in the current inventory.

Total = \$3.7B

or

- Buy 46 more SM-3 Block 1B interceptors at \$0.2B
- Complete C-130 Avionics Modernization Program at \$2.2B
- Take AF and Navy off strategic MILCON pause at \$1.5B or take Army of strategic MILCON pause at \$1.5B

Total = \$3.9B

or

- Buy 46 more SM-3 Block 1B interceptors at \$0.2B
- Complete Global Hawk Block 30 program at \$2.5B
- Take AF off strategic MILCON pause at \$0.9B

Total = \$3.9B

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON. JAMES M. INHOFE,
U.S. SENATOR FROM THE STATE OF OKLAHOMA

Chairman Sanders, thank you for holding this important hearing today. I believe one of the primary reasons for this hearing is to highlight the Obama administration's efforts to impose its green energy agenda on our military. I have long been outspoken in my opposition to their use of the military to promote a green agenda at the expense of affordable energy. Gas prices today are skyrocketing, yet here we are today talking about an alternative energy agenda that will force our military to spend even more on energy resources at a time when the Obama administration is gutting our military budget.

Now let me be clear: I have always supported efforts to make more efficient use of our natural resources and taxpayer dollars. For instance, EPA's WaterSense program, a voluntary public-private partnership, is a great example of a cost-effective conservation program geared toward saving money and protecting water resources. What I don't support, however, are policies that are designed to raise the price of traditional energy to make alternatives more competitive, especially at a time when our military and American families can least afford it.

I'm glad to welcome witnesses from the Department of Defense (DoD) at the table because I will have a number of questions for you. As I pointed out last week in an Armed Services hearing, I am deeply disappointed that DoD is expending increasing amounts of its scarce resources on expensive alternative energy when your budget is being slashed by a half-trillion dollars over the next 10 years. DoD is already drastically cutting its personnel, the number of brigade combat teams, tactical fighters, and airlift aircraft. It is cutting or postponing programs such as the C-27, Global Hawk Block 30, C-130 avionics modernization, the F-35, the littoral combat ship, the next generation ballistic missile submarine, and the ground combat vehicles. Forcing DoD to expend more money on expensive alternative fuels further exacerbates its budget issues. For example, the Secretary of the Navy has pledged taxpayer funds of \$170 million as their share of a \$510 million effort to construct or retrofit biofuel refineries in order to create a commercially viable market and recently purchased \$26 per gallon fuel. And as if the Services are not already stressed by serious budget cutbacks, the Secretary directed the Navy and Marine Corps to produce or consume 1 gigawatt of new, renewable energy to power naval installations across the country. I frankly do not believe you should be using defense funds to develop private sector alternative energy capability especially when we're delaying and canceling the important projects mentioned above. With a range of domestic alternatives already commercially viable and in use such as CNG or LNG, taxpayer funds do not need to be used to pick winners and losers.

Make no mistake, this Administration's policies are killing jobs, undermining the economy, and threatening America's long-term security. I don't share the opinions of Senator Boxer and Al Gore that global warming will be the leading cause of conflict in our world over the next 20 years or that it is more of a threat than terrorism. Forcing our military to take money away from core programs in order to invest in unproven technologies as part of a failed cap-and-trade agenda is not only wrong, it's reckless. Any discussion of "EPA's work with other Federal entities to reduce pollution and improve environmental performance," as this hearing is titled, must include a discussion of policies that restore balance between policies that protect the environment and those that kill jobs and weaken our national security. I hope that the Senate will soon act to restore that balance.

Senator SANDERS. Yes.

Jim, what did you want to say?

Senator INHOFE. I was saying it would be very difficult for him to provide it now. I do apologize. It seemed like back when Republicans were majority, and I chaired this Committee, we were going to be able to do something about these conflicting committees. We were able to do it; you are not able to do it; so I have to go to the Armed Services Committee.

Senator SANDERS. OK. Thank you.

Senator Whitehouse.

**OPENING STATEMENT OF HON. SHELDON WHITEHOUSE,
U.S. SENATOR FROM THE STATE OF RHODE ISLAND**

Senator WHITEHOUSE. Thank you.

I am very happy to co-chair this hearing today with my colleague from Vermont, Senator Sanders, regarding EPA's role in the military's efforts to become more efficient, more energy independent, and more sustainable.

A quiet transformation is taking place in our Armed Services, a clean energy transformation. Our men and women in uniform are working to reduce demand for fuel convoys through enemy territory, make our military bases less dependent on the grid, and test alternative jet fuels so as to lessen our dependence on Middle East oil. They are also looking for innovative ways to cut water use and waste.

Some of these efforts grew out of the grim realities of a decade at war. Last summer the Department of Defense reported that over 3,000 soldiers or contractors have been killed in fuel supply convoys between 2003 and 2007 in the Iraq and Afghanistan; 80 percent of all supply trucks operating in those zones of conflict are fuel trucks. Over-dependence on oil costs us lives and dollars.

Secretary of the Navy Mabus has calculated that for every \$1 increase in the price of a barrel of oil the Navy's energy costs rise by \$31 million. The Wall Street Journal reported recently on Pentagon information showing that if we think that \$4 per gallon gasoline is expensive here at home, the all in cost for a gallon of gasoline delivered in Afghanistan was \$400 a gallon.

The U.S. military understands that greenhouse gas pollution from these fuels is driving global climate change and that this change in our oceans and atmosphere has made security implications. The White House has provided key leadership to the military's efforts to deploy renewable energy and reduce energy use.

In 2009 President Obama signed Executive Order 13514 setting sustainability and greenhouse gas reduction goals for the Federal Government. This Executive Order built on a Sustainability Executive Order signed by President George Bush in 2007. President Obama's Executive Order called for energy efficiency efforts that would result in a 28 percent cut in the Government's 2009 greenhouse gas emissions by 2020 for a cost savings of \$8 billion to \$11 billion.

When each Federal agency set energy efficiency targets for this framework, the Department of Defense rose to the challenge, pledging the most ambitious reductions of any agency. The military has been aggressive in meeting these targets. Just last week, the Army announced it will work with industry to deploy up to \$7 billion in renewable energy resources—wind, solar, and geothermal—on its bases. This announcement is the Army's latest effort to meet its goal of producing 25 percent of its energy needs through renewable energy by 2025.

The U.S. Air Force is an award winning member of the Environmental Protection Agency's Green Power Partnerships Program. In fiscal year 2011, this military branch had about 194 renewable energy projects on 71 sites either in operation or under construction. The U.S. Navy has set a goal of producing at least 50 percent of its onshore energy from alternative sources by 2020.

In my home State of Rhode Island, Naval Station Newport has proposed a wind installation to provide much of its power. In 2008 Naval Station Newport was recognized by the Navy for having reduced its energy use from a 2003 baseline by 28 percent through a base-wide energy efficiency program. The military is moving toward a cleaner energy future.

I am grateful that our witnesses from the military branches are here: Richard Kidd, IV, Deputy Assistant Secretary for Energy and Sustainability, U.S. Army; Thomas Hicks, Deputy Assistant Secretary for Energy, U.S. Navy, and he will be representing both the Navy and the United States Marine Corps at this hearing; and Dr. Kevin Geiss, Deputy Assistant Secretary for Energy, U.S. Air Force.

These men have strong military backgrounds as well as energy expertise, and it speaks volumes that they hold these positions and that our military branches have these positions.

For many Federal agencies, the Sustainability Executive Order marks the first time they attempted to incorporate sustainability into their operations. The EPA, however, has always had sustainability as its core mission. That is why Federal agencies and entities look to the EPA as a leader in the Governmentwide efforts to reduce greenhouse gas pollution and energy use.

Over the past several years, EPA has worked with the military on a number of sustainability efforts citing renewable energy installations on military brownfields, funding biofuels research, and reducing military use of pesticides and other chemicals. However, only very recently are these relationships being formalized.

Last November the Army and EPA entered an MOU formalizing EPA's support of the Army's net zero-based initiative. Their work will begin by focusing on wastewater and stormwater management at two Army bases. Last month EPA's Office of Research and Development and the Department of Defense entered into a second MOU pledging to work together to deploy cutting edge technologies that make military operations more sustainable.

I look forward to learning more in this hearing about the plans to execute these MOUs and how we can help. I also look forward to hearing from EPA's witness, Leslie Gillespie, who is herself a West Point graduate, a former active duty member of the U.S. Army and one of the point persons at EPA for cooperative efforts with the military.

These are exactly the type of strategic partnerships we need to push forward in the clean energy and energy efficiency fields. I thank everyone for their participation in this hearing.

I yield to Senator Boozman.

**OPENING STATEMENT OF HON. JOHN BOOZMAN,
U.S. SENATOR FROM THE STATE OF ARKANSAS**

Senator BOOZMAN. Thank you, Chairman Whitehouse and Chairman Sanders, for having the hearing today and looking into the collaboration between the EPA and the Department of Defense on pollution reduction and environmental performance issues. These are valuable, worthwhile efforts.

At the same time, we must keep our priorities straight. The mission of the military must be to have the best trained, most well

equipped and capable fighting force on the planet. The Department can and should fulfill this mission and maintain appropriate environmental safeguards. However, if we find that minor improvements come at the expense of the core mission of the Department of Defense, we should reexamine our priorities.

Please understand that I know helping the war fighter and achieving environmental goals can be complementary to each other. We simply need to know what are the benefits, what are the costs, what are the highest priorities when we have limited resources and tremendous needs. There is no doubt that smart energy efficiency improvements can provide benefits to the men and women in uniform and provide long-term savings to the taxpayer.

Ultimately, this may not be the most exciting hearing we are going to have in Congress today or in the near future, but it is very, very important. I sit on both the Subcommittees represented here today, and I am glad to see the Oversight Subcommittee holding one of its first hearings, and I hope that in the future we have many more.

I served in the House of Representatives at the time in the majority and at the time in the minority. I served during both the Bush and Obama administrations. During that experience, I found that strict oversight was—though sometimes painful—ultimately beneficial to the Administration and helps to prevent minor problems from growing into big problems.

Again, I know that we are all interested in doing all that we can to help you all in your efforts and hope to play a continued role as we go forth this year.

Thank you again, Mr. Chairman, for convening the hearing.

Senator SANDERS. Thank you very much, Senator Boozman.

Now we will hear from our panelists. Senator Whitehouse has already introduced the panelists. I don't think you need a second introduction. Why don't we begin with Leslie Gillespie-Marthaler.

Thank you very much for being with us, and we would love to hear from you.

STATEMENT OF LESLIE GILLESPIE-MARTHALER, SENIOR ADVISOR, OFFICE OF RESEARCH AND DEVELOPMENT, U.S. ENVIRONMENTAL PROTECTION AGENCY

Ms. GILLESPIE-MARTHALER. Good morning, Chairman Sanders, Chairman Whitehouse, Ranking Member Boozman, and other members of the Subcommittees.

My name is Leslie Gillespie-Marthaler, and I am the Senior Advisor in the Office of Research and Development at the Environmental Protection Agency. I am happy to be here today to talk to you about our partnership with the U.S. military to conduct research and technology demonstrations on innovative water treatment and infrastructure technologies.

Let me start by saying that EPA is very proud to be partners with the Department of Defense as they develop and deliver water technology solutions by leveraging EPA's expertise. EPA has two Memorandums of Understanding with the Department of Defense, specifically with the Assistant Secretary of the Army for Installations, Energy and Environment and with the Deputy Under Secretary of Defense for Installations and Environment.

On November 28, 2011, the EPA and the Army signed an MOU to partner on mutual and interrelated interests in the areas of water, energy, and waste through joint development and demonstration of new applications and technologies. These can be used on Army installations in order to achieve net zero goals.

The Army's net zero goal is to move installations closer to consuming only as much energy or water as they produce and eliminating solid waste sent to landfills. The goal of the MOU is to partner on the development of integrated solutions to environmental challenges such as water quality, conservation, and reuse and to create innovative approaches toward addressing challenges of urban stormwater management and energy efficiency within water infrastructure systems. EPA is also collaborating with the Department of Energy in order to better understand the water-energy nexus.

We will use the remainder of fiscal year 2012 as a period for planning our research for the months and years ahead. Implementation will begin in fiscal year 2013. EPA seeks to leverage existing resources to achieve mutual goals that initially benefit Army communities and eventually benefit communities across the country.

Our efforts are focused on helping Army installations. Together as partners, we chose to begin our initial collaboration at two installations, Joint Base Lewis-McChord, Washington, and Fort Riley, Kansas. On February 7, 2012, the EPA and DOD signed an MOU to jointly promote and demonstrate innovative technologies on DOD bases. This not only complements the partnership with the Army but expands opportunities to promote and transfer technology successes across the board to military bases and surrounding communities. We are in the initial stages of discussion with DOD at this time.

In conclusion, our partnership with DOD supports EPA's mission of protecting public health and the environment within military communities through shared solutions, technology, and innovation. This partnership demonstrates how Federal agencies are creatively advancing one another's expertise and mission through science-based technologies and approaches. To maximize the opportunity of this partnership, we look forward to collaborating with other Federal agencies, stakeholders, and most importantly with surrounding communities.

I appreciate the opportunity to testify before you today and will be happy to respond to any questions you may have.

[The prepared statement of Ms. Gillespie-Marthaler follows:]

WRITTEN
TESTIMONY

LESLIE GILLESPIE-MARTHALER
SENIOR ADVISOR
U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
OFFICE OF RESEARCH AND DEVELOPMENT

HEARING ON
ENVIRONMENTAL PROTECTION AGENCY'S (EPA) WORK WITH OTHER
FEDERAL ENTITIES TO REDUCE POLLUTION AND IMPROVE ENVIRONMENTAL
PERFORMANCE
BEFORE THE
SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
SUBCOMMITTEE ON GREEN JOBS AND THE NEW ECONOMY AND
OVERSIGHT
UNITED STATES SENATE
MARCH 27, 2012

Good morning Chairmen Sanders and Whitehouse, Ranking Members Boozman and Johanns, and other members of the Committee. My name is Leslie Gillespie-Marthaler, and I am a Senior Advisor in the Office of Research and Development (ORD) at the Environmental Protection Agency (EPA). I am happy to be here today to talk to you about our partnership with the U.S. military to conduct research on innovative water treatment and infrastructure technologies.

Let me start off by saying that the EPA is proud to be partners with the Department of Defense (DOD) as they develop and deliver water technology solutions by leveraging EPA's expertise. EPA has two Memorandums of Understanding (MOU) with DOD, specifically with the Assistant Secretary of the Army for Installations, Energy and Environment, and the Deputy Under Secretary of Defense for Installations and Environment.

On November 28, 2011, EPA and the Army signed a MOU to partner on mutual and interrelated interests in the areas of water, energy, and waste through joint development and demonstration of new applications and technologies. These can be used on Army installations in order to achieve Net Zero goals. The Army's Net Zero goal is to move installations closer to consuming only as much energy or water as they produce and eliminating solid waste sent to landfills. The work generated through the MOU will provide integrated solutions to environmental challenges such as water quality, conservation, and reuse, and create innovative approaches towards addressing challenges including urban storm water management while promoting energy efficiency within infrastructure systems. EPA is collaborating with the Department of Energy in order to further our understanding of the water-energy nexus.

We plan to use Fiscal Year 2012 as a period for planning our research for the months and years ahead. Implementation will begin in Fiscal Year 2013. EPA seeks to leverage existing resources to achieve mutual goals that initially benefit Army communities and eventually will benefit communities across the country. Our efforts are focused on helping Army installations. The Army has selected Joint Base Lewis-McChord, Washington and Fort Riley, Kansas, for our initial collaboration.

On February 7, 2012, the EPA and the Deputy Under Secretary of Defense for Installations and Environment signed an MOU to jointly promote and demonstrate innovative technologies on Department of Defense bases. This not only complements the partnership with the Army, but expands opportunities to promote and transfer technology successes across the board to military bases and the surrounding communities. The two Agencies are currently in the initial stages of discussion at this time.

In conclusion, the partnership with DOD further enhances EPA's mission of protecting public health and the environment within military communities through shared solutions, technology and innovation. This partnership is an example of how federal agencies are creatively advancing one another's expertise and mission through science-based technologies and approaches. In order to maximize the opportunity of this partnership, we are open to collaborating with other federal agencies, stakeholders, and

most importantly, surrounding communities. Immediate benefits will include the ability to maximize the results of science-based technology, share information with our federal partners, and educate surrounding communities at military bases across the country. We anticipate productive discussions and interagency collaboration as we move forward with our planning.

I appreciate the opportunity to testify before you today and will be happy to respond to any questions you may have.

UNITED STATES SENATE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

“Oversight Hearing on EPA’s Work with Other Federal Entities to Reduce Pollution and Improve
Environmental Performance”
March 27, 2012

Hearing Questions for the Record

The Honorable Tom Carper

QUESTION:

1. I applaud the military’s advancement of environmentally beneficial sources of clean energy generation or its bases, but I’d like to ask you specifically whether you have explored less traditional, more advanced forms of clean energy generation beyond the legacy renewable. For example, fuel cell technology for stationary generation, such as those being built by American companies like Bloom Energy in my state of Delaware can be more flexible and reliable than intermittent renewable technologies, and can require fraction of the footprint.

Fuel cells are commercial-off-the shelf technology and do not require lengthy environmental clearances so often required by large-scale wind and solar projects. Currently, fuel cells can be installed and operational faster than wind and solar facilities and do not require additional transmission capability to move electricity to the end use. Most importantly, the newest fuel cell technologies can provide clean, reliable electricity even when the electric grid goes down.

Fuel cell technology is not just in the research and development phase, the technology is real, proven, and being deployed by some of our country’s leading companies. For example some of the leading Fortune 500 companies, as well as leading educational institutions, are already deploying Bloom Energy’s fuel cells to provide cleaner, more reliable, onsite electricity to power their office buildings, campuses, or data centers.

While the Department of Defense had invested significant time and resources into developing bio-fuels and traditional renewable, the additional energy reliability and security benefits offered by fuel cells, in addition to their environmental benefits, should not be overlooked as another tool for the federal government to simultaneously meet its energy and environmental goals. Can you please let me know what steps you are taking to incorporate US-manufactured stationary fuel cells into your clean energy plans?

I have been told that some Department of Defense installations want the benefits of this technology because of its energy benefits, but policy guidance requiring “renewable” rather than “clean” and “secure” has limited their ability to move forward. Is this true?

RESPONSE:

The EPA believes that the Department of Defense (DOD) could more appropriately answer this question. We have forwarded your question to DOD for its review.

Enclosure

The Honorable James M. Inhofe

QUESTION:

1. Describe for the committee some of the water conservation measures you have begun implementing in your/DOD facilities. How did you choose these conservation measures over others available?

RESPONSE:

The EPA believes that the Department of Defense (DOD) could more appropriately answer this question. We have forwarded your question to DOD for its review.

QUESTION:

2. EPA and the White House have increasingly focused efforts on maintaining and treating storm-water on site. I know there are a number of both legislative and executive orders that your facilities must comply with in managing storm-water. Can you please describe some of the challenges associated with additional storm-water controls as well as some of the choices that your facilities face in complying with storm-water mandates?

RESPONSE:

The EPA believes that controlling storm-water discharges from its own facilities and from other sources is critical for improving water quality. Section 438 of the Energy Independence and Security Act (EISA) of 2007 instructs federal agencies to "use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow" for any project with a footprint that exceeds 5,000 square feet. The EPA has a critical day-to-day role in managing its own facilities across the country to achieve storm-water management results.

The EPA also served in a policy role in helping to implement the provisions of Section 438. The EPA's Office of Water (OW) issued *Technical Guidance on Implementing the Storm-water Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* on December 4, 2009.¹

Implementation of Section 438 of the EISA can be achieved through the use of green infrastructure/low impact development (GI/LID) tools. Federal agencies can also use footprint or impervious cover reduction practices to reduce their stormwater impact. Green infrastructure practices include but are not necessarily limited to:

- Rain gardens, bioretention, and infiltration planters;
- Porous pavements;
- Vegetated swales and bioswales;
- Green roofs;
- Trees and tree boxes;

¹ This guidance is available at http://www.epa.gov/owow/NPS/lid/section438/pdf/final_sec438_eisa.pdf.

Enclosure

- Pocket wetlands;
- Reforestation/revegetation using native plants;
- Protection and enhancement of riparian buffers and floodplains; and
- Rainwater harvesting for use (e.g., irrigation, Heating, Ventilation, and Air Conditioning (HVAC) make-up, non-potable indoor uses).

Some of the challenges associated with implementing on-site management of storm-water at federal facilities and from other sources can include:

- Engineering and design consultants may still be new to green infrastructure practices, so there may be a smaller pool of available contractors to construct green infrastructure projects.
- There may be a lack of a knowledgeable staff to review storm-water management plans using green infrastructure.
- There may be barriers in local government codes and ordinances that make it difficult to implement innovative green infrastructure practices.
- Although green infrastructure practices can be cost competitive or less expensive than traditional "grey" storm-water management approaches, they may be perceived as more costly because they include newer and less familiar technologies.

For example, practitioners may not recognize that green infrastructure avoids the costs of other infrastructure (e.g., ponds, pipes, paving, clearing, and grading) that can be reduced or eliminated when green infrastructure practices are used. Green infrastructure practices may benefit from economies of scale. For example, contractor fees for a small batch of pervious pavement for pilot projects may be more expensive than larger applications that will eventually be used once the projects are brought to scale.

QUESTION:

3. Currently, the EPA exclusively uses the LEED certification system for all new building construction. However, LEED currently does not include Life Cycle Analysis and does not recognize SFI or ATFS certified wood. By recognizing only a forest certification standard that is primarily found outside the U.S., this provides incentives to use foreign timber and excludes the use of 75% of certified U.S. timber. Importing foreign wood as opposed to using American lumber flies in the face of the goals laid out in the E.O. 13514. Why does EPA exclusively use LEED certification in new building construction? Are there other available Green Building certification programs EPA could use? Can EPA's use or the federal governments' use of one certification system influence the market and hinder the use of other available Green Building certification programs?

RESPONSE:

The EPA uses the LEED-New Construction (NC) certification system as just one of several tools to meet its sustainable building objectives. The LEED-NC system is the most widely accepted green building rating system in the U.S. market and provides a familiar vocabulary and framework for architects, engineers, construction contractors, landlords and lenders (for buildings leased via GSA). The EPA does not typically specify individual points that must be obtained under the LEED-NC green building rating system, except in the energy efficiency area. The EPA does not require the LEED-NC point related to sustainable wood products when it uses LEED-NC.

Enclosure

There are other green building certification programs in the U.S., including the Green Building Initiative's Green Globes system, and the International Living Building Institute's Living Building Challenge.

GSA provides approximately 60% of the EPA occupied space – offices and support space – via lease procurements with private landlords or in GSA owned buildings. While the EPA does own several laboratories and other facilities, and some on-going construction projects, the magnitude of these facilities and projects alone will probably not have a significant influence on the market share of green building rating systems in the U.S. But given the size of the entire federal real property inventory, the EPA believes there is substantial ability for the federal government to influence the market for green building certification programs.

QUESTION:

4. EPA's RE-Powering America's Land program encourages the development of renewable energy on current and formerly contaminated lands. Under this program, does EPA encourage the development of renewable energy (wind, solar, biomass, and geothermal) on contaminated land and former mine sites? On what type of contaminated lands does EPA support developing renewable energies under the RE-Powering America's Land program?

RESPONSE:

The EPA's *RE-Powering America's Land Initiative: Siting Renewable Energy on Contaminated Land and Mine Sites* aims to revitalize degraded land by promoting renewable energy as a productive end use. Our goal is to turn liabilities into assets for surrounding communities by fostering collaborative networks, developing tools, and providing site-specific technical assistance. The EPA is encouraging communities to consider all types of contaminated lands such as Superfund sites, brownfields, landfills, and abandoned mine sites. These sites can offer significant advantages over open space for renewable energy development. Development costs and timelines can be reduced because these sites are often served by existing infrastructure such as transmission lines, substations, roads, railways, and water. Many sites are already zoned for this purpose and, often, community partners are eager to see blighted areas put to use. Ultimately the decision on how the site will be reused should align with the community's vision and renewable energy may not be the best use for all sites. However, it makes sense to first look at potentially contaminated sites, closed landfills, and abandoned mining sites before developing open space for renewable energy projects. By reusing these sites for renewable energy production, we can decrease the amount of green space used for development, increase energy independence, protect public health and the environment, and provide economic benefits to local communities, including job creation.

QUESTION:

5. Explain why the President's interagency task force on electronic waste recommended two standards? Does EPA endorse e-Stewards and the R2 standard? Please explain how each standard works. Is the federal government going to be recycling its' overseas computers domestically or will they be recycled abroad? Wouldn't this party international standard, which is backed up by third-party certification, be the model for international organizations?

RESPONSE:

The President's Interagency Task Force recommended the two accredited third-party electronics recycling certification programs (Responsible Recycling (R2) Practices and e-Stewards®) because they combine a range of tools to help ensure used electronics are recycled in an environmentally sound manner into one package, including accredited third-party certification systems, best practices and standards, and increased knowledge and transparency of electronics companies and practices along the full recycling chain.

The EPA supports and will continue to push for further safe and protective recycling efforts and encourage improvements in best management practices for recyclers. The EPA believes that existing recycling certification programs such as R2 and e-Stewards® advance environmentally safe practices and include standards for use in third-party certification of such efforts.

Both the R2 Practices and e-Stewards® advance best management practices and offer a way to assess the environmental, worker health, and security practices of entities managing used electronics. Specifically, these certification programs are based on environmental standards that: maximize reuse and recycling; preclude disposal in landfills or incinerators; minimize exposure to human health or the environment; ensure safe management of materials by downstream handlers whether domestic or abroad; require functionality documentation for reusable equipment; and require destruction of all data in the equipment.

The EPA encourages all electronics recyclers to become certified to either of these two available certification programs, by demonstrating to an accredited, independent third-party auditor that they meet a specific standard(s) to safely recycle and manage electronics. The EPA also encourages customers of electronics recyclers to choose certified electronics recyclers. The EPA recognizes a responsibility to ensure that these programs stay strong, relevant, and are implemented properly. To this end, under the National Strategy for Electronics Stewardship, the EPA and GSA have committed to developing a baseline set of environmental criteria to be included, at a minimum, in electronics recycling standards that are to be used in managing the federal government's used electronics; and initiating a study of the implementation of the currently used electronics certification programs.

R2 and e-Stewards® are standard setting bodies. Standard setting bodies are responsible for developing a standard, making any interpretation of a standard, and providing guidance on implementing a standard.

These standard setting bodies work with the ASQ-ANSI National Accreditation Board (ANAB),² which assesses programs and abilities of certifying bodies (also known as "CB's" or "registrars") that are interested in becoming accredited to certain standards. ANAB awards accreditation to CBs once they demonstrate that their certification program meets specific certification standards and that the CB has the appropriate knowledge, skills, and abilities to properly audit against the standards. ANAB ensures that the CBs maintain accreditation by conducting additional witness audits. Accreditation ensures the impartiality and competence of the CB and fosters confidence and acceptance of the CB.

1. Not all standards that are audited against by certifying bodies require accreditation by ANAB. R2 and e-Stewards have determined that they will use only accredited certifying bodies to ensure the highest quality of auditing and certification.

Enclosure

Accredited CBs follow accreditation rules that are specific to the standard being accredited (e.g. R2 or e-Stewards®) as well as standards that are specific to how certifying bodies should perform. CBs develop and manage certification programs for individual standards; hire, train, manage and oversee auditors; and make all final certification decisions. CBs ensure facilities maintain certification by conducting surveillance audits. Auditors conduct the facility certification audits to determine conformance to the specific standard. As of June 2012, there are six CBs that are accredited to the electronics recycling certification standards. All six are accredited to the R2 standard; three are accredited to both R2 and e-Stewards®.

Facilities hire accredited CBs to become certified to the specific electronics recycling standard. Facilities demonstrate through facility audits and other means to skilled and trained auditors that they continually meet the specific environmental standards that are identified. For both R2 and e-Stewards® programs, it may take anywhere from three to ten months to achieve certification of a facility due to making necessary modifications to a facility's process and/or availability of the certifying body and auditor. As of September 2012, there are over 300 electronics recycling facilities certified by these certification programs worldwide.

Federal departments and agencies must comply with disposal regulations prescribed by GSA. GSA has also issued additional guidance on the specific topic of the disposal of used electronics equipment in the February 29, 2012 GSA Bulletin. "GSA BULLETIN FMR B-34: Disposal of Federal Electronic Assets," a copy of which can be found at: http://www.gsa.gov/graphics/ogp/FMR_Bulletin_B-34.pdf. The decision of whether to recycle overseas electronics domestically or abroad will likely depend on a number of factors, including the availability of domestic and overseas recycling facilities, and the cost of recycling overseas versus shipping waste back to the U.S. for domestic recycling.

Both R2 and e-Stewards® were the first standards of their kind worldwide. Since both became available, there has been increasing interest in international facilities becoming certified to them. Global electronics manufacturers companies are increasingly being held responsible for equipment they make and sell worldwide. In fact, as of September 2012, there are over 20 certified facilities located in other parts of the world, including Canada, Mexico, the United Kingdom, India, Malaysia, Singapore, Germany, Australia, New Zealand and China, with additional facilities seeking certification. Countries such as Canada, Ireland and Germany are developing their own electronics recycling standards that cover proper electronics management.

The Honorable Jeff Sessions**QUESTION:**

1. In October 2009, President Obama issued Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance." In that Executive Order, President Obama told all federal agencies, including the Defense Department, to take the "lead" on creating a clean energy economy." He said the federal agencies must "reduce their greenhouse gas emissions," make greater use of "renewable energy" such as solar power, and consider the purchase of "alternative fuel vehicles." What was EPA's role in developing and implementing this Executive Order?

Enclosure

RESPONSE:

The EPA did not have a policy role in developing EO 13514. There are two areas where the EPA actions directly relate to the development of EO 13514:

Providing technical advice and policy recommendations to interagency groups that develop EO 13514 guidance, and working to make sure that EPA facilities, fleet, electronics management practices, and procurement practices meet EO 13514 requirements. Examples of advice and recommendations include:

- o The EPA's Office of Air and Radiation worked with the Department of Energy and other federal agencies to develop a federal greenhouse gas inventory methodology.
- o The EPA's Office of Sustainable Communities worked with the Department of Transportation (DOT) and the Department of Housing and Urban Development (HUD) to develop federal sustainable location guidance. EPA's Office of Administration and Resources Management (OARM) actively participates in interagency work groups that develop federal water conservation program guidance, green building program guidance, and other EO 13514-related guidance.

OARM manages the EPA's real property and fleet. It, therefore, manages the implementation of major portions of EO 13514, including energy and water conservation programs, green building programs, stormwater management requirements, the environmental performance of the EPA fleet, etc. The Office of Environmental Information plays a lead role meeting the green electronics and data center requirements in EO 13514, and OARM's Office of Acquisition Management oversees the green procurement program.

QUESTION:

2. Has EPA calculated the total cost of implementing Executive Order 13514?

RESPONSE:

Because EO 13514 requirements overlap with directives and mandates found in previous Executive Orders, the Energy Independence and Security Act, the Energy Policy Act of 2005, and other legal requirements, it would be difficult to calculate the incremental costs of implementing EO 13514 at the EPA. The agency would also have difficulty separating the staff resources related to general environmental policy development versus EO 13514 guidance work.

QUESTION:

3. Are you aware whether any federal agency has determined the cost of implementing Executive Order 13514?

RESPONSE:

The EPA is not aware of any federal agency that has determined the cost of implementing EO 13514.

The Honorable Mike Crapo**QUESTION:**

1. Through the Energy Independence and Security Act of 2007 signed into law by President Bush, the EPA was directed to implement the updated national Renewable Fuel Standard (known as RFS2). However the lack of qualified cellulosic bio-fuels on the market is a sore spot in an otherwise successful implementation of RFS2. The New York Times published a story in January pointing out that oil companies were paying a fine for not providing a fuel type that doesn't exist. That being said, it is also my understanding that there are number of qualified products that are close to coming to market with the hope that these products will be qualified C-RINs in 2012.

Sadly at least one of these qualified cellulosic bio-fuels is being held up unnecessarily by the EPA regulatory process. It just so happens that the company that produces this fuel, a renewable fuel oil derived from woody biomass, is also currently negotiating a contract with the US Navy at the Naval Station Washington. This company has planned facility developments in Idaho with the potential of 450 jobs in a timber industry region of the state that desperately needs jobs.

What can the EPA do to alleviate the current market reality that there are not enough qualified products, and how can the EPA support the qualification of renewable fuels, such as oil derived from woody bio-mass, to qualify under the RFS?

RESPONSE:

The Energy Independence and Security Act of 2007 (EISA), in revising the Renewable Fuel Standard (RFS) program, put into place multiple provisions to encourage the development of advanced biofuels. The statute, for example, includes annual volume requirements for renewable fuel with a minimum volumetric requirement for biomass-based diesel and standards for advanced biofuels derived from cellulosic feedstock, subject to change each year based on the EPA's assessment of production capacity. A credit system (renewable identification numbers, or RINs, used to identify qualifying fuels) serves to increase the value of advanced renewable fuels and thereby spur their development. The statute also put in place requirements that any advanced renewable fuel, including cellulosic fuels, meet certain regulatory requirements, including specified lifecycle greenhouse gas (GHG) thresholds.

In the final rule adopting the amendments to the RFS program published in March 2010, the EPA approved pathways representing a range of feedstock sources, fuel production technologies, and fuel types. That final rule focused on the fuel pathways already in production or most likely to contribute significant volume of biofuels in the near future. It included cellulosic biofuel pathways from two prominent sources of woody material, slash and pre-commercial thinning. In the last two years, the EPA has made significant progress in evaluating additional feedstocks, fuel production technologies, and fuel types under the RFS program. The EPA has, for example, approved canola as a new feedstock and six other new fuel pathways through the petition process, and has released for public comment analysis on six other feedstocks (camelina, arundo donax, napiergrass, energy cane, sorghum, and palm oil). We have also initiated our analysis of renewable fuels based on pulp wood biomass as a feedstock, and understand there is a high level of interest and activity in the market

Enclosure

regarding its potential. We believe that reviewing such fuel pathways in accordance with statutory requirements, and, where appropriate, qualifying them for use in the program, is a critical way that the EPA can support the development of renewable fuels.

While such steps are important, the ultimate success of new biofuels in the marketplace hinges on multiple factors unrelated to the EPA, including access to financing, infrastructure limitations, and the cost competitiveness of the fuels. The EPA will continue to monitor the marketplace and will take steps, as appropriate, to help spur the development of the next generation of advanced biofuels.

QUESTION:

2. With the RFS2 final rules, the EPA suggests that certain heating oils should qualify as renewable fuels. Can you comment on what the EPA is doing to qualify heating oil as a renewable fuel?

RESPONSE:

We have just issued a direct final rulemaking that will expand the scope of renewable fuels that can qualify under the definition of heating oil to include fuel oil produced from qualifying renewable biomass that would be used to generate heat to warm buildings or other facilities where people live, work, recreate, or conduct other activities. Fuel oils used to generate process heat, power, or other functions are not included in the amended definition. Producers or importers of fuel oil that meets the amended definition of heating oil are also allowed to generate Renewable Identification Numbers (RINs), provided that the fuel oil meets the other requirements specified in the RFS regulations. Fuels that already meet the definition of heating oil in the RFS regulations are unaffected by the amendment to the rule.

QUESTION:

3. Are there other rule-making steps or regulatory easements could be allowed to bring cellulosic bio-fuels to market quicker?

RESPONSE:

As discussed above, the EPA plays an important but limited role in bringing cellulosic and other advanced biofuels to the market. Besides reviewing and analyzing new fuel pathways (see above response), the EPA is also required to issue regulations that set the annual volume standards for various renewable fuel volumes, including cellulosic, advanced, and total renewable fuels. Setting volumes and reviewing new pathways are the two key areas where the EPA can play a role in encouraging the development of cellulosic and other renewable fuels. Separately, in the course of implementing the RFS program, we are constantly looking for ways to streamline or otherwise modify the program in order to make the program more efficient, and to encourage the development of cellulosic and advanced biofuels. We anticipate that some of these changes will be proposed for public comment in upcoming RFS-related rulemakings.

Senator SANDERS. Thank you very much.
 We have been joined by Senator Tom Carper of Delaware.
 Our next panelist is Richard G. Kidd, IV, Deputy Assistant Secretary for Energy and Sustainability, U.S. Army.
 Thanks very much for being with us.

STATEMENT OF RICHARD G. KIDD, IV, DEPUTY ASSISTANT SECRETARY FOR ENERGY AND SUSTAINABILITY, U.S. ARMY

Mr. KIDD. Thank you very much, Chairman Sanders and Chairman Whitehouse, Ranking Member Boozman and other members of the Subcommittees for having me here today. It is a pleasure to be here and to discuss the Army's energy security and sustainability efforts.

The Army is addressing energy security through development of force-wide energy doctrine and operating principles, technological investments, operational training, education, facilities management which are all critical aspects of instilling a mindset of conservation, efficiency, and sustainability.

While these efforts will have many intended benefits, you should be clear that the Army does this for the simple reason that we believe energy security is essential for the Army to meet mission requirements now and in the future. Reducing energy use across the Army is mission critical, operationally necessary, and financially prudent.

The Army recognizes the value of collaboration and we are working closely with several public and private organizations to meet our energy security requirements. These include the Office of the Secretary of Defense, other military services, the Environmental Protection Agency and the Department of Energy.

In particular, we entered a Memorandum of Understanding with the Environmental Protection Agency last year for water programs to identify and demonstrate new applications and technologies. The Army is the largest facilities energy user of electricity in the Federal Government representing just over 20 percent of the Federal Government's electric energy bill.

Since 2003 the Army has been able to reduce the consumption of electricity on installations by over 13 percent despite the fact that the total number of active soldiers and civilians has gone up by 20 percent. Operationally, the Army spends 40 percent of its liquid fuel to reduce electricity in generators.

To meet statutory requirements and Army energy security goals, the Army plans on using a variety of appropriated funds as well as third party financing. The Army is currently the largest user of energy performance contracts in the Federal Government. Going forward, assuming that the fiscal year 2013 budget is approved by Congress, we plan to execute \$393 million in appropriated energy projects, \$400 million in energy savings performance contracts, and up to \$700 million in renewable energy projects. The answer to questions posed by the committee, if all of these funds go forth, that represents at least 15,000 jobs created.

Army investments in energy projects throughout all of these mechanisms are subject to thorough cost-benefit analysis to ensure that the life cycle costs of these projects will be positive and beneficial to the Army. Additionally, integral to all of our efforts is cul-

tural change and the requirement to implement a holistic, integrated design approach to our installations and to our operations in the field.

In this regard, we have announced the Army Net Zero Initiative. Net Zero Initiatives will move closer to the objective of consuming only as much energy and water as they produce and eliminate solid wastes to landfills. When fully implemented, Net Zero installations will establish model communities for energy security, sustainability, value, and quality of life. Seventeen installations have been identified to pilot this effort.

As mentioned earlier, last November we signed a Memorandum of Understanding with the Federal Environmental Protection Agency's Office of Research and Development for water intensity reduction to maximize the Army's Net Zero Water Initiative. The Army and the EPA are working jointly to advance the development of new, science-based applications and technologies that can be implemented to achieve Net Zero energy, water, and waste goals.

The Army-EPA MOU complements the DOD-EPA Memorandum of Understanding signed February 7, 2012. In addition, the Army's Tank and Automotive Research, Development and Engineering Center, TARDEC, has an MOU with the Department of Energy, and the Army participates as part of the Department of Defense's broader MOU with the Department of Energy.

In regard to renewable energy, to streamline the process of developing large scale renewable energy projects on Army lands, last September we established the Energy Initiatives Task Force known as the EITF. The Energy Initiatives Task Force serves as the central management and negotiation office to augment installation staff for the development of renewable energy projects greater than 10 megawatts.

They are currently reviewing 15 projects and have a further 81 that they are modeling and under development. Of these 81, they are at or below grid parity costs for like sources of electricity.

In conclusion, the Army is working diligently to improve our energy security posture. I did not prepare remarks on operational energy, but just to reflect the comments made earlier, this year the Army will be deploying two entire Airborne Brigade combat teams to Afghanistan equipped with new soldier power solutions to include renewable power systems to recharge soldier batteries lightening their load in combat.

Improved energy security means increased mobility by not being tethered to supply lines, foreign suppliers, or volatile energy markets. Investment in energy capabilities including renewable energy and energy efficient technologies will help ensure that the Army can meet mission requirements today and into the future.

Not only is it the smart thing to do, it is the right to do from both an operational and financial standpoint.

I thank you for your attention and look forward to your questions.

[The prepared statement of Mr. Kidd follows:]

RECORD VERSION

STATEMENT BY

MR. RICHARD G. KIDD
DEPUTY ASSISTANT SECRETARY OF THE ARMY FOR
INSTALLATIONS, ENERGY, AND ENVIRONMENT
ENERGY AND SUSTAINABILITY

BEFORE THE

SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
SUBCOMMITTEE ON GREEN JOBS AND THE NEW ECONOMY AND
OVERSIGHT
UNITED STATES SENATE

SECOND SESSION, 112TH CONGRESS

ENVIRONMENTAL PROTECTION AGENCY'S (EPA) WORK WITH
OTHER FEDERAL ENTITIES TO REDUCE POLLUTION AND IMPROVE
ENVIRONMENTAL PERFORMANCE

MARCH 27, 2012

NOT FOR PUBLICATION
UNTIL RELEASED BY
SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE

**STATEMENT BY
MR. RICHARD KIDD
DEPUTY ASSISTANT SECRETARY OF THE ARMY FOR
INSTALLATIONS, ENERGY, AND ENVIRONMENT
ENERGY AND SUSTAINABILITY**

INTRODUCTION

Mr. Chairman and members of the Subcommittee, it is a pleasure to appear before you to discuss the Army's Energy Security and Sustainability Program and partnerships. With your support, coupled with the President's vision for Energy Security and Sustainability, the Army will achieve improved access to reliable supplies of energy, the ability to protect and deliver sufficient energy to meet operational needs and reduced energy costs.

The Army requires secure and uninterrupted access to energy. Investment in energy capabilities, including renewable energy and energy efficient technologies will help ensure the Army can meet mission requirements today and into the future. We are moving forward to ensure the Army of tomorrow has the same or greater access to energy, water, land, and natural resources as the Army of today. Reducing energy use across the Army is mission critical, operationally necessary and financially prudent.

OVERVIEW

The Army is addressing Energy Security through the development of a force-wide energy doctrine and operating principles. Technological investments, operational training, education and facilities management are all critical aspects of instilling a mindset of conservation, efficiency and sustainability.

The Army recognizes the value of collaboration and to this end we work closely with a variety of public and private organizations to meet our energy security requirements. Some of the Federal government agencies the Army collaborates with include the Offices of the Secretary of Defense, other military Services, Environmental Protection Agency, OMB, Department of Energy, Department of Interior, and the General Services Administration. Examples of these collaborations include a Memorandum of Understanding (MoU) between the Department of Defense and the Department of Energy on efforts to enhance national Energy Security, a MoU between the Department of the Army and the Environmental Protection Agency on water, and a MoU between the Department of Energy and the Army's Tank Automotive Research, Development and Engineering Center (TARDEC) on vehicle development.

The Army is leveraging the authorities given to us by the President and the Congress. Authority to enter into power purchase agreements, enhanced use leases and energy performance contracts attract outside investments. Investments are geared toward long-term installation energy resource management that benefits both Army and industry. In the area of Operational Energy, we expect projects to make positive contributions to mission success through reduced fuel demand on the battlefield, increased capability, reduced energy weight carried by a Soldier on patrol, and more energy-informed operations.

The Army's Energy Program planned activities and project execution for FY13 include: \$393 million in appropriated funds; \$400 million in Energy Savings Performance Contract / Utilities Energy Services Contract awards; and \$700 million in renewable energy projects. Using Council of Economic Advisor ratios, we anticipate generating more than 16,000 jobs.

BASE / INSTALLATION ENERGY

The Army is the largest facilities energy user in the Federal Government, using roughly one fifth of the Government's total facilities consumption. Since FY 2003 the Army has reduced its installation energy consumption by 13 percent while its total number of active Soldiers and civilians has increased by 20 percent.

Energy Security on our Installations require: a) energy efficient buildings, b) on-site power generation, and c) a secure micro-grid with energy storage that can match power with key loads. The Army is making investments in each of these areas.

Army Energy Program

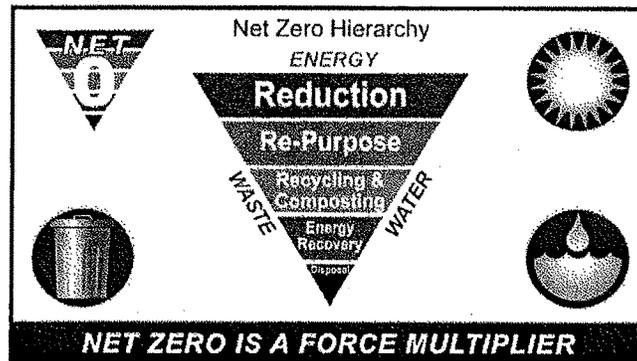
The Army's invests in areas such as efficiency, on-site energy production and grid security. When developing energy projects to be funded with appropriated dollars, the Army subjects these projects to a Cost Benefit Analysis (CBA) process to ensure that the Army will receive a reasonable return on investment. The Army has initiated several policies to promote Energy Security. The Army has adopted the most stringent building code in the Federal Government, ASHRAE Standard 189.1, which will reduce energy and water consumption on average by 40 percent annually in our new construction program and in existing facilities that undergo major renovations.

While internally the Army is focusing and prioritizing investments towards Energy Security, we are very mindful of and trying to achieve the goals for reduction in installation energy that Congress and the President have mandated. The Army energy goals include a 30% reduction in facilities energy intensity by 2015 from the 2003 baseline; generation of

25% of energy from renewable resources by 2025; and reduction in petroleum use in non-tactical equipment by 20% by 2015.

Integral to all of our efforts is culture change and a need to take a holistic integrated design approach, which can be found in the Net Zero Initiative. In FY11, the Army announced the Net Zero Initiative (Figure 1), which will provide significant security benefits to installations while working to meet Congressional and Presidential goals. The Net Zero initiative is advancing an integrated approach and will improve the management of energy, water, and waste. Net zero installations will move closer to the objective of consuming only as much energy or water as they produce and eliminate solid waste to landfills. When fully implemented, Net Zero installations will establish model Army communities for energy security, sustainability, value, and quality of life. Seventeen installations have been identified for this effort, with plans of striving toward Net Zero by 2020.

Figure 1: Net Zero Initiative



The installations piloting this initiative have already had successes. In support of its Net Zero Water Installation goals, Tobyhanna Army Depot (TYAD) used Army Working Capital Fund (AWCF) resources for an in-

house project that replaced potable water with processed wastewater for foam reduction in two locations at its wastewater treatment plant. The project cost of \$1,200 will result in savings of 300,000 gallons of potable water per month. The project paid for itself in just over one month.

Also using AWCF, TYAD installed a water chiller to replace a single-pass cooling system in an Industrial Operations Facility. This project saves over two million gallons of potable water per month. A payback period of 8 months is expected to cover project costs of \$125,000.

In addition to the Army resources for water intensity reduction, we have partnered with the federal Environmental Protection Agency's Office of Research and Development to maximize the Army's Net Zero initiative. On 28 November 2011, Ms. Katherine Hammack, the Assistant Secretary of the Army for Installations, Energy and Environment and Dr. Paul Anastas, the EPA's Assistant Administrator for Research and Development and the Science Advisor to the Administrator during this time, signed a Memorandum of Understanding to formalize the collaboration between the two organizations. The Army and EPA are working jointly to advance the development of new science-based applications and technologies that can be implemented to achieve Net Zero Energy, Water, and Waste goals at Army installations. Initial planning meetings with Fort Riley, KS and Joint Base Lewis McChord are underway. Technologies and science-based approaches include:

- Increase efficiency and recovery of energy and materials from wastewater
- Incorporate design and use of Green Infrastructure in storm water management
- Address the energy/water nexus

- Address social and behavioral components of introducing new technologies
- Aid in understanding of water, energy, and material flows and interactions within systems, and
- Incorporate water and energy security and climate-ready solutions into technology approaches

The Army-EPA MOU complements the DoD-EPA Memorandum of Understanding signed on 7 February 2012.

Renewable Energy

To streamline the process of developing large scale renewable energy projects on Army lands we have established the Energy Initiatives Task Force (EITF). The EITF is integral to the Army addressing rising energy security challenges and escalating fuel prices. Through the EITF, the Army will secure renewable electricity on our installations. The EITF serves as a central management and negotiation office to augment installation staff for the development of renewable energy projects greater than 10 MW. Their objective is to obtain secure, sustainable, and affordable energy from a diversity of sources. The EITF is dedicated to working with the private sector to streamline the process to help speed overall project development timelines and ensure the best value to the Army and private sector. The EITF is currently evaluating 15 projects at eight installations to determine feasibility for further development and has identified further opportunities at 21 installations.

Energy Security Projects

Energy security projects are specifically focused on assurance of electrical service. Projects programmed for energy security are ones to upgrade electrical power distribution systems, harden transformers, and provide back-up power capability.

The Army is also working to develop "Smart" grid capabilities on its installations. The technology and processes in this area are still emerging. The Army is making investments in "Smart" grids to develop and acquire these technologies for use at our fixed installations and in contingency operations.

Alternative Financing

The Army is the largest user of Energy Performance Contracting in the Federal Government. Energy Savings Performance Contracts (ESPCs) and Utilities Energy Service Contracts (UESCs) are contracts where private companies / servicing utilities provide initial private capital investment to execute projects, and are repaid from realized energy savings. To date the Army has implemented ESPCs at 72 installations, representing more than \$1 billion in private sector investment, more than 5,860 billion British Thermal Units (BTU) energy savings per year. The Army has also implemented UESCs at 43 installations representing more than \$500 million in private sector investment, more than 3,590 billion BTU energy savings per year. The Army plans to expand the use of these contracts. In the first quarter of FY12, the Army has executed \$93 million of contracts, more than the total contracts executed in FY11 (\$74M).

Conclusion

In conclusion, the Army is working diligently to improve our Energy Security posture. To do this the Army is working closely with other federal agencies such as the Department of Energy and the Environmental Protection Agency. The ability for the Army to produce, store, dispense and manage its own energy, with reduced reliance upon outside sources, will greatly enhance our performance goals. Reduced reliance means increased mobility by not being tethered to supply lines, foreign suppliers and volatile energy markets. Investment in energy capabilities, including renewable energy and energy efficient technologies will help ensure the Army can meet mission requirements today and into the future. Not only is it the smart thing to do; it is the right thing to do from both an operational and financial stand point.

CHARRTS No.: SEPW-01-001
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Boxer
Witness: DAS(E&S) Kidd IV
Question: #1

Question: In your testimony, you highlighted the efforts in the Army Energy Program to improve efficiency, increase renewable energy, develop on-site energy, and improve grid security. These efforts require investment, and your testimony highlighted the use of cost-benefit analysis to ensure a reasonable return on that investment. Can you please expand on the returns the Army expects from its investment in improved efficiency and expanded renewable energy? Why is investment in these areas in the Army's long-term interest?

Answer: When developing its FY13 budget the Army performed a Cost Benefit Analysis (CBA) on the energy projects in its budget. The result of this CBA is that the Army has developed an energy investment plan that will increase energy efficiency and the use of renewable energy on Army installations in a cost effective manner. These investments are critical to contain energy costs over the long term. Historically energy costs have increased faster than inflation. For example, since 2003 the Army has decreased its facility energy usage by 13%, while at the same time its energy costs have increased by more than 50%. As energy costs continue to increase, it is critical that the Army invest in energy efficiency and renewable energy projects to lower costs over the long-term.

CHARRTS No.: SEPW-01-002
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Boxer
Witness: DAS(E&S) Kidd IV
Question: #2

Question: What are the benefits to the Army of expanding the use of alternative energy sources? How can expanding beyond conventional energy sources improve the Army's ability to meet its mission requirements?

Answer: The Army is working to develop alternative energy sources on its installations in order to provide secure onsite power generation. These projects are expected to contain utility cost escalation over the long-term, saving funds and reducing utility price volatility. Additionally, by developing alternative energy sources on Army land the Army will realize increased energy security and mission effectiveness due to reduced vulnerability and risk to its energy supply.

CHARRTS No.: SEPW-01-003
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Boxer
Witness: DAS(E&S) Kidd IV
Question: #3

Question: The President recently announced a new Army initiative to create a Green Warrior Convoy to test advanced energy vehicle technologies. This will include a tour of schools, communities, and military facilities to demonstrate the value of these new technologies. Can you please describe what types of technologies are being developed and how these advanced technology vehicles can help the Army achieve its mission? I believe educating the public about the Army's efforts is critical, and I am pleased that this program will have a public education component. Can you please describe the goals of the public outreach effort and provide additional detail on the plans for public appearances of the Green Warrior Convoy?

Answer: The Green Warrior Convoy will likely include technologies associated with tactical vehicles such as fuel cells, hybrid systems, battery technologies, and alternative fuels; all showcasing the Army's science and technology developments in operational energy and sustainability. Additionally, the Army's Science, Technology, Engineering and Mathematics (STEM) Asset Vehicle, will be part of the convoy to further publicize STEM careers and demonstrate how civilian scientists and engineers help to support America's national security mission, with our uniformed Soldiers. Our efforts are focused on the theme, "Tactical Advantage through Energy Enabled Operations." The convoy will travel from the Army's Tank and Automotive Research Development and Engineering Center, Detroit, Michigan, to Washington D.C., stopping at schools, colleges, communities and military facilities along the way.

The convoy, beyond being a method in which to test and evaluate existing systems and new fuels, is also a means by which we can show the American public the rapid progress we are making in all areas of Army power and energy. The convoy will carry and display a variety of Soldier Worn Integrated Power System components. From fuel cells to hybrid systems, battery technologies to alternative fuels, we will highlight the Army's advanced vehicle power and technology developments.

CHARRTS No.: SEPW-01-004
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Carper
Witness: DAS(E&S) Kidd IV
Question: #4

Question: I applaud the military's advancement of environmentally beneficial sources of clean energy generation on its bases, but I'd like to ask you specifically whether you have explored less traditional, more advanced forms of clean energy generation beyond the legacy renewables. For example, fuel cell technology for stationary generation, such as those being built by American companies like Bloom Energy in my state of Delaware, can be more flexible and reliable than intermittent renewable technologies, and can require a fraction of the footprint. Fuel cells are commercial-off the-shelf technology and do not require lengthy environmental clearances so often required by large-scale wind and solar projects. Currently, fuel cells can be installed and operational faster than wind and solar facilities and do not require additional transmission capability to move electricity to the end user. Most importantly, the newest fuel cell technologies can provide clean, reliable electricity even when the electric grid goes down. Fuel cell technology is not just in the research and development phase, the technology is real, proven, and being deployed by some of our country's leading companies. For example, some of the leading Fortune 500 companies, as well as leading educational institutions, are already deploying Bloom Energy's fuel cells to provide cleaner, more reliable, on-site electricity to power their office buildings, campuses, or data centers. While the Department of Defense has invested significant time and resources into developing biofuels and traditional renewables, the additional energy reliability and security benefits offered by fuel cells, in addition to their environmental benefits, should not be overlooked as another tool for the federal government to simultaneously meet its energy and environmental goals. Can you please let me know what steps you are taking to incorporate US-manufactured stationary fuel cells into your clean energy plans? I have been told that some Department of Defense installations want the benefits of this technology because of its energy security benefits, but policy guidance requiring "renewable" rather than "clean" and "secure" has limited their ability to move forward. Is this true?

Answer: The Army is open to all clean energy technologies and believes that fuel cells hold tremendous potential to improve energy security on its installations. One example of the Army's Fuel Cell efforts is the partnership between the U.S. Army Corps of Engineers, Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL), and DOE's Office of Energy Efficiency and Renewable Energy on a Fuel Cell Backup Power Demonstration. This project involves the installation and testing of proton exchange membrane (PEM) emergency back-up power fuel cells at 8 DoD locations and INASA Research Center for a total of 9 federal installations. This 5-year demonstration project will test and evaluate these fuel cells working in "real life" conditions to research performance under actual and simulated grid outages. The results will be compared to conventional backup power capabilities to identify benefits or areas for improvement of these technologies.

Selected facilities were announced in June of 2011 and are:

- Fort Bragg, NC

- Fort Hood, TX
- U.S. Military Academy at West Point, NY
- Aberdeen Proving Grounds, MD
- Picatinny Arsenal, NJ
- Cheyenne Mountain Air Force Base, CO
- U.S. Marine Corps Air Ground Combat Center, 29 Palms, CA
- Ohio National Guard, Rickenbacker, OH
- NASA Ames Research Center, CA

CHARRTS No.: SEPW-01-005
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Inhofe
Witness: DAS(E&S) Kidd IV
Question: #5

Question: Describe for the committee some of the water conservation measures you have begun implementing in your/DoD facilities. How did you choose these conservation measures over others available?

Answer: Most water conservation measures occur during routine repairs that many times lead to replacement of worn out equipment at the end of its lifecycle. For example, broken fixtures are replaced with high water-efficient fixtures as repairs are required.

Proactive water management at Army facilities is a multifaceted process that requires planning and forethought in new facility construction, existing structure renovation, and day-to-day maintenance procedures to ensure that water conservation is at the forefront of installation management in general.

Some of the measures that are being implemented include the use of water efficient fixtures such as low flow toilets and urinals that can significantly cut water use. In addition, efficient shower and sink faucets do the same.

Water conservation is increased when single pass cooling equipment is replaced with recirculating cooling systems, eliminating the disposal of water that was only used for chilling.

Improvements are being gained in irrigation systems to minimize the loss of water to the environment due to evaporation and/or wind. Xeriscaping (use of native vegetation) is being used to reduce water used for landscaping.

On-going work at central energy plants saves water by improving the maintenance of boiler/ steam systems to reduce leaks that require make-up water. Controlling the water chemistry in these systems is also minimizing blow-downs. For cooling, traditional cooling tower equipment is being replaced so that water loss to the environment is being replaced with newer technologies that minimize water loss as they cool.

A cost-effective means to reduce water consumption is to ensure that water distribution systems are leak-free. Leaks throughout a water distribution system can account for sizable water loss if not detected and corrected. Therefore, the regular use of distribution system audits in conjunction with electronic/ automatic leak detection systems helps to reduce leaks. The Army is actively using leak detection technology to identify and repair leaks in its pipe distribution systems.

CHARRTS No.: SEPW-01-006
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Inhofe
Witness: DAS(E&S) Kidd IV
Question: #6

Question: EPA and the White House have increasingly focused efforts on maintaining and treating stormwater on site. I know there are a number of both legislative and executive orders that your facilities must comply with in managing stormwater. Can you please describe some of the challenges associated with additional stormwater controls as well as some of the choices that your facilities face in complying with stormwater mandates?

Answer: The Army experiences several challenges when complying with laws and executive orders that require management of storm-water, but the Army is addressing these challenges through training personnel on how to design and implement the construction of storm-water management systems using low impact development tools such as permeable pavements, roof systems to capture rainwater, and bio-swales.

The Army is developing guidance on how to implement low cost, low impact development (LID) solutions to address a broad variety of situations such as how to address acres of hardstand and roof line; the best use of rainwater harvesting techniques; the importance of minimizing site clearing and soil grubbing; taking advantage of natural site elevations; and directing storm-water flow to desired locations. It is still a challenge to incorporate LID design and construction techniques as a means to manage storm-water on impervious soil types, but best practices are being developed.

CHARRTS No.: SEPW-01-007
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Inhofe
Witness: DAS(E&S) Kidd IV
Question: #7

Question: In February of this year, the Army released a draft Request for Proposal for "Large Scale Renewable and Alternative Energy Power Production for Army Installations." This Request for Proposal was open for comment for 30 days. As I understand it, the intent of the program is to award \$7 billion in shared capacity contracts to procure reliable, locally generated, renewable and alternative energy through power purchase agreements and the like. What amount of infrastructure investment is expected to be necessary to provide alternative energy production on Army installations for the next 30 years? What are the most viable renewable energy sources that can be produced on base? What is the expected return on investment for these renewable energy sources? What recourse will the Army have to hold companies accountable should energy projections in terms of the amount of energy produced and/or cost not be met?

Answer: (1) Estimates made earlier last year indicated that the Army would need to invest up to \$7B in renewable energy projects by 2025. The recent significant price decreases for wind and solar now suggest the actual figure will be much lower.

(2) Presently, there is viability in a number of renewable energy technologies to include solar, wind, geothermal and biomass energy plants. Each of these technologies have their particular advantages/limitations, based on the characteristics of a military installation and local utility market.

(3) The return on investment will be determined for each project during the due diligence phase and finalized prior to project award. A business case analysis will be completed for each project that will capture life cycle cost and benefits prior to award of task order under this contract.

(4) The Army includes performance and quality assurance requirements in all task orders and contracts. In order to hold companies accountable contracts and task orders may include the requirement for the contractor to purchase energy to make-up any shortfall to its minimum production/cost performance obligation, and/or include a liquidated damages provision if the contractor fails to produce its contracted minimum and the Army has to pay a higher price.

CHARRTS No.: SEPW-01-008
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E&S) Kidd IV
Question: #8

Question: In your testimony, you discussed the importance of increasing our energy security. How would increase the production of domestic sources of energy, including more American oil and gas, improve our energy security posture?

Answer: The Army does not develop energy policy with respect to oil and gas production on non-Army lands. It is the Administration's policy to follow an all-of-the-above strategy for the energy development that considers every source of American-made energy to increase domestic energy security.

CHARRTS No.: SEPW-01-009
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E&S) Kidd IV
Question: #9

Question: Has the Army evaluated the impact of near-record low natural gas prices on its total energy expenditures? Will the natural gas boom in the United States help to reduce the Army's energy costs?

Answer: The Army pays close attention to energy commodity costs, which have been rising much faster than inflation resulting in increased energy costs for the Army. For example, since 2003 the Army has decreased facilities energy usage by 13% while at the same time total energy costs have risen more than 50%. The Army does not make predictions regarding future energy costs, but relies on figures from the Department of Energy's Energy Information Agency and the National Institute of Standards and Technology. Based on this information, utility costs, on average across the country, are expected to continue to rise.

CHARRTS No.: SEPW-01-010
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E&S) Kidd IV
Question: #10

Question: Gasoline prices are nearing record high levels. A gallon of gasoline now costs twice what it cost in 2009. Has the Army evaluated how much it would save annually if the Administration had a focused effort on driving down the price of gasoline through increased offshore and onshore energy production or other means?

Answer: No, the Army does not engage in evaluations of this type, which are outside its scope and purpose.

CHARRTS No.: SEPW-01-011
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E&S) Kidd IV
Question: #11

Question: Lumber and wood products are a renewable natural resource that is produced domestically and supports jobs in Alabama and all over rural America. What steps has the Army taken or recommendations that it has endorsed with respect to the use of wood and wood products in buildings and other purposes? Are you aware of any federal agency policies that discourage the use of any wood or wood products in construction or other projects?

Answer: The Army has adopted a neutral position with regard to construction materials. The Army allows the use of wood in many instances such as structural framing, flooring, cabinetry, doors, shelving, decorative items, etc. In accordance with sustainable principles, the Army also promotes the use of wood as a renewable material. The Army specifies the performance requirements and allows contractors bidding on a project to propose the materials that they determine achieve the objectives of the project, based on structural strength, location, resource availability, economics and performance. We are not aware of any Federal policies that discourage the use of renewable wood or wood products.

CHARRTS No.: SEPW-01-012
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E&S) Kidd IV
Question: #12

Question: How much has the Army spent in fiscal years 2009 through 2012 on use of, research related to, deployment of, or other efforts related to solar, wind, and other renewable energy sources?

Answer: The Army does not have one funding line to track research and development, deployment and other costs related to renewable energy. Funding occurs across the Army budget and for significantly varying purposes. For example, in combat operations the Army has procured portable solar chargers to recharge Soldier batteries, and solar powered generators to reduce fuel demand in theater. On its permanent installations the Army has generally invested its appropriated funds in smaller scale renewable energy projects. The primary account for these projects has been Energy Conservation Investment Program (ECIP). From FY09 to FY11 the Army has spent \$99.97M on renewable energy through the ECIP program and has \$40.03M programmed in FY12. The Army strives to achieve a savings to investment ratio of 2 to 1 on these projects.

Senator SANDERS. Thank you very much, Mr. Kidd.
Mr. Thomas W. Hicks is the Deputy Assistant Secretary for Energy, United States Navy.
Mr. Hicks, thanks very much for being with us.

**STATEMENT OF THOMAS W. HICKS, DEPUTY ASSISTANT
SECRETARY FOR ENERGY, U.S. NAVY**

Mr. HICKS. Thank you, Senator.

Chairman Sanders, Senator Whitehouse, Senator Boozman, Senator Carper, members of the Subcommittee, I am pleased to be here before you today to provide an overview of the Department of Navy's energy investments.

Time permitting, I would like to address the questions posed by Senator Inhofe rather than taking those for the record.

The Department of the Navy's fiscal year 2013 budget request includes \$1 billion and \$4 billion across the future years' defense plan for operational and shore energy initiatives. Our energy investments are not about advancing an environmental agenda or to be green. Our energy investments are about improving our combat capabilities, increasing our mission effectiveness, and reducing our vulnerabilities to foreign sources of fossil fuel, and for those brave sailors and marines deployed overseas, it is about bring more of them home safely to their families.

We are on track and intend to meet the energy goal set forth by Congress and the Secretary of the Navy. We understand that energy is an essential resource for the Navy and the Marine Corps requirement. Our use of new energy technologies and resources will allow us to reduce our dependency on fuels that negatively impact our economy and reduce our vulnerability to price volatility.

Every time the cost of a barrel of oil goes up \$1, it costs the Department in excess of \$30 million in fuel costs. In fiscal year 2012, in large part due to political unrest in oil producing regions, the price per barrel of oil has risen \$38 over what was originally, raising the Navy's fuel bill in fiscal year 2012, the year of execution, by more than \$1 billion. These price spikes must be paid for out of our operations, meaning our sailors and marines are forced to sail less, fly less, and in short, train less.

In efforts to meet Congress' renewable energy goals and the Department of Navy's goal of procuring 50 percent of our offshore 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 adding cost to the taxpayers.

Under the direction of Congress and our Commander in Chief, and in partnership with other Federal agencies, we have two major initiatives underway. The first is advancing the consumption of 1 gigawatt of renewable energy generation on or near our installations. While a seagoing service, we own more than 3 million acres of land and over 72,500 buildings. We will facilitate the production of large scale renewable power projects on naval installations, we will use third party financing mechanisms such as power purchase agreements, joint ventures, and enhanced use leases to avoid adding costs to the taxpayers.

Currently our bases support over 350 megawatts of renewable energy through a variety of sources such as solar, wind, and geothermal. Recently, we have awarded contracts for three solar projects in the southwest and are finalizing a similar contract in Hawaii. The three awarded power purchase agreements at China Lake, Twenty-Nine Palms and Barstow will save the Department \$20 million over 20 years, and in all three cases we will be paying less per kilowatt hour than we would be for conventional power.

Operationally, we are undertaking numerous initiatives such as hybrid electric drives, stern flaps, propeller coatings, paint coatings to make our fleet of 285 ships and 3,700 aircraft more efficient. This results in greater combat capability while potentially saving many millions of dollars.

The Marine Corps Experimental Forward Operating Base Initiative has reduced fuel supply vulnerability and has also delivered greater combat capability by deploying renewable energy technologies throughout the Afghanistan theater. In addition to these efforts, a second major initiative is being undertaken in conjunction with the U.S. Departments of Agriculture and Energy to accelerate a domestic biofuels market capable of delivering advanced biofuel blends that meet or exceed all commercial and military specifications that do not require any modifications to our ships, aircraft, or infrastructure, that do not compete for food, and that do not cost any more than conventional fuel.

To date, we have tested all of our manned and unmanned aircraft and a majority of service combatants. Later this summer at the rim of the Pacific, 2012, at the world's largest naval exercise, we will sail a carrier strike group on 50-50 biofuel blends.

As we implement these initiatives, the Department continues to deploy methods to promote behavioral and cultural change through education and training to ensure that the energy is understood to be a strategic and tactical capability that enables us to conduct our tactical and expeditionary shore missions.

In closing, your support of the Department's fiscal year 2013 budget request ensures we can build and maintain facilities and an operational fleet that enables our Navy and Marine Corps to meet the diverse challenges of tomorrow.

Thank you for the opportunity speak before you today, and I look forward to answering any questions you may have.

[The prepared statement of Mr. Hicks follows:]

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SENATE ENVIRONMENT AND PUBLIC WORKS
COMMITTEE

STATEMENT OF

HONORABLE TOM HICKS
DEPUTY ASSISTANT SECRETARY OF THE NAVY
(ENERGY)

Before the

GREEN JOBS AND THE NEW ECONOMY and OVERSIGHT
SUBCOMMITTEES

Of the

UNITED STATES SENATE ENVIRONMENT AND PUBLIC WORKS

27 MARCH 2012

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SENATE ENVIRONMENT AND PUBLIC WORKS
COMMITTEE

Chairman Sanders, Chairman Whitehouse, Senator Boozman, Senator Johanns and members of the Subcommittees, 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 increasing our energy efficiency and 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.

The Secretary of the Navy 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.

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 2020 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.

To meet the goal of 50% of shore based energy requirements from alternative resources and 50% of Department installations will be net-zero, the DON is working closely with private industry, academic institutions and federal agencies. By the end of this year, a strategy to facilitate the production and/or consumption of large-scale renewable power projects on or near Naval installations will be completed and forwarded to the Secretary for approval. 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 Goshawk, 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.

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.

CHARRTS No.: SEPW-01-013
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Boxer
Witness: DAS(E) Hicks
Question: #13

Question: Your testimony highlighted the expanded use of solar energy at three California installations -29 Palms, China Lake, and Barstow - and that the power purchase agreements at these facilities are expected to save the Navy \$20 million. I'm pleased to see the Navy pursuing alternative energy projects in California that both improve sustainability and reduce costs. Can you highlight additional opportunities in California and across the nation for expanded solar power as well as other alternative energy technologies, such as the efforts to capture landfill gas in Miramar, CA? Are there any hurdles to the expanded deployment of these technologies?

Answer: Additional Department of the Navy opportunities for solar power and other alternative energy technologies exist primarily in California as well as Hawaii and consist of the following:

1. Non-utility scale photovoltaic with minimum hurdles: Approximately 22.2 MW at Naval Base Ventura County, Naval Weapons Station Seal Beach, Naval Air Facility El Centro, Naval Support Activity Monterey and Detachment Fallbrook.
2. Utility-scale photovoltaic with moderate hurdles due to project size: Up to 90 MW at Naval Air Station Lemoore (additional moderate hurdle of transmission capacity).
3. Miramar landfill gas power production: 3 MW due online shortly with an additional 3 MW proposed in a staged methodology to accommodate installation increasing demand. Hurdles for 2nd 3 MW proposed include a) having the demand to support the purchased production and b) being able to negotiate a deal acceptable to both Government and contractor.
4. Non-utility scale photovoltaic with minimum hurdles: Currently negotiating complex contract terms and conditions for developing approximately 7 - 13 MW in Hawaii. The potential project would serve multiple military services on the island and includes ground and roof mount systems. Some of the project's hurdles include negotiating contract terms that support private financing and designing a system for minimal environmental and historical impacts.

CHARRTS No.: SEPW-01-014
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Boxer
Witness: DAS(E) Hicks
Question: #14

Question: Your testimony highlighted new equipment being tested at Experimental Forward Operating Bases at 29 Palms and Camp Lejeune. This equipment includes alternative energy sources that cut fuel use and logistical support by up to 90 percent. What benefits do these new energy sources offer over conventional energy sources? How can they help to reduce risks for Marines deployed overseas and help achieve mission goals?

Answer: The Experimental Forward Operating Base (ExFOB) capabilities we have evaluated in CONUS and Afghanistan have helped our Marines operate lighter, with less reliance on resupply. Our forces today are widely dispersed across the battle space: a Company today may cover an area of 50 square miles or more, manning multiple outposts, and executing extensive dismantled operations. Our Marines depend on communications gear and equipment, and rely on frequent resupply to support fuel and battery, as well as water and food needs. By providing a new source of power—solar and hybrid solar energy—and reducing the power demand of equipment, we have reduced mission risk, and increased our commanders' options. Ultimately, our goal is fewer Marines at risk on the road hauling fuel and protecting fuel convoys.

In less than a year, through our Experimental Forward Operating Base process, we have twice evaluated capabilities at Twenty-nine Palms and deployed them to Afghanistan. In 2010, while engaged in nearly constant combat, Marines of India Co. 3rd Battalion, 5th Marine Regiment used small scale solar power, man portable solar battery rechargers, hybrid-solar generators, plus energy efficient lighting and shelters, with positive results:

- Two patrol bases operated entirely on expeditionary solar power generators.
- Another patrol base reduced its fossil fuel need by approximately 90% – from 20 gallons of fuel a day to 2.5 gallons a day.
- Using the SPACES back pack portable solar power system to recharge their radio batteries they were able to patrol for three weeks with no battery resupply. Typical battery resupply is every 2-3 days.

As a result of this feedback, four of these capabilities were acquired and 5 battalion sets were accelerated to Marine units in Operation Enduring Freedom. This equipment is now Program of Record and part of the Marine Corps equipment kit.

In fall 2011 the Marine Corps deployed hybrid power systems and direct current powered air conditioners for evaluation at Patrol Base Boldak. The hybrid system demonstrated an 80% reduction in generator run time, and 55% reduction in fuel consumed. Insights from this evaluation are being used to inform the Marine Expeditionary Energy Hybrid Systems Analysis of Alternatives initiated in spring 2012.

The deployment of renewable energy on the battlefield has had benefits at small and remote patrol bases where power demands are low, usually where total power required is below 10kW. Specifically, the challenge of larger bases is the refrigeration required for food stores and environmental control for personnel comfort and sensitive electronic equipment. At these larger bases, today's renewable energy technology will have minimal impact. The Marine Corps is addressing these challenges by investigating new environmental control technologies.

CHARRTS No.: SEPW-01-004
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Carper
Witness: DAS(E) Hicks
Question: #4

Question: I applaud the military's advancement of environmentally beneficial sources of clean energy generation on its bases, but I'd like to ask you specifically whether you have explored less traditional, more advanced forms of clean energy generation beyond the legacy renewables. For example, fuel cell technology for stationary generation, such as those being built by American companies like Bloom Energy in my state of Delaware, can be more flexible and reliable than intermittent renewable technologies, and can require a fraction of the footprint. Fuel cells are commercial-off the-shelf technology and do not require lengthy environmental clearances so often required by large-scale wind and solar projects. Currently, fuel cells can be installed and operational faster than wind and solar facilities and do not require additional transmission capability to move electricity to the end user. Most importantly, the newest fuel cell technologies can provide clean, reliable electricity even when the electric grid goes down. Fuel cell technology is not just in the research and development phase, the technology is real, proven, and being deployed by some of our country's leading companies. For example, some of the leading Fortune 500 companies, as well as leading educational institutions, are already deploying Bloom Energy's fuel cells to provide cleaner, more reliable, on-site electricity to power their office buildings, campuses, or data centers. While the Department of Defense has invested significant time and resources into developing biofuels and traditional renewables, the additional energy reliability and security benefits offered by fuel cells, in addition to their environmental benefits, should not be overlooked as another tool for the federal government to simultaneously meet its energy and environmental goals. Can you please let me know what steps you are taking to incorporate US-manufactured stationary fuel cells into your clean energy plans? I have been told that some Department of Defense installations want the benefits of this technology because of its energy security benefits, but policy guidance requiring "renewable" rather than "clean" and "secure" has limited their ability to move forward. Is this true?

Answer: The Department of Navy has been conducting pilot demonstrations of various fuel cell technologies since the 1990s. Early conclusions regarding these tests were that the cost per Kilo Watt of these systems was uneconomical. The short lifespan of the fuel cell stacks, the requirement to utilize the thermal heat from the fuel cells to make the system more efficient, and the reliance on a vulnerable national natural gas transmission network were contributing disadvantages. In recent years new fuel cell technology, built by companies like Bloom, have addressed most of the issues raised in earlier systems. The Department is considering how this technology can be utilized to provide a more secure source of power for our critical loads to supplement on-base renewable power. No policy has been issued that would restrict the use of fuel cells.

CHARRTS No.: SEPW-01-015
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Carper
Witness: DAS(E) Hicks
Question: #15

Question: In your testimony, you stated that the Navy is watching with great interest the potential offshore wind development happening off' our Atlantic coastlines. To me, a partnership between the Navy and offshore wind is a no brainer. We have a huge supply of untapped clean, consistent wind energy off our coasts _ and we have the Navy, a huge energy consumer on our coasts. Active engagement from the Navy in this fledgling industry could help get this industry started in this country. However, during our discussion in the hearing, you mentioned that you expected the Navy will have difficulties entering into long term power purchase agreements with offshore wind projects because the likelihood these project will not be able to connect directly into a base. You mentioned that the law restricts the Navy from entering into thirty or twenty year agreements for projects that have to be connected via another distributor or utility. Can you provide technical assistance on legislative language that would allow the Navy to enter into long term power purchase agreements for offshore wind?

Answer: : 10 USC 2922a Contracts for Energy or Fuel for Military Installations, currently stipulates that:

a) Subject to subsection (b), the Secretary of a military department may enter into contracts for periods of up to 30 years—

(1) under section 2917 of this title; and

(2) for the provision and operation of energy production facilities on real property under the Secretary's jurisdiction or on private property and the purchase of energy produced from such facilities.

(b) A contract may be made under subsection (a) only after the approval of the proposed contract by the Secretary of Defense.

(c) The costs of contracts under this section for any year may be paid from annual appropriations for that year.

The DON has current statutory authority (10 USC 2922a) to negotiate agreements with private entities to produce power on land under DON's jurisdiction or land owned by the private entity. OCS lands currently fall into neither category, unless it is withdrawn for the DoD/DON. 10 USC 2922a, allows DON to negotiate power purchase agreements (PPAs) with energy producers for up to 30 years and may need amending in a manner to specifically include OCS lands. The Department would still want the connection from the off shore wind project to come to shore at a military installation to comply with the requirement of 2922a to purchase energy produced from such facilities, and to address energy security concerns.

CHARRTS No.: SEPW-01-005
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Inhofe
Witness: DAS(E) Hicks
Question: #5

Question: Describe for the committee some of the water conservation measures you have begun implementing in your/DOD facilities. How did you choose these conservation measures over others available?

Answer: : DoN focuses on increasing efficiency and reducing consumption by conducting water efficiency audits in compliance with the 2007 Energy Independence and Security Act. The audits result in project development and proposals that reduce consumption and increased efficiency. The list below includes samples of projects/conservation measures implemented:

- 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
- Building optimization and retro commissioning in NAS Kingsville
- Centralized irrigation at NAVSTA Pearl Harbor
- Reuse of Waste Water Treatment Plant effluent as golf course irrigation at Naval Air Station Jacksonville, Florida.
- Installation of automatic freeze protection valves at Naval Base Kitsap and Puget Sound Naval Shipyard.
- MCAS Miramar's Recycled Water Irrigation System was completed in 2011 making the Air Station one of the largest users of recycled water in the entire San Diego metropolitan area.
- MCAS Yuma contracted for eight xeriscaping projects which reduced water usage by 3,088,483 gallons per year.
- MCAS Beaufort wrapped of work on recent ESPC delivery order which included retrofitting faucets and showerheads in 99 buildings.

DoN chooses water conservation measures for implementation based on economic factors utilizing life cycle cost projections that produce a standardized method of scoring the cost-effectiveness of individual conservation measures.

CHARRTS No.: SEPW-01-006
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Inhofe
Witness: DAS(E) Hicks
Question: #6

Question: EPA and the White House have increasingly focused efforts on maintaining and treating stormwater on site. I know there are a number of both legislative and executive orders that your facilities must comply with in managing stormwater. Can you please describe some of the challenges associated with additional stormwater controls as well as some of the choices that your facilities face in complying with stormwater mandates?

Answer: DON is aware of the increased efforts of EPA and the White House regarding management and treatment of stormwater on site. DON proactively issued a Low Impact Development Policy (LID) in November 2007, which requires consideration and implementation of LID features on new construction and major renovation projects with the goal of no net increase in storm water volume, sediment, or nutrient loading. In addition, DON complies with the Energy Independence and Security Act (2007), Section 438 that places stormwater runoff requirements on federal development projects.

DON is committed to complying with stormwater controls and reducing stormwater pollution as part of its stewardship responsibilities, but faces multiple challenges. On heavily developed properties, past practices involved engineered conveyance systems to divert stormwater off site in compliance with the Clean Water Act. New stormwater management and control requirements necessitate a different, often difficult and expensive, approach of holding water on site for surface irrigation or subsurface infiltration or use within buildings, many of which were not previously designed or built for these purposes. Our facilities are also faced with increased costs associated with permit requirements to meet Total Maximum Daily Load reductions for Municipal Separate Stormwater Systems in critical watershed areas (i.e. Chesapeake Bay and San Diego Bay). Additionally, our facilities face technical and financial challenges with preserving and restoring pre-development site hydrology due to space constraints, utility conflicts, and engineering design issues. Lastly, National stormwater requirements have prompted many local authorities to assess significant stormwater "fees" to DON installations, for which we have not programmed and budgeted.

CHARRTS No.: SEPW-01-016
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Inhofe
Witness: DAS(E) Hicks
Question: #16

Question: The biofuel solicitation you put out last year resulted in only one eligible bid, which was in large part because the Navy has only certified one fuel. Given the extensive list of alternative renewable diesel fuels out there that meet or surpass ASTM specifications, how can the Navy say that there's only one source for its renewable diesel? The Air Force has done more work in this area by certifying Fischer-Tropsch fuels and testing other alternatives. Why haven't you leveraged the work the Air Force and private sector has done thus far? It appears you are narrowing your procurement aperture so only the fuels you want are eligible. This is an example of what I call bureaucratic earmarking. Technology neutrality, rather than picking winners and losers, is the surest way to bring in competition to lower the cost to taxpayers. Wouldn't your limited resources be better spent on certifying fuels rather than feedstock-specific procurement so you could have multiple technologies competing?

Answer: The Navy is not making the statement that there is only one renewable diesel fuel vendor that can meet ASTM specifications, or more important and relevant to Navy use, Military Specifications (MILSPEC). It is accurate to say that of the available renewable diesel and jet fuel vendors, the lowest cost, technically acceptable proposal was selected.

The Navy works closely with the Air Force on testing and certifying alternative fuel specifications. The Air Force first focused on Fischer Tropsch Synthetic Paraffinic Kerosene (FT-SPK), and the Navy focused on hydrotreated esters and fatty acids (HEFA). Air Force and Navy continue to share results from the individual efforts so that the Air Force can quickly certify HEFA and the Navy certify FT-SPK. It is inaccurate to state that the Navy, who must test and certify its unique jet fuel and marine diesel fuel, JP-5 and F-76, lags behind other agencies who use a single fuel (i.e. JP-8) or have themselves only certified a single specification. In addition to closely working with the Air Force, the Navy works closely with ASTM, CAAFI, and other civilian agencies involved in alternative fuels specification development, and will shortly be pursuing the test and certification of alcohol-to-jet (ATJ) fuels. Our efforts come from working in close concert with industry, not contrary to industry. We have met financiers, feedstock developers, fuel refining, blending and logistics companies to determine the best, most viable, most economical course of action to bring about our much-needed energy security and independence.

The Navy's limited resources could only be used for the FY12 RIMPAC effort on fuels for which the Navy can with certainty say would cause no harm to our ships and aircraft or the men and women that operate them. At the point in the testing program, the only fuel that could be used is HEFA, a fuel type made by multiple vendors. It is also crucial, for full certification and implementation of these fuels, to test them in operational environments such as the upcoming

RIMPAC 2012.

The Navy did not and will not pursue feedstock-specific procurement. Alternative fuels that the Navy can use can come from fats, oils, and greases derived from plants, algae, animal processing, or even waste products.

CHARRTS No.: SEPW-01-017
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E) Hicks
Question: #17

Question: Gasoline prices are nearing record high levels. A gallon of gasoline now costs twice what it cost in 2009. Has the Navy evaluated how much it would save annually if the Administration had a focused effort on driving down the price of gasoline through increased offshore and onshore energy production or other means?

Answer: While the rising price of gasoline is an important issue to the American consumer, the Navy in particular uses very little gasoline for its tactical vehicles and at its installations. Nearly all of the Navy's fuel comes in the form of jet fuel (JP-5 or JP-8) and marine diesel (F-76). Taking a completely Navy centric view, the price of gasoline has little to no affect on our fuel cost.

From a larger perspective, while Navy has not commissioned a study to analyze the effects of greater domestic oil production, the Congressional Budget Office released a May 2012 report titled *Energy Security in the United States*. One of the findings mentioned on page 5 of that report is included below:

“Policies that promoted greater production of oil in the United States would probably not protect U.S. consumers from sudden worldwide increases in oil prices stemming from supply disruptions elsewhere in the world, even if increased production lowered the world price of oil on an ongoing basis. In fact, such lower prices would encourage greater use of oil, thus making consumers more vulnerable to increases in oil prices. Even if the United States increased production and became a net exporter of oil, U.S. consumers would still be exposed to gasoline prices that rose and fell in response to disruptions around the world.”

The report also concludes on page 4 that any effect on the world price of oil through an increase in domestic production of oil “would probably be small. Many analysts (including the U.S. Energy Information Administration) expect that large oil-producing countries would reduce their actual or planned production of oil in the face of increased production of oil in the United States, thereby diminishing or eliminating the effect of such U.S. actions on the world price of oil.”

CHARTS No.: SEPW-01-018
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E) Hicks
Question: #18

Question: Has the Navy evaluated the impact of near-record low natural gas prices on its total energy expenditures? Will the natural gas boom in the United States help to reduce the Navy's energy costs?

Answer: The Navy currently has many installations with dual-fuel boilers that can take advantage of lower natural gas prices to help potentially lower the Navy's overall energy costs. The Navy will take advantage of these opportunities where available, but can only do so in limited fashion as our installation energy consumption represents only 25% of our total energy use. The bulk of the energy consumption occurs in our ships and aircraft, for which natural gas is an unsuitable fuel in recovered form.

CHARRTS No.: SEPW-01-019
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E) Hicks
Question: #19

Question: Lumber and wood products are a renewable natural resource that is produced domestically and supports jobs in Alabama and all over rural America. What steps has the Navy taken or recommendations that it has endorsed with respect to the use of wood and wood products in buildings and other purposes? Are you aware of any federal agency policies that discourage the use of any wood or wood products in construction or other projects?

Answer: The Department of Navy (DoN) is not aware of any federal agency policy that would discourage or otherwise restrict the use of wood or wood products. The Naval Facilities Engineering Command utilizes wood and wood products extensively as a construction material. Engineers evaluate the cost/benefit of wood (and other construction materials) based on various physical factors including strength, durability, loading, safety, maintenance, etc. during the material selection process. Because of the excellent cost/benefits of wood in construction, commercial grade lumber is used and will continue to be used in suitable applications and where cost effective.

CHARRTS No.: SEPW-01-020
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E) Hicks
Question: #20

Question: How much (in total dollars) has the Navy spent in fiscal years 2009 through 2012 on use of, research related to, deployment of, or other efforts related to solar, wind, and other renewable energy sources?

Answer: Below is a comprehensive listing of all of the Navy's renewable energy projects for 2009-2012.

Project Title	Installation	Fiscal Year Funded	Funding Type	Contract Costs \$(000)
Install Photovoltaic Systems	CBC Gulfport, MS	2009	ARRA O&M, N	\$13,252
Install Photovoltaic Systems	Hampton Roads, VA	2009	ARRA MILCON	\$23,306
Ground-source Heat Pump	JB Little Creek, VA	2009	ECIP	\$2,479
3,300 MBtu/Year Solar Thermal Pool Heating System	NAS Fallon, NV	2009	ECIP	\$371
Solar Heating for BUMED Swimming Pool, Bldg 928	NAS Jacksonville, FL	2009	UESC	\$1,079
Install Photovoltaic Systems	NAS Kingsville, TX	2009	ARRA O&M, N	\$19,993
GSHP - Bldgs. 1001 and 1044	NAS Kitsap, WA	2009	ECIP	\$4,165
20 kW PV Roof, BOQ 840	NAS Lemoore, CA	2009	Geothermal	\$720
"Oceana 2": Closed steam plant, ground source heat pump, solar domestic hot water, heat and water conservation measures	NAS Oceana, VA	2009	ESPC	\$44
Renewable Energy Systems Bldg 285 and Bldg 333	NAS Oceana, VA	2009	ECIP	\$1,518

Solar Ventilation Preheat	NAS Oceana, VA	2009	ARRA ECIP	\$731
Provide Facility Daylighting and Solar Walls in various hangars at Naval Air Station Whidbey	NAS Whidbey Island, WA	2009	ECIP	\$747
Install Photovoltaic Systems	NAS Whiting Field, FL	2009	ARRA O&M, N	\$33,322
155 kW AC Photovoltaic System	NAWS China Lake, CA	2009	ARRA ECIP	\$1,459
Heat Recovery System for Boilers, 90KW PV Solar Thermal and Domestic Hot Water	NAWS China Lake, CA	2009	ECIP	\$1,017
Repair Superior Valley Remote PV System	NAWS China Lake, CA	2009	Geothermal + NWCF	\$1,768
Photovoltaic System	NB Coronado, CA	2009	ARRA ECIP	\$1,900
FRC Daylighting 250 and 472	NB Coronado, CA	2009	ECIP	\$1,481
Energy Conservation Measures, Solar Photovoltaic Arrays (250KW)	NB Guam, Guam	2009	ESPC	\$14,400
50.5 kWAC PV Carport, Bldg PH1100	NB Ventura County, CA	2009	NWCF (eMMRP)	\$683
Install Photovoltaic Systems	NB Ventura County, CA	2009	ARRA O&M, N	\$30,371
Solar & Lighting	NS Norfolk, VA	2009	ARRA ECIP	\$906
Install 180 Ton Ground Source Heat Pump for Building Z-140	NS Norfolk, VA	2009	ECIP	\$1,283
Install Photovoltaic Systems	NSA Washington, DC	2009	ARRA O&M, N	\$2,510
Install Photovoltaic Systems	NSA Washington, DC	2009	ARRA O&M, N	\$6,129
Solar & Lighting	NSY Norfolk, VA	2009	ARRA ECIP	\$1,114
Photovoltaic System	NWS Seal Beach, CA	2009	ARRA ECIP	\$1,951
NEX Bldg 230 Partial PV	CFA Sasebo, Japan	2010	ECIP	\$705
Install BIPV on Bldg H20, Phase 1 and 2	COMFLEACT Yokosuka, Japan	2010	ECIP	\$3,495
Provide Various Solar Hot Water Heating System and PV at Various Locations, HI	JB Pearl Harbor, HI	2010	ECIP	\$2,415

Install Photovoltaic Systems	JB Pearl Harbor, HI	2010	ARRA O&M, N	\$21,926
6,650 MBtu/year Solar DHW Systems, BQs	NAS Fallon, NV	2010	ECIP	\$976
550KW Solar Photovoltaic Array	NAS Kingsville, TX	2010	MILCON	\$3,106
Pool 932 PV Shade Structures, CEP	NAS Lemoore, CA	2010	ECIP	\$854
Solar Thermal Heating System	NAS Lemoore, CA	2010	ECIP	\$2,783
Ground Source Heat Pump and well field installation at Bldg 464	NAS Oceana, VA	2010	ECIP	\$624
100KW PV Array	NAS Sigonella, Italy	2010	ECIP	\$1,005
Solar Daylighting	NB San Diego, CA	2010	ECIP	\$1,536
Phase I - 1 - 100 kW Wind Turbines, San Nicolas Island	NB Ventura County, CA	2010	ECIP	\$6,463
Phase II - Two 100 kW Wind Turbines Generators	NB Ventura County, CA	2010	ARRA ECIP	\$6,567
Ground Source Heat Pump, FEI	NBK Keyport, WA	2010	ESPC	\$1,281
175 EA Solar Perimeter Lights	NS GITMO, Cuba	2010	ECIP	\$981
300 KW PV	NSA Naples, Italy	2010	ECIP	\$2,615
200 KW Solar Carport	NSA Souda Bay, Greece	2010	ECIP	\$1,888
1 MW Wind Turbine	NSWC Andros Island	2010	ECIP	\$6,516
Solar Ventilation Pre-heat	NSY Portsmouth, NH	2010	ECIP	\$455
Ground Source Heat Pump, FEI	NUWC Keyport, WA	2010	ESPC	\$15,846
555 kW Photovoltaic System rooftop	SPAWAR San Diego, CA	2010	ARRA ECIP	\$3,742
Photovoltaic System	SPAWAR San Diego, CA	2010	ARRA ECIP	\$3,774
Install 350 kW Solar PV & GHSP Bldgs 1292,3858, 3859	COMFLEACT Yokosuka, Japan	2011	ECIP	\$1,456
Solar Hot Water	JB Pearl Harbor, HI	2011	ECIP	\$2,250
Solar Ventilation Preheat	NAB Little Creek	2011	ECIP	\$744
Solar Heating - Pool	NAF Atsugi, Japan	2011	ECIP	\$1,409
Daylighting and Solar PV System	NAS Lemoore, CA	2011	ECIP	\$821
Solar Hot Water	NAS Sigonella, Italy	2011	ECIP	\$1,009
Solar Pool Heating (NAS 1)	NAS Sigonella, Italy	2011	ECIP	\$568
Solar Pool Heating (NAS 2)	NAS Sigonella, Italy	2011	ECIP	\$470
GSHP - Bldgs 973 and	NAS Whidbey	2011	ECIP	\$2,215

2527	Island, WA			
Photovoltaic System	NAWS China Lake, CA	2011	ARRA ECIP	\$2,164
Photovoltaic System	NAWS China Lake, CA	2011	ARRA ECIP	\$2,273
25 ton heat pump in Building 833	NB Kitsap, WA	2011	UESC	\$469
Photovoltaic System	NB San Diego, CA	2011	ARRA ECIP	\$1,595
100 KW Wind Turbine	NB Ventura County	2011	ECIP	\$1,900
100 KW Wind Turbine	NB Ventura County	2011	ECIP	\$2,250
200 KW Wind Turbine	NB Ventura County, CA	2011	ECIP	\$5,460
Solar Domestic Hot Water Systems	NS Rhode Island, RI	2011	ARRA ECIP	\$1,330
GSHP and Solar Wall	NSA Norfolk, VA	2011	ECIP	\$1,080
Solar Water Heating	NSA Souda Bay, Greece	2011	ECIP	\$595
Solar Water Heating - Bldg 2 and 66	NSA Souda Bay, Greece	2011	ECIP	\$346
Solar Thermal & Instantaneous DHW 500 Series Bldgs	NAF El Centro, CA	2012	OM&N (RM)	\$99
Solar Thermal Heating at Small Pool (B. 239)	NAF El Centro, CA	2012	OM&N (RM)	\$134
Solar Heating Aerators	NAS Kings Bay, GA	2012	ECIP	\$666
Hangar 4 Daylighting and PV System	NAS Lemoore, CA	2012	ECIP	\$910
B218 Solar Water Heating for Laundry	NAS Meridian, FL	2012	OM&N (RM)	\$31
Install Solar Water Heaters and Low Flow fixtures	NB Guam, Guam	2012	OM&N (RM)	\$1,116
54.0 KW Photovoltaic and Lighting Upgrades	NB San Diego, CA	2012	ECIP	\$1,010
SCI REWS PV System- Connect to Grid	NBC-SCI	2012	NWCF (eMMRP)	\$325
LED Solar Lighting	NS GITMO, Cuba	2012	ECIP	\$1,901
Solar LED Exterior Lights	NS GITMO, Cuba	2012	ECIP	\$12,490

INSTALL SOLAR HOT WATER AT BEQS 567, 568, 569, 570	NS Rota, Spain	2012	OM&N (RM)	\$708
REPLACE SOLAR PANELS AT ADM. PROUT POOL	NS San Diego, CA	2012	OM&N (RM)	\$169
ECIP P837 Solar Thermal Water at NSA Monterey	NSA Monterey, CA	2012	ECIP	\$1,940
Reliable Renewable energy for NH 76	NSA Norfolk, VA	2012	OM&N (RM)	\$24
Energy - Install Solar Hot Water System, Diego Garcia	NSF Diego Garcia	2012	OM&N (RM)	\$342
Energy Install Solar Pool Heater NMAWC Pool	SUBASE Point Loma, CA	2012	OM&N (RM)	\$84
Energy - Install solar film on windows, var. bldgs, Okinawa	CFA Okinawa, Japan	2013	OM&N (RM)	\$626
Energy - Solar Water Heating B151 & B1604	CFA Sasebo, Japan	2013	OM&N (RM)	\$643
Install PV and Cool Roof at B-284 Fire Station JBPHH	JB Pearl Harbor, HI	2013	ECIP	\$790
Install Solar Hot Water for Digesters	JB Pearl Harbor, HI	2013	NWCF (eMMRP)	\$280
Energy - Solar Thermal DHW 4016 Barracks	NAF El Centro, CA	2013	OM&N (RM)	\$229
Energy- Solar Parking and Street Light LED Retrofit	NAS Key West, FL	2013	OM&N (RM)	\$503
RM10-9114 NAS Oceana Install Transpired Solar Wall B301	NAS Oceana, VA	2013	OM&N (RM)	\$506
Large Scale Photovoltaic (PV) Plant - Weapons Area	NAS Sigonella, Italy	2013	ECIP	\$6,121
Solar Thermal for Domestic Hot Water (DHW) in 13 barracks	NAVSTA Rota, Spain	2013	ECIP	\$2,671
Renewable upgrades C60 & C62	NAVWPNSTA Earle, NJ	2013	OM&N (RM)	\$690

Ground Mounted Photovoltaic (GMPV) at Junction Ranch	NAWS China Lake, CA	2013	NWCF (eMMRP)	\$2,696
ESPC - Net Zero Naval Base Coronado	NB Coronado, CA	2013	ESPC	\$32,400
Energy - Transpired Solar Collector	NB Kitsap, WA	2013	ECIP	\$770
ENERGY - TRANSPIRED SOLAR COLLECTOR ENERGY PROJECT	NB Kitsap, WA	2013	OM&N (RM)	\$573
Energy - Geothermal System	NSA Annapolis, MD	2013	OM&N (RM)	\$650
ENERGY-SOLAR WALL	NSA Naples, Italy	2013	OM&N (RM)	\$144
110 kW PV System Capodichino	NSA Naples, Italy	2013	OM&N (RM)	\$657
DDC Energy Conservation & Control and Solar Water Heating	NSA Panama City, FL	2013	OM&N (RM)	\$1,760
Geothermal Heat Pumps	NSA Panama City, FL	2013	OM&N (RM)	\$411
Renewable Energy ECM 3.1. SOLAR THERMAL HOT WATER	NSA South Potomac, VA	2013	OM&N (RM)	\$174
ECP Solar Heating for Swimming Pool and Gym	NSB Kings Bay, GA	2013	OM&N (RM)	\$737

Below is a summary of the Research Development Test & Evaluation (RDT&E) funds Navy has invested in renewable energy technologies, primarily to develop Ocean Energy technologies (Ocean Thermal Energy Conversion and Wave Energy).

- FY09: \$10.5
- FY10: \$9M
- FY11: \$6M
- FY12: \$8M

Senator SANDERS. Mr. Hicks, thank you very much.
Our next panelist is Dr. Kevin T. Geiss, Deputy Assistant Secretary for Energy, U.S. Air Force.
Dr. Geiss, thanks for being here.

**STATEMENT OF KEVIN T. GEISS, PH.D., DEPUTY ASSISTANT
SECRETARY FOR ENERGY, U.S. AIR FORCE**

Mr. GEISS. Chairman Sanders, Chairman Whitehouse, Ranking Member Boozman, Senator Carper, distinguished members of the Committee, thank you for inviting me to testify and provide an overview of how the United States Air Force is working to improve its energy security through conservation in pursuit of clean energy sources.

From aviation operations to installation infrastructure within the homeland and abroad, energy enables the dynamic and unique defense capabilities of global vigilance, global reach, and global power that our Air Force needs to fly, fight, and win in air, space, and cyberspace. Our focus will continue to be on improving our energy security to ensure we have the energy when and where we need it to conduct our national security missions.

As the largest single consumer of energy in the Federal Government, the Air Force spent \$9.7 billion on fuel and electricity last year. That is \$1.5 billion more than we spent in 2010. This increase occurred even as we decreased our overall consumption 17 percent since 2003. With the price of energy increasing and our budget decreasing, energy is becoming a larger share of the Air Force budget, going from 3 percent in 2003 to over 8 percent for fiscal year 2011. Reducing our energy footprint is one way we can avoid these increases.

There is more to energy than saving money. There are global security risks from depending solely upon traditional energy supplies as access and costs are impacted by natural disasters, terrorism, and political or economic instability. We are taking steps to assure our energy supplies and to improve our resiliency while reducing energy demand while expanding the use of clean energy sources.

From the standpoint of reducing demand, we first look to our biggest fuel user, aircraft. Our goal is to reduce to consumption of aviation fuel 10 percent by 2015 as compared to 2006. To date, consumption is down 4 percent by optimizing aviation operation through policy and investment, developing partnerships with the commercial transportation industry, and working with the Department of Defense and our sister Services.

Eighty-four percent of our energy costs come from aviation, and one of the biggest consumers is the Air Mobility Command. AMC provides airlift, aerial refueling, disaster response, and aero medical evacuation. They fly some of our largest aircraft and send over 900 flights a day all around the world.

By streamlining operations and promoting operational efficiencies, AMC's cost to move 1 ton of cargo 1 mile is down 21 percent since 2006. While the Mobility Air Force's fuel consumption increased 3 percent from 2006, they are hauling 27 percent more cargo.

While we work hard to reduce demand, we are also focused on diversifying our energy supplies. We set an ambitious goal to be

prepared by 2016 to meet half of our domestic jet fuel needs through alternative blends. These blends must be replacements that are cost competitive with traditional petroleum fuels and meet our environmental and technical specifications.

To get there, we are certifying our aircraft to fly on three different alternative fuel blends that are half petroleum JP-8 and half alternative fuel. To date, the Air Force has certified our entire fleet on synthetic fuel and expects to have full fleet certification on biofuel by the end of this year. We have sent a strong message to industry that we are ready when they are ready.

The Air Force and EPA have worked closely over the past few years as part of interagency working groups looking at the environmental aspects of those fuels including calculating greenhouse gas footprints. From a facilities perspective, Air Force has a goal to develop significant amounts of on-base clean energy sources. We have been a green power partner with the EPA since 2003, and we are currently the second largest user of such power in the Federal Government. That accounts for only 6 percent of our total facility energy usage.

During our partnership, we have received multiple awards for leadership in clean energy. While those accolades are appreciated, they are not what drives us. We are developing these projects for the same reason we take on all of our energy initiatives: to improve energy security. Ultimately, a more robust, resilient, and ready energy security posture enables our war fighters, expands operational effectiveness, and enhances overall national security.

This concludes my opening remarks. Thank you again for providing this opportunity, and I appreciate your support of our airmen, their families, and I look forward to your questions.

[The prepared statement of Mr. Geiss follows:]

**Statement of Dr. Kevin Geiss,
Deputy Assistant Secretary of the Air Force for Energy
for a Hearing before the
Senate Environment and Public Works Committee
Subcommittee on Green Jobs and the New Economy and the Subcommittee on Oversight
March 27, 2012**

Energy is a common thread that runs through every mission in the Department of Defense and each of us brings different capabilities to this challenge, but our overarching mission is the same: protect the security of our nation. Each day, the Air Force flies to points around the globe, including over 900 mobility missions a day to provide the Nation with *Global Vigilance*, *Global Reach*, and *Global Power*, missions that require significant amounts of energy. To meet our energy needs, the Air Force is leveraging sound business practices and making prudent investments in energy conservation and alternative sources of energy to enable our warfighters and improve our energy security. These investments are crucial to ensure we have the energy where and when we need it to conduct the military missions that protect our core national interests.

Energy Strategy

Energy is the corner stone of the Air Force's ability to maintain global vigilance, reach, and power at home and abroad. Energy security is having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs. To enhance its energy security, we have developed a three-part strategy to:

- 1) Reduce energy demand through conservation and efficiency,
- 2) Assure and expand supply through alternative and resilient energy sources, and
- 3) Foster an Air Force culture to recognize the necessity and criticality of energy.

These three goals are aimed towards making energy a consideration in all we do. To support these goals, we have set a number of aggressive targets across our entire portfolio—targets that, if met, will help us avoid over \$1 billion a year (based on today's energy prices) and improve energy security for our critical assets.

Energy Consumption and Expenditures

The Air Force is the largest single consumer of energy in the federal government, spending more than \$9.7 billion on fuel and electricity for approximately 2.5 billion gallons of aviation fuel and more than 64 trillion British Thermal Units (BTUs) of installation energy in Fiscal Year 2011 (FY11). That energy bill equates to over 8% of the entire Air Force budget. Expenditures for aviation fuel drive our energy costs—in FY11, we spent \$8.3 billion for aviation fuel, compared to \$1.1 billion for facility energy and \$323 million for ground vehicle fuels.

Despite our reduction in consumption, fuel costs have increased 225% over the past decade and we are expecting them to continue to rise in the future. Between FY10 and FY11, our energy costs increased by \$1.5 billion, an increase that occurred even as fuel use went down by more than 50 million gallons and facility energy consumption was reduced by 2 trillion BTUs. Moreover, as energy costs increase and take up more and more of our budget, it is essential that we continue to reduce the amount we consume. Every dollar we don't spend on fuel frees up funds for reinvestment into capabilities for the warfighter.

ENERGY SECURITY

There are risks from depending solely upon traditional energy supplies, as access and costs are impacted by natural disasters, accidents, terrorism, and political instability. In addition to petroleum fuels, our installations are heavily dependant on the commercial grid. These

dependencies add risk to our core mission support functions and can jeopardize effectiveness. To address these, we are mitigating risks by identifying alternate sources of energy, building in redundancies, and identifying where and for how long we need to ensure we have the ability to operate. These challenges require an energy security posture that is *robust, resilient, and ready*.

- A Robust posture means that the Air Force has sufficient supply when and where we need it, regardless of external challenges.
- A Resilient posture means we have options – whether in terms of location or the types of fuel or electricity.
- A Ready posture means we are prepared to respond at a moment's notice if energy supplies are compromised or our mission requires large amounts of additional fuel or electricity.

In short, energy security enables our warfighters, expands operational effectiveness, and enhances national security.

BUSINESS RULES

Our first priority is doing what is right to make sure we can achieve our mission. To achieve that, we are implementing no- or low-cost initiatives, such as policy changes, wherever possible, partnering with other federal agencies and private industry to share best practices, and investing in those material solutions that provide the best returns from both financial and energy security perspectives.

The Air Force recognizes the value of the limited financial resources available for investments. To ensure we are making the best use of taxpayer dollars, our corporate structure requires strong evaluations based on sound business case analyses, with a particular focus on return on investment and payback period. Every action taken by the Air Force to improve its

energy security and efficiency is well researched and executed to provide the greatest impact in support of the Air Force mission.

The Air Force is also looking at private investment wherever possible, particularly with regards to developing renewable energy sources and reducing our facility consumption. By utilizing this approach, we can improve our energy security and take advantage of underutilized land with little or no additional costs to the taxpayer. Beyond our installations, we are looking to expand the concept of third party investment into other areas of our operations.

INSTALLATIONS

The Air Force's infrastructure portfolio is immense—we serve as the taxpayers' stewards for an amount of land twice the acreage of New Jersey, almost 90 times more facility square footage than the Microsoft Corporation, and enough airfield runways that would be equal to the length of a highway from Philadelphia to Boston. And each of those items requires electricity, heating and cooling, or water to fulfill their mission requirements. At our installations, the Air Force spent more than \$1 billion for facility energy in both FY10 and FY11. To improve our energy security and reduce our costs, we are actively pursuing on-base renewable energy projects and identifying ways to conserve energy.

Renewable Energy

The Air Force is looking to improve its energy security and diversify its energy supply through increased use of renewable energy. In FY11, more than 6% of the electrical energy used by the Air Force was produced from renewable sources. By making the most of private sector knowledge, technology, and financing, we plan to improve our energy security by capitalizing on

underutilized land on our installations to develop those projects. Currently, the Air Force has 131 operational renewable energy projects and another 50 under construction across a wide variety of renewable energy sources, including 8.7MW from wind energy, 26.2 MW from solar, and 2.4MW from waste-to-energy projects.

The Air Force has been a green power partner with EPA since 2003, and we are currently the second largest user of green power in the federal government, behind only the Department of Energy. During our partnership, we have received multiple awards for our leadership in renewable energy. While the accolades are appreciated, they are not the reason the Air Force is pursuing on-base development of renewable energy sources. We develop renewable projects to diversify our energy portfolio and reduce stress on the commercial grid.

For example, the Air Force recently installed a 1.45MW solar project at Burlington Air National Guard Base, Vermont, including a roof-mounted array on the fire station, which serves not only the base, but also the Burlington International Airport and the local surrounding community. Combined, these projects produce 40% of the installation's needs, and are expected to save the Air National Guard \$246,000 in electric costs a year. More importantly, the base will be helping reduce the stress on the commercial grid and increasing its energy resiliency.

The Air Force is pursuing renewable energy on a cost effective basis through a three-tier priority order. The first priority is to develop renewable energy generation either on Air Force property or on adjacent federal property. There are three avenues to accomplish this. First, a renewable energy Power Purchase Agreement (PPA) may be developed with third parties under a utility purchase contract. This allows third party developers to obtain financing and build renewable generation with cost recovery through a long-term utility purchase agreement. Second, the Air Force can sign an agreement with a utility or other third party to provide

renewable energy at a pre-negotiated rate. Third, a direct Air Force investment could be made to construct the renewable power generator.

Direct Air Force funding of renewable projects is very rarely cost-effective when compared to commercial utility rates, due to the inability of federal agencies, including the Air Force, to gain the benefit of renewable energy certificate (REC) sale value, tax rebates, and state or federal incentives. If the Air Force attempted to meet the renewable energy goal through direct investment, the cost would be over \$7 billion, based on our history with recent renewable energy projects and the current cost of power.

To address this, the Air Force is using existing authorities, such as Enhanced Use Leases (EUL) and PPA, to attract private industry to develop renewable energy projects on underutilized land on Air Force installations. The Air Force is anticipating third-party investments could reach more than \$1 billion over the next 5 years to construct on-base renewable projects, while we plan to invest only \$5 to \$8 million a year for renewable projects over the same period. The Air Force has set a goal to identify \$5 billion worth of EULs and over half will be energy EULs.

The second priority is to purchase renewable energy from a distant producer and have it delivered to us via the normal power grid. The third priority is to purchase RECs along with the renewable power from an off-base generator.

Energy Conservation

Overall, our focus is to reduce our energy footprint across all operations and we have made significant progress. We have reduced our overall facility energy consumption by nearly 20% and reduced energy intensity by more than 16% since FY03. However, installation energy

expenditures have increased by 32% over that same period due to increase prices for electricity. Looking long term, the Air Force is on track to meet its installation energy goals by reducing its energy intensity by 37.5% by 2020 and increasing its renewable energy use to 25% by 2025.

Included in our FY13 budget request is \$215 million for energy conservation projects on our installations, a continuation of the nearly \$800 million we have invested in such projects over the last four years. As a result of the initiatives put in place over the last eight years, we have cumulatively avoided \$1.1 billion in facility energy costs since FY03, including over \$250 million in additional facility energy costs in FY11 alone, which is money that could be redirected to better support our warfighters. Investments we are making in FY12 to improve our facility energy efficiency and reduce our energy requirement are expected to start generating savings in FY14, and the majority are expected to payback before or just shortly after the FY13-17 Future Years Defense Plan (FYDP) period.

For example, at Dover Air Force Base, Delaware, the Air Force recently began a heat plant decentralization project. This project, which replaces a 1950's era system, is estimated to save about \$2 million a year by reducing energy use by more than 15% per year. All new building projects on base are also having new boilers installed, so no new specialized training will be required. The project is scheduled to be completed in December 2012, and we anticipate recovering our funding costs in 12 years.

The Energy Conservation Investment Program (ECIP) is a critical element of the Air Force's strategy to improve the energy performance of its permanent installations. In FY11, we completed 17 ECIP projects at a cost of under \$30 million. The Air Force estimates these projects will save more than 253 billion BTUs annually and nearly \$54 million over the life of the projects. For FY12, we have submitted an additional six projects to save 213 billion BTUs to the Office of the Secretary of Defense (OSD), which manages ECIP.

The Air Force is looking to reduce demand by building in smarter ways that maximize energy efficiency and use environmentally-friendly materials. We are also identifying and demolishing 20% of our old, unnecessary, and high-energy use facilities by 2020.

Greenhouse Gases

The Air Force has a robust Strategic Sustainability Implementation Plan that supports DoD's Strategic Sustainability Performance Plan, which provides a coherent approach both for complying with multiple federal requirements for sustainability, including the reduction of greenhouse gas emissions, and for ensuring the mission. While the Air Force does generate greenhouse gases from some process activities, such as wastewater treatment plants, the vast majority of our greenhouse gas emissions, which contribute to climate change, are attributable to our use of energy in the form of electricity and fuels to power, heat, and cool our weapons systems, vehicle fleets, and facilities. By reducing our energy consumption and increasing our use of renewable energy, we improve our energy security, as well as reduce greenhouse gas emissions in support of U.S. climate change initiatives. As our energy use has declined, so have our greenhouse gas emissions; specifically, Air Force greenhouse gas emissions resulting from the direct and indirect use of energy are down over 17% against a 2008 baseline. Climate change has the potential to significantly impact future Air Force actions—from the environments where we operate to the missions we undertake and where our facilities can be located. It is essential we consider the impacts to our capabilities and our energy security in future planning efforts.

AVIATION

The Air Force's aviation fleet is composed of more than 4,600 aircraft that consume nearly 2.5 billion gallons of jet fuel every year. Our fleet represents the largest category of energy consumption in the military, accounting for approximately 59% of the total DoD aviation fuel

consumption. Aviation fuel costs represent a significant financial requirement for the Air Force. To help mitigate the impact of those costs, we have set a target to reduce aviation fuel consumption 10% by 2015 based on our 2006 consumption. While this 10% reduction target—which equates to 254 million gallons—is aggressive, if we can achieve it, there will be a big impact. Since 2006, the Air Force has reduced its aviation fuel consumption by 4%, which translated into a cost avoidance of \$165 million in 2011. In 2015, if the price of fuel were at \$4, the Air Force would avoid more than a billion dollars of energy costs.

Efficiencies

Efficiency is not just about aircraft improvements, but also changing how we fly. To address this, the Air Force is looking at policy changes across our mobility, combat, and training aircraft, in addition to investments in equipment. The Mobility Air Forces account for 64% of aviation fuel consumption within the Air Force, and as their mission lends itself to capturing lessons from industry, these aircraft have been our primary focus for energy savings.

For example, Air Mobility Command (AMC) updated their policies to eliminate any extra fuel carried, while still maintaining safety standards. Category 1 fuel requirements existed for decades as an added amount of reserve fuel equal to 10% of the time over water (outside of ground-based navigation systems) to account for inaccurate navigation systems. With technological advances and current on-board navigation systems requirements, this additional fuel is unnecessary, and by eliminating the requirement (and associated excess weight) we estimate an annual savings of 5 million gallons in fuel, or more than \$19 million a year based on today's fuel prices. While each one of these policy changes is small, together they add up to 19.5 million gallons of fuel, or \$75 million, in FY11, with an expected savings of \$325 million

over the Future Years Defense Program (FYDP). With these efficiencies put into practice, the cost for AMC to move 1 ton of cargo 1 mile by air is down by 21% and the Air Force was able to move 27% more cargo on just 3% more fuel last year.

Alternative Aviation Fuels

While we endeavor to reduce demand in our aviation fleet, we are also focused on increasing and diversifying the supply side of the equation to improve energy security. The Air Force views energy security as a strategic imperative and alternative fuels are key to addressing that imperative. To demonstrate our commitment to this effort, we set a very ambitious target to be prepared by 2016 to meet half of our domestic jet fuel needs via an alternative fuel blend by ensuring our aircraft can fly on commercially available fuels. These blends must be drop-in fuels that are cost competitive with traditional petroleum-based jet fuels and meet our environmental and technical specifications.

To get there, we are certifying our aircraft to fly on three different alternative fuel blends, all of which are half-traditional petroleum-based JP-8 fuel and half-alternative fuel. The first blend the Air Force tested was synthetic fuel developed using the Fischer – Tropsch process. The Air Force has completed the testing and certification process for 100% of its fleet on a 50/50 blend of Fisher-Tropsch and JP-8. By applying lessons learned and experience from the extensive Fisher-Tropsch certification program, the Air Force conducted certification of the second alternative fuel effort, hydro-treated renewable jet (HRJ) fuel, using a “pathfinder” approach. Only the most challenging systems, such as the C-17 and F-15, were tested and the rest of the fleet will be “certified by similarity.” The Air Force expects to complete certification of the entire fleet by the end of 2012. The Air Force is beginning to evaluate a third alternative

fuel process called alcohol-to-jet (ATJ), which is produced using cellulosic materials. Depending on funding availability, the Air Force anticipates completing certification efforts by 2014 using the “certification by similarity” approach used for HRJ.

By preparing for a variety of alternatives, we are ensuring we will be ready for whatever private industry is able to bring to market, as well as having the flexibility to use those fuels in different areas of the world, depending on the availability of fuel stocks and refining capability. Since we started our certification initiative in 2006, we have purchased 1.1 million gallons of alternative fuels. Through our certification process, we are ensuring we will be ready to purchase a variety of different fuels by 2016 but we are just a purchaser, not a producer, of alternative aviation fuels. The Air Force’s core competency is understanding the fuel/engine interface, not producing fuel. We will need industry to produce those fuels in a manner that meets our criteria.

Promising market opportunities and testing of these fuels in the field are positive steps; however, we recognize that to achieve our ambitious goal, we need to be involved directly with the private sector to share lessons learned, establish standards, and support the development of these fuels as a consumer. While the Air Force consumes a large amount of fuel, we are relatively small compared to the commercial sector. Overall, the Air Force makes up just 11% of the aviation fuel market in the United States, about the same as American Airlines. This means that while we do have some market power, we are not large enough to drive the market.

To help move the market and provide the ability to exchange data and best practices, we are partnering with commercial industry through the Commercial Aviation Alternative Fuels Initiative (CAAFI). CAAFI includes other government entities like the Federal Aviation

Administration, along with airlines, airports, aircraft and engine manufacturers, energy producers, researchers, and international participants. Together, we developed a repeatable process to certify fuels in a way that helps both commercial aviation and the military. Through CAAFI's efforts, ASTM International, which develops industry technical standards, approved the 50% HRJ blend for use in commercial aircraft in July 2011. As several of our aircraft are commercial derivatives, we can apply the aircraft certifications directly to our fleet.

Role of RDT&E

Innovation is part of our DNA and the Air Force is on the lookout for ways to improve warfighter effectiveness. Led by Dr. Maybury, the Air Force Chief Scientist, a team from across the Air Force collaborated with other Services and federal agencies to identify a framework for thinking about new energy technologies that are being developing in the near, mid, and long terms. The report looks at all aspects of the Air Force mission—air, space and cyberspace—and evaluates many technologies, including aircraft engines, airframe design, energy storage, and best practices in planning and logistics. Energy Horizons identifies three priority categories for technology:

- **Technology Leader** – The Air Force is inventing novel technologies that are at the core of our mission. Aircraft engines and airframes fall into this category.
- **Fast Follower** – The Air Force is not at the forefront of research but looks to rapidly adopt, adapt, or accelerate technologies originating from external leading organizations.
- **Technology Watcher** – The Air Force stays aware of developments and is ready to adopt technology as it matures.

While some are unique, many of the challenges we face are similar to those of the Army and Navy, federal agencies, and private industry and we are actively partnering with them to leverage each entities unique expertise, resources, and experience. For the Air Force, we are

focusing our RDT&E efforts primarily to meet our aviation, space, and cyberspace missions, as opposed to areas where there is significant overlap with our Sister Services or private industry. For example, in FY13 we are investing more than \$300 million in energy RDT&E, which includes \$214 million for the Adaptive Engine Technology Development (AETD) initiative. This initiative will build upon the Adaptive Versatile Engine Technology (ADVENT) effort to reduce energy consumption and improve efficiency and reliability of future and legacy aircraft, and estimates are that it will be as much as 25% more fuel efficient than current technology.

GROUND VEHICLES

In FY11, the Air Force spent \$323 million on fuel for ground vehicles and equipment, or 96 million gallons, which equates to approximately 3% of the overall Air Force energy costs. This is an increase of \$13 million from FY10, even though consumption declined by 20 million gallons. The Air Force is committed to reducing the amount of petroleum products it utilizes for its ground vehicle fleet, and has targets to reduce fossil fuel consumption 2% annually through 2020 while increasing alternative fuel usage 10% compounded annually by 2015. The Air Force has made significant progress towards both targets seeing a reduction in vehicle petroleum consumption by 8% and an increase in alternative fuel use by 70% since 2005 (in its CONUS based vehicle fleet applicable to executive orders and federal mandates). The Air Force's plan to meet its targets include: implementing an acquisition strategy to procure the right-sized, least cost vehicle option; maximizing the use of alternative fuels; and increasing the use of hybrid electric vehicles and explore the use of plug-in electric vehicles.

Right sizing

One effort that the Air Force is undertaking right now is right-sizing our motor vehicle fleet, which entails eliminating unfilled and underutilized vehicle authorizations to get to true mission needs, and using more fuel-efficient vehicles. To date, the Air Force has identified over 5,000 vacant or underutilized vehicle authorizations. The Air Force has also been working on a midsize and large vehicle burn down plan to reduce the number of high gas-consuming vehicles. Over 2,250 vehicles have been identified for down-sizing to smaller, more fuel efficient vehicles, and over 725 of those have already been down-sized.

Alternative Fueled Vehicles

In FY11, the Air Force consumed 1.7 million gallons of alternative fuel (E85 ethanol and biodiesel) and has 28 E85 stations and 63 B20 stations on Air Force installations. We now have over 10,000 E85 capable vehicles in the light duty fleet, compared to only 9,000 in FY10. The Air Force has also incorporated nearly 1,000 hybrid electric vehicles into its vehicle fleet.

The Air Force is not just limiting its efforts to incorporating alternative fueled ground vehicles into our fleet through acquisition, but is also working to ensure such vehicles as compatible with its mission. With the support of other private and public stakeholders, the Air Force is currently working to develop an all plug-in electric vehicle fleet at Los Angeles Air Force Base (AFB) in California. When the initiative is completed later this year, Los Angeles AFB will be the first federal facility to replace 100% of its general-purpose vehicle fleet with plug-in electric vehicles. By working with OSD and our Sister Services, we have identified 15 other potential locations where such vehicles will support the mission and improve our energy security. We will use the lessons learned at Los Angeles AFB to continue to refine the business case and operational analyses to determine where best to employ electric vehicles.

CONCLUSION

From aviation operations to installation infrastructure within the homeland and abroad, energy enables the dynamic and unique defense capabilities the Air Force requires to fly, fight and win...in air, space and cyberspace. Effective and efficient energy management is not only necessary, it is critical to assuring energy availability today and energy sustainability into the future to ensure the Air Force can execute these missions. We are making business-driven investments to reduce our energy demand and assure our supply to meet our mission needs. The Air Force is taking a coordinated, progressive, and comprehensive stance towards energy management through the integration of its three-part energy strategy to reduce demand, assure supply, and foster an energy aware culture. This approach will lead to enhanced energy security and reduced energy costs, and enables our warfighters, expands operational effectiveness, and enhances national security.

CHARRTS No.: SEPW-01-021
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Boxer
Witness: DAS(E) Geiss, Dr.
Question: #21

Question: Your testimony highlighted the financial impacts of volatile energy markets and how alternative sources of energy can help the Air Force to mitigate risk. Can you please describe the risks of being too reliant on conventional energy sources? How can expanding beyond conventional energy sources improve the Air Force's ability to reduce risk and improve operational effectiveness?

Answer: The Air Force has a strategic rationale and operational imperative for improving its resiliency to internal and external energy disruptions, decreasing energy demand, and assuring energy supplies through alternative and renewable sources as a means to enhance energy security. Air Force operations are heavily dependent upon petroleum and petroleum-derived fuels, and this dependency poses significant strategic and security vulnerabilities where long-term disruptions would put pressure on energy supplies for the U.S. and our allies. The ability of the Air Force to ensure continuity of operations is dependent upon not only the delivery of reliable and uninterrupted energy supplies in the necessary quantities, but also on the adaptability of mission platforms to operate on diversified energy sources, such as biofuels or synthetic fuels.

From an operational perspective, the Air Force is diversifying the types and sources of energy compatible with existing and future platforms to improve its energy posture and assure supply. Any alternative sources of energy must be economically feasible, compatible with existing platforms, and able to support the deployed force. Diversification helps ensure the Air Force has the required energy to support its missions. By increasing its use of alternative and renewable energy sources, the Air Force will be less reliant on a single, finite resource that is subject to price fluctuations, geopolitical volatility, and delivery disruptions.

CHARRTS No.: SEPW-01-004
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Carper
Witness: DAS(E) Geiss, Dr.
Question: #4

Question: I applaud the military's advancement of environmentally beneficial sources of clean energy generation on its bases, but I'd like to ask you specifically whether you have explored less traditional, more advanced forms of clean energy generation beyond the legacy renewables. For example, fuel cell technology for stationary generation, such as those being built by American companies like Bloom Energy in my state of Delaware, can be more flexible and reliable than intermittent renewable technologies, and can require a fraction of the footprint. Fuel cells are commercial-off the-shelf technology and do not require lengthy environmental clearances so often required by large-scale wind and solar projects. Currently, fuel cells can be installed and operational faster than wind and solar facilities and do not require additional transmission capability to move electricity to the end user. Most importantly, the newest fuel cell technologies can provide clean, reliable electricity even when the electric grid goes down. Fuel cell technology is not just in the research and development phase, the technology is real, proven, and being deployed by some of our country's leading companies. For example, some of the leading Fortune 500 companies, as well as leading educational institutions, are already deploying Bloom Energy's fuel cells to provide cleaner, more reliable, on-site electricity to power their office buildings, campuses, or data centers. While the Department of Defense has invested significant time and resources into developing biofuels and traditional renewables, the additional energy reliability and security benefits offered by fuel cells, in addition to their environmental benefits, should not be overlooked as another tool for the federal government to simultaneously meet its energy and environmental goals. Can you please let me know what steps you are taking to incorporate US-manufactured stationary fuel cells into your clean energy plans? I have been told that some Department of Defense installations want the benefits of this technology because of its energy security benefits, but policy guidance requiring "renewable" rather than "clean" and "secure" has limited their ability to move forward. Is this true?

Answer: The pursuit of renewable energy does not have an adverse impact on the exploration for secure energy solutions. Energy solutions are significantly impacted by the local energy markets regardless of the type of technology. The Air Force is amenable to cost competitive, reliable sources of energy. In fact, the Air Force has explored fuel cells such as the Bloom Energy technology. In 2011, the Air Force conducted a fuel cell demonstration at Barksdale AFB. Although the technology performed well, the equipment was taken off line due to the relatively high cost of natural gas required when compared to the local rate of \$0.05 per kilowatt.

CHARRTS No.: SEPW-01-005
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Inhofe
Witness: DAS(E) Geiss, Dr.
Question: #5

Question: Describe for the committee some of the water conservation measures you have begun implementing in your/DOD facilities. How did you choose these conservation measures over others available?

Answer: In compliance with the Executive Order 13514—*Federal Leadership in Environmental, Energy, and Economic Performance* (EO 13514), the Air Force established a goal to reduce water use by 26% by 2020 based on a 2007 baseline usage. To accomplish this goal, the AF is utilizing water saving fixtures, water distribution leak detection, xeriscaping and water recycling or water reuse where allowed by law. Each water saving initiative is evaluated using a cost/benefit analysis to determine if the initiative should be pursued at a specific location.

CHARRTS No.: SEPW-01-006
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Inhofe
Witness: DAS(E) Geiss, Dr.
Question: #6

Question: EPA and the White House have increasingly focused efforts on maintaining and treating stormwater on site. I know there are a number of both legislative and executive orders that your facilities must comply with in managing stormwater. Can you please describe some of the challenges associated with additional stormwater controls as well as some of the choices that your facilities face in complying with stormwater mandates?

Answer: The greatest challenge is onsite stormwater management for individual construction projects. In many cases, it is impractical to retain stormwater onsite due to lack of available space or mission constraints. It is not cost effective to manage stormwater onsite for each project when there are multiple projects in the same general location. We are developing a comprehensive approach to identify a suitable location on every installation to comply with the intent of the onsite stormwater management including treatment. Resources (manpower and funding) continue to be limited to perform required operations and maintenance of infrastructure built to support onsite stormwater capture and treatment. Negotiating and budgeting additional funds to support paying fair and equitable stormwater fees in the current austere fiscal environment is also a challenge.

CHARRTS No.: SEPW-01-022
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Inhofe
Witness: DAS(E) Geiss, Dr.
Question: #22

Question: The United States Air Force is perennial name on the Environmental Protection Agency's Topp 25 list of Green Power Partners. The Air Force has 131 projects in operation on 56 bases and an additional 50 are under construction. The FY13 budget has instituted a \$900 million "deliberate strategic pause" in military construction for the Air Force. How are renewable energy projects affected the strategic pause in military construction for the Air Force? We need a fire station at Altus at a cost of \$15 million (ranked the worst in air education and training command). I could give you hundreds of examples of projects that are waiting to get funded at every service. If military construction for renewable energy projects is still being funded in FY13, why are these projects being exempted?

Answer: The Air Force MILCON program took a deliberate pause in FY13. However, The Air Force intends to continue to develop and award renewable energy, energy conservation and energy security projects through the Office of the Secretary of Defense's Energy Conservation Investment Program (ECIP). The DOD ECIP program was not affected by the Air Force's deliberate pause. In fiscal year 2011 the Air Force received \$33,845,000 for ECIP, we expect this level of funding to continue, but are capable of executing nearly double this in future years, if the funding is available. The ECIP project list includes wind turbines and solar projects where cost effective and when the projects contribute to the federal mandates for renewable energy.

The Air Force recognizes the value of the limited financial resources available for investments. To ensure we are making the best use of taxpayer dollars, our corporate structure requires strong evaluations based on sound business case analyses, with a particular focus on return on investment and payback periods. The Air Force is also looking at private investment wherever possible, particularly with regards to developing renewable energy sources and reducing facility energy consumption. By utilizing this approach, the Air Force can improve its energy security and take advantage of underutilized land with little or no additional costs to the taxpayer.

CHARTS No.: SEPW-01-023
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E) Geiss, Dr.
Question: #23

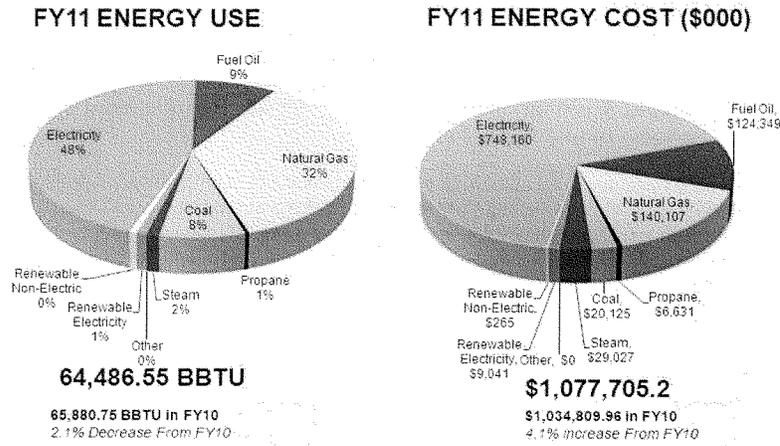
Question: Gasoline prices are nearing record high levels. A gallon of gasoline now costs twice what it cost in 2009. Has the Air Force evaluated how much it would save annually if the Administration had a focused effort on driving down the price of gasoline through increased offshore and onshore energy production or other means?

Answer: The Air Force has not conducted such a study.

CHARRTS No.: SEPW-01-024
 Hearing Date: March 27, 2012
 Committee: SEPW
 Member: Senator Sessions
 Witness: DAS(E) Geiss, Dr.
 Question: #24

Question: Has the Air Force evaluated the impact of near-record low natural gas prices on its total energy expenditures? Will the natural gas boom in the United States help to reduce the Air Force's energy costs?

Answer: While natural gas is about a third of the energy mix, the cost is about 11.5% of the total Air Force energy bill. As a result, the cost of electricity drives the utility costs.



While the cost of one energy source decreases, another might increase offsetting the total utility bill. In FY10, energy use decreased by over 2% while costs increased 4%. A reduction in costs of all utilities will help reduce the Air Force's energy cost.

CHARRTS No.: SEPW-01-025
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E) Geiss, Dr.
Question: #25

Question: Lumber and wood products are a renewable natural resource that is produced domestically and supports jobs in Alabama and all over rural America. What steps has the Air Force taken or recommendations that it has endorsed with respect to the use of wood and wood products in buildings and other purposes? Are you aware of any federal agency policies that discourage the use of any wood or wood products in construction or other projects?

Answer: The Air Force does not endorse or prohibit the use of wood and wood products, and has no policies restricting their use other than compliance with the International Building Code (IBC) which limits the use of wood and wood products in certain facilities for fire safety. AFCEE is currently developing Standardized Requests for Proposal that will allow construction contractors to use any material, including wood and wood products for Air Force construction provided the project complies with the IBC, which limits use of certain products for various types of construction. IBC Types of Construction define allowable materials based on the building's occupancy classification and size.

Air Force policy mandates that all new vertical construction and major renovation projects achieve US Green Building Council's Leadership in Energy and Environmental Design (LEED) Silver Certification. There is a perception that LEED Silver Certification only allows certified wood products, but this is not a mandatory LEED requirement, and it does not prohibit use of non-certified wood.

CHARRTS No.: SEPW-01-026
Hearing Date: March 27, 2012
Committee: SEPW
Member: Senator Sessions
Witness: DAS(E) Geiss, Dr.
Question: #26

Question: How much (in total dollars) has the Air Force spent in fiscal years 2009 through 2012 on use of, research related to, deployment of, or other efforts related to solar, wind, and other renewable energy sources?

Answer: The primary focus of the Air Force's installation energy program is to reduce its energy demand through energy conservation and efficiency projects. The Air Force's approach to renewable energy projects is to utilize third-party financing wherever possible; as such, the Air Force has not made significant investments into developing on-base renewable energy projects using Air Force funds. Between FY2009 and FY2012, the Air Force spent over \$55 million on renewable energy projects. This amount includes funding received through the Energy Conservation Improvement Program (ECIP) and \$24 million for renewable projects received under the American Recovery and Reinvestment Act.

The Air Force has also invested approximately \$4.8 million in support joint efforts in FY2011 to develop and demonstrate renewable power capabilities for expeditionary applications, and recently began a \$17.4 million joint project over the next 3 years to continue that effort. Improving energy management at deployed locations will help enhance combat effectiveness, and reduce risks and costs for military missions.

Senator SANDERS. Dr. Geiss, thanks very much.

Senator Carper, did you want to make an opening statement?

Senator CARPER. I would appreciate maybe when I ask my questions, if I could use a couple minutes before I ask questions to do that.

Thanks so much.

Senator SANDERS. Let me begin. I will throw it out to anyone who wants to jump in.

To give you some examples, I come from a cold weather State, or it used to be a cold weather State. We have had a very warm spring, and we found that when we weatherize older homes, we can cut fuel consumption by 30 or 40 percent just by doing that.

Let me ask anyone who wants to jump in, if this country were aggressive in trying to deal with what many of you discuss as one of your missions of military which is to save lives while trying to make this country more secure, in terms of energy efficiency and sustainable energy, whether biofuels, solar, wind, geothermal, what do you see as the potential in terms of the role the United States military can be playing, and where they can eventually move?

Dr. Geiss, you began to talk about the use of biofuels. Why don't you start it off? Where can we go? Where is the potential here?

Mr. GEISS. Senator, I will answer the question on biofuels first. I think what we are looking at in diversity and supply is resiliency. As we look at our Air Force, and I mentioned those 900 flights a day we fly all around the world, plus our combat aircraft, we are looking for opportunities to use other sources of fuel, not only domestically or as we operate around the world. Having a singular source of petroleum provides some challenges as we operate, and we believe that alternative fuels will give us more freedom of action and greater resiliency and diversity.

Senator SANDERS. Let me ask you this. As somebody who may be watching this would think, do you have any concerns about the safety of this fuel? Are our aircraft any less safe using this fuel than just petroleum?

Mr. GEISS. I don't have any concerns but you might better speak to a pilot, and I have done so. Just about a year ago, I had the privilege of being at Joint Base Andrews, and our Thunderbirds flew on that 50-50 blend of a hydro-treated renewable jet. I can say it was a moment of pride for me to see that happen. As soon as those planes landed, I went over and spoke to those pilots. My first question was, did you feel a difference, did you see a difference, and they said no.

As we look at the speed and precision by which our Thunderbirds and the Navy Blue Angels have done it as well, if they can perform, and they don't see any difference, I think that it starts to allay some of the fears of our pilots that there is no impact.

We have also done the robust testing and analysis in the laboratory and certification of those aircraft, so technically and from an engineering perspective there is no impact. From a personal perspective of individuals who have flown with that, they see no difference.

Senator SANDERS. Let me throw out a tougher question. That is, some will say that is all very well and good, but it is more expensive. Biofuels may be more expensive today than buying petroleum.

We have a series budget crisis in America. How can you justify that? What is your response to that?

Mr. GEISS. My colleague, Mr. Hicks, is dying to jump in.

Senator SANDERS. Mr. Hicks, why don't you respond to that?

Mr. HICKS. Thank you, Kevin.

I think what we are seeing today, and as Senator Inhofe pointed out, we did pay \$15 a gallon for fuel, a very small quantity. That quantity represents .03 percent of the Navy's fuel spend and really is important that we purchase that so that we can do the proper research, testing, and evaluation to make sure there are ships and aircraft, that those fuels are transparent to them.

I am not sure where the \$3.9 billion figure comes from, but I think it probably stems from that \$15 per gallon figure. We have no intention of paying a cost premium for these fuels and certainly no intention of paying \$3.9 billion for premium in the future. Our efforts and where we see the market today, if you look at reports whether it is from Group SEC LMI, Institutions like MIT, Bloomberg, New Energy Finance, all suggest that these alternative fuels will be competitive without any additional outside forcing function such as Government investment in the 2018–2025 timeframe. We believe if we take an active role in that, we can drive down those fuels to parity in a much shorter timeframe.

Senator SANDERS. I would assume that for the mission of the United States military of defending our country, it would be preferable to be producing these biofuels on farms in the United States of America rather than importing from Saudi Arabia or other countries who are not necessarily friendly to us. Would that be a fair statement?

Mr. HICKS. It would, Senator. From our view, this is an opportunity to produce the fuels domestically. It is also an opportunity for us to trade where we get those fuels, if you will, from countries that don't necessarily represent our values and interests with those that do. As a globally deployed force, we are going to need those fuels wherever and whenever we find ourselves.

That said, if we cannot only produce more of those fuels ourselves and have more of our allies produce those fuels, I think it can make for some interesting strategic implication for us.

Senator SANDERS. Senator Boozman.

Senator BOOZMAN. Following up on the Chairman's questioning, by 2025 DOD says it is going to generate 25 percent of its electricity from renewable sources. Again, there is the fuel component to this also. Do we know when we are going to have a cost even break, or maybe we are not going to achieve a cost even break but we feel the advantages are worthy of some increase? Have we graphed that out? Do we know how much this is going to cost us?

Mr. HICKS. This may be a question for everyone on the panel. I will say as I mentioned in my remarks, the three most recent power purchase agreements, which are solar, photovoltaic arrays in China Lake, Barstow, and Twenty-Nine Palms, the day those begin producing that power will be cheaper than what we pay today and will be cheaper over the life of those 20-year contracts. We will save on those three contracts \$20 million.

That necessarily is not always going to be the case, but that is the ethos that we are bringing in this.

Senator BOOZMAN. In regard to 25 percent being generated by 2025, not those contracts but the big picture, what is that going to cost us? How much more is our electricity bill going to be then? Because it is important. I think in your testimony, Mr. Hicks, you said that increased oil is costing us \$1 billion, that means less flying, less training, less at sea, so there is a finite amount of money so that is an important question. How much more is our electricity bill going to be in 2025 than it is now?

Mr. HICKS. I would like to see if my colleagues would like to respond to that, but I will say what we are doing and what we are pursuing is that it doesn't necessarily have to cost any more. What we are finding most recently is in fact that it doesn't. If we structure these contracts in the correct way, if we do our due diligence and use our mission compatible lands for these resources, we have an ability to produce power in specific locations, not necessarily around the country, that are below market rate.

Mr. KIDD. I would just like to align my comments with Deputy Assistant Secretary Hicks. Because the Army is the largest electric consumer in the Federal Government, we also have to by the mandate produce that much more renewable energy to get to our 25 percent goal. As indicated in my opening remarks, we have created the Energy Initiatives Task Force, which is modeled to think and act like a private sector, project development entity that has to compete and attract capital to viable energy projects.

Right now we believe that we have 81 projects across the Army that, according to models and preliminary analysis, could produce power for the Army at or below grid parity. These projects would more than exceed that 25 percent goal. The dramatic reduction in the cost of wind and solar power coupled with better building design and more efficient use of energy makes this goal attainable at little to no additional cost.

Senator BOOZMAN. The other thing is, and you are welcome to comment, there is just so much law. We are at these hearings all the time. The energy efficiency of the old motors that are all over the place compared to the new motors, things like that. I hope that we are looking at those kinds of things.

Dr. Geiss.

Mr. GEISS. Senator, some very good examples from the Air Force, one of the projects we are doing at Massachusetts Military Reservation in partnership with the Army is where the Air Force has the responsibility for environmental clean up. That environmental clean up requires quite a bit of electricity.

As you may know, there is quite a bit of wind potential in that arena, and we have now constructed three wind towers that are powering that environmental clean up. It has an expected rate of return of 7 years, so after 7 years those turbines will be providing free power to MMR. That is a renewable example.

Another example, Senator, you mentioned low hanging fruit. We have a project at Little Rock where we are replacing some of the water storage tanks up there. We are spending about \$2.7 million to replace those to reduce loss of water and reduce our power costs to do that.

Another good example, at Dover, we are decentralizing the heat plant from an old 1950s era structure to brand new natural gas

powered boilers. We expect that will reduce our energy use at Dover by 15 percent and save the Air Force \$2 million a year.

As my colleagues have said, we are looking very closely at the business cases, whether it incorporates renewable or not, but what makes sense at that particular location for the mission that we have and for the types of facilities and needs that we have at those installations.

Senator BOOZMAN. Thank you, Mr. Chairman.

Senator SANDERS. Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Chairman.

The suggestion was raised at the beginning of the hearing in one of the opening statements that this energy effort by our military might compromise the core priorities of the Department of Defense. As I recall, I was scribbling quickly so I may not have it exactly right, the military witness' testimony, Mr. Kidd said the energy program was mission critical, operationally necessary, and fiscally prudent and Mr. Hicks said that it provided greater combat capability to our military forces. Dr. Geiss said that it enables our war fighters, improves operational effectiveness, and enhances national security. Do I have that correctly?

Mr. KIDD. Yes.

Mr. HICKS. Yes.

Mr. GEISS. Yes.

Senator WHITEHOUSE. Let me go on to another point about the cost issues. I ask unanimous consent to put in a statement by a veterans group called Operation Free which includes the following paragraph: "America's oil dependence leaves us dangerously vulnerable. America spends over \$1 billion per day overseas for oil. Our voracious demand for the single source of fuel ensures high oil prices in a global market draining our economy and enabling our enemies. Every time the price of a barrel of oil goes up \$5, Iran makes an additional \$7.9 billion annually."

When we are looking to use—Senator Sanders' example—home grown, American industry produced let us say algae fuel, because we have a wonderful algae company in Rhode Island that bioprocesses H₂O that is doing this right now, and we compare that with foreign imported oil, the market price does not necessarily take into account the collateral considerations.

For instance, the algae fuel is jobs in America, it is domestic supply, it contributes to energy independence. If it is exactly dollar for dollar, the same dollar sent overseas adds to say the government of Iran's revenues, makes us more vulnerable to the Straits of Hormuz, good luck blocking algae fuel from Kansas to fuel plants in the United States, it is a lot less vulnerable than Hormuz, how is it that the military takes into account those factors that are directly relevant to the true cost of imported oil versus the market cost as it bears on the military's own responsibility to care for the troops and try to reduce unnecessary conflict, save lives and operate effectively in the global environment?

Mr. KIDD. Sir, in terms of domestic energy prices, I think I would associate myself with the comments that the market price does not reflect all the externalities. For the military, that is something we cannot control. When we make our investments, we have to use the rules and standards given to us by Congress and OMB. We can do

that, and as I said, we can justify energy efficiency investment, renewable energy investments right now purely on a cost basis.

Senator WHITEHOUSE. Without considering externalities, but you would agree that the externalities are an added bonus that are good for our national security, our national interests, and the interests of the U.S. military?

Mr. KIDD. Yes, sir. Operationally, many of those externalities are borne within the force. In other words, the casualty figures, the amount of resources that are diverted to protect convoys, the full burdened cost of delivered energy, we can start to calculate those. In the Army, we have deployed a Tactical Field Manager Defense System in Afghanistan so that we can now track the end use of all the fuel used.

We are developing modeling tools that will allow us to better understand the true cost of our military, our Army, when we use fuels in combat, and this is being reflected in the Army's doctrine. The Army is a doctrinally driven organization and our operational energy doctrine will be emerging this spring and summer which over time will change almost everything the Army does, how we train, how we operate, what goes on in our schoolhouses, and what requirements we put into our future acquisition of equipment.

Senator WHITEHOUSE. My time has virtually expired, so as it expires, let me just thank all of you for what you are doing. It is work that, according to your own testimony, expands the resources available to our fighters and makes more effective in the field and protects our national interests by working toward domestically produced fuels.

Although we haven't had a chance to, in my questioning, hear much from Ms. Gillespie-Marthaler, I wanted to thank you for both your service to our country and also for helping to coordinate this effort.

Again, I would ask unanimous consent that the Operation Free statement go into the record.

Senator SANDERS. Without objection.

[The referenced information follows:]



OPERATION ★ FREE

Secure America with Clean Energy

Press Inquiries Please Contact:

Ben Lowe

Truman National Security Project

Advocacy Communications Director

202-216-9723

ben@trumanproject.org

In response to a hearing held today by the Senate Committee on Environment and Public Works, Operation Free campaign manager Lauren Wolfe released the following statement:

“Operation Free is proud to join security leaders of both parties in recognizing that America’s reliance on oil is a serious threat to our national security. The Department of Defense and Environmental Protection Agency are leading the fight to develop and demonstrate sustainable technologies. We applaud their efforts to share knowledge and expertise.

America’s oil dependence leaves us dangerously vulnerable. America sends over \$1 billion per day overseas for oil. Our voracious demand for this single source of fuel ensures high oil prices in a global market, draining our economy and enabling our enemies. Every time the price of a barrel of oil goes up five dollars, Iran makes an additional \$7.9 billion annually.

The military is making unparalleled progress in investing in and developing energy solutions. The rest of government must follow the military’s example by taking bold action, such as the EPA’s new CAFE standards that require cars and light trucks to meet a 54.5 miles per gallon standard by 2025. Agreements like the Memorandum of Understanding recently signed by DoD and the EPA ensure that technologies and innovations are shared and adopted efficiently throughout government and the private sector.

It is time to secure America with clean energy. Our civilian leaders must match the military’s commitment and stop putting partisan politics ahead of good policy. We call on Congress to encourage the progress made by the military and government agencies, such as the EPA, in the development of clean, domestic, alternative sources of energy for the sake of the security of the United States of America.”

Learn more about the Operation Free campaign at www.OperationFree.net. Operation Free is an advocacy campaign of the [Truman National Security Project](http://www.TrumanNationalSecurityProject.org).

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Senator WHITEHOUSE. The article about Solar Generator training to troops headed off to Afghanistan where Colonel Peter Newell, who is the Director of the Army's Rapid Equipping Force, says, "This initiative is not just about saving fuel, it is about saving lives."

Thank you, Mr. Chairman.

[The referenced material follows:]

Huffington Post

U.S. Army: Solar Generator Training Given To Troops Before Heading To Afghanistan

Posted: 03/23/2012 2:38 pm

From EarthTechling's Pete Danko:

For the first time, U.S. Army soldiers are receiving specialized training on how to use generators with solar-power capability before heading to Afghanistan. The Army says these generators save lives by reducing the amount of fuel that needs to be trucked to troops over dangerous roadways.

The military has been deploying green gear in Afghanistan for a while -- we've reported on Marines at one forward operating base using flexible solar panels they can carry to power radios, solar tarps to power tents at night and even solar panel arrays that can power more than 20 lighting systems and 15 computers.



But the Army said it hadn't before had the opportunity to integrate work with green-energy devices into the focused training soldiers undergo directly before they ship to Afghanistan. The Vicenza, Italy-based 173rd Airborne Brigade Combat team is the beneficiary of this training, which was scheduled to wrap up this week at the Hohenfel Training Area in Germany.

“The 173rd allowed us to catch someone in the right timeline. It was the first opportunity to actually train a unit at home-station, look at the equipment during their CTC [combat training center] rotation, and actually take it into theater and put it to use,” said Col. Peter A. Newell, director of the Army’s Rapid Equipping Force.



We always look for the military to give long, technical-sounding names to its gear, with initialisms to match, and it did not disappoint in this case: The Army said the soldiers were being trained on the “Advanced Medium Mobile Electric Power Source (AAMPS),” a tactical power system said to be at least 20 percent more efficient than the old generator used.

“The generators may be connected to solar panels that store energy produced by the sun and allow the batteries in the generator to rest when it reaches capacity, which reduces equipment run time, man-hours and maintenance costs,” said Brandon W. Bloodworth of Barbaricum, a consultancy that works with the military on energy and readiness issues. “We’re looking at energy to increase capability.”

Getting energy from the sun translates to savings but more importantly it can trim the amount of fuel that has to be trucked in. The Army said a typical combat outpost might have 40 to 70 personnel, requiring 6,000 gallons of fuel per month, and the 10-day missions to keep those outposts fueled can be especially deadly.

“This initiative is not just about saving fuel,” Newell said. “It’s about saving lives.”

Senator SANDERS. Senator Carper.

**OPENING STATEMENT OF HON. THOMAS R. CARPER,
U.S. SENATOR FROM THE STATE OF DELAWARE**

Senator CARPER. Thank you, Mr. Chairman.

I am going to just give an abbreviated statement, and when I come back, the first question I have is for you Ms. Gillespie-Marthaler. The question will be, do you want to comment on any of the things you have heard these guys say, correct, add to, take away, or whatever you might want to do. Just be ready for that.

One of my top priorities this year, which I share with President Obama and many of our colleagues, is to continue to support initiatives that spur job growth, initiatives that help create what I call a nurturing environment where communities in Delaware and beyond can generate jobs and prosperity.

One of the best examples of this is through the Federal Government's actions to help advance development of clean, sustainable, and domestic energy. As many of you know, our country's dependence on fossil fuels exacts a huge cost on our economy. Our country sends, I am told, over \$250 billion a year overseas to pay for our oil imports, roughly one-third of our trade deficit. Often this money goes to countries that frankly don't like us a whole lot, and some actually use our money to I think hurt us. This dependence also has an enormous public health cost for our Nation.

The Federal Government can help level the playing field between fossil fuels and clean energy and be a catalyst for the creation and use of clean energy technologies including wind, solar, nuclear, and advanced vehicles.

Having said that, simple common sense solutions should not be overlooked. As I have learned through my Subcommittee in the Senate Homeland Security and Government Affairs Committee, among other things, the Federal Government is the single largest energy user in our country. The Federal Government can lead by example by embracing new clean energy technologies. Just by changing our Federal Government's energy consumption, our Government can send a strong signal to marketplaces to encourage private investment in these new energy sources.

Encouraging energy investments in new technologies like the development of offshore wind off the coast of States like Delaware, from North Carolina up to Maine, will nurture further economic development and job creation.

Changing our Federal Government's energy consumption also will save money in the long run. We mentioned that here today. That is money that can be put toward job creation and debt reduction instead.

Last year, in order to help agencies meet the fiscal and environmental challenges they had, I introduced something called the Reducing Federal Energy Dollars Act of 2011. This legislation is really a comprehensive set of proposals to, among other things, make it easier for Federal agencies to use private financing to pay for energy efficient retrofits at little or no cost to taxpayers.

I believe this legislation will help the Federal Government lead by example and demonstrate to the American people that energy

efficiency efforts are a gateway to job growth and can pay real dividends in saving both money and our environment.

Thank you for letting me give that abbreviated statement, Mr. Chairman. If I could just ask some questions now, I would be grateful.

Ms. Gillespie-Marthaler—the moment we have been waiting for—do you want to critique what these guys have been saying?

Ms. GILLESPIE-MARTHALER. Thank you for the question, Senator Carper.

I have nothing to add nor to detract or contradict anything.

Senator CARPER. Don't pull your punches.

Ms. GILLESPIE-MARTHALER. Again, the EPA is very proud to partner where we can align our missions to bring better solutions to military bases. We look forward to that continuing cooperation.

Senator CARPER. Thank you.

For our Air Force friends—we have a big Air Force base we are real proud of in Dover, as you know, a big airlift base. We are changing out C-5Bs for C-5Ms. One of them set I think 41 or 42 records last fall in flying nonstop from Dover to I think Turkey. One of the things the C-5M, which is really the C-5B with a lot of new engines, new hydraulics, and a lot of other systems, does is it is a little more energy efficient. Would you just talk about the energy efficiency of large aircraft like the C-5M and how that is going to help us in this effort to use less energy?

Mr. GEISS. Senator, you hit on my favorite topic.

Senator CARPER. Good; it is mine too.

Mr. GEISS. From fiscal years 2010 and 2011, the initiatives that we put in place, we estimate we are saving about \$165 million in aviation fuel by basically changing how we fly and incorporating best practices from the commercial industry, improving aircraft like the C-5 where we talk a lot about the energy efficiency of that aircraft but the other benefits accrue in decreased sustainment costs, and we see that in some of the other engine improvement programs. We are looking at improving the KC-135 tanker and that will get us a few percent better in efficiency, but it will also save us about \$1.5 billion in life cycle costs.

As we talk about attendant benefits beyond energy, sustainment cost is one of the significant things we see as we modify those aircraft.

Using better scheduling techniques so that we can ensure when an aircraft lands at Dover, we are maximizing the amounts of cargo that can be loaded onto that aircraft. That is where that number came from I mentioned earlier, 3 percent more fuel and 27 percent more cargo is because we are getting better at how we plan those cargo flights.

The Air Force will always respond to that demand on the ground. We will always have those 900 flights a day or expect to have every single day because we will continue to have disasters, humanitarian assistance, VIP transport, other airlift and tanker missions that we have and we see the biggest opportunity in decreasing our fuel bill and focusing on our mobility aircraft.

Senator CARPER. Thank you for sharing your enthusiasm.

May I ask maybe one more question, Mr. Chairman, if you don't mind?

The Department of Defense is unique—this is for the whole panel—among Federal agencies in its ability to enter long-term power purchase agreements which are essential to support long-term project financing such as needed for offshore wind farms. Based on conversations we have had with industry, I believe the Department of Defense’s participation in procuring offshore wind power could help launch the industry at scale in the U.S. fostering economic growth along our coastlines, especially from North Carolina to Maine.

Could you each briefly describe your branch’s efforts to purchase renewable energy off your bases and facilities? Specifically, I want to know about efforts involving offshore wind; are there major hindrances to long-term power purchase agreements by the DOD for offshore wind power? If any of these issues are statutory, have there been any discussions about identifying solutions?

Mr. KIDD. Sir, obviously the Army doesn’t have as much potential to talk about offshore wind as our sister Service, the Navy. They have all the good ocean view installations.

Simply put, the power purchase agreement authority for 30 years is a great asset for the Department, and that is the premise that we used in creating the Energy Initiatives Task Force, to maximize the Army’s potential to take advantage of that authority that we have.

Thank you very much.

Senator CARPER. Thanks.

Let us hear from the Navy.

Mr. HICKS. As I mentioned before, we have done three power purchase agreements very recently and are pursuing several others where we have a very good understanding of the unique power that authority allows us to use. We have used it to good effect in projects in California for solar, delivering power to the Navy at a below market rate over the life of those 20-year contracts.

As it relates to offshore wind, specifically I think you mentioned North Carolina to Maine, we certainly have been engaged at the State level with the energy offices and the Governors’ offices in every State looking to do that. Power purchase agreements appear to be an excellent way to look at wind.

One of the challenges we have with that is when it relates to power purchase agreements, that power either has to be produced on an installation or directly connected to it. That becomes kind of the rub as it relates to offshore wind and power purchase agreements. We can look at—and are looking at—our standard utility contracts, but those are limited to 10 years. For these major types of efforts, typically we require more than a 10-year contract to really make the economics work.

That said, we are working with a variety of interests along the Eastern Seaboard, working with the State energy offices and Governors’ offices trying to come up with some way we can use that energy. We are very interested to do that. We are interested to do that where we have mission compatible wind, we are interested to be a customer.

Senator CARPER. Maybe one more quick comment, and if I could one last comment from the Air Force on this, offshore wind?

Mr. GEISS. Senator, we have a robust portfolio of clean energy projects. I am not currently aware of any we are working on as far as offshore wind and would voice similarly the comments that my colleagues have made.

Senator CARPER. Thanks so much.

Thanks, Mr. Chairman.

Senator SANDERS. Senator Whitehouse.

Senator WHITEHOUSE. Can I jump in for 1 minute?

Senator SANDERS. Yes, Senator Whitehouse.,

Senator WHITEHOUSE. I wanted to jump here for a minute with the Chairman's permission because I have a group of visitors in the room here from Rhode Island from the Cooley Group. They make, among other things, Cool-Flex, which is a flexible solar material that can go on the edge of a tent and be deployed in the field and provide power and help support cooling within.

It was a coincidence they happened to come today and that I happened to be in this hearing while they came but it is a very tangible demonstration of how pursuing these initiatives creates jobs right here in Rhode Island in the United States of America that would otherwise have been spent on oil and much of it foreign oil.

I just wanted to take a moment and thank the people from Cooley Group who are here and thank all of you again.

Senator SANDERS. Senator Whitehouse, a moment ago you used the fancy word externalities. I think Mr. Kidd appropriately responded by saying that for him and the military, they are looking at the bottom line, can the fuel they are buying now be seen as cost effective with other fuels.

I think, Mr. Hicks, you gave us some examples where today the contracts you are signing for sustainable energy are competitive with the more mature fuels.

When we talk about externalities, let us not forget that may not be within your jurisdiction, but externalities have a lot to do with whether or not we should have been in Iraq in the first place, a war many thought might be a war for oil, or Afghanistan, or our foreign policy in the Middle East. This is a huge, huge issue.

Externalities means thousands of people who died in that war, tens of thousands who came home with PTSD or TBI. When we talk about externalities, it is not only creating jobs in Vermont or Rhode Island, it is dealing with issues of whether or not we have to fight wars for oil or whether we can grow our energy in the United States and become energy independent, whether or not we can create perhaps hundreds and hundreds of thousands of jobs creating that energy. It is an enormously important issue.

Let me get to Mr. Hicks. In Vermont, I worked with the Vermont National Guard, as you know, to install a significant PV panel installation there. It is now producing 1.45 megawatts of solar; it is providing 40 percent of the installation's needs for the National Guard at that location, saving the National Guard over \$240,000 a year.

Do projects like this make sense? Are we seeing projects like this taking place in other areas of the country?

Mr. HICKS. The answer is yes, and it will depend on the local market conditions, the local availability of resources. In the case of solar, for example, is there enough solar capacity; in the case of

wind, is the wind blowing at the right speeds and right heights; and what is the local cost of power? All of those are factors as well as other factors such as environmental assessments and siting that come into play and ultimately determine the economics of a project. That said, we are seeing projects across the country from Hawaii and southern California.

Senator SANDERS. Go into depth a little, if you can. I know you mentioned this. Exactly what are we talking about across the country where sustainable energy is now cost effective with the more mature industry?

Mr. HICKS. I think what we are seeing in California with the cost of power, in addition to the production tax credits which do have an impact on that, we are seeing solar being competitive in those markets. We are also seeing other technologies whether it is waste to energy, geothermal is another we see, and that is more related to the southwest where we see geothermal as an opportunity to use those resources. The Navy has a plant that is rated at 270 megawatts of power, the largest plant in the Navy.

Senator SANDERS. We have talked to people in the geothermal industry who think there is huge potential in geothermal. Do you agree with that?

Mr. HICKS. I do. There is enormous potential. We have seen this from our own experience in running a plant or having a plant on our base for the past 25 years at China Lake rated at 270 megawatts. It is not quite producing that today, but that is the nature of geothermal over time. That said, there are many other opportunities in the southwest not only at the Navy installations but also at the Army and the Air Force for geothermal.

Senator SANDERS. Dr. Geiss, why don't you jump in. What do you see as the potential of solar with the significant declining price of PV in this country for the military?

Mr. GEISS. From my experience, one of the most impactful elements in making those things pencil out or be economic, what is the State environment, what is the utility experiencing? If there are renewable energy credits for that State, if there is a renewable portfolio standard, what is the utility price; all of those things determine whether it is actually going to be financially viable.

I may have said we are not pursuing energy for the sake of energy, we are pursuing it for what it does for us and we have to consider what that cost is. As we look at the opportunities, where it makes sense, where the costs work out, those are the areas we are targeting for these renewables.

Senator SANDERS. Mr. Kidd, do you want to jump into that discussion?

Mr. KIDD. Sure, I am happy to. Again, what Dr. Geiss said is very important. The Army has 155 installations across America. We have over 200 utilities, a fact I am still trying to get my brain around, but certainly the local conditions at the State as well as the local utility level are big factors in whether or not renewable energy projects will pencil out and go forward.

In White Sands Missile Range, the Army just signed an energy savings performance contract to install solar panels. What makes these panels so attractive is the new peak pricing charge that has

gone into effect so that the panels will actually be producing at the time of day when the electricity rates are the highest.

In many places right now, Hawaii, Puerto Rico, and other areas in the country, solar panel is the cheapest power you can bring online at this point in time, so that is very attractive to the Army.

In your opening comments, you mentioned the National Guard, and if Senator Merkley were here from my home State I would have talked a great deal about one of the Army's net zero efforts which is with the Oregon National Guard with the intent to make all of Fortress Oregon, as they call it, Fort Oregon, net zero. One of the things that is attractive to the Governor and the Adjutant General in Oregon is the Adjutant General also wears the hat of Director for Emergency Response for the State, which is the same case in 34 States across America.

With that, the Oregon Guard is planning that they will have energy secure and reliable installations for the National Guard so they can respond to the Governor in the time of crisis. It is very interesting working in Oregon with the Department of Energy and EPA on helping move those efforts forward.

Senator SANDERS. Thanks very much.

Senator BOOZMAN.

Senator BOOZMAN. Thank you, Mr. Chairman.

Again, I appreciate your comment, Dr. Geiss, about where it makes sense in the areas that it does work because again, it doesn't matter if the increase is due to a surge in oil prices or a surge in switching over to some new technology, the reality is, I think we would all agree, that means less money, as you said, Mr. Hicks, for training, less money for the things that it takes for our core mission. That is what I was really referring to, Senator Whitehouse.

I understand the statements that it is this way or that way, but that is the purpose of the hearing, to really make sure it is this way or that way.

One of the things I am also looking at, some of the fuels we are using now don't have as much bang for the buck in the sense they don't have as much energy. In other words, you might have to have more quantity for a gallon of gasoline, you might have to have more quantity for it. Is that true, as in the case of ethanol?

Mr. HICKS. That is true for ethanol, the power density isn't as great. To be clear, the fuels that we are all pursuing are the advanced biofuels, second and third generation fuels where that is not an issue. For us, we are not going to sacrifice any decrease to a range of our ships or our aircraft.

Senator BOOZMAN. So the power density would be same or greater?

Mr. HICKS. That is correct.

Senator BOOZMAN. Again, one of the problems you guys know much better than I, and Ms. Gillespie-Marthaler coming through the Academy, transport is a huge deal on the field, putting people at risk in hauling more fuel. These are the kinds of things that I think we really need to be looking at.

Again, I appreciate your testimony, and I think one of the good things about your testimony is you are reassuring me that you really are looking at this in the way I would like for you to look

at it in the sense that not only do we have limited resources in the energy department in the sense of natural resources, we have limited resources in the financial ability we have as we are seeing the significant cuts.

Mr. Hicks, in your testimony you mentioned strategically we are at risk because much of the fuel we use comes from volatile regions of the world. Canada wouldn't be one of those, would it?

Mr. HICKS. No, Senator.

Senator BOOZMAN. That might be a reason we might look to Canada for some of our needs in the future?

Mr. HICKS. I don't have the figures myself, but that said, we do purchase fuel from about 600 places around the world wherever and whenever we need it. That fuel is ultimately sourced from whatever makes the most sense logistically, so a lot of that fuel comes from places such as the Middle East.

Senator BOOZMAN. I agree with you totally. That is certainly a consideration.

We appreciate your being here, appreciate your testimony, appreciate all of your hard work. I might ask you one last thing. Tell me why the EPA is such that in using renewables in our military, why we cannot use national forest wood?

Ms. GILLESPIE-MARTHALER. Senator Boozman, I appreciate the question. It falls outside of my realm of expertise, so I would be happy to take that back to the EPA to provide additional information if you would like.

Senator BOOZMAN. Good. Thank you. I think it has fallen out of the realm of a lot of people when the question is asked. It seems it would make sense that the forests we manage as a country would be eligible to be used by another agency of our Government.

Ms. GILLESPIE-MARTHALER. I think additionally it is outside of the EPA's jurisdiction with respect to the national Forest system but again, I will be happy to take that back.

Senator BOOZMAN. Thank you very much.

Thank you, Mr. Chairman.

Senator SANDERS. Thank you, Senator Boozman.

Senator WHITEHOUSE. All set.

Senator SANDERS. Senator Carper.

Senator CARPER. Thank you.

Ms. Gillespie-Marthaler, I have no more questions for you. Rest easy. At ease, as we say.

I do have a question for Mr. Kidd. I might just add my grandmother was a Kidd; we are probably related somewhere. She turned out pretty well, and I am sure you have, too.

Mr. KIDD. My grandmother would agree with that.

Senator CARPER. That is good.

How many of the Army's total, non-tactical vehicles are powered at least partially by non-petroleum fuel sources? Do you have any idea?

Mr. KIDD. Senator, non-tactical vehicles or tactical vehicles?

Senator CARPER. Non-tactical vehicles powered at least partially by non-petroleum fuel sources. If you have some idea, let me have it, and if you don't, just answer for the record.

Mr. KIDD. Senator, I will get an answer back to you for the record on the exact number. I would like to say that the Army does

have the largest non-tactical vehicle fleet in the Federal Government. We reduced our petroleum consumption last year by 8 percent in 1 year, and we are on track to meet or exceed all Federal mandates for petroleum reduction, alternative fuel use, and alternate vehicle use.

I will get you the exact breakdown, but we have a large number of electric vehicles, hybrid vehicles, and E85 vehicles in the non-tactical fleet. On the tactical fleet side, we are qualifying our biofuels for use and certifying our vehicles and generators to use that fuel when it is available at the market in a price competitive manner and the quantities that we need.

Senator CARPER. You partially answered my next question, but I am going to ask it anyway, and maybe you can work around what you have just said. How will the Army pursue its goal of reducing petroleum use in tactical vehicles by 20 percent by 2015? Will the Army just largely replace its inefficient clunkers with newer, more efficient petroleum fuel vehicles, or will the Army be seeking to replace some of their vehicles with hybrids or hydrogen-powered vehicles?

Mr. KIDD. The Federal goals apply to the non-tactical vehicle fleet, and we are using a variety of mechanisms. We are downsizing the fleet, reducing the number; we are right sizing the fleet, using a more fuel efficient vehicle to do the required job; and we are transitioning to alternate fuel and alternate powered vehicles as warranted.

At Fort Carson, Colorado, the Army will soon deploy the largest vehicle to grid charging capacity in the United States, and we are looking to model whether large electric powered delivery vans and delivery trucks can provide energy storage on the installation to help provide some energy security.

Senator CARPER. A question, if I could, for Mr. Hicks.

Mr. Hicks, I am curious about how the Department of the Navy tracks energy consumption. Does the Navy conduct regular energy consumption and efficiency audits? Does the Navy have the ability to precisely know where its forces are the most energy inefficient? Have these audits ever led to changes in missions or to the assets used in these missions?

Mr. HICKS. Thank you, Senator.

The Navy, with respect to our installations, we audit 25 percent of our buildings or square footage per year, so every 4 years, all of our installations will have gone through comprehensive energy audits. Those audits create energy projects that we either fund or seek third party financing on for those that make sense.

We are also installing 27,000 advanced meters. We are more than halfway through that process of installing those meters. That is around the globe at all of our installations, our roughly 100 installations around the globe, Navy and Marine Corps. Those advanced meters will provide us data at a level of granularity that we have not had before.

On top of that, we are adding an energy management system using some commercial, off the shelf software modified just slightly for the use of the Navy that will be able to take in that data and be able to better understand how our energy is being used, and we

will also be better customers of the utilities in the sense of being able to more promptly pay our bills in the future.

Senator CARPER. I have a question for the record. I am going to ask a question about something called Bloom Boxes. I don't know if you have heard of Bloom Boxes, but they are developed by a company in California. The fellow who runs the company used to work on NASA projects. The idea was to create all sorts of electricity in outer space using fuel cells I guess with hydrogen and natural gas. I think they have the ability to also use biofuels for creating electricity as well. Is that something you have ever heard of or thought of?

Mr. HICKS. I certainly have heard of them. I met with the folks from Bloom Energy, and I believe we actually have at least one, perhaps two, of those boxes in Hawaii, I want to say, but we can take that for the record and provide more information on that and let you know how those projects are going as well.

Senator CARPER. Thanks.

Mr. KIDD. Senator, the Army is interested in exploring fuel cell technology, and we are doing at a variety of scale that two Airborne Brigade combat teams I mentioned earlier will be taking portable fuel cells with them as part of their new equipment for the recharging of batteries. Referring to the earlier comment on power density, the most important power density in the Army is the power that is stored in the batteries that our soldiers carry into combat. We have been investing a great deal on battery technology as well as renewable systems to charge those batteries.

Last year, the Army spent, for the first time, 52 percent of our battery buy for rechargeable batteries. At the start of the war it was 2 percent. We do that because that gives some tactical flexibility to our soldiers to recharge on the move either with renewables or with the fuel cells.

On the fuel cell and installation side, in terms of partnerships, the Army is partnered with the Department of Energy; we are testing fuel cells at 8 different installations, and we can give you some more details on that, a variety of shapes and sizes from different manufacturers.

Going back to the cost competitive nature, we have to make sure the business case works, and we are not quite there yet.

Senator CARPER. Good. Thank you.

Mr. Chairman, I would just observe a couple of months ago driving to the train station I was listening to NPR, and they were reporting on an international study where they asked thousands of people around the world what they liked about their work. Some people said they liked getting paid; some people said they liked the benefits, vacations, health care, pension; some people said they liked the folks they worked with or the environment in which they worked. But most said the thing they really liked about their work was they thought what they were doing was important, and they were making progress.

I would just observe that what you are doing in your respective branches of the Armed Services is important and we are making progress. As we say in the Navy, Bravo Zulu, go get 'em.

Thank you.

Senator SANDERS. I think we all concur with that. Thank you, Senator Carper.

Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Chairman.

Let me add one final document to the record and ask Mr. Hicks a question about it. It relates to the Navy specifically. It is a document by Kathleen Paulson at Navy Facilities Engineering Service Center. It is entitled U.S. Naval Facilities Engineering Service Center Environmental Program on Climate Change.

There are no trick questions here. Let me just tell you what it says. "The Navy is now beginning to appreciate the potentially devastating potential of a new set of environmental issues related to climate change. There is a growing recognition that the Navy will need to perform its national security mission in a changing global environment characterized by," and then there are three bullet points: "One, rising sea levels that threaten the viability of Navy coastal institutions; two, increasing extreme weather events that threaten Navy shore installations and air and sea operations; and third, climatic shifts in temperature and precipitation with attendant problems such as disruption in water resources, reductions in food supply and increase in disease vectors."

Making it more specific, the report goes on to point out that "The Navy owns over 500 piers and wharves where certain regions of the world might experience as much as 3 meters of sea level change with combined land subsidence and sea level rise with, as a result, waterside facilities potentially becoming unusable."

I come from Rhode Island. We are the Ocean State and have a lot of coastline in addition to the wonderful Newport Naval Station that is there. I wonder if you could just give us a few comments. It sounds to me as if there is no doubt in the Navy's mind that carbon pollution is causing very significant climate and oceans impacts; that they include sea level rise; that they include worse storms and include environmental changes that impact Navy operations.

Is that an accurate statement? Does the Navy have any hesitation that manmade carbon pollution is creating changes in our atmosphere and in our oceans that having these effects?

Mr. HICKS. Thank you, Senator.

I guess I would like to start by saying the Navy's investments in this, what we have in our fiscal year 2013 budget, and what we have across the future years' defense plan, is really on energy. It is not about an environmental agenda. Let me start there.

It is about combat capability. That said, we do take our direction, if you will, and look toward touchstone documents such as the Quadrennial Defense Review which looks at climate change as an accelerant to future challenges. From that, our investments take their cues and we invest accordingly.

I am not familiar with the document you mentioned, would be happy to review that and to the extent that represents the Navy's perspective, but those are certainly impacts that are being felt. There are also others that we know of over the next 20 to 30 years where we may see the Northwest Passage open for the first time, and that has other strategic implications for us as the Service

charged with protecting the global commons of the sea lanes, so that is something that provides future challenges for us.

I would like to have some opportunity to review that document and be able to provide a more full response to you. For us, this is about enhancing our combat capabilities. We recognize that there are additional benefits that come with that. I think that document may speak to those.

Senator WHITEHOUSE. Is it fair to say that each one of our military services neither doubts nor denies the reality of climate changes caused by carbon pollution, and indeed, you are spending significant resources in order to anticipate and deal with those effects, correct?

Mr. Kidd.

Mr. KIDD. Senator, it is clear that there is a policy position and a considered opinion of the scientific bodies of the Federal Government that what you said is true. The Army follows that position.

Senator WHITEHOUSE. You neither doubt nor deny it?

Mr. KIDD. It is not my job to have doubt or deny or to ascertain. It is my job to follow the policy.

Senator WHITEHOUSE. I mean the organization.

Mr. KIDD. We follow the policy that is established in the Quadrennial Defense Review and other documents put out by the Department of Defense and the scientific advice we get from the Department of Energy, NOAA, and others. Also, we live and work in the real world, and our soldiers, on a day to day basis, are first line observers of the changes that our world is going through right now.

Senator WHITEHOUSE. There is nothing in the Quadrennial Review that doubts or denies the science behind climate change, correct?

Mr. KIDD. That is correct.

Senator WHITEHOUSE. Mr. Hicks, same answer?

Mr. HICKS. I would concur with those comments. Again, our views will come from that doctrine, the Quadrennial Defense Review, which recognizes the challenges that climate change can propose.

Senator WHITEHOUSE. Dr. Geiss.

Mr. GEISS. As well, I agree with the Quadrennial Defense Review perspective.

Senator WHITEHOUSE. Thank you.

[The referenced information follows:]

US Naval Facilities Engineering Service Center Environmental Program on Climate Change

Kathleen Paulson
Naval Facilities Engineering Service Center, Port Hueneme, CA

Dallas Meggitt
Sound & Sea Technology, Inc., Ventura, CA

Abstract- The United States Navy has a long record of responsible environmental stewardship covering many areas such as environmental planning, regulatory compliance, site clean-up, and protection of natural resources. The Navy is now beginning to appreciate the potentially devastating potential of a new set of environmental issues related to climate change. There is a growing recognition that the Navy will need to perform its national security mission in a changing global environment characterized by:

- Rising sea levels that threaten the viability of Navy coastal installations
- Increasing extreme weather events that threaten Navy shore installations and air and sea operations
- Climatic shifts in temperature and precipitation with attendant problems such as disruption in water resources, reductions in food supply, and increase in disease vectors

This paper provides a broad overview of climate change-related technology work at the Naval Facilities Engineering Service Center (NAVFAC ESC) in Port Hueneme, California. NAVFAC ESC categorized technologies that can be applied to climate change as mitigation, adaptation, and intervention. An essential element of the Navy's response to climate change is assessment of the potential impacts on Navy infrastructure. Adaptation technologies primarily focus on infrastructure changes to accommodate future climate conditions, including relocating facilities. Mitigation technologies seek to reduce greenhouse gas emissions that are driving climate change, typically through energy conservation or adoption of alternative energy sources. NAVFAC ESC has also identified approaches for intervention technologies that seek to alter the impacts of climate change through such means as carbon sequestration and storm abatement.

I. Introduction

The seagoing services and the U. S. Navy in particular, are the services most likely to be adversely affected by sea level rise, inundation from more extreme storm events and other consequences of climate change. The Navy owns extensive (and expensive!) waterside infrastructure and inland buildings and other facilities that may be vulnerable to these changes. As with other organizations with similar potential vulnerabilities, the Navy is beginning to take a proactive approach to understanding the potential issues and to develop methodologies and technologies to deal with them.

For Navy facility managers at the Naval Facilities Engineering Command (NAVFAC), sea level rise (SLR) and increased risk of storm inundation likely is of paramount importance, since most bases are located adjacent to or on waterways, placing both the infrastructure and workforce at risk. Significant areas of certain Navy bases could become inundated during normal operations if the predicted high end of SLR occurs. Other facilities will be at increased jeopardy from inundation and wind due to predicted increases in extreme weather events. The Navy is beginning to develop risk assessment methods reflecting climate change science, site vulnerability and mission criticality.

The work underway at NAVFAC ESC can be categorized as Assessment, Adaptation, Mitigation, and Intervention.

II. Assessment

The Navy owns over 500 piers and wharfs. When the Navy builds piers, wharfs and quay walls, they typically are designed to last 50 years and existing structures are generally repaired and refurbished to last up to another 25 to 50 years. Certain regions of the world might experience as much as three meters of change with combined land subsidence and sea level rise. As a result, waterside facilities may become unusable.

Basic infrastructure facilities such as water and wastewater treatment plants are likely to be impacted, since the US Navy:

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- Relies on approximately 171 public water systems
- Owns/operates 59 domestic sewage treatment systems and 38 industrial wastewater treatment systems
- Manages approximately 365 storm water systems such as infiltration systems, ponds, constructed wetlands, etc.
- Manages nearly 1,600 small scale treatment systems such as septic systems, oil water separators, grease traps, etc.

A critical element in developing any strategy or methodology for response to climate change impacts is an objective, defensible means of assessing the impacts. NAVFAC ESC employs several initiatives to adapt or where appropriate, develop, methodologies for assessing potential climate change impacts specific to Navy facilities and interests. The Navy's primary initial effort has been to assess potential inundation due to both SLR and SLR combined with storm surges due to increased extreme weather events.

The Federal Emergency Management Agency (FEMA), the National Oceanic and Atmospheric Administration (NOAA) and other agencies have developed models for predictions of storm surge inundation. NAVFAC ESC is extending these previously developed methodologies to predict possible inundation at Navy facilities from SLR and combined effects with extreme weather events, with the primary objective of providing facilities planners a means for determining which elements of infrastructure are most at risk. Figs. 1-3 demonstrate this kind of assessment analysis using the Navy base at Pearl Harbor, Hawaii as an example. Fig. 1 shows an aerial view of the primary facilities at Pearl Harbor. Fig. 2 emphasizes, in green, the critical infrastructure items at the Pearl Harbor complex. Fig. 3 shows the projected inundation from a combined 3-foot SLR and a 4-foot surge from a 500-year storm event, with the impacted infrastructure shown in red. It is immediately clear from this analysis that substantial portions of critical infrastructure at the base are at risk from both sea level rise and the significantly increased inundation due to the combined sea level rise and storm surge. These analyses are used to inform facility planners of the potential risks to allow for planning for mitigation measures.

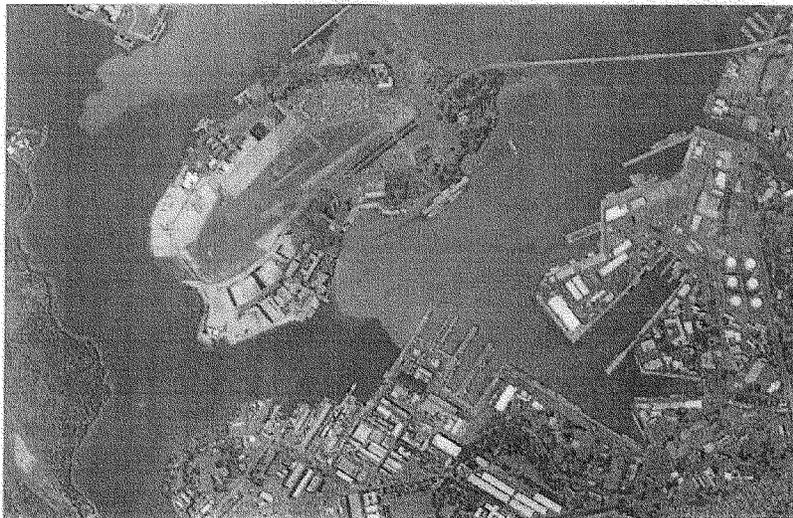


Fig. 1 Navy Base, Pearl Harbor Hawaii (Courtesy USGS)

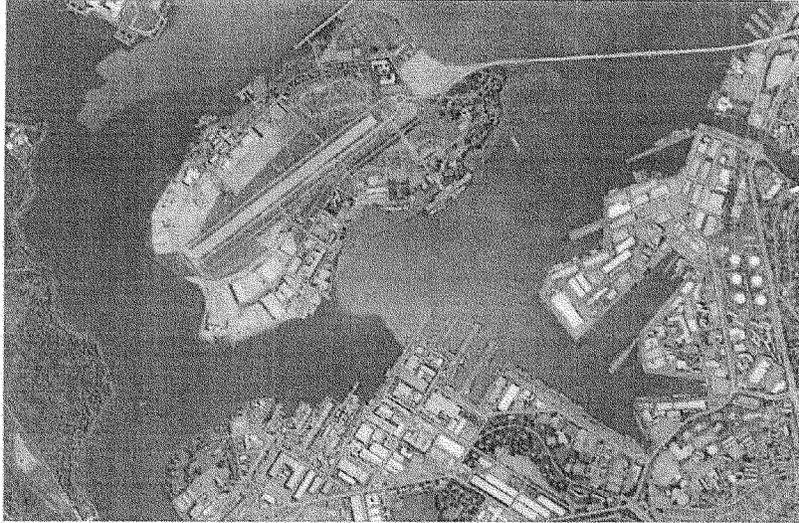


Fig. 2 Key Infrastructure Facilities at Pearl Harbor Complex (Courtesy USGS)

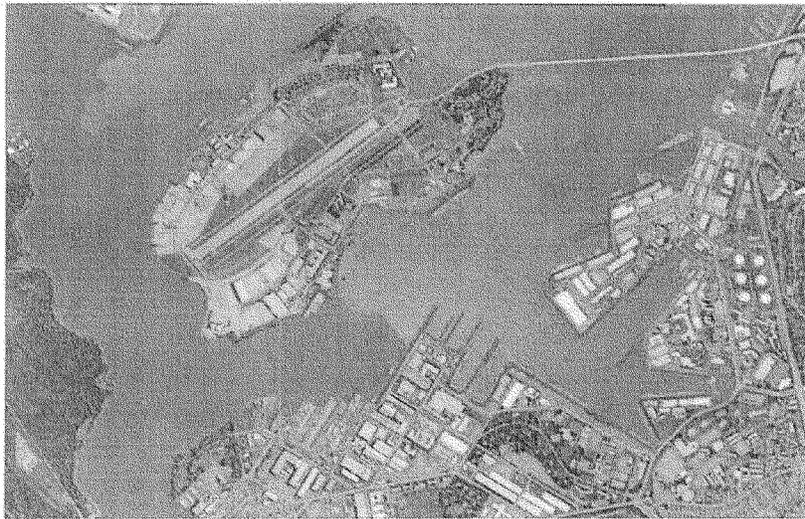


Fig. 3 Projected Inundation from Combined 500-year Storm and 3 foot Sea level Rise (in red) (Courtesy USGS)

III. Adaptation

As a largely waterfront enterprise, the Navy is developing numerous approaches for adapting to sea level rise and the likelihood of more frequent storm surge events. As the use of assessment tools become incorporated into the Navy facility planning processes, facility planners can incorporate into their designs the likely environment, and changes in it, over the life of the facility, which is commonly 50-75 years. This applies to renovation and rehabilitation of existing facilities as well, to extend their useful lives in the face of changing sea level and storm surge risks.

The simplest adaptation strategy in concept, but probably most expensive in implementation, is relocation of critical Navy facilities. This approach is likely limited by availability of suitable sites and cost. However, as part of the enterprise-wide facilities planning and development process, it may be more cost effective to selectively relocate functions and facilities than to attempt to protect them in place. In some instances, it may be more cost effective to provide physical protection in the form of berms or levees. In other situations, simply relocating specific equipment (backup communications, power, etc.) from lower floors to higher floors might be effective in helping to ensure continuity of operations. Building designs that raise the habitable levels, for example by incorporating parking structure as the first one or two floors instead of putting them below grade, may be a cost-effective solution. The assessment tools described above provide a means for objective evaluation of these approaches.

Another approach suitable for waterfront facilities such as piers and wharfs is to use floating facilities, based, for example, on the Mobile Offshore Basing (MOB) program sponsored by the Office of Naval Research. The MOB program assessed the practicality and cost of very large floating structures based on offshore oil platform technology for supporting advanced Navy bases. The program concluded that such structures were both practical and highly survivable in extreme conditions. Smaller versions of the MOB concept can be used as piers and wharfs that accommodate sea level rise. Fig. 4 shows one such concept, the Modular Hybrid Floating Pier, being investigated by NAVFAC ESC.

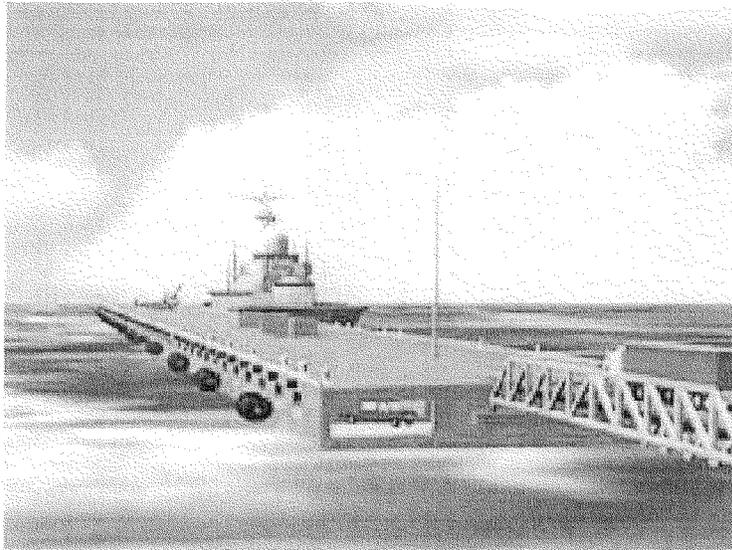


Fig. 4 Modular Hybrid Floating Pier

IV. Mitigation

NAVFAC ESC is investigating several Navy-specific mitigation strategies and others that have more general application. As with many organizations, the Navy is seeking technologies that can reduce the carbon footprint of Navy operations. As one of the largest operators of ships and aircraft, the Navy uses large amounts of fossil fuels. The mitigation strategies investigated often have the added benefit of more fuel-efficient operation and, in particular, reduction of fossil fuel usage. Some programs are aimed at near-term results, while others are longer term.

Some of these programs include:

- **Conservation:** Conservation is generally acknowledged as the least expensive mitigation strategy with the most immediate payoff. The Navy has a long-standing program to investigate and implement methodologies and technologies to conserve energy throughout the enterprise, including building design, construction techniques and facilities operations.
- **Bio-Fuels:** These include such technologies as methane generation from bio-solids (including algae) and waste-to-power. NAVFAC ESC is evaluating the use of bio-diesel in heavy construction equipment and other Navy mobile and stationary heavy equipment (such as diesel generators). While these are likely longer-term in their impact on climate change, they are an essential element of a comprehensive strategy.
- **Renewable Energy:** The Navy is supporting several renewable energy developments. These include increased use of on-site renewable energy (such as wind, kinetic hydropower [both wave and tidal] and photovoltaic solar), and managing water systems as energy storage to support the electrical grid. Renewable, alternate energy usage is a primary mitigation strategy to reduce fossil fuel usage and greenhouse gas emissions. Using wind, ocean and solar energy on existing and new buildings and designing buildings as "resource islands" is an existing program, along with a recent push for Green Building Council Leadership in Environmental and Energy Design (LEED) certification in new and existing buildings. NAVFAC ESC is supporting several ocean renewable energy projects, including a wave energy buoy that utilizes a linear generator, kinetic hydropower tidal energy turbine development and demonstration, and a wave energy buoy using a mechanical power converter. These are shown in Fig. 5.

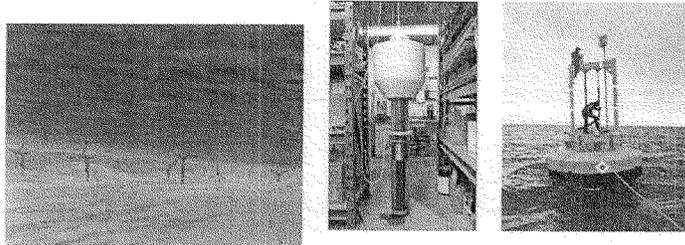


Fig. 5 NAVFAC ESC Renewable Ocean Energy Partnering Projects
(Underwater Turbines courtesy of Verdant Power)

Hybrid Vehicles: NAVFAC and the Navy SEABEES operate a very large amount of construction equipment. NAVFAC ESC is assessing the utilization cycle of medium-duty equipment such as backhoes, front loaders and others to evaluate the utility of hybrid designs to reduce the fossil fuel usage (and thus the carbon footprint) of these machines.

Hydrogen Infrastructure: NAVFAC ESC is evaluating the implications of a hydrogen-based energy infrastructure for Navy operations. In a parallel effort, NAVFAC ESC is evaluating the use of Ocean Thermal Energy Conversion (OTEC) technology to produce hydrogen at the OTEC site.

V. Intervention

Direct intervention strategies that have been proposed include approaches such as sequestering CO₂ in subsurface geologic formations and stimulating phytoplankton blooms to sequester atmospheric CO₂. Other approaches seek to reduce hurricane intensity by cooling Gulf Coast surface waters. The Navy is evaluating its role in intervention. In some cases (CO₂ sequestration in undersea formations), Navy technology may have application. In others, Navy engineering expertise may be useful for assessing the strategy. These efforts must be thoroughly evaluated for their practicality and to avoid unintended consequences.

VI. Summary

The Naval Facilities Engineering Command, and the Naval Facilities Engineering Service Center, have a wide variety of programs underway related to climate change impacts on the Navy and Navy facilities. These include development of tools for facility planners, assessment of adaptation strategies appropriate for the Navy, investigation of short and term mitigation measures suitable for Navy implementation, and evaluation of intervention approaches.

Senator SANDERS. Thank you, Senator Whitehouse.

Let me direct a question, if I could, to Mr. Hicks.

Mr. Hicks, as I understand it, Section 526 of the 2007 energy bill prohibits the use of high carbon fuels including oil from tar sands for the United States military. Is the Navy comfortable with that?

Mr. HICKS. I am quite familiar with the Energy Independence and Security Act of 2007, Section 526. I will make two comments. One, we feel it is an effective policy. From what we have seen across this Nation of the companies that are looking to provide alternative fuels, that does not seem to be a barrier to their ultimate success. In fact, many and most of those companies are able to produce fuels that have half the life cycle greenhouse gas emissions of petroleum.

As relates to tar sands, my understanding is that has been already ruled upon and that those fuels from tar sands are able to be used and are kind of excluded from that definition within Section 526. I could be mistaken, but I believe that is the case.

Senator SANDERS. I think Senator Boozman is going to say a word in a minute, but let me make my final remarks by saying this. Willie Sutton famously said that the reason he robs banks is because that is where the money is. The reason we are doing an energy hearing with the military is you guys are the largest consumers of energy in the United States of America and I think the largest single entity in the world.

If we are serious about energy, we have to be serious about what the United States military is doing. I think I concur with what Senator Carper said a moment ago. We think you guys are doing really some extraordinarily good work, both in terms of energy efficiency and trying to move this country and the military to safer, more sustainable energies.

In particular with the military, it is not just a dollars and cents issue. It is an issue of fulfilling your mission of defending this country. If we can, through sustainable energy, keep our troops safe in Iraq, Afghanistan, or any other field of battle by developing and expanding these new technologies, we have performed a huge service.

If as a result of your work in sustainable energy you help bring down, as a major consumer, these energies, you help bring down the cost of solar, you help us develop new technologies in wind, utilization of geothermal, create breakthroughs in energy efficiency. What you have also done is above and beyond the military; you have implemented important national goals.

I want to thank you very much for what you are doing, and I see some really exciting progress being made in the United States military in that area.

Senator Boozman.

Senator BOOZMAN. Very quickly, again, I do appreciate your testimony. I appreciate the service of all of you to our country and your being in uniform.

In regard to climate change, I think we all agree that the climate is changing. The question is what is causing that, so that is really the sticking point. I think, Mr. Kidd, that you are trying to avoid the reason or whatever.

When I was in school many years ago, I was told that we would have a 20-year supply of natural gas, and we would run out. I was told we were on the verge of an ice age. Again, as I said, the idea that you are planning based on climate change, we are having that in rising seas and whatever unrest.

You mentioned for the first time having perhaps a new route to get around. There are going to be pros and cons. It is good you all are thinking about that.

Like I said, we do appreciate your testimony. The other thing is, I would agree with the Senator, in the sense these are things that when they work, we need to be exploiting. It does seem the attitude you are using in regard to if it is cost effective, if it is good for our troops, it is good for the mission, those are the things we are going to be doing and not just be doing things just to be doing them to meet some goal. Again, I think that is a concern, and yet I think you have done a good job today of basically tamping that down, which is real important.

We appreciate your testimony and service to our country.

Thank you, Mr. Chairman.

Senator SANDERS. Thank you, Senator Boozman.

With that, this hearing is adjourned. We thank the panelists very much for being with us.

[Whereupon, at 11:43 a.m., the Subcommittees were adjourned.]
[An additional statement submitted for the record follows:]

STATEMENT OF HON. JEFF SESSIONS,
U.S. SENATOR FROM THE STATE OF ALABAMA

Good morning. Thank you, Chairman Sanders and Chairman Whitehouse, for holding this oversight hearing concerning EPA's work with the Defense Department and other agencies to reduce energy consumption and environmental impacts.

In fiscal year 2013, under the President's proposal, our Government will run the 5th consecutive trillion dollar deficit. That is not sustainable, and if our debt course is not corrected will lead our Nation straight to the most predictable economic crisis in history. We have to act now to ensure that all Federal agencies are operating as efficiently as possible; that means at the lowest possible cost, and yes, it can also mean with minimal adverse impacts to the environment.

I am pleased that we have the Deputy Assistant Secretaries of Energy for the Army, Navy, and Air Force here today. The Defense Department (DoD) is the Nation's single largest energy consumer. DoD comprises about 80 percent of Federal sector energy consumption. In fiscal year 2010 DoD spent almost \$4 billion on energy consumption at its various facilities. It is fiscally and environmentally smart for the Defense Department to reduce energy consumption to the extent possible. In fact, DoD has already reduced its facility energy consumption more than 10 percent since 2003. That is substantial progress.

However, I am concerned about some areas where DoD is being forced by politicians to make green energy commitments for reasons other than cost savings to the Government. Importantly, in 2009 President Obama issued Executive Order 13514, which told all Federal agencies, including the Defense Department, to take the "lead" on "creat[ing] a clean energy economy." He said the Federal agencies must "reduce their greenhouse gas emissions," make greater use of "renewable energy" such as solar power, and consider the purchase of "alternative fuel vehicles." This was an ambitious and costly directive. One may wonder whether he was looking to ensure a customer base for his other social engineering experiments—Solyndra and the like, which have wasted billions. When our Nation is facing substantial cuts to the Defense budget, we simply cannot afford to impose unwarranted green energy mandates on DOD, especially if they will increase the cost taxpayers pay to run these facilities.

I am also concerned about some of the requirements that have become part of Federal agency building standards. The President's Executive Order told agencies to use "environmentally preferable materials." That, apparently, does not include many kinds of American lumber. Why would renewable materials like trees grown

in the United States not be considered “environmentally preferable materials”? I think that is something that needs to be looked at closely.

Finally, we cannot have a discussion about DoD’s energy consumption issues without also talking about the importance of energy independence in our Nation. If the United States becomes energy independent, our Nation’s warfighter will be energy independent and better able to complete the missions asked of them. So what can we do to become more energy independent? Conservation has an important role to play. And so does development of new energy technologies. But most significantly, the U.S. has the ability to become the world’s largest supplier of energy. If the Administration would just get serious about a pro-American energy policy, we can produce more oil here at home, where it can be refined into gasoline by American refineries. We can obtain massive amounts of oil shale from Canada and move it to U.S. refineries along the Gulf Coast via the Keystone XL pipeline. We can continue to produce our abundant sources of coal and natural gas. And we can finally start building new nuclear reactors in the U.S.

If we use more of our affordable, reliable, clean U.S. energy sources, the Defense Department will benefit, the environment will benefit, the economy will benefit, the security of our Nation will benefit, and the hardworking people of this country will benefit.

Thank you.

