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ALTERNATIVE ENERGY AND ENERGY EFFICIENCY PROGRAMS OF THE DEPARTMENT OF DEFENSE

JOINT HEARING

BEFORE THE

TERRORISM UNCONVENTIONAL THREATS AND CAPABILITIES SUBCOMMITTEE

MEETING JOINTLY WITH

READINESS SUBCOMMITTEE

OF THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

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CONTENTS

CHRONOLOGICAL LIST OF HEARINGS

2006

Page

HEARING:

Tuesday, September 26, 2006, Alternative Energy and Energy Efficiency Programs of the Department of Defense 1

APPENDIX:

Tuesday, September 26, 2006 53

TUESDAY, SEPTEMBER 26, 2006

ALTERNATIVE ENERGY AND ENERGY EFFICIENCY PROGRAMS OF THE DEPARTMENT OF DEFENSE

STATEMENTS PRESENTED BY MEMBERS OF CONGRESS

Hefley, Hon. Joel, a Representative from Colorado, Chairman, Readiness Subcommittee 2

Ortiz, Hon. Solomon P., a Representative from Texas, Ranking Member, Readiness Subcommittee 3

Saxton, Hon. Jim, a Representative from New Jersey, Chairman, Terrorism, Unconventional Threats and Capabilities Subcommittee 1

WITNESSES

Aimone, Michael A., Assistant Deputy Chief of Staff, Logistics, Installations and Mission Support, U.S. Air Force 7

Bartis, James T., Senior Policy Analyst, RAND Corporation 42

Connelly, Richard, Director, Defense Energy Support Center, Defense Logistics Agency 8

Grone, Philip W., Deputy Under Secretary of Defense for Installations and Environment, Office of the Secretary of Defense 5

Sklar, Scott, President, the Stella Group, Ltd. 40

Wagner, Mark, Member, Federal Performance Contracting Coalition, Business Council for Sustainable Energy 45

Young, Hon. John J., Jr., Director, Defense Research and Engineering, Office of the Secretary of Defense 4

APPENDIX

PREPARED STATEMENTS:

Aimone, Michael A. 166

Bartis, James T. 131

Connelly, Richard 158

Hefley, Hon. Joel 57

Ortiz, Hon. Solomon P. 64

Saxton, Hon. Jim 59

Sklar, Scott 77

Wagner, Mark 67

Young, Hon. John J., Jr., joint with Philip W. Grone 138

Page

DOCUMENTS SUBMITTED FOR THE RECORD:
[There were no Documents submitted.]

QUESTIONS AND ANSWERS SUBMITTED FOR THE RECORD:
[There were no Questions submitted.]

ALTERNATIVE ENERGY AND ENERGY EFFICIENCY PROGRAMS OF THE DEPARTMENT OF DEFENSE

HOUSE OF REPRESENTATIVES, COMMITTEE ON ARMED SERVICES, TERRORISM, UNCONVENTIONAL THREATS AND CAPABILITIES SUBCOMMITTEE, MEETING JOINTLY WITH READINESS SUBCOMMITTEE, *Washington, DC, Tuesday, September 26, 2006.*

The subcommittees met, pursuant to call, at 2:03 p.m. in room 2118, Rayburn House Office Building, Hon. Jim Saxton (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. JIM SAXTON, A REPRESENTATIVE FROM NEW JERSEY, CHAIRMAN, TERRORISM, UNCONVENTIONAL THREATS AND CAPABILITIES SUBCOMMITTEE

Mr. SAXTON. Good afternoon.

Today the subcommittee will hold a joint hearing with the Subcommittee on Readiness, chaired by my good friend, Joel Hefley, on the alternative energy and energy efficient programs of the Department of Defense (DOD). We will also have an opportunity to learn about options to affect both energy supply and demand in order to foster lasting energy security, which is a component to national security.

Energy security and conservation of natural resources are cross-cutting issues of great concern to many members of the committee. In fact, we received a bipartisan request signed by more than 20 members of this committee requesting this hearing.

As the single largest consumer of petroleum fuels in the United States, the military has an opportunity to serve as an early adopter of alternative fuel sources and to offer a certain level of market assurance to alternative fuel suppliers. Nonetheless, Department of Defense's fuel usage represents less than two percent of the total fuel usage in the United States. Therefore, we must set realistic expectations. The Department of Defense alone cannot shoulder the responsibility of formulating and implementing a national strategy, nor can it drive the market. However, it is appropriate for the Department to exercise the leadership role in this area, and likewise for this committee to exercise appropriate oversight of those efforts.

Speaking of leadership, I would like to thank the Vice Chairman of the subcommittee, Robin Hayes, for his work on this topic. Robin has been productive in bringing about this matter to the subcommittee's attention and in engaging the Department. This hearing follows a briefing that we had on the subject in June, which was also prompted by Mr. Hayes.

These activities are intended to be the early steps of a multi-phased oversight effort with regard to the investments in the utili-

zation of alternative energy and energy-efficient technologies within the Department of Defense.

Our first panel of witnesses will provide building blocks for greater understanding of, one, the steps taken by the Secretary of Defense to develop a comprehensive energy security strategy; two, how the Air Force, as the largest consumer of fuel within the United States Government, is actively conducting research, development, testing and evaluation of alternative fuels in order to reduce dependency on foreign oil and to maintain assured mobility; and, finally, how the Department procures and distributes fuel, and the Department of Energy Support Center's efforts to assess the current conditions of synthetic fuel markets.

The second panel of witnesses will share their nongovernmental perspectives on several items: first, the Department of Defense efforts to incorporate energy-efficiency renewables and distributed energy programs; second, nontraditional options for increasing energy supply; and finally, third, options for incentivizing the federal contractors and incorporate energy efficiency into government programs in order to reduce energy demand in the federal sector.

We would ask the witnesses to begin by providing their perspectives on the issues. After the conclusion of the testimony, we will open the floor for questions.

With that, I turn to my friend, Mr. Hefley, for any comments that he would like to make.

[The prepared statement of Mr. Saxton can be found in the Appendix on page 59.]

STATEMENT OF HON. JOEL HEFLEY, A REPRESENTATIVE FROM COLORADO, CHAIRMAN, READINESS SUBCOMMITTEE

Mr. HEFLEY. Thank you, Chairman Saxton. And I would like to begin by thanking you and the Ranking Member and all the members of your subcommittee for your support in arranging this very important joint hearing.

As we all know, DOD is the largest single consumer of fuel in the United States. And while this may not be the most glamorous subject we deal with, energy is critical to success on the battlefield.

Fuel and fuel logistics are an enormous part of the Department's operation and budget, as the military consumes over 350,000 barrels of petroleum-based fuels per day. And the Air Force alone seeks a $600 million increase in the annual cost of doing business for every $10 increase in the price of a barrel of oil. Although the majority of energy consumption in the Department of Defense is for transportation, installation energy requirements must also be considered as we work to maintain and modernize our military facilities.

I understand that the Department is actively looking into the energy needs across the board and working to find ways to reduce energy consumption, improve efficiency and employ alternative fuels as they go about accomplishing their mission. And I am delighted to be here today and look forward to this hearing from our distinguished witnesses.

Thank you very much.

[The prepared statement of Mr. Hefley can be found in the Appendix on page 57.]

Mr. SAXTON. Thank you, Mr. Hefley.

Energy conservation is a bipartisan issue, and so we are going to turn to Mr. Ortiz for his comments.

STATEMENT OF HON. SOLOMON P. ORTIZ, A REPRESENTATIVE FROM TEXAS, RANKING MEMBER, READINESS SUBCOMMITTEE

Mr. ORTIZ. Thank you, Mr. Chairman. I would also like to extend our welcome to our distinguished witnesses.

The energy needs of this country are one of the most important challenges facing our Nation today. Energy needs influence our international policies and are key to our National Defense Strategy. For this reason, I am pleased that we are hearing testimony about what the Department of Defense is doing to reduce its needs for external sources of energy.

The rise in cost of gasoline has affected all Americans, and our military is not immune. Rising energy costs are consuming a larger portion of the operations and maintenance (O&M) budget, so every dollar spent on fuel means fewer dollars for operation, training and maintenance.

In a time of increasing needs and increasing budgets, the DOD must find every way possible to stretch its energy dollars. And fuel is not only expensive, it is also very heavy. Moving fuels takes an enormous logistical effort and consumes a strategic lift that could be better used moving soldiers, equipment and ammunition. The most effective way to improve the deployability of our ground forces is to reduce their fuel requirements.

So finding energy efficiencies isn't just about money, it is also vital to increasing the strategic capabilities of our forces.

I have been following the work of the services in developing new technologies. Of particular interest is the historic B–52 alternative fuels test flight conducted by the Air Force on December the 19th. DOD testings and implementation of technology such as this will ultimately influence the private sector and benefit the economy at large. For that reason, it is vital that Congress continue to fund new initiatives and for DOD to aggressively pursue them.

Energy security is vital to our national defense, so we must find ways to reduce our energy needs and find new technologies to meet our energy requirements.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Ortiz can be found in the Appendix on page 64.]

Mr. SAXTON. Thank you very much. Some years ago, Senator John Bennett told me that he had purchased a hybrid car. And I asked him about it and I asked him how fast it went. He said it goes with the rest of traffic. And I asked him how he got his big long legs in it; and he said, I don't know, there is plenty of leg room. So I went out and bought one. And it is really a remarkable technology. And I guess we are here today to kind of do what Senator Bennett did to me: to find out where we are in DOD, let us ask some questions, and hopefully spur not only some discussion here today, but some activity inside of DOD that will lead to other things both inside and outside of DOD to help us understand where DOD is today.

Our first panel consists of the Honorable John Young, Director of Defense Research and Engineering, Office of the Secretary; Mr. Phillip Grone, an old friend who worked here on this committee for many years, and he now serves as Deputy Under Secretary of Defense for Installations and Environment, also in the Office of the Secretary; Mr. Mike Aimone, Assistant Deputy Chief of Staff, Logistics Installations Missions Support, United States Air Force; and Mr. Richard Connelly, Director, Defense Energy Support Center, Defense Logistics Agency.

We are anxious to hear your thoughts of these matters, and so why don't we begin, Mr. Young.

STATEMENT OF HON. JOHN J. YOUNG, JR., DIRECTOR, DEFENSE RESEARCH AND ENGINEERING, OFFICE OF THE SECRETARY OF DEFENSE

Mr. YOUNG. Chairman Saxton, Chairman Hefley, Congressman Ortiz, and members of the committee, thank you for the opportunity to testify today.

I am pleased to have the chance to appear before the committee to discuss the Defense Department's broad range of activities on energy.

Energy security, efficiency, and the use of renewable resources has been of interest to the Administration long before the recent publicity. The National Security Strategy, signed in March of 2006, sets forth a challenge for the Nation to expand the types and sources of energy and to foster private investment that can help develop the energy needed to meet the global demand.

The Defense Department also has unique energy requirements which often align with the energy needs of the Nation. For example, in early August, Major General Richard Zilmer, our Anbar Province commander, submitted an urgent request for renewable energy systems for remote forward-deployed forces due to the vulnerability of supply lines to insurgent attack or ambush by roadside bombs.

The Defense Department has worked steadily toward many of these goals and needs over the past several years. From the facility side, by 2005 the Department had reduced the facilities' energy use by over 28 percent from the 1985 baseline, and the Energy Policy Act of 2005 has reset the baseline and increased the reduction target.

Indeed, in 2005, military service installations received four of the five Presidential awards for leadership in Federal energy management. My colleague, Phil Grone, will be able to talk in much greater detail about these efforts.

DOD continues to develop renewable energy technology and facilities on bases using geothermal sources, wind, solar, and ocean temperature differentials. DOD has a range of research and development programs underway to improve energy efficiency. Examples include the use of lighter-weight materials in platforms, fuel-efficient engine designs, drag-reducing coatings, and testing alternative fuels.

The Service Funded Energy and Power Technology Initiative has focused on lightening the logistics burden of our ground forces by

developing efficient power generation, energy storage and power control and distribution technologies.

Secretary Rumsfeld directed, in the Strategic Planning Guidance this year, that a task force review the Department's efforts on power energy alternatives and efficiency. The Task Force reviewed DOD plans to invest $1.8 billion on energy-related efforts between fiscal years 2007 to 2011.

The military services, combatant commands and defense agencies, embraced this task force, and the result was tremendous collaboration. Indeed, a key early outcome is that the Department has established a Web site for use by the Defense Department's program and policy personnel working on energy. This site is being populated with completed and planned projects, and lessons learned on energy-related programs to allow continued collaboration and coordination. While the work of this task force is not yet finalized, we are looking at a wide spectrum of ideas and opportunities to pursue even greater energy efficiency and flexibility.

Over the next few years, the Department plans to test and demonstrate new technologies for reducing energy consumption for our weapons systems and their facilities. If the technologies are successful, DOD could realize substantial annual savings in energy costs in the long run, with full implementation, and many of the programs may start yielding net savings soon. Some of these technologies should also reduce maintenance cost and the associated logistics tails.

In addition, testing and certifying energy sources for our military platforms in concert with the Department of Energy may help to catalyze U.S. industry to produce these fuels, enabling the Nation to move forward toward the goal of energy security and independence advocated by President Bush in his State of the Union message.

In closing, Mr. Chairman, I will stop, leaving much more to say. The Department is truly grateful for your strong support of our energy initiatives and investments, and I look forward to working with you as we increase energy security and reduce operating costs for the Department. And I look forward to your questions.

[The joint prepared statement of Mr. Young and Mr. Grone can be found in the Appendix on page 138.]

Mr. SAXTON. Thank you very much.

Mr. Grone.

STATEMENT OF PHILIP W. GRONE, DEPUTY UNDER SECRETARY OF DEFENSE FOR INSTALLATIONS AND ENVIRONMENT, OFFICE OF THE SECRETARY OF DEFENSE

Mr. GRONE. Chairman Saxton, Chairman Hefley, Mr. Ortiz, and distinguished members of the joint subcommittees, I am pleased to appear before you this afternoon to discuss the energy efficiency programs supporting the management of military installations by the Department of Defense.

As you are aware, the real property and asset management portfolio of the Department is extensive. The Department currently manages nearly 570,000 buildings and structures, with a plant replacement value of more than $650 billion, and more than 46,000 square miles of real estate.

In support of that infrastructure, and as the single largest energy consumer in the Nation, the Department expended nearly $3 billion on facility energy in fiscal year 2005.

To achieve the President's objectives for energy independence and to meet our management responsibilities under the President's Management Agenda, the Department has continued its development of a comprehensive energy program that conserves energy, invests in energy-demand reduction measures and the development of alternative sources, and enhances our objectives to reduce the total operational cost of our facilities. We are achieving these objectives in a number of ways.

First, conservation. As Mr. Young noted, in fiscal year 2005 the Department reduced standard building energy consumption by 3.3 percent over the previous year, and since 1985 have reduced that consumption by over 28 percent. Since 1990, DOD has reduced energy consumption in energy-intensive and industrial facilities by nearly 22 percent. Energy savings performance contract authority, reauthorized in the fiscal year 2005 National Defense Authorization Act, and extended for an additional 10 years in the Energy Policy Act of 2005, is a key tool. In addition, the Department has launched an aggressive energy awareness campaign.

Renewable energy. The Department has significantly increased its focus on purchasing renewable energy and developing energy resources on military installations. The Department's total renewable energy purchases and generation accounted for 8.3 percent of all electricity used last year, and we have established a goal of 25 percent by 2025.

A key program is the energy conservation investment program, which focuses on projects that produce energy and water savings, renewable energy, and the converting of systems, existing systems, to cleaner energy sources. The Department has achieved significant savings using this program, with projected savings on average of at least $2.30 for every dollar expended. The success of this program led the Department to increase investment in the program for fiscal year 2007 and to enhance the mix of renewable energy projects in the program.

In 2003, roughly 10 percent of the Energy Conservation Investment Program (ECIP) program was dedicated to renewable energy projects. For the coming fiscal year, we expect 28 percent of the program to be dedicated to these types of projects. And also for the first time, the Department proposes to invest an additional $2.6 million through the ECIP program for fuel cell projects that support installation and installation management.

Facility metering. In accordance with the Energy Policy Act of 2005, the Department is developing metering plans to install meters on all facilities where it is economically feasible to do so. We expect that the data gathered can be used to enhance our conservation initiatives, and benchmarking state-of-the-art facilities will provide the ability to prioritize future projects,.

Sustainable design. DOD recently entered a memorandum of understanding with multiple Federal agencies and is developing uniform facility criteria standards for sustainable renovation and construction. New facilities will be required to utilize the standards and will operate under reduced energy consumption.

Alternative fuel vehicles. For nontactical applications, the Department continues its efforts to increase fuel economy and to acquire alternative fuel vehicles. In 2005, DOD represented 71 percent of the Federal purchase of biodiesel. In recent months, we have installed four new E–85 ethanol stations, and the Marine Corps has been particularly successful in meeting Federal objectives by increasing fuel economy in the nontactical vehicle fleet by 4.4 miles per gallon, reducing petroleum use by 26 percent and increasing the use of alternative fuels by nearly 30 percent from the established 1999 baseline.

Last, biobased products. Although not strictly speaking in the energy efficiency program, the Department continues to implement aggressively the requirements of the Farm Security and Rural Investment Act of 2002 that directed Federal agencies to establish procurement preference programs for biobased products designated by the Secretary of Agriculture. These products provide a sound alternative in a variety of applications, and many replace nonrenewable fossil-energy-based products, thereby supporting the President's objective of energy independence.

As this committee knows, the Department is working hard to reposition, reshape, and sustain our military installations worldwide. Your support of our efforts in energy conservation and demand reduction and innovative technologies is an important part of sustaining those installations over time. We appreciate your support and look forward to continuing to work with you on these important programs. Thank you.

Mr. SAXTON. Thank you, Mr. Grone.

[The joint prepared statement of Mr. Grone and Mr. Young can be found in the Appendix on page 138.]

Mr. SAXTON. Mr. Aimone.

STATEMENT OF MICHAEL A. AIMONE, ASSISTANT DEPUTY CHIEF OF STAFF, LOGISTICS, INSTALLATIONS AND MISSION SUPPORT, U.S. AIR FORCE

Mr. AIMONE. Chairman, and distinguished members of the subcommittee, I thank you for the opportunity to appear today to describe the Air Force's new Energy Strategy for the 21st Century and some preliminary results from our recent flight of a B–52 bomber using a blend of synthetic and crude-oil-based jet fuel.

In the aftermath of the hurricanes that impacted the Gulf of Mexico last summer, the Secretary of the Air Force directed extraordinary actions by all airmen to help mitigate the resultant energy issues that faced the Air Force and the Nation. The Secretary has formulated a solid vision and a concrete strategy to implement this vision.

Our energy vision is creating a culture where airmen make energy a consideration in every action. Our strategy is twofold: first, ensuring energy supply-side assurance to critical fuel and utilities is achieved to meet combatant commanders' requirements; and second, identifying aggressive demand-side conservation initiatives focused at aviation operations, ground transportation, fleet management, and an accelerated installations energy conservation program.

Mr. Chairman, and members of the subcommittee, I am sure you are most interested in the Air Force's dramatic flight of a B–52 Stratofortress bomber, powered partially by synthetic fuel manufactured from a pilot synthetic fuels plant in Tulsa, Oklahoma. The flight took place on Tuesday, 19 September, after a set of careful fuel compatibility tests at the laboratories at Wright Patterson Air Force Base, and ground engine tests at the Oklahoma City Air Logistics Center. These tests allowed us to conduct an aviation flight demonstration at the Air Force Test Flight Center at Edwards Air Force Base.

To ensure maximum crew safety in the first Air Force jet aircraft powered by synthetically manufactured liquid hydrocarbons, the test was conducted using a blend of 50/50 liquid hydrocarbons and crude refined jet fuel. Also, the first flight was arranged such that only a single pod of two engines were powered by the blend; the remaining six engines on the aircraft used crude oil refined jet fuel.

The first flight occurred on the morning of Tuesday, 19 September. And while there was an unrelated mechanical issue with the aircraft, over two hours of flight time occurred to demonstrate that the aircraft could fly and land safely.

Additional flights are scheduled. And in fact, if all the maintenance actions we have in place stay this afternoon, we expect the second flight to occur tomorrow morning at about 6:30 local time at Edwards Air Force Base, and it should be about a 10-hour duration flight.

As you know, we cannot accomplish our vision without the full support and cooperation of industry, and, specifically with respect to the aviation operations, without the support of the Federal Aviation Administration. We have partnered with industry throughout our planning and flight testing, and next month we will meet with our commercial aviation counterparts for the second time under the auspices of the Air Transportation Association and the FAA. Our collective goal in these meetings is to ensure we build a road map to successfully create adoption of synthetic fuels for the aviation transport sector.

Mr. Chairman, and members of the subcommittee, I stand ready to answer your questions.

Mr. SAXTON. Thank you very much, sir.

[The prepared statement of Mr. Aimone can be found in the Appendix on page 166.]

Mr. SAXTON. Mr. Connelly.

STATEMENT OF RICHARD CONNELLY, DIRECTOR, DEFENSE ENERGY SUPPORT CENTER, DEFENSE LOGISTICS AGENCY

Mr. CONNELLY. Thank you, Mr. Chairman.

Chairman Saxton, Chairman Hefley, Congressman Ortiz, and distinguished members of the subcommittees, thanks for the opportunity today to describe to you the efforts of the Defense Logistics Agency to support Air Force and Navy efforts to introduce synthetic fuel into the streams of jet and marine fuel that we buy on behalf of DOD.

As the Director of the Defense Energy Support Center, or DESC, as I will call it, which is a field activity of the Defense Logistics Agency, it is my job to make sure that we an uninterrupted supply

of clean fuel for the military forces whenever and wherever they want it. The surging cost of crude oil over the past few years has made the job particularly challenging.

Even though we pride ourselves on acquiring fuel at prices which meet or beat the industry averages, it is somewhat painful to be captive to a crude oil commodity market that reacts to world events in a manner that underlines the downside of our reliance on offshore crude resources.

DESC has been working for some time with the Air Force, Navy, Department of Energy. And industry experts examining the potential for alternative domestic energy sources that might economically provide some relief from our dependence on offshore crude. Among these alternatives are the conversion of the United States' abundant domestic coal reserves to synthetic fuel using the Fisher-Tropsch coal-to-liquid manufacturing process.

In April of this year, the Air Force requested that DESC poll industry regarding its ability to provide DOD with 100 million gallons of synthetic jet fuel, or JP–8 beginning in January of 2009, along with capacity estimates for future years.

The Navy subsequently asked that we include 100 million gallons of Navy jet fuel, or JP–5, in that request.

The request for information, known as an RFI, was released in May, with responses due on August 10th. The RFI asked the respondents a number of questions, including what their proposed feedstock would be, where their plant would be located, when their planned streams of synjet would become available, and what mitigation strategies they might be seeking.

Now, there was significant interest, with 28 firms responding, 22 of which intended to manufacture synthetic fuel. Twenty of the 22 proposed using the Fisher-Tropsch coal-to-liquid technology, and 18 said they would use domestic coal. If such endeavors could acquire appropriate financing, the aggregate stream of synjet by 2016 would far exceed the amount necessary to supplant 50 percent of domestic DOD needs.

The respondents identified significant risk mitigation requirements before they could engage in the development of coal-to-liquid capabilities. Most identified a need for long-term contracts, 15 to 25 years, with guaranteed minimal annual DOD purchases; and, in addition, most wanted a guaranteed minimal price for their product during the contract term. These requirements are understandable from the manufacturer's perspective, but would expose DOD to a significant risk of paying more than the market price for fuel. The length of the contract term would be commensurate with the terms of the financing arrangement. The guaranteed minimum price would protect the oil industry from a dip in the crude oil commodity market below the level of economic viability, precisely the scenario that doomed an attempt in the early 1980's to encourage synthetic fuel production. There was a time when the futures markets were not yet available for private risk management.

Now, we estimate that crude oil price threshold to be $53 to $57 dollars per barrel. Both of these risk mitigators are currently beyond our authority. DESC is legislatively limited to 5-year contracts and must pay fair and regional prices for its fuel. In addition, both of these requirements are outside our normal purchase

practices for jet fuel contracts, which are tied to the market price of jet fuel.

Many respondents also cited the availability of tax credits and Department of Energy loan guarantees as essential to their ability to enter the synfuel business. I believe that additional information on this aspect is available from experts within the Department of Energy.

Another challenge is that of carbon capture. The Fisher-Tropsch process produces almost twice as much carbon as a crude oil refining process. There is no current requirement for carbon capture in either process, but there is concern in the industry that such will be required in the relatively near future. This would raise the price of synfuel. Not requiring carbon sequestration would pose additional risk should it be required in the future.

Senior leadership in DOD is still considering the various options for the way forward. As we wait for that, and with the concurrence of the Air Force and the Navy, we will solicit for synthetic jet fuel within the bounds of our current authorities to determine if there is any interest.

There is little doubt that Fisher-Tropsch coal-to-liquid manufacturing could emerge as a significant source of synthetic fuel that is fungible and interchangeable with the current supply of crude-oil-derived fuel. Without long-term contracts with price floors, financing this process will require confidence by the financial markets that crude oil prices will remain above the $53 to $57 range per barrel.

Thank you for this opportunity, and I await your questions.

Mr. SAXTON. Thank you very much.

[The prepared statement of Mr. Connelly can be found in the Appendix on page 158.]

Mr. SAXTON. Before we begin questioning, let me just take care of a little business.

After consultation with the minority, I now ask unanimous consent that Mr. Conaway and Mr. Israel, members of the House Armed Services Committee, be allowed to participate in today's joint subcommittee hearing, and be authorized to question the witnesses. These members will be recognized at the conclusion of the questioning by the other subcommittee members. Hearing no objection, so ordered.

Let me just begin with a question, kind of a general question. Back in 1980, Congress, in consultation with the Administration, created the Synfuel Corporation. It was a government corporation originally funded at a healthy $88 billion. Even in today's numbers those are big numbers.

The Synfuel Corporation was intended to produce synthetic fuel in partnership with the Department of Energy, which provided price and loan guarantees. The three projects started in 1981. One was Union Oil at the Parachute Creek Shale Oil Project. The second was the Oil Shale Corporation, COSCO. And the third was the Great Plains Coal Gasification Project. None were successful, and in four years Synfuel shut down.

The question is: How have conditions changed in the last four years, and why might we be more successful this time in fostering

a supply base? And what, if any, role should DOD have in this endeavor?

Mr. YOUNG. I guess I would start, and the panel may have additional comments to make.

One thing that is obvious, I think, was noted in the statements, in your statements, is the price of fuel or price per barrel of oil today is significantly higher than the 20 to 30 that was seen in the past, and that makes many of the new fuel processes economical and potentially competitive. They are not initially competitive on small scales, and the fuel that was purchased for the B–52 test was significantly more expensive than the market price. But over time, and with potential support in various forms, including the possibility of long-term contracts, the market can be created out there, and the Department is looking at those issues.

I think the Department of Energy will play a significant role in that. The new act grants them authorities to provide loan guarantees that can help foster businesses moving in this area, and the Congress has provided tax credits that can assist businesses in this area.

Mr. AIMONE. Chairman Saxton, I might offer several other additional comments to Mr. Young's.

The experience over the last 30 years in the industry, both within the engineering and design community with regards to how to develop and plan and design and construct these types of facilities, has matured significantly. As you may be aware, there is a facility—actually, several facilities in South Africa that are very mature. There is an online facility in Indonesia; that didn't exist in the 1980's to the level of today, although Sisal had built an early plant in the middle 1970's, building on the technology that they had refined in the 1950's and 1960's. So engineering designs have matured.

The second is, as I mentioned, the worldwide plan experience. There are two plants online. There is a handful of plants that are in the process of construction. There is a significant effort in China going on, all this building in the worldwide experience of how to build these plants effectively.

I might suggest to the committee that there is an excellent reference that is called The Unfulfilled Promise of the Synthetic Fuels, and it was written in 1986, and essentially went through the questions, sir, you asked in great detail, actually walking back to 1913 in this country when the first initial synthetic fuel attempts were generated in the West Virginia coal valleys.

There is a lot to be understood in that textbook; and I constantly re-read that, about every month, to say let's not make these kinds of mistakes again.

Mr. SAXTON. Have there been other technological changes or advances that have occurred in the last 20 years that give us more hope?

Mr. AIMONE. In a nutshell, no, sir. The technology from the 1920's and 1930's is a very mature technology, at least, I am thinking, the indirect coal gasification technology. There is better ways of using tooling and the like inside the catalyst to get better flow of gases through the catalyst materials to give you more contact area, thus more effort.

There are several universities that have significant research programs in place. To mind comes the University of Kentucky. I hope to visit the University of Kentucky in two weeks to understand their research program. Purdue University, Penn State University, and several others that I am sure I could go on and explain. So there is significant research in this country that is evolving, if you will, not revolutionary, but evolving what is in fact a fairly mature technology first introduced in the 1920's.

Mr. SAXTON. Okay, great. What role should the Department of Defense play in this process from each of your views perhaps?

Mr. YOUNG. Well, as I noted, the Department has in the current President's Future Defense Program, 2007 to 2011, about $1.8 billion in investment. The biggest piece of that is $700-plus million in energy power technology initiatives focused on such things as superconducting motors, efficient energy storage, new technology and capacitors and distribution mechanisms, high power, high voltage, high current switching systems. There is a full spectrum of technology in that space to try to help particularly focus on military systems to deliver more efficiency, maintain performance and potentially enhance options, because, as you know, increasingly the power load on our systems demand more electrical power in addition to the prime moving power for the vehicle. And so we have to be conscious about the so-called "hotel" load to power radars and sensors, as well as the load to drive the vehicle.

So in that technology space, the investments DOD makes I think frequently have a dual-use aspect to them, where many of those technologies can move into the commercial marketplace and enable some of the things that Mike made reference to in other areas. And Phil can talk more about that.

We help, at least in the marketplace, and even pushing the technology, by the deployment of systems in our facilities. And work is being done in spaces such as Defense Advanced Research Projects Agency (DARPA) on higher efficiency photovoltaic cells for solar.

So across the board I think the Department is a partner with other agencies in the government and the commercial industry, which is helping to drive this space and push the technology forward both in revolutionary places and in areas where we see—or evolutionary spaces, and in places where we see chances of an evolution. And I will leave it to the panel to add to that.

Mr. GRONE. Sir, the only thing I would add to what Mr. Young suggested is that there are, just from the perspective of the installation side of the portfolio and the nontactical vehicle fleet—I mean, just recently we had the example of the Marine Corps taking possession through the Army from General Motors a new technology, an alternative fueled vehicle which the Marine Corps will test for several months to a year and provide data back.

So I do think there is a synergy of the activities of the Department and activities of the broader Federal family and industry, both in research and development and the actual application of the technology to vehicles, where we can have an effect on understanding and, ultimately, of markets in terms of demonstrating the viability of certain technologies. But certainly the throw weight, in terms of the major investments and the technologies, the interfaces

of other technologies, are along the lines of what Mr. Young suggested.

Mr. AIMONE. Mr. Chairman, early on when the Secretary of the Air Force asked me to look into this area, I thought of myself as a facilities engineer, and had spoken to the Secretary about the Air Force's facility energy program. And he kind of put his thumb in my chest and said, I like your program, now make this work on the aviation side. And I started looking at it and first discovered that 80 percent of the energy of the Air Force is consumed on the aviation side, that the wonderful opportunities over the last 20 years we have had to save 30 percent of facilities energy in the Air Force was really untouched in energy conservation opportunities in the aviation fleet. And, of course, the attitude was well, we can't tell the flyboys how to fly.

Well, the Secretary has helped me articulate to our aviation counterparts how to effectively accomplish the same training and operational capability, and do it with a little bit more sense of energy conservation in the aircraft system.

At the same time, I had the opportunity to go to Patuxent River and look at the Navy fuels Integrated Planning Team (IPT) operation and what they were doing in fuels research. And then my counterpart in the Navy and I went to Wright Patterson, and we compared our programs and invited the Army and the Department of Energy to come in place. And what we found out is there was a phenomenal program that has been in being for years, but just needed a little bit of executive leadership to bring it out of the weeds. That, sir, is part of what the Air Force can do and I think is doing.

We have the ability to certify fuel for aviation airworthiness. We do that with our counterparts, as Mr. Young mentioned in the aviation sector, the original equipment manufacturers. We have had an opportunity to meet with them in May, and we have a follow-on meeting scheduled for about 30 days from now where we will continue walking down our road map of how do we work together to create the conditions of certifying an alternative fuel.

Mr. SAXTON. Thank you.

Mr. Connelly.

Mr. CONNELLY. As my colleague was saying, I think it is the role of the services and the Department, DOD, to give us the go-ahead as the operational supply chain manager, to go ahead and move forward in these markets.

You did mention, Mr. Chairman, earlier, the percentage of domestic consumption. Internationally that translates to something less than one-half of one percent of total fuel consumed. So while we are probably the biggest single purchaser of fuel in the world, and certainly a voice to be heard in the marketplace, we are not going to move the market, but we can try to exhibit some leadership. What is of main concern to us on the buying side is can we do it economically.

Mr. SAXTON. We are going to move over to Mr. Ortiz shortly, but I guess I would just like to say that it seems to me that the Department of Defense has a real role here to play in terms of showing the appropriate kind of leadership on these issues. We are the biggest consumer of energy in the transportation sector. We have the

capacity to do things that perhaps individuals don't. And if we put our minds to it, we could have a public relations operation that would let the rest of the world—or at least the rest of the people in our country know what it is that we can do to be successful. And to that extent, I think that we are to move forward as aggressively as we can.

Mr. Ortiz.

Mr. ORTIZ. Thank you, Mr. Chairman.

You know, since 1980 to now, that is 26 years, and I am pretty sure that there were some studies made as to what could work and what couldn't work and why they shut down. What has changed from 1980 to 2006 that makes us believe that now we might be able to come up with some type of fuel without having to spend another $80 billion?

Mr. AIMONE. Let me try to articulate two thoughts, sir, if I could.

First, one change is in 1983 and 1984, the price dropped out of the oil market, and what had been fairly expensive oil—in today's market we would cheer for it at $40 a barrel—dropped to 15, $20 a barrel, literally overnight. That I don't believe can happen in the same kind of direction, given the worldwide growth of China and India and the current state of most of the Organization of Petroleum Exporting Countries (OPEC) nations at or near capacity.

Probably second, sir, I would suggest that in this country, the last new refinery built was 1976, which makes it about 40 years old, admittedly having plant improvements all the way throughout. And we operate in this Nation at about 96 to 97 percent of capacity of refinery.

One might argue that given those kinds of margins in both the supply worldwide crude, the demand in the worldwide marketplace, and then ultimately the U.S. refining capability, something has to change. It could be another refinery with oil that may or may not be available in 20 or 30 years. Or maybe if we dream for a moment, it could be an alternative form of energy conversion that would convert some of the U.S. sources of supply of coal, oil shale and biomass into forms of liquid. And although certainly there are opportunities for wind and portable in the infrastructure arena for transportation, and specifically for aviation, liquid hydrocarbons turns out to be the sweet spot for energy per pound or energy per density.

So to sum, I believe the conditions in the marketplace, the conditions in where the plant and equipment is in this Nation, the opportunity of maybe locating a refinery other than along a coast that might be prone to a hurricane or other natural disasters, say, on the West coast, has an opportunity for this Nation to stand up and make a difference.

Mr. Saxton, I would like to beg just one slight technical, if you will, discussion point. Although some will claim that the Great Plains Plant was a failure—and it certainly went bankrupt so from a financial point of view it did—technically it operates still today; it operates at a revenue-stream positive, producing natural gas from coal as well as other significant products for the commercial marketplace. And that is since 1983 it has been continuously operating. So it was an investment, admittedly a lot of money, and it

did in fact technically work. Financially, of course, sir, you are correct.

Mr. ORTIZ. Anybody else? If not, I have another question now.

And maybe can you educate us—I mean, you gentlemen are the experts—in the difference between alternative fuels and synthetic fuels. Now, I know that you cannot utilize pipelines to move it; am I correct when I say that?

Mr. CONNELLY. I can take that. Yes, sir. The synthetic fuel certainly generated through the Fisher-Tropsch process would be a fungible process and interchangeable and could be moved by pipelines, yeah. Some of the alternative fuels, ethanol, I don't think that is the case.

Mr. ORTIZ. Which is the most promising of the fuels that could be used by the military? I mean, I know that when you are in combat, I mean, you have to move the fuel. And it—is very expensive now; I mean, the gas that you get when you drive those Humvees and tanks. You probably have to have a big storage area, just like you do now, to move the fuel.

Mr. CONNELLY. I don't think any of that would necessarily change. The requirements would still be there, and the capability we have today and we will have in the future will be there to store fuel and to move fuel. I guess the point is here that this type of fuel that we are talking about, Fisher-Tropsch and synfuel, would be able to be moved in those same pipelines and stored in those same tanks with our other normal crude-derived JP–8 fuel. And that is the same fuel, by the way, that drives those ground vehicles that you talked about, the tanks and the armored personnel carriers; they also run on JP–8, which is petroleum-based jet fuel.

Mr. ORTIZ. Thank you. I am going to be short because we have a lot of——

Mr. SAXTON. Let me just ask a question for clarification for everybody—or at least for me. I have always used the atomic energy alternative fuel and synthetic fuel as kind of synonymous terms, but I get the feeling there may be a difference in meaning. Alternative fuels seems like—synthetic fuels are, in fact, alternative fuels, and it seems to me like alternative fuels are synthetic. So help me out.

Mr. AIMONE. Allow me to take a stab on that answer.

First of all, the terms are very interchangeable. If you look at EPact, the Energy Policy Act of 2005, section 369, it defines the term—I will even add another one, strategic unconventional fuels, and define that as a combination of coal, oil shale or biomass material that could be converted through an indirect gasification process into liquid products. So maybe if we fall back on the law and say the terminology, or the term of art, it might be strategic unconventional fuels.

I tend to believe that all these terms, alternative fuels, synthetic fuels, unconventional fuels are all in the same class. For example, there are subtle differences. Oil shale is a precursor to oil that has not formed underneath the pressure of temperatures of hundreds of millions of years, and that precursor material can be retorted; i.e., cooked under pressure and turned into oil that could be refined, or it could be turned into—or gasified, as any carbon mate-

rial can be gasified, and turned into carbon monoxide that passes through a Fisher-Tropsch process gasification.

So it gets very steep into the terminology, but I would even suggest to you that wind and photovoltaic would fall underneath this class of alternative energies, and I would refer to Mr. Grone on that.

Mr. SAXTON. Thank you. Mr. Hefley.

Mr. HEFLEY. Thank you very much, Mr. Chairman.

For years I represented the Solar Research Institute at Golden, Colorado, and it is something else now, they have changed the name, still there. They were doing some amazing things, but it seemed like one of the consistencies there was that it cost more in most cases to produce the power that they were producing than the power they got out of it; in other words, they were producing a synthetic fuel; it cost more to produce that than you actually got out of it.

Is that the case when you talk synthetic fuels or when you talk coal liquefying and things like that? Does it cost more to produce a gallon of that fuel than in fuel cost that you get out of it?

Mr. CONNELLY. At today's prices, Chairman Hefley, it does not cost more. What industry is selling as a response to our RFI is at a price range for crude, $53 to $57. That is about the break-even point where they can do Fisher-Tropsch—manufacture Fisher-Tropsch fuel and break even, a crude class above that level. And they are turning a profit is what they are telling us.

Although the financial markets haven't had the confidence yet that the price of crude will remain at a level that would allow them to safely make an investment, and hence the risk mitigators that asked us—or at least mentioned in response to our RFI.

Mr. HEFLEY. Well, let me ask you a little different way. If we are not talking cost, then let's talk about energy used. Does it take more energy to produce a certain—so many British Thermal Unit (BTUs) or whatever of energy than you are actually getting out of it? Even if the cost might be a break-even at $57 a barrel, does it take more energy to produce a unit of energy?

Mr. CONNELLY. I think that would require some research on my part, sir. I will have to take that one and answer it for the record if I may.

Mr. HEFLEY. Okay.

Mr. YOUNG. Chairman Hefley, if I could add some comments to the discussion.

The Department has a Defense Science Board task force looking at this issue, and also some work was done by a study group called the JASONS for the Department. And they looked at some of the issues you have raised, and we can try to get you that information. But it is very important.

And Mike Aimone mentioned the process. You have to look very carefully at the processes of energy in, energy out, and then the by-products. And those can be optimized in certain Fisher-Tropsch processes to be efficient, but there is still, as you rightly say, less efficiency relative to crude processes. For example, it is estimated that the Fisher-Tropsch processes there is as much as four times more capital intensive to build the facilities than a comparable crude process, and then less of the feedstock energy ends up in the

synfuel, if you will, that is produced out of that process in general. So the efficiency losses are losses that are compensated by higher prices in oil, making that process at least viable economically.

Ethanol, for example, which is less useable, in the Department's perspective, because it has two-thirds of energy by volume of a comparable crude product, and it is also highly flammable, has a lower flashpoint, people suggest that that is kind of a near break-even or a little—it is very close to breaking even on the process to produce that fuel. So you rightly say that you have to look carefully at the energy in, versus the energy out, and then add that with the cost factor to determine economic viability.

Mr. HEFLEY. Well, let me ask you, do you see yourself—and by yourself, I mean the Department—does the Department see itself as a test bed facility for new energy resources, energy savings and energy economy? Or do you see yourself as just trying to solve the day-to-day practical problems in saving energy and doing it? In other words, do you see yourself at the cutting edge of trying to produce new sources of energy, or are you just trying to meet the daily requirements?

Mr. YOUNG. Where the requirements of the military demand it, we are prepared to be at the cutting edge of technology. And some of those include the example I mentioned in the beginning, of the complications of getting logistics fuel to forward-deployed and remote base locations make some of the renewable energy methods or alternative energy methods very useful to the military and, frankly, safer for our forces. So in those spaces, we are prepared to work hard and make investments and potentially be first adopters.

In other spaces, we can help enable a market that needs to be driven by the Nation, and probably a significant role by the Department of Energy, and, as was pointed out, the Air Force is working to qualify synfuels and ensure that they don't have detrimental effects on our engines in terms of engine maintenance or wear or premature decay of seals and some of the other things that some of the synfuel properties have.

So I think we can be, as was well noted, a large single source but not a market-driving source, but a force to enable industry to take those steps. Some of that will clearly require additional steps, particularly by the Department of Energy, with the authorities invested in them by the Energy Policy Act.

Mr. HEFLEY. The reason I ask that is that I can see us investing additional moneys over and above what we might invest otherwise if you were just using conventional fuels, if you are a test-bed facility, because with the amount you use this could be the place to test the new technologies and so forth.

And let me ask you, and then I am through, Mr. Chairman, the medical researchers tell us if they just can do their research with stem cells and so forth, that we are on the very verge of solving Alzheimer's and multiple sclerosis and Lou Gehrig's Disease and all manner of diseases if we can just take this one little extra step.

Do you see anything on the horizon that is one of those breakthrough, gee-whiz type things, and if we just take this other step we can really have a breakthrough?

Mr. YOUNG. Other panel members may have a comment. I think I mentioned earlier I am very pleased with the Energy Task Force. The services made substantial contributions and brought to bear their knowledge and experiences. DARPA brought to bear the work they are doing. And I think one conclusion of the task force is it will take a lot of different efforts, each effort producing some incremental benefit, to make a big step in this space.

And I don't see any single thing that makes a dramatic big step right now. There is a lot of work that needs to be done in a lot of areas, from materials to facilities to energy cycle or engine cycle changes, all of which will yield significant benefits that in many cases have a business that pay for themselves for the Department, but no single breakthrough area has a dramatic promise right now that is easily within reach of us.

Mr. HEFLEY. Thank you very much.

Mr. GRONE. Mr. Hefley, on your former question—in the business area of installations, the question is really not a question of test bed, it is a question of applying technology, and the aggressive implementation of applied technology to solve energy-efficiency-demand management issues. So as we talk about what we have done in the last few years, even in the modest ECIP program, of ramping up what we do in the renewable energy category, which is wind, solar, geothermal and similar technologies. As those technologies continue to improve and mature and we apply those, to some degree yes, there is lessons learned, there is what one might call them test bedding; but really it is aggressive application of technology to meet these problems. And again, we are seeing significant savings accrue from that within a reasonable break-even period, on average about six years.

So that kind of return on investment, that kind of stimulus for both market purposes and lessons learned that we can apply to other installations, is an important part of the seed capital we provide through ECIP. But again, it is not a test-bed question. It is different than the tactical question that Mr. Young has to wrestle with with the service acquisition executives and the research and development community, but from a facilities perspective, we are trying to take every aspect we can of new technologies and apply them to how we can have better energy conservation and better demand management, particularly for power on a daily basis.

Mr. HEFLEY. Thank you.

Mr. HAYES. Thank you.

Mr. SAXTON. The gentleman from Arkansas Mr. Snyder.

Dr. SNYDER. Thank you, Mr. Chairman. I appreciate you all being here today. I feel a bit like I am sitting in a sex education class in the seventh grade, which should be a very exciting thing somehow became exceedingly tedious when you have it presented in this manner. But I think what you are saying is we are down to a lot of hard work, and I think your word was incremental in response to the question from Mr. Hefley what was the big and dramatic thing.

Let me go at this a different way. What innovation that—are you aware of any innovations that have been developed, invented in the military or through defense research dollars that have now spun off into the civilian world that I now have in my car or that was in

the plane I rode out on here from Little Rock yesterday or Monday? What innovations in the energy area have been developed by the military that have now spun off into the civilian world?

Mr. YOUNG. Well, I would say, as you probably well know, success has 1,000 fathers usually. So I am cautious to claim success. If you go back 10-plus years, a lot of work was pioneered at DARPA on applying energy—electrical power to military vehicles, and some of those things I think are showing up in the cars, the hybrid cars you see today; regenerative breaking, the idea you would use a system to stop the car that is actually the load on the generator and that generates electricity to help recharge your battery. Some of those ideas were extremely unique to DOD, so I am careful about it, but some of the investments by DARPA made those technologies more and more practical, and then they get picked up in the commercial sector.

A lot of work has been done in DOD, DOE and NASA on foldable tags and solar cells to get the efficiency up, and today we have DARPA looking to kind of crack a glass ceiling on the current efficiency of solar cells to get to a new level that makes them much more economically viable. Across that space, I think several departments, including the Defense Department, can claim credit for being a first adapter, being willing to pursue a technology and, when it has payoff, you can see it quickly picked up in the commercial sector.

Dr. SNYDER. You all said several times that the volume of fuel that you all—and energy that you all consume is actually a fairly small part of the world's use and U.S. use, and I understand that. But who do you think is the leader in the United States Government in terms of aggressively pursuing energy efficiency and new energy sources?

Mr. YOUNG. Well, I think the Department of Energy has a significant mission assignment there. The Department of Defense, because of our opportunity for investment and, as the Chairman pointed out, as well as some of our unique military needs, certainly is on par. And in terms of a lot of different metrics, our installations are leaders in this space. Maybe better to let Phil comment, but the Department has been recognized with, in many cases, a majority of Federal awards because of the steps taken in facilities to make some of those modest, but significant improvements in efficiency and reduced energy consumption in our facilities.

Dr. SNYDER. A few days ago, or within the last week or two, a column, the Commander SEALS I think it was called, SEALS Column or something like that, at a naval air station, that these commanders do very well in terms of communicating with their base and their troops and their military families, and wrote a column about—what the real problem the military is having now that we are underfunding a substantial number of things. We are cutting back the number of hours the libraries are open, and cutting grass, and painting and a whole lot of things.

He was discussing the impact on services to military families on his particular base, but then in the last column he starts talking about we all need to work together to turn off the lights and make sure we are doing the most energy-efficiency stuff. I am thinking, shouldn't we have already invented that? Shouldn't that have been

something 30 years ago that every base in the country before we ever had any kind of an energy—you know, $60-plus a barrel, we all should have been doing that? It should be automatic at this point, shouldn't it?

Mr. YOUNG. Yes, sir. I agree, and I think in some cases the extreme of that is there are many situations where that is automatic. The facilities that are being renovated in the Pentagon, actually to the anxiety of some of the very dedicated people who work long hours, have situations where the lights go off automatically, and you have to take a step to turn the lights back on. I know for a fact the lights go off in the restroom if nobody—for a while and comes back on. So a lot of those steps have been taken proactively.

Mr. GRONE. My observation, Mr. Snyder, from a facility management perspective, his awareness is a continuing concern. And while it may seem self-evident after 25, 30, 35 years that those are the kind of small steps we all should be taking, that kind of awareness campaign, to put it in the forefront of everyone's mind is something we have to continually come back to. It is important to do. It is important to remind people of the effect that those small steps have on the overall management of the facility, the conservation of the resource, the conservation of the dollars.

There is a natural human tendency to stray toward the free rider problem, and making sure the people understand the contribution that they can make, as small as it might be. Making people aware of the importance of energy conservation is something that we take very seriously in the portfolio from a business perspective to make sure that our people understand how important conservation on a daily basis is.

Mr. YOUNG. I think if I could, I agree totally with what Mr. Grone said, but I would add—pick up on something Mike Aimone said. All the services are trying to bring that to light in people's minds, including those of our military operators. The Navy has had initiatives to make the captains of ships very conscious of the fuel they consume and how they consume that fuel. The same is being done in the Air Force in terms of aircraft, and same thing is being done with tactical vehicles in the Army. A lot of emphasis is being put on simulation to try to reduce the steaming or flying or driving hours, so on a big scale, and then on a small scale in terms of the lights. That is, I believe, pervasive and being led by leadership in the Department to accomplish those objectives.

Mr. SAXTON. The gentleman from Minnesota Mr. Kline.

Mr. KLINE. Thank you, Mr. Chairman.

Thank you, gentlemen, for being here.

Every time the DDR&E company show up, I always wish I had paid more attention not in the sex class that apparently Mr. Snyder was having difficulty with, but in chemistry.

Let me just sort of see if I can focus this down on a couple of issues. We talk about—or you talk about in testimony particularly in the facilities using more—increased use of E85, and I think there was a percentage of something like 71 percent biodiesel, and it seems to me that is pretty straightforward to be able to start to use more E85 or certainly E10, E20 in the facilities. And then the DDR&E said, well, we can't use E85 in the military vehicles, I am

assuming we are talking about tactical vehicles, because it is too flammable and some other issues.

Can we—I guess, Dr. Young, can we go to you and just sort of explore that? What are you and the Department looking at in terms of using biodiesel or E85 or E20 or E10 in what I will broadly call tactical vehicles, a little bit separate from the synfuel we are talking about using, the B–52, I assume, but particularly those ethanol and biodiesel sort of blends?

Mr. YOUNG. I think where it is appropriate, those fuels can be used. By some analytical work that has been given to me, 62 percent of DOD fuel use is expended in combis, so where appropriate, some of those fuels, including ethanol, may be viable options, but for, as you said, tactical fuels, there is two-thirds of the energy in a gallon of ethanol versus a gallon of crude-based product, JP–8, and that leads to significantly less energy. You would have to take more fuel, and then the flammability creates a danger situation. So that would not be a preferred option for us, certainly for our deployed forces, and in some cases for training operations day to day on aircraft carrier and the other hazardous situations military equipment is used in. Facilitieswise it is potentially a very viable option, and I will let the panel talk to that.

Mr. KLINE. Before you leave that, I really want to focus a little bit more on this tactical use. Is there someone in the Department who has the responsibility for looking at making the engines more efficient so that you could, for example, use one of these blends of—it could be E85 or biodiesel or something like that to get more efficient use out of it, the turbochargers and that sort of thing? I mean, would you look in the commercial—civilian commercial world now? You are seeing vehicles being made so that they are flexfuel vehicles, and that efficiency loss of increased ethanol use is being addressed. So I am just—who is, who is looking at that? Is anybody in the Department?

Mr. YOUNG. Absolutely. I think, again, as the task force, I think, did a very positive thing in response to Secretary Rumsfeld's direction, looked across the Department and shared that knowledge across the Department, and we have created a Web site to continue to share with the program managers and program officials that information. But within the Department there is work in the services on kind of incremental and even some next-generation-type engines where you would adjust the cycle to achieve upwards of 25 percent reduction in fuel consumption. It is called High-Energy Embedded Turbine Engine Program. It is a follow-on to a precursor where we continually looked at all the features you said, the combuster, the cycle, the turbines themselves to try to get more efficiency. The DARPA has some similar work focused on UAV-class engines that could be scaled to again achieve the fuel consumption reductions that you are talking about.

So across the board, the Army—we are partnered with the Army to look at a ground vehicle demonstrator. The current heavy Humvee gets about 8 miles per gallon at 45 miles an hour. We believe we can build a lighter vehicle using other materials and get as much as 30 to 40 percent fuel savings in a lighter vehicle to that point of view.

So across the board there are a full range of efforts, including putting codings—some of these came to the attention of the task force, and the Department is reviewing them right now. We could put coatings on Navy ship propellers and potentially get four to five percent savings in fuel efficiency and possibly some reductions in maintenance. Looks like it pays for itself and no more—in about a year.

So we are going to put forward all these business cases and let the Department come to, you know, evaluate if we can work them in the budget, but clearly the best business cases I am very hopeful will be part of the President's budget in the coming year.

Mr. KLINE. Okay. Thank you very much, and I see my time has expired, so I yield back.

Mr. SAXTON. Ms. Bordallo.

Ms. BORDALLO. Thank you very much, Mr. Chairman, and, Mr. Grone, it is good to see you again, and I would like to thank the Members for their testimony. I have a rather specific question to my district. And I would just like to share with the committee that I met just this morning with Assistant Secretary of the Navy B.J. Penn, and our conversation included discussion on the potential for alternative energy production out of Guam as part of the development of the new infrastructure to support the 8,000 to 10,000 Marines and their families who are moving to Guam.

Now, this gentleman needs nearly 20,000 new personnel moving to Guam over the next 10 years, and Guam's appetite for energy, like so many other places, will increase substantially. With at least $740 million expected to be invested in base utilities to support this move, there will be opportunities to construct energy-efficient housing, workplaces, and perhaps even a new alternative energy power-generation facility.

Let me therefore go on the record and strongly encourage you and your colleagues, as you look at the development on Guam, to incorporate as many energy-efficient and modern technologies as you can. And to this end, can you tell me what are the most promising types of energy efficiency projects that the Department is currently utilizing or considering that might be employed on Guam? Perhaps you could comment on waste energy technology and wave energy power generation. And because the over 3,000 new family housing units will be built under a privatized housing plan, can you tell me how we can ensure that the private industry undertaking this construction is using as much energy-efficient technology as possible? And I guess, Mr. Grone, we will begin with you.

Mr. GRONE. Well, certainly, ma'am, in the context of the facilities that will be built on the island to support relocation of Marines from Okinawa to Guam, our standard requirements versus sustainable design to improve energy efficiency, water conservation will all be built into those facilities.

In terms of specific technologies, for—to support the utilities, for example, or waste energy or whatever it might be, I think we have to continue to look to the Marine Corps and the Navy as they look at the design criteria, the infrastructure requirements, and they continue to take the master planning process to additional levels of detail to get a better handle on that before we can have a specific discussion about that. I just don't think we are quite far

enough along to tell you that we have come to a specific set of assumptions or recommendations in that regard, but we know it is of deep interest to you and to the committee, and we will keep you informed as things proceed.

Ms. BORDALLO. Would any of the other witnesses care to comment further on that?

If I could then, Mr. Grone, if I could ask any of the witnesses or yourself to please let my office in on any development that will be made, because this is specifically what we talked about this morning, and I would appreciate any information you could give me.

Mr. GRONE. Yes, ma'am. We will certainly do that. And when you ask about specific technology, certainly one of the things we may look to, when we privatized housing on Hawaii, one of the things that was done there by our private sector partner, the largest solar enterprise, solar development in the context of a major housing development is that DOD housing privatization development on Hawaii. So certainly in terms of the work that we have done in housing, other facilities and the project on Hawaii I think sort of proves that. We are looking toward using those applied technologies as aggressively as we can to get the best efficiency and long-term sustainability of those assets as we can.

Ms. BORDALLO. Mr. Grone, my second question is when you speak of this alternative energy, I understand that DOD has a program in Hawaii called the wave energy. Are you aware that there is a pilot program?

Mr. YOUNG. Yes, ma'am.

Ms. BORDALLO. I am curious. We have just as many waves around Guam; in fact, I think they are bigger. Could you comment on that?

Mr. YOUNG. We just—there is a project that is in pursuit. I believe it was proposed by an enterprise in Hawaii. And so through a process we at least endorsed testing of that proposition, and so there is tests underway. Largely driven by where the company was, I think it proposes the idea, but certainly if it is productive technology, it is yet another avenue to produce energy, as you said, very efficiently because there are waves available for largely free all around the world. So very interested in how that project produces——

Ms. BORDALLO. Is that a private program, or is it sponsored by DOD?

Mr. YOUNG. Oh, DOD is participating in the research and paying for a portion of it.

Ms. BORDALLO. Thank you. Thank you very much, Mr. Chairman.

Mr. SAXTON. Thank you.

Mr. Hayes.

Mr. HAYES. Thank you, Mr. Chairman.

Gentlemen, thank you for being here. I have been listening very carefully. This is something that I have been thinking and saying frequently is the future for energy in America, but just as an observation, your responses have been careful, calculated, cautious, as they always are, and I appreciate that. But is this cautious, tepid approach realistic or just cautious? Where are we? Brazil, we say,

is energy-independent. Can we get there? Are we looking in the wrong direction? Can you give me a little help here?

I am just not seeing a level of enthusiasm or interest in the project. I know it is the nature of the Department, but can we step it up a notch here?

Mr. YOUNG. Well, sir, I guess that at least falls to me to start.

Mr. HAYES. Or we could get Phil to volunteer.

Mr. YOUNG. Actually this would be a great chance to set him up maybe. I apologize if we are doing that. We don't mean to do that.

I was extremely pleased and a bit surprised to see the Department has 1.8 billion over the next 4 to 5 years, 5 years invested in this space. It is—most of the investment is tailored to help meet our needs, but it has that great benefit of helping the Nation also get toward its goals.

So I think it is positive, but as a result of the tasking for Secretary Rumsfeld, we said that is not enough. So the Energy Task Force that had tremendous participation from the services and agencies put forward another set of new ideas that we are combing through now, looking at the business cases. Many of those, I think, pay dividends for the Department, but also have dividend potential for the Nation.

And then, as you have heard from other panel members, DOD is looking, even though there is an expense, to be a first adopter of some of the synfuels that—we are actively testing them to see if our engines can run successfully on them, and there is tremendous excitement about that.

You know, visually the market has got to catch up because we can't alone carry that marketplace, and that is the only hesitation, that it is going to take other parts of the government, Department of Energy in particular, and, frankly, the private sector to carry some of these much further toward the finish line than DOD can alone. But we are extremely pleased to be a party to this and having the attention of Secretary Rumsfeld down on pushing forward these initiatives and being willing even in a tight fiscal environment to make investments, help our own energy efficiency, and recognize fully that pays dividends for the Nation.

Mr. HAYES. I feel better already.

Thinking in terms of plateaus, obviously with ethanol, methanol, biodiesel, all these different products, we have gone from purely petroleum-based to a plateau of sorts, and again, based on you all's experience and professional opinion, is this a plateau that needs to move up and out at the same pace? When I say up and out, more effort in development than what we have got on the table. Do we need to have a similar lateral look at what else might be out there. Being an Aggie as well, there is tremendous amount of value as well for the agricultural sector if we are successful going up with some of these renewable fuels.

Anybody want to take a shot at that? Again, we have this new tone of enthusiasm and level of excitement going.

Mr. AIMONE. Mr. Hayes, I have never been accused of not being enthusiastic or passionate about the subject of energy. I have had the opportunity to be in basically every energy initiative the Air Force has created since the 1970's as a form of a crisis, and when I had the opportunity in May to brief the Defense Sciences Board,

my getting off the slide bullet was, been there, got the T-shirt, done it before, dot, dot, dot; how do we prevent this from again happening?

And I know the Secretary of the Air Force personally made the trip out to Edwards for this B–52 flight. The Under Secretary of the Air Force flew out and, in, fact flew on this initial maiden flight. That is a pretty enthusiastic——

Mr. HAYES. I was going to ask if they flew or watched.

Mr. AIMONE. There was a discussion about both not flying on the same airplane.

Mr. HAYES. A lot safer than driving out there in the same car out there together.

But anyway, using that particular example, one of the things that I found when I got interested in, I think we need to, among other things, understand that the marketplace, the petroleum traditional marketplace. And it is human nature, it is not just them, traditionally resist change, particularly if it threatens what they have always done.

So do you all in the research that you are doing see more interest on the part of the petroleum companies, foreign and domestic, to add that to their—to diversify their industry by using their expertise and appropriate materials to get into this business?

Mr. AIMONE. Sir, when Mr. Connelly was talking to the process official, tropes, he mentioned one of the challenges we have to address in this Nation is the carbon capture or the carbon sequestration that might come from a coal gasification process. I might suggest to you that one of the opportunities that exists with the partnership of the oil industry is the ability to take that carbon dioxide, flood it into oil wells that are essentially depleted, and do what is called enhanced oil recovery; in fact, the potential of providing several more years beyond the, if you will, conventionally termed peak oil.

So I do see some opportunities of synergism between the various marketplaces if we can go forward and do this right, and the key word is doing it right.

Mr. HAYES. I appreciate that.

One more comment, if I may, Mr. Chairman.

Mr. SAXTON. Make it a good one.

Mr. HAYES. Okay. It is two good ones. Two things: We have to keep the pressure on so that the traditional energy folks know we are serious; because the price of gas is coming down, which is great, we are not going to stop doing our work. And again, the other thing, having the energy put into the distribution so we can begin to successfully use these products.

Thank you, Mr. Chairman, for your indulgence.

Mr. SAXTON. You are a great American.

Mrs. Davis.

Ms. DAVIS OF CALIFORNIA. Thank you. Thank you, Mr. Chairman. Thank you to all of you for being here.

I wondered if I could go back for a second to the memo that General Zelmer put out that basically looked to creating a self-sustainable energy solution on the battlefield. Could you discuss more—I guess my first question is, in response to some of my colleagues, too, how come it took the general to ask for that? Is it something

that had already been contemplated, we have been working on, trying to figure out how in the world you got that kind of supply, energy supply, to the field without having to transport it and risk the lives of those that are transporting? Had you been working on that? And where are we in trying to actually bring that to bear?

Mr. YOUNG. Well, certainly we have deployed in many cases with the equipment we have had, but made changes as fast as we can through things like the Joint Rapid Acquisition Cell or the Army's Rapid Equipping Force or Operation Respond Navy Marine Corps. And so when we see an adjustment in the requirements, we act.

And then to answer your question more directly, we are already working in those spaces pretty aggressively. So essentially on the shelf there was a system that generates a small amount of wind energy and a battery storage device. There was a separate system that stored solar energy or produces solar energy through solar and can store that in the battery. Those have kind of been combined into something they call the transportable hybrid and electric power station. It generates, I think, a kilowatt, roughly, of energy by wind and has the potential to generate six kilowatts by solar. And there then there is a tactical quiet generator that can generate like three kilowatts, and so you can get a modest steady load and some peak loading, and it looks like that system can serve and answer some of the requirement that General Zelmer tabled, and we expect to have systems in the field by February, if not sooner.

Ms. DAVIS OF CALIFORNIA. If there is a cost to that, obviously, in creating that, how do we balance that? How do we make the judgment then in terms of whether the cost in deploying that is worth it? Has that been an issue?

Mr. YOUNG. I don't think that has been an issue. You know, you get variations in the—I guess the best way I can say is it the commander has a mission to accomplish. General Zelmer has been one of the first, I think, to rightly say, I can do that mission, but in addition to doing that mission, I would like to reduce aspects of it in terms of supply, if you can bring me some technology.

Some commanders have asked not to see technology until it has been fully tested and vetted, so you get this full range of willingness to be a first adopter, if you will, on the battlefield, which has certain risks, as well as others who don't want to take those steps.

But across the board, when we get those requirements, the Department set up processes, and the Congress has been very helpful in providing some funds that let us have these quick reaction capabilities, if there is a technology solution address a need right away, and that is what is happening.

Ms. DAVIS OF CALIFORNIA. Is there anything else you need from the Congress in exploring those possibilities?

Mr. YOUNG. The one thing I would say, and I have said this in previous hearing opportunities, is there are places where technology moves quickly these days. You know, you all are familiar with how quickly new models of home computers come out. Other technologies move in that space quickly, and the commercial market has begun to be a primary force in developing and delivering new technologies, especially if you get on the information side. And increasingly the Global War on Terror demands some of those information-side technology tools. So the more we can have flexibility

and speed and funding, the better we are going to be able to adopt technologies and give them in the hands of troops.

We have some challenges now. I have small companies that feel like they can't get a contract fast enough. Our budget process, you know, if I started today and wanted to do something brand new that required some significant amount of funds, we would put it in the 2008 budget, and maybe 12 to 18 months from now I could do something. That doesn't work as well as the places where the Congress has been very supportive in giving us pools of funds for quick reaction, rapid equipping or counterterrorism, so we can act very quickly when either a requirement or a technology opportunity presents itself.

Ms. DAVIS OF CALIFORNIA. Okay. Thank you very much.

One other—I was just going to suggest, I feel somewhat encouraged with the discussions between the Department of Energy and the Department of Defense. We talk a lot about interagency coordination, or we have started talking more about that. Can you just tell me, the next panel might want to comment on this, how would you characterize that relationship in terms of how well we are working today to make sure that we are vetting issues properly between the two agencies, or even as you go; you know, not just—even agriculture, for that matter, in terms of finding new solutions, where are we? How would you characterize that? Quickly, I am sorry.

Mr. YOUNG. I think there is positive progress there, and there is always more room for improvement. But I had on my calendar—I have a meeting with senior levels of the Energy Department, the task force engaged with senior levels and even working levels with the Department of Energy, and we have made them aware of the work that came out of the task force. So I intend to hold the Department as an open book and encourage and invite others to look at the portfolio. The Energy Department has accepted that and wants to work with us particularly in some of the areas where they are going to have some significant primary responsibilities in terms of are loan guarantees made to stimulate synfuel production and others. In other areas where our technology is dual use, but driven by military needs, they are keenly interested in seeing how those programs progress. So the partnership is good, and we are going to keep working at it.

Mr. SAXTON. Thank you very much. The gentlelady's time has expired.

Mr. Schwarz.

Dr. SCHWARZ. I would like to talk about the Navy. We don't use NSFO anymore, which was Navy Special Fuel Oil, for some of you who know what it is, black oil. That was my time in the Navy. Would a member of the panel or anyone that wants to step in tell me what the Navy is doing both at the level of the fleet, fleet air, land-based air to increase their energy efficiency?

I was interested to hear about the coating on the propellers, which I assume is some sort of a Teflon material or some sort of a plastic to cut down friction to make that—the props a little more efficient. Winglets on aircraft, the most efficient nuclear propulsion for carriers and for submarines, hull design; somebody just give me a good summary of what the Navy is doing at the seagoing level

and the land-based level and at the level of aircraft to be as energy-efficient as it can possibly be.

Mr. YOUNG. If you would offer us a chance to expand the record, I would really like to do that, but I can give you the starting point and tell you——

Dr. SCHWARZ. Real quickly for purposes of the hearing, and if you would like to provide something in writing, I would be delighted.

Mr. YOUNG. The new ship designs have bulbless bows, which provide a few percent efficiency improvement in fuels savings. The DDX design during the time I was in the Navy was changed from four large turbines to two large turbines and two small turbines. The ship can do, you know, basic loitering and some maneuvering speeds and run the whole load on the two small turbines, and only at really high-end tactical speeds move the turbines. That provides several percent of fuel efficiency.

On the aircraft side, the Navy has worked very hard in making particularly the operators conscious of the cost of flying hours and help make decisions about when to fly as well as how to fly to save funds. And the Navy has taken, you know—some of that is a mentality approach. The Navy has made improvements adding stern flaps to ships that added both stability and several percent savings in the fuel economy there. So I would tell you the Navy has a pretty comprehensive—and Phil can add on the facility side, but on the side you are asking about, ships and airplanes, some comprehensive and cultural efforts to improve efficiency either through technology or operating choices on the part of the sailors and marines out there.

Mr. GRONE. Sir, from a facility perspective, the Navy, as Mr. Young indicated, is also stepping out and doing a good deal of leading on the design of facilities. We are also doing—the Navy is actually doing a good deal of work for the interagency on the cost impact of some of the new requirements in the Energy Policy Act in the design and construction program to identify where those requirements are and to develop the energy efficiency measures to achieve the 30 percent reduction that is required by the act.

So the Navy is not just on the hardware side, but also on the brick-and-mortar side, stepping up very aggressively to do the applied technology work, to do the design work, to do the construction activity work that is necessary to achieve the kind of conservation savings that we hope to achieve.

Dr. SCHWARZ. What is the power plan of choice for the Navy surface ship, the Navy combatant surface ship? And then you have to start saying, what kind of combat are you talking about, the medium to larger-size combatant surface ships for the 21st century Navy up to the year 2050.

Mr. YOUNG. Well, I am operating from my previous experience, but the current fleet is, I think, largely certainly the majority-plus level.

Dr. SCHWARZ. We will exclude nuclear carriers and nuclear submarines.

Mr. YOUNG. Right. Equipped with a General Electric turbine, I think 2,500 and 2,500-plus. Going forward in the new generation combatant DDX, and there will—the Navy, I believe, anticipates a competition between at least a couple of vendors for large turbines.

Dr. SCHWARZ. But the very efficient steam turbine is where we are going to go, would you say?

Mr. YOUNG. Right. But the new turbine design, exactly as you said, it offers significant improvements, and it is derived from some of the aircraft engines that have made those step improvements driven by the commercial airlines.

Dr. SCHWARZ. How about very efficient diesel for smaller combatants, yes or no?

Mr. YOUNG. The JASON study I referenced earlier recommended that we take a very hard look at some of the new improvements made, additional diesel engines and potential for a small diesel engine to be used even in many of the Army vehicles, and possibly even reengining the M–1 from a turbine to a diesel. So these recommendations are on the table for us to go back and take a hard look at right now.

Dr. SCHWARZ. Thank you very much.

Thank you, Mr. Chairman.

Mr. SAXTON. Thank you, Mr. Schwarz.

Mr. Taylor.

Mr. TAYLOR. I want to thank the gentleman and follow up to my colleagues' questions.

I am amazed. I guess I have to point this at Dr. Young. The first atomic bomb was detonated in 1945. To the best of my knowledge, by 1953 we had operational nuclear propulsion submarines. So 8 years from a weapon to an ideal source of power for a submarine. Admiral Rickover worked very hard with some success of getting a nuclear-powered surface fleet in the early 1960's, and everything that he said made sense then, makes sense now as far as cutting down your vulnerabilities when you have to refuel, as far as the amount of time you can spend to see—as far as the amount of time you can spend at high speeds when you have to.

But two things have changed. I am going to guess in the early 1960's our Nation still probably produced about 70 percent of its own oil, certainly more than 50 percent and probably closer to 70 percent. Second thing is in the early 1960's, I would imagine fuel wasn't even a factor in the Navy's budget, it was probably so reasonably priced. So given our dependence on foreign oil, given to a certain extent our involvement in Iraq as a result of our dependence on foreign oil, given the volatility of that market, the price spikes, it is still very expensive even though it has come down a little bit coincidentally in time for an election.

Why has the Navy shown such reluctance to go back to nuclear power for the surface fleet? I am convinced that is the way to go. I believe I can speak for my colleague Mr. Bartlett that he is certainly leaning in that direction. But if I look back at what happened with Admiral Rickover, he is the one who came to Congress and said this is the way we need to go. He spoke for the Navy and got a reluctant Congress to come along. Why is it that Congress is now asking the Navy to look at it? What is the reluctance on the Navy's part?

Mr. YOUNG. If I could, I would really like to let the Navy leadership have a chance to answer your question.

Mr. TAYLOR. But I think you are in a very good position; having held that job and now doing something else, I think you can, as we

say, speak freely on this. I would like to hear your opinion on the Navy's reluctance.

I mean, obviously we pay the guys who work in those engine rooms. We spend a lot of money to train them. We spend a lot of money to retain them, but that pipeline for training those people is already there. I am told that the ship is more survivable. It obviously makes sense as far as replenishment, as far as the amount of time you can spend. So there are so many reasons why the Navy ought to be pushing for it.

Give me the downside again based on your experience—and I will open this up to the panel. Give me the downside on why the Navy hasn't pushed for it sooner, and why they apparently don't seem real crazy about the idea right now.

Mr. YOUNG. I don't have enough knowledge as to what led the Navy to retire the surface fleet, and the other knowledge I don't have is what is the complete cost to the Federal Government of that process, because, you know, the fuel really doesn't come—all the costs to the fuel supply are not within the DOD budget.

So I assume the Navy is looking at all those different factors and probably willing to consider the issue especially in light of, as you said, where the price of fuel is in the economy. But there is a clear difference in price between the nuclear fuel ships in the Navy and the conventional fuel ships, too. There is a difference in cost. There is a difference in the labor structure because of the training and skill of the workforces required build those ships.

So there are a lot of different aspects of that issue that I think have to be looked at to give a total answer on that, and I can't answer it today, but we will ask the Navy to get you additional comments.

Mr. TAYLOR. In your previous job did anyone, you know, fairly up in the office or corps say this is the way we ought to going? Is there within the existing office or corps of the Navy right now, anyone to carry that proposal to the extent that Admiral Rickover did back then? Because I haven't met that fellow, and I would like to meet him.

Mr. YOUNG. Well, there is some people that definitely feel strongly about its potential in the nuclear side of the Navy, but I can't say people have advocated its broad expansion to surface ships and others as aggressively as you have recommended.

Mr. TAYLOR. If you think of anyone. Thank you very much.

Thank you very much, Mr. Chairman.

Mr. SAXTON. Mr. Shuster.

Mr. SHUSTER. Thank you, Mr. Chairman.

My question concerns the coal to liquid to coal jet fuel program, and I know that there was a test of the B–52, I think you mentioned earlier, out of Edwards Air Force Base about a week ago. Could you first speak to how that test went? And I know it is probably too early to get the full analysis on the performance, but preliminarily what was the outcome?

Mr. AIMONE. Sir, the first test flew for about two hours. It had a landing gear retraction issue, so we couldn't go up to flight altitudes and fly what is called the test points for the ten-hour flight. So essentially we flew successfully with the engine. We went through various throttle adjustments as we burned down fuel to be

able to abort the mission and land. So from the point of view of a success of an engine operating with synthetic fuel, having thrust and all the things associated with it, and to quote the pilot of the airplane, I saw no difference.

The instrumentation and the telemetry and all that is being analyzed as we speak. We are actually putting most of our energy in maintenance of the aircraft, fixing, tweaking some of the instrumentation from what we saw on the first flight so that we can collect the best information, as I would like to hopefully be able to report tomorrow morning the flight schedule for 0630 local takeoff for about a 10-hour flight where it would go up to altitude, go through a full set of flight regime envelope—etched to the envelope type of tests to see how the fuel operates.

So the short answer is it was able to start, taxi, rotate, fly and land successfully.

Mr. SHUSTER. And you said that hopefully tomorrow you will be able to announce another test flight. How soon?

Mr. AIMONE. There is a test flight that is scheduled for right now in the morning, and I can certainly inform the committee of the success or not of that flight. And it will take several days of data reduction to gather the data and analyze the exact pressure temperatures and thrusts and those types of things, and we expect to have a full report out for all the tests, including the roughly 50 hours of engine run time to date. In the late December, January, February time frame is when we expect to wrap up this entire test program.

Mr. SHUSTER. That is good to hear. And is it accurate to say that the Navy and the Air Force are very enthusiastic about turning coal into jet fuel?

Mr. AIMONE. We are enthusiastic to look for alternative sources of supply to achieve energy independence, yes, sir.

Mr. SHUSTER. I also understand you are getting pushed back from the White House. Office of Management and Budget (OMB) is reluctant to give long-term contracts for coal to fuel, coal to jet fuel. Is that an accurate——

Mr. AIMONE. I would have to refer you, sir, to OMB.

Mr. SHUSTER. From your standpoint in the DOD, you are moving forward. You are enthusiastic about, if this test works out, which it sounds like it very well will work out, that you want to move forward with those long-term contracts?

Mr. AIMONE. Yes, sir. I want to move forward and achieve the ability to certify another source of supply of fuel for aviation purposes, manned aviation flight, yes, sir.

Mr. SHUSTER. And I think Mr. Young may have answered this question Mrs. Davis put forward. What can we do in Congress? And I think you said we were very good at putting programs together, pots of money out there to be able to pursue. Is that something that we should be undertaking?

Mr. YOUNG. I think those efforts can be helpful, and in this space you have rightly focused—and the Department is internally going to think through whether any additional flexibilities would help us. You know, one that is on the table for discussion is there is an approach that lets a contractor come onto a facility, and I really would like Phil to talk more about this, and make an energy im-

provement, and if it creates a savings stream, they can be paid from that savings stream.

There may be an opportunity the task force has brought to the table through some of the services and recommendations to let that be done on our platforms or systems. If we let someone come in and consider reengining airplanes or putting winglets on airplanes or doing something on ships, and if they made that investment and created a savings stream, we could do the same thing with a piece of tactical equipment that has been done with the facility. So we are going to study that and see if there is enough opportunity to come and ask for your help with the legislation that would enable us to go into these kinds of partnerships.

Mr. SHUSTER. I think everybody said today there seems to be a lot of reluctance out there, why we are not moving forward faster. I mentioned the OMB pushed back. Also the Administration, from what I have heard, is reluctant to get involved in what they believe is pushing the market one way or the other, but we do that every day whether it is developments at NASA or Department of Defense. It is something we should embrace, and we are looking at an alternative fuel supply that is a national security issue.

You are saying you don't have those things in place now legislatively that can move forward to do that program. You need us to act?

Mr. YOUNG. I am not sure I am aware of any particular reluctance. I think we still need information, just as you will ask us for information so you and we can make the best possible decisions. The law governing all the branches of government right now, I think, limits in general the five-year contracts, and indeed when we want to enter into a multiyear contract particularly for tactical systems, we have to have specific legislative authority even when there is a great business case.

So to go beyond five years I think we will need some legislation, and we will need to bring you the data, but in many cases, and I would be more comfortable with my colleagues talking about it, the indications are to us that in some of these areas because of the capital costs and the facilities to produce these synfuels, just being a customer and an anchor tenant customer may not be enough. We may need to be a long-term anchor tenant customer and agree to some price floor that keeps that enterprise viable. And as you can see, there will be some that will be for that and some that will be concerned about that, because if the price of oil were to drop significantly, we would find ourselves committed to a contract with a pricing floor because we agreed, as Chairman Saxton has pointed out, to go into a long-term business venture.

So we need, I think, to keep collecting a data set, but I don't—I would not want you to perceive that as a lack of enthusiasm and determination. In fact, I hope you have heard from the desire and qualify and tests of the fuels. Right on the heels of that is a desire to see that marketplace be able to produce it domestically, because right now we don't have a domestic source for the quantities that even DOD might want to buy synthetic fuels, and so there is a potential for that to be bought offshore.

Mr. SHUSTER. Thank you very much.

Mr. SAXTON. The gentleman's time has expired.

Mr. Secretary, let me just ask you this. I am told that the Secretary of Defense already has the authority to waive the application of any provision of law prescribing procedures to be followed and award contracts if, number one—and that is under 10 USC, section 2404—if market conditions for the fuel source have adversely affected DOD's ability to buy it; and, two, the waiver will expedite the government's ability to buy the fuel. Why is this authority not sufficient in this case?

Mr. YOUNG. I think the statistics have said, frankly, the Department of Defense's demand for fuel can be met by domestic production sources. So there is not an extremist situation here. We can make—we can be a positive customer in pushing forward the demand for synthetic fuels and in creating capital investment to those facilities, but the conditions that would let the Secretary of Defense recommend a waiver I don't think exist right now, because, frankly, DOD's needs can more be met by U.S. production capability.

Mr. SAXTON. Charlie, did you have a comment?

Mr. CONNELLY. I would agree with that comment, sir. We have thought about it, but we are certainly not in a position to say we are in that kind of situation now, and we are able to adequately source all the fuels we need worldwide to perform our mission.

Mr. SAXTON. Maybe we can talk about this some more as we go forward. This is really an important point, and we will work with you.

Mr. Langevin.

Mr. LANGEVIN. Thank you, Mr. Chairman.

Gentlemen, thank you for your testimony today. It is a very interesting and timely topic, and it is essential that we maximize this issue of developing alternative fuels for our own national security needs long term.

During the discussion we talked about—Mr. Connelly, you touched on the fact that the capital markets have not yet seen the payoff investing in big dollars in this area, and, Secretary Young, you said that DOD can't do this all on its own. And the previous line of questioning, I think it kind of gets to the point of isn't it just, you know, clear here why we need a long-term national energy policy in place with a dedicated funding, significant amounts of funding to sense prime purpose, so to speak, and start to get the benefits from it, the breakthroughs? And can we get the attention of the capital markets. Could you comment on that?

Mr. YOUNG. I think some of those issues are particularly going to be addressed by DOE. As the Chairman noted, there are some tools that under the right extreme circumstances could let us take action. Without extreme circumstances the Energy Policy Act gives the Department of Energy authority with some modest set-alone guarantees and other tools to help stimulate that investment. I think DOD's purchase of fuels and testing fuels helps stimulate it. So all these are moving forward progressively.

I am not sure I see the Department of Defense getting into the loan guarantee business, and we are trying to understand, though, the full spectrum and the task force's table, a full spectrum of ways the Department—and Mr. Connelly might be able to comment more—that we can do this. Either long-term contract to buy, would

we provide some support? The commercial marketplace seems to be willing to make those investments. I think he can say better than I but something like 28 responses to requests for information on the potential for us to purchase 200 million gallons of fuel. So there is a lot of interest in energy out there. We need to frame the rest of the details and figure out what is going to be the appropriate role and the role the Congress would support for the government, and some of that rests with the Department of Energy as well as the Department of Defense.

Mr. LANGEVIN. Mr. Connelly, would you care to comment?

Mr. CONNELLY. The clear signal from our respondees to our responders was that they would be seeking risk mitigation factors from us before they would be able to obtain the financing they would need.

Mr. LANGEVIN. On the test of the B–52 using the synthetic fuel, can you elaborate on—did you get more flying hours out of the synthetic fuel that was used? And basically cost ratio, was it—was there significant cost savings in using this, or is that too early to determine?

Mr. AIMONE. Sir, it is a great question. We blended the fuel such that it was a drop in for JP–8. So from a testing point of view, it acted like jet fuel. It was, in fact, blended such that it would meet the jet fuel specifications, so it had no more or no less efficiency in amounts of BTUs per pound. Both become very significant in aircraft use. So it is status quo because we blended it to be such.

The fuel itself inherently has the same energy component as any of the liquid hydrocarbons in aviation, JP–5, JP–8 aviation, JP–8, et cetera. Where there is a difference is the environmental characteristics of the fuel in its nature. That is to say, if it burnt 100 percent synthetic, it would not have sulfur, and it would not have the so-called aromatics or benzene rings that are producers of both soot and, in the case of benzene rings or the case of the sulfuric acid, some type of a small component. So the environmental consequences are significant there. Although we would like to make sure that we look at the whole picture, which is the manufacturer of the fuel and ensuring that we take care of the carbon management issues in the industry manufacture and fuel.

Mr. LANGEVIN. The cost issue.

Mr. AIMONE. The cost that we have, this was a research quantity of 100,000 gallons of fuel, a one-time purchase, so these costs were fairly high. In fact, the actual cost of—the actual was about $23 a gallon of the neat or the 100 percent synthetic before it was blended.

Mr. LANGEVIN. How much regular jet fuel?

Mr. AIMONE. It was blended 50/50.

Mr. LANGEVIN. But the cost of regular jet fuel is——

Mr. AIMONE. Is about $2.50 a gallon, so 10 times, roughly.

Mr. YOUNG. So if I can use that maybe to tie together the previous discussion, that fuel was on the order ten times more expensive than what we are paying every day for fuel. This is the right thing to do to test and certify and give ourselves an alternate source, but nobody would be comfortable with the idea that DOD's fuel costs would go up by a factor of ten, and even if we could pay that bill, as you have heard testified today, that stimulus alone

would not likely by itself create the capacity in the marketplace. It is going to have to be add, buy with other demand. And if we created that demand, the price would come down.

The question is, how fast would the price come down, and when can we get it closer to the market? Because I think the desire on the Department's part and probably the Congress's part is going to have this fuel cost get as close to market as possible in the end state over some period of time.

Mr. SAXTON. The gentleman's time has expired.

Mr. Bartlett.

Mr. LANGEVIN. Thank you.

Mr. BARTLETT. Thank you very much, gentlemen, and thank you very much.

The Corps of Engineers commissioned the study on oil, I think it was dated last September. It was several months before it was available openly. In that study it was concluded that oil production has either peaked, or its peaking is imminent with potentially devastating consequences.

On page 10 of The Washington Post today was a little article referencing a paper just printed in the proceedings of the Academy of Sciences which said that the Earth was at its highest temperature in the last interglacial period, which is about 12,000 years long.

Mr. BARTLETT. And indeed, the article said that the earth was at its highest temperature and highest carbon dioxide level in a million years. Mr. Young and the rest of the panel, I am asking you if you see any common interest or challenge in these two reports, the one by the Corps of Engineers on peeking of oil, and the article in the proceedings of the Academy of Sciences, that the world has reached its highest level of CO2 and its highest temperature in the last million years, and if so, what ought we be doing about it?

Mr. YOUNG. Mr. Chairman, I know you are, frankly, more familiar than I with some of those statistics. One statistic in some of the studies is, as much oil as has been recovered and consumed to date will be recovered and consumed from now until 2030 and make a significant dent in the known reserves. These factors raise questions about the long-term price of oil, which you are extremely familiar with, and they are driving a lot of the Department's demand and desires to have options ranging from our investments in fuel cells to solar across the border, but the Nation as a whole has got to take those steps, and I think the department is trying to be a participant, if not, frankly, a leader, in many of those areas in pushing that effort forward.

Mr. BARTLETT. I would be very skeptical of Energy Information Agency projections as to the amount of oil that is to be found. They are based on data from USGS, which makes the assumption that the 50 percent probability is the equivalent to the 50th percentile and therefore the most probable. And most of the experts that I know of in the world believe that we have probably found about 95 percent of all of the oil that we will ever find. There is a very interesting oil chart, which you may have a copy of, and Professor Laherrere says that it is essentially inconceivable that with all of our exploration techniques and computer modelling and 3–D seismic, that the world will find as much or more oil than as now exists. We have about a thousand gigabarrels of oil out there yet to

be pumped. USGS assumptions assume that we are going to find another thousand gigabarrels of oil out there; that is absolutely improbable.

And I checked with the head statistician from the Congressional Research Service, and this is an absolutely bizarre use of statistics, to assume that the 50 percent probability is the 50th percentile, and therefore the most probable thing. Indeed, they have a chart 10 years old from which they make projections from where they think oil discovery is going to go, and it is not following their optimistic 50 percent probabilities. It is following, as you would suspect it would follow, the 95 percent probability because that is what the 95 percent probability said.

If indeed these two studies—and I think I that they are related—what we need to be doing is aggressively moving from an economy based on fossil fuels for two reasons: One, they are going to run out; and second, we are now releasing more carbon—on renewables, you are releasing exactly the amount of carbon in the atmosphere that you sequestered from the atmosphere in making the renewables.

And so I think there is indeed a common thread between these two articles, and they both demand that we do something much more aggressive in the energy area than we are doing. And I am appreciative of what you all are doing, but it is in—the reality is, they are simply nibbling at the margins, and that is maybe all that, in Defense, we would expect it to do, but it sure as heck, as a country, it is not what we would expect it to do.

Thank you very much for your testimony.

Mr. SAXTON. Thank you, Mr. Bartlett.

Mr. Udall.

Mr. UDALL. Thank you, Mr. Chairman.

I want to thank the panel as well, and thank my colleague, Mr. Bartlett, for his continued advocacy of paying attention to the reality of the situation we face.

Mr. Connelly, I was glad to see in your testimony that you mention the concern that industry has, and by extension the DOD has, about possible future requirements for carbon capture and the Fischer-Tropsch processes. And I want to thank you for thinking about it. And if I could, I want to ask you for the record at a later date if you would just submit some of the ideas that the DOD and your office is generating as to how you would respond to that eventual development, and that is that we will require some form of carbon sequestration with a cap and trade program to back it up, whatever it might be. If you do would that, I would be greatly appreciative of it.

Mr. CONNELLY. I would be pleased to do that.

Mr. UDALL. Director Young, Mr. Aimone, great to see you. You testified about the Energy Task Force, and I know your report is due—I think it is looming, right, in the very near future? I have read in some of the testimony that the Task Force might lead to a permanent Assured Fuels Task Force, and I wonder if you could comment on that. And I would like to put a pitch in that, if a permanent group, committee or body were chartered or put into force, would you also consider including power solutions to such a body?

Mr. YOUNG. One of the recommendations from the Task Force is to continue, if you will, the Task Force. And specifically, I think you probably—you said one recommendation is that there might be a—the Task Force or a smaller group to look at the assured fuels issue and develop options and solutions. I think that will be the recommendation we take to the Secretary.

And on a personal basis I will tell you that the participation of the services and agencies in this group to achieve collaboration and coordination is one of the highest benefits, aside from tabling ideas. And so I would be a fan of continuing this forum and sharing the lessons so the Department continues to maintain an integrated program going forward as we especially consider new investments and opportunities and make sure those are fully informed by the knowledge that exists in the Defense Department.

Mr. UDALL. Mr. Grone, do you care to comment?

Mr. GRONE. I am going to associate myself with Mr. Young's remarks. And I think to the extent—and one of the benefits of the work that we have done today is it is broadbased. It is not just an R&D question. It is not just a platform question. It is—we have tried to take a holistic approach to the entirety of the Department of Energy's requirements, be they facility based or system based. And I would expect that that kind of work in collaboration between our sides of the house and certainly with AT&L and certainly with the components would continue.

Mr. UDALL. I think there is just so much opportunity here as we have discussed in the past. And I would like to be a part of seeing that those task forces are stood up in a permanent way.

I would like to thank the Chairman, Mr. Saxton, and the other chairman, Mr. Hefley, for responding to the broadbased interest on the part of the committee members to have this hearing today. I know 20 Democrats or more signed a letter asking for this kind of hearing to be held, and I am pleased that it has unfolded in this way. And I have never seen in my eight years on the Hill so much interest in this across party lines. And I think the challenge for us is to keep this commitment very steady over the next decades, because of the threats but also because of the opportunities this presents. And we have often asked the DOD and the men and women in uniform to lead our society forward in ways that aren't necessarily center to the mission, but whether it is integration of our troops, new products and services that have resulted in civilian advances in their quality of lives, this is key, I think, and I have got great faith in what you all can accomplish.

I wanted to just finish two quick points. I want to thank you for your emphasis on the nontactical fleet liquid fuels opportunities, because historians are going to excoriate us for burning oil in our automobiles because there are so many uses of petroleum; there are so many of uses of it that have higher value. But as you push a nontactical fleet expansion in ethanols and otherliquid fuels, you could make the case that that leaves the petroleum for the higher uses in our battlefield and in our airplanes and so on. So I want to encourage you to continue to do that.

And then, much more specifically, I know we have talked, Mr. Grone, about what you might do in Colorado as we expand the presence of the Army, particularly with a fourth ID moving to Colo-

rado, but also the academy is there, and NORTHCOM NORAD. And you had some plans afoot for the installations there. I could make a pitch again that we would like to see that in Colorado. We style ourselves as the Saudi Arabia of whatever it is, renewable technologies. And I see my time has expired, but if you had ten seconds worth of thought on that, I would appreciate it.

Mr. GRONE. Well, certainly we continue to work with the services on issues related to installations in Colorado. As we came out of a fairly comprehensive base realignment and closure process, those installations proved to be enduring installations. And the work that we are doing—it is important that—there is a lot of opportunity I think for joint approaches in the Colorado Springs area between the Army and the Air Force, and we are continuing to explore those. As those mature, we will keep you and the rest of the Colorado delegation and the committee informed as we move forward.

Mr. SAXTON. Thank you very much, Mr. Udall.

Mr. Israel.

Mr. ISRAEL. Thank you, Mr. Chairman. And thank you so much for extending me the courtesy of sitting in on this subcommittee. I am a member of the full committee, not this subcommittee, and I appreciate your kindness and Ms. Simler's assistance.

I won't abuse the privilege; I just want to make one point. I have one very quick factual question and then a slightly broader question. The point that I want to make is that Mr. Bartlett and I have been working very closely together on a bipartisan energy security working group, which we will kick off on Thursday with Secretary Gordon England. We are trying to bring members together, again on a bipartisan basis, to focus in on this issue. And I appreciate the cooperation of the Department, as well as Jim Woolsey, who has been one of our key advisors.

Quick question to Mr. Aimone. Is the Air Force Research and Development Program on SynFuels fully funded in this fiscal year? We are going to do a DOD appropriation at some point today. To the best of your knowledge, do you have all of the resources that you need for that specific program, or are there any funding shortfalls that you are concerned with?

Mr. AIMONE. Mr. Israel, for fiscal year 2007, what we are working is approximately $13 million worth of funding to be sourced from within Air Force needs—existing Air Force capability to be able to meet this need. We think that moves us to the continued steps that we are wishing, including the purchase of twice the amount of fuel that we purchased this year, so 200,000 gallons. There will be a problematic issue with that in that the pilot plant that we were able to secure the 100,000 gallons from this year is shut down, so we don't know exactly the route to secure that fuel, but that will be part of our challenges and will be part of our challenge to understand how to do that.

So the short answer is, I believe the money exists within the funds available to the Department.

Mr. ISRAEL. For this fiscal year?

Mr. AIMONE. For fiscal year 2007. For fiscal year 2006, that is terminating in three days, we have achieved exactly what we wanted to do, and we have enough money to finish out the flight tests. We actually believe that we will have a little bit of fuel left when

we get done with the second and potentially third flight test to move the jet up and do some on-the-ground engine starts in a very cold weather environment. So we think fiscal year 2006 funds are sufficient. We believe that with the funds that we have available within the Department, we can proceed in the direction we were hoping to go to with the Secretary of the Air Force for fiscal year 2007. And then fiscal year 2008 is going to be what we are debating internally.

Mr. ISRAEL. We will work together on that, and I am sure my colleagues will do just that.

A slightly broader question to Mr. Young. On the issue of DOD's role as a test bed or facilitator or a catalyst, Mr. Saxton and I sat in a Stryker combat vehicle in April in Iraq; great platform, great tactical vehicle, gets between five and ten miles to the gallon. Shortly after that, I met with representatives of the big three, and I said, you have Members of Congress driving around Capitol Hill in hydrogen demo vehicles; why aren't you starting to work on plug-in hybrids and hydrogens and other applications for the battlefield? And here is what they said, Congressman, we can make anything you want. You want hydrogen, we can do it. You want to plug in hybrids, we can do it. The problem is, don't tell us what to do, ask us to risk all of our capital and our R&D dollars to build something that nobody wants to buy. The two worst selling vehicles in America right now are the Hummer H1 and the Honda Insight, which is a hybrid.

The DOD has always been a test bed. DARPA helped create the computer chip, the Internet, the Boeing 707. So my question is, what are you doing specifically with Detroit to incentivize and facilitate new partnerships for R&D that may make sense for our tactical vehicles? My belief is you are spending about, department-wide, about $500 million a year on R&D for advanced energy, alternative fuels programs. How much of that is spent in investments with Detroit and partnerships with Detroit, not only to protect our national security but create jobs in the manufacturing industry?

Mr. YOUNG. I would have to expand on that. You know, we target the research to need, and then go out and competitively award it. And so some of it is incumbent on companies to come and bid and propose ideas to us, we can't necessarily go out and pick a small group of three and say, we want to give you money. But in those cases, the Army in particular has a strong partnership, both through past experience and proximity, with some of the auto manufacturers. And I think TARDEC has done a lot of work with them on a range of technologies. The Department of Energy has particular relationships with—I suspect you are extremely familiar with—on hydrogen vehicles and other such things. Hydrogen poses some unique problems for DOD in terms of tactical battlefield use, but there are other options that we are very interested in discussing with them, and in many cases, some of the Special Forces and others use some specialty or slightly modified commercial vehicles to accomplish some of their missions. I know the sealed delivery vehicles, some of them are pulled by the high end trucks that we buy off the commercial line, so when those products can meet our needs, we certainly pursue them because they are usually cost effective.

Mr. ISRAEL. Thank you, Mr. Chairman.

Mr. SAXTON. Well, thank you very much. This has been an interesting two hours. Thank you for being with us to share your ideas, and thank you for your patience. We appreciate your participation, and we look forward to working with you as we move forward.

We will move on now to our second panel, which consists of Mr. Scott Sklar, who is president of the Stella Group Ltd.; Dr. James Bartis, Senior Policy Analyst of the RAND Corporation; and Mr. Mark Wagner, member of the Federal Performance Contracting Coalition of the Business Council for Sustainable Energy.

Thank you for joining us, gentlemen. We look forward to hearing from you.

Gentlemen, thank you for being with us, we appreciate it. We are interested in what you have to say, so why don't we get right to it, Mr. Sklar.

STATEMENT OF SCOTT SKLAR, PRESIDENT, THE STELLA GROUP, LTD.

Mr. SKLAR. Yes, thank you, Mr. Chairman. I will try to keep this short, since I know it is late.

First, I want to thank the subcommittee for just looking at these issues. As you know, it is important.

Secretary Rumsfeld has two activities underway, the Defense Research and Engineering Power and Energy Task Force, and then the Defense Science Board Task Force on DOD energy strategy. These are good, too, this is good news. And it is good looking at these issues from 60,000 feet, but there are some ongoing activities that DOD is doing that need to be lauded. DARPA programs are really very sophisticated and have been ongoing. Some of the work that I wanted to highlight is work on fuel cells, biomass, waste utilization. I brought a sample of the Nano technology solar they support that they are putting on tents. These are light sensitive dyes, totally new materials that can make the tents on the battlefield produce their own electricity.

There are a lot of specialized programs, too. The ones I like on the procured programs, we have 10,000 solar blankets for powering field phones. Here is one of them that is put out that—just so that you can keep the field phones running on sunlight during the day and then use their batteries at nighttime. And obviously, they are out in the military and on the battlefield today.

We have the Air Force's Advanced Power Technology Office doing cutting edge stuff the way the military ought to in distributed generation from fuel cells to solar to biomass to combining power. And the Centers for Army Analysis and for Naval Analysis are doing the analytical work we need.

We have had four executive orders under President Bush and an overarching one of President Clinton that have set the stage for some of these activities.

And last, I participated in two studies under DOD auspices on November 2003 on Army installation security and then a report to Congress issued March 2005 that took about two years and dozens of experts within DOD primarily and a few of us on the outside. The first one was important because it was really a response to the President that, if we had catastrophic grid failure or if we had

pipelines down, either natural gas or fuel, for any length of time, could we have critical functions at key military bases? And it was pretty dismal, actually. So we need to look at new technology to ensure that we can meet the challenges that we face, particularly after September 11th.

We have a lot of these reports and programs going on throughout DOD, but we have a problem. And the problem really is that there is no central place within that agency where the studies, the ongoing programs and the experts within DOD, retired from DOD or have supported DOD, that people within the military can sort of find out what is going on. So you have a lot of times—every year, we are spending time and money repeating the same learning curve. We have got to stop that. We need to have experts—projects need to be conveyed both in a database and in ongoing programs via National Defense Universities, and at the War Colleges for the emerging leadership, so they know about what we have discussed, what we have studied, and what new technologies either DOD is testing, evolving or in fact trying to adopt.

And, you know, Major General Zimmer, we talked about so much; he found out about the units by chance. And we have a demo in Arlington, Virginia,10 minutes from here—I am happy to show the committee—using solar and wind in a deployable unit using shipping containers, where you can add diesels, you can expand—contrary to what Mr. Young testified to you—into hundreds of megawatts on the field, battle hardened. And they were stunned. They should have known about that.

Similarly, the Defense Science Board—as you know, that is underway—was stunned that the Army Analysis Center had already done fuel-cost analysis on what it actually cost the military to bring one gallon of fuel to the battlefield front. It is exorbitant. And so if you are going to do cost/benefit analysis, you ought to know what your costs are.

I included in my testimony lots of studies, but I want to point out a few of them.

First of all, we have commercial technologies in our markets that can impact on the military. We have shown, for instance, that we can have new technologies—and a recent Department of Energy study showed that Europe recycles lubricating fuels three times that of the United States—that if the Department of Defense looked at new processes and new technologies—and we have one company in Texas with a pilot line that has shown that you can recycle lubricating fuel used by the military. I have a little sample here from this company. And most of that recycled fuel is the highest quality lubricating oil you can use, so it is military quality, and diesel fuel. So why wouldn't we want to have that capability at virtually every base and at the front lines so we are recycling the fuel we have rather than concocting new ones? Good idea. And this is very superior to sort of what I call the primitive recycling we use now.

Mr. SAXTON. Excuse me for just a moment. Did you say that you—you confused me when you said you can recycle fuel.

Mr. SKLAR. In this case, lubricating oil; I wanted to say, in this case, you are correct.

I also want to say that we have an immense set of new technologies from efficiency renewables and distributed generation, I listed them in my testimony and provided pictures. I brought in, it just hit the markets, our screw-in bundled Light Emitting Diode (LED) lights that take about 60 percent of the energy for the same lumens. And so now we can screw them in in basic traditional sockets for lighting. We ought to reduce military facilities and on-field installations, and with a real move by 60 percent in reduction.

I would like to add—and again, I am abbreviating my remarks—to push that the advanced technologies—and I include all the advanced distributed technologies—fuel cells, combined heating power, wave-powered buoys, micro hydro photovoltaics, solar, thermal, ground-coupled heat pumps, modular biomass—I am sure I missed a few, small wind—are utilized cost effectively in real terms. The military is using them all, and they are hidden away or pushed to the side. We need to expand it. We need to replicate it. We need to train our emergency officers and leaders with it. And then as these markets expand, which they are at 30 percent a year, they will come down in cost, and we will have a more resilient, a more agile military force and a greater defense that will have less chance of having fuel disrupted.

And then I would like to just comment that there was a misstatement here by one of the Defense testifiers that the energy balance on biofuels was even. And the Department of Agriculture has completed two studies during this Administration to show a positive energy balance of 1.4 to 1.8.

And last, the question of fuels might be better addressed with we want a portfolio of fuels, and we want to follow the private sector approach of multi-fuel vehicles. And I yield to the Chairman—who has a few more hybrids than I own—to understand that. But the fact of the matter is we have the technology to utilize a range of liquid fuels in our military and be agnostic about it, which would give us far more agility in the field than worrying about a particular fuel here and there that needs to be centralized, pipelined and centralized.

Thank you very much.

[The prepared statement of Mr. Sklar can be found in the Appendix on page 77.]

Mr. SAXTON. Mr. Bartis.

STATEMENT OF JAMES T. BARTIS, SENIOR POLICY ANALYST, RAND CORPORATION

Mr. BARTIS. Mr. Chairman and distinguished members, thank you for inviting me to testify today.

My testimony addresses alternative fuels for military operations, specifically alternatives to JP–8 and its close relative, JP–5.

These fuels are preferred for combat operations because of their high energy content per unit of volume and because they are less subject to accidental ignition, as compared to gasoline. In the United States, there exists only two technically viable alternatives to crude oil for producing significant amounts of JP–8 over the next 20 or so years. One option is to tap abundant and rich oil shale deposits in Utah, Colorado and Wyoming. The other option is based on a method known as Fischer-Tropsch synthesis. This method

uses coal or a combination of coal and local agricultural wastes or other types of biomass to produce liquid fuels.

But beyond the co-feeding of biomass with coal, no other technically viable approaches are ready today for using renewable resources to produce significant amounts of JP–8, or similar fuels such as diesel or home heating oil.

In particular, the potential for biodiesel, which is produced from vegetable oil today, is severely limited by very low yields per cultivated acre and because of the amount of suitable arable land available in the United States. Also, at the current state of technology development, there is no fermentation type process capable of us producing a product that would be suitable for blending with JP–8, as is the case for gasoline, which can be blended with ethanol.

Some very promising near-term development work on oil shale is underway in Colorado, but pending success in this work, oil shale remains a very expensive option for producing liquid fuels. For this reason, the remainder of my remarks will be focused on the prospects and policy issues for coal-to-liquids development.

My bottom line is that the prospects for a commercial coal-to-liquids industry developing within the United States remain very uncertain. Three major impediments block the way forward: uncertainty about the costs in performance in coal-to-liquids plants; uncertainty about the future costs of world oil prices; and third, uncertainty about whether and how greenhouse gas emissions, especially carbon dioxide emissions, might be controlled in the United States.

Given the importance of these three uncertainties, an immediate national commitment to rapidly put in place a multi-million barrel per day coal-to-liquids industry would be premature. Rather, Congress should consider a more measured approach to developing a coal-to-liquids industry.

The focus of that measured approach would be to foster early commercial experience by promoting the construction and operation of an unlimited number of commercial-scale plants. Getting early commercial operating experience from a few coal-to-liquid plants would yield important benefits. Cost and performance uncertainties would be reduced. Early operating experience would promote post production learning. And most important, a small number of early plants could form the basis of a rapid expansion of a more economically competitive coal-to-liquids industry in the future.

But just as it is in the national interest to promote early production experience, it is just as important that this early experience be limited to a few plants. A Federal subsidy of fuel production from such plants could be very expensive. A mere $10 per barrel subsidy for a single small commercial plant producing 30,000 barrels per day would add up to a taxpayer burden of about $100 million per year.

A second reason for a measured approach is to avoid adverse economic impacts that would be associated with a dramatic increase in orders for specialized materials and equipment, and such cost increases could spill over to other sectors of the U.S. economy. The third reason is that a large increase in coal use may just not be

consistent with the need to reduce worldwide greenhouse emissions.

An advantage of the Fischer-Tropsch approach is that carbon dioxide generated at the plant's site can be easily captured. Therefore, the first few coal-to-liquids plants might be able to put that carbon dioxide to a good use, such as enhancing petroleum in U.S. oil fields. However, until carbon sequestration on a large scale is demonstrated as technically viable, we must recognize the possibility that coal use for both power generation and liquid fuel production may not be a sustainable path for the United States.

There are productive measures that the Federal Government can take. The Federal Government should consider cost sharing the development of a few site-specific designs. The information from such efforts, which each design costs about $30 million, would also provide Congress with a much stronger basis for designing broader measures to promote unconventional fuel development. The Federal Government can also take a number of approaches to reduce the risk to owners of coal-to-liquids plants of a sustained drop in world crude oil prices.

The challenge here is to protect the taxpayer by minimizing Federal expenditures while at the same time providing appropriate incentives to motivate private investment. Purchase agreements, which basically involve a guaranteed minimum purchase price, are one approach for mitigating financial risk that we understand are being considered by the Department of Defense. This approach can be effective for reducing risk to plant investors. However, I do caution against the use of Federal loan guarantees. Firms with the technical and management wherewithal to build and operate first-of-a-kind coal-to-liquids plants generally have access to needed financial resources. Loan guarantees induce the participation of less capable firms, thereby increasing the financial liability passed to the public.

If the Federal Government is prepared to promote early production experience, then expanded efforts in other areas would also be needed. Most important, the Federal Government should accelerate the development in testing, including large-scale testing of methods of long-term sequestration of carbon dioxide. This could involve using an early coal-to-liquids production plant as a source of carbon dioxide since they are excellent producers of it for the testing of sequestration options.

Finally, consideration should be given to enhancing long-term, high-pay-off, high-risk research in both fossil as well as renewable routes to distillate fuels, including routes involving fermentation.

In closing, I thank the committee for looking at this very important issue. Thank you.

[The prepared statement of Mr. Bartis can be found in the Appendix on page 131.]

Mr. SAXTON. We thank you, Mr. Bartis, for your very excellent testimony.

Mr. Wagner.

STATEMENT OF MARK WAGNER, MEMBER, FEDERAL PERFORMANCE CONTRACTING COALITION, BUSINESS COUNCIL FOR SUSTAINABLE ENERGY

Mr. WAGNER. Thank you, Mr. Chairman.

I am here on behalf of the Federal Performance Contracting Coalition. We are a group of energy service companies, including Ameresco, Chevron Energy Solutions, Honeywell, Noresco, and my company, Johnson Controls. Our business is to help military installations become energy efficient and energy secure. And please let Mr. Hayes know that we are darn enthusiastic about it.

Mr. Bartlett referenced a recent Army Corps report that issued an insightful analysis on energy issues facing U.S. military installations. The critical issues in that report were energy availability, affordability, sustainability, security, and they did mention the fragility of the electric grid.

The report recommended energy efficiency measures, because they are readily available and pay for themselves; expansion of renewable energy and onsite generation at military bases; and leveraging financial options.

Currently, we have the technology to address many of the problems and the recommendations in the Army Corps report. The issue is whether we can adequately deploy those solutions. Let me cite several successful projects on military bases that provide energy efficiency, reliability, security and renewable power.

At Elmendorf Air Force Base, a 50-year-old heating and power plant was replaced with a new energy-efficient distributed generation system. Picatinny Arsenal in New Jersey, again, distributed energy and back-up generation was installed to address energy efficiency and mission needs. At Twentynine Palms in California, a dual-fueled co-generation plant was erected, and one of the largest photovoltaic solar plants in the country was installed. This co-generation plant is fueled by gas line, and if the gas line is disrupted by an earthquake or mischief if you will, this plant can switch immediately to diesel fuel, which is on base and on critical loan to the base for the two weeks. That is energy security, sir.

Naval Station Guantanamo Bay, high-tech windmills are now providing more cost-effective power than off the extensive grid. And Fort Bragg now has a new combined heat and power plant for energy efficiency and security.

Unfortunately, Mr. Chairman, these successful projects are more the exception than the rule. We need the will and the way to deploy efficiency and alternative energy technologies that we already have at more military installations throughout the country, the world and even in Guam, sir.

To do this, investments are needed in energy-efficient equipment and systems. One way to do this is to appropriate more dollars, but we know sufficient funding for infrastructure improvements are tight. The main program Mr. Grone mentioned earlier today was the ECIP program, the Energy Conservation Investment Program. According to the Office of Management and Budget, this program has a 3–1 return on investment ratio. For every dollar that Congress appropriates for this program, the Department of Defense saves $3 in energy in these projects. Unfortunately, funding for ECIP is basically at the same $50 million level that it was when

it was created 15 years ago by this committee. To be honest, with a 3–1 return on investment, this program should get a $100 million increase.

The alternative to direct appropriations if the dollars aren't available is financing projects through the energy savings, which Mr. Grone also brought up, programs such as the Energy Savings Performance Contracting Program. Let me explain how that program works. Under the program, the private sector energy companies finance, install and maintain new energy-efficient equipment in Federal facilities at no upfront cost to the government. The energy service company is paid back over time from the dollars saved by the agency on its energy and maintenance bills. The key is that project costs are guaranteed by the companies to be paid from the energy cost savings. As you can see on the chart, the second bar can exceed the first bar, the original energy cost. If the energy savings do not occur, the contractor doesn't get paid. In addition, the energy savings for each project are measured and verified on a regular basis. This acts as an insurance policy for the government.

The bottom line is that the energy use is guaranteed to be reduced; the military base has new energy-efficient equipment, and it does not pay any more than it was already paying for utilities. The five successful projects I mentioned earlier were all done by ESPC, with no upfront funding from the government.

The infrastructure investments for these five projects were worth over $200 million to the Department of Defense. This was financed by private sector capital and paid back with guaranteed energy cost savings.

While the ESPC program has enjoyed support from Congress and the Administration, quite frankly, the program needs to be supercharged. It has yet to rebound from 2004, when the authority lapsed and all projects stopped. In our written testimony, we have offered a number of specific recommendations to improve and accelerate the program. I won't go over each one individually. But the important thing to note is this program is one of the few ways DOD can afford to address its critical energy needs of its facilities. Agencies need to be encouraged—no, sir, they need to be required to develop energy-efficient projects at their installations.

Finally, let me close with a few comments on sustainable buildings. The private sector has embraced green buildings because they save money. Sustainable buildings optimize energy efficiency and water efficiency, reduce operational costs and improve indoor environment and worker productivity. To the private sector, it is all about the bottom line because sustainable buildings are better and cost less to maintain.

DOD has embraced the concept of sustainable buildings and have signed on to the Federal-wide Memorandum of Understanding supporting sustainable buildings, but the problem is resources to build them. Far too often MilCon dollars are forced to focus on first costs, and the ability to build sustainable buildings suffer. The Congress and the Department need to find solutions to the first cost trap and develop ways to consider the long-term operational impact if we don't build sustainable buildings today.

DOD buildings built with fiscal year 2007 MilCon dollars will be around long after most of us in this room are gone. We should not

burden the Department's O&M budgets long into the future because we didn't build sustainable buildings today.

Thank you, Mr. Chairman. I appreciate the opportunity to testify.

[The prepared statement of Mr. Wagner can be found in the Appendix on page 67.]

Mr. SAXTON. Thank you very much, Mr. Wagner.

I would just like to explore a couple of practical issues that came to my mind.

First, Mr. Wagner, while you were talking, I gather from the title of your organization that you are a business man?

Mr. WAGNER. Yes, sir, I work with Johnson Controls.

Mr. SAXTON. Good. Then you are the perfect guy for me to ask this question.

Currently in the Department of Defense, we have a privatization housing program that is well underway; are you familiar with it?

Mr. WAGNER. Yes, sir, very familiar.

Mr. SAXTON. My understanding is that, with regard to solar, there are many programs in the country where a house built with solar energy or with solar energy applied to it—solar energy application, if you will—that the power company will actually give a credit for electricity that is fed back into the grid.

Mr. WAGNER. Yes, sir.

Mr. SAXTON. That is okay. Good. My understanding——

Mr. WAGNER. In some States, I know they do it.

Mr. SKLAR. It is called net metering, and it is accepted in 29 States.

Mr. SAXTON. Okay, that is a good thing. What would prevent the Department of Defense from writing specs from a privatization project involving housing to build a—to put specs in a proposal that would include electrification through solar? And I am not quite sure about the logistics of whether the contractors would pay for the electricity or be reimbursed through the solar process, or whether the military family would, but if we put those specs, that would be a private investment in military housing not only for the housing, but for the energy.

Mr. WAGNER. I would say you would probably have to have the project be in a location where solar energy is certainly viable and there is a good return on investment, because the way I understand the housing privatization project works there, there is a certain amount of income stream that the private sector is using to finance the cost of the housing that is built.

The other problem you have got is, who is paying the utility bill? If the housing privatization firm isn't on the tab for the utility bill, then there is not going to be an incentive for them to install higher—but you could structure the program like that.

Mr. SAXTON. Good. I will tell Mr. Grone next time I see him. Thank you.

Mr. Sklar, the other issue that I thought was interesting was your lubricant recycling suggestion.

Mr. SKLAR. Yes.

Mr. SAXTON. On a military base in theater, is it practical to move in a recycling process that would work on a relatively large scale? I mean, if you are at Baghdad Airport or you are at the air base

north of Baghdad, which I can't think of the name at the moment—Balad, thank you—or any other number of other places, I mean, I have been there. There are fleets of cars and trucks, as was pointed out a little while ago, Strykers and other tanks, whatever; seems to me like there would be a very large need where this process could not only save us the necessity of using up additional lubricant but also the cost of getting it there.

Mr. SKLAR. Mr. Chairman, you are absolutely right. I am a private business man as well, and I have been asked by many of the military bases here, domestic, as well as in Iraq and Afghanistan, as to looking at recycling. They have to collect the fuel, the recycled lubricant anyway. There are concerns about the military for recycling or getting rid of fuel that is extended, old lubricants. By being able to have the capability onsite not only to recycle the lubricant but to return it to its highest lubricant value and have diesel fuel—and remember, diesel fuel is used extensively for generators overseas—it could really be of value.

In addition, we have waste, moving pallets and other biomass, and there has been a big move to bring modular biomass generators, gasifiers to get rid of that waste as well. And the reason that Major General Zimmer was interested in solar and wind shipping containers was also to get rid of the miles high of shipping containers over there, trying to figure out what to do with them as well. So this concept of recycling what we have for higher value has to be a critical concept not just here in the States but as we create this next-generation, more agile military force.

Mr. SAXTON. Thank you very much.

Ms. Davis.

Ms. DAVIS OF CALIFORNIA. Thank you, Mr. Chairman.

Thank you to all of you for being here.

I think what sometimes happens with the second panel, unfortunately, we have fewer people here, but there is also a kind of disconnect between what is said in the first panel and the second panel, and unfortunately, we don't have you all together. And I always find that to be quite frustrating, not just on this committee, but on others as well.

Mr. SKLAR. Happy to do that in the future.

Ms. DAVIS OF CALIFORNIA. Could you address—we can point to a whole lot of issues, culture perhaps of the DOD, vis-a-vis private industry and a host of areas. If there is a way of trying to bring those two together, do we not have enough individuals working in DOD on these kinds of issues that are embedded from time to time in the private sector that would make a difference? You know, I know there are no silver bullets here, but are there some ways in which you think we can better bridge the gap between what is actually going on in the private sector with the military? I know that we have certainly—Homeland Security, for example, major companies that were so frustrated because they couldn't bring their technology to bear in the Homeland Security effort. And we were just getting geared up for that process, but on the other hand, it just took forever, and it still is not easy. Can you help me out with that? What do you suggest?

Mr. SKLAR. In my testimony, I recommended that there are some brilliant lights in the Department of Defense programs going on,

and we need to figure out a tactic—and it really has to be the prodding of this subcommittee, actually—to highlight those programs and to get them acknowledged by their peers. We have to, again, develop databases so that their knowledge and their successes are easy to access because there is no—it is so big, it is such a giant agency it is hard to get control of. So a lot of the successes that Mr. Wagner just testified on are not known generally in the agency, except by some of the people involved.

And last, we need to integrate these successes in the War Colleges at National Defense University and the service space war colleges so that the leaders of that are coming through them—that will be your generals and admirals and colonels—will be aware of what is going on, will have seen that those doing these kinds of cutting-edge things are getting acknowledged and rewarded so that they feel open to do it. And unless that is all done in sort of a parallel set of tasks, you are going to have these hearings again four years from now wondering why we are not caught up and having it service-wide. So we really need your help as a full committee to help pursue this.

Ms. DAVIS OF CALIFORNIA. Did you want to comment?

I appreciate you all addressed that to a certain extent, but there, obviously, is a push back, and I am trying to get through that.

Mr. WAGNER. We work with some great folks on bases who really want to do the right thing and deploy technology, but oftentimes we are faced with the fear of action is greater than any greater consequence of inaction, not doing something. We find people are at their, gee, I don't know if I should do that; is this the right thing to do? These contracts are complicated. They are long term. They frankly wring their hands over them. They are concerned about approval processes for them.

We need more top level cover, if you will, from leaders in Congress and the Administration to say it is okay to go do these things. You need to be doing energy efficiency projects, and you need to bring these technologies to bear. There ought to be a—there are goals out there right now, but they are goals. There are not a lot of requirements. And I think that is truly important. And I think we find that a lot of projects get stalled because someone along the line starts asking a whole lot of questions about it, and then everybody backs off because they are afraid, you know, let's not get in trouble for this one. And we find that on a lot of initiatives that are out there.

Ms. DAVIS OF CALIFORNIA. Okay, I guess that is for us, Mr. Chairman, to follow through.

Mr. SAXTON. Thank you very much, Mrs. Davis.

Mr. Udall.

Mr. UDALL. Thank you, Mr. Chairman. I appreciate your question, Mr. Chairman, about net metering, and I think Mr. Sklar said, in 29 States, net metering is in place. I would invite you to take a look at a couple of pieces of legislation here that would apply to that metering standard in the entire country. There are some vested interests that get pushed back with a great deal of alacrity against such an idea, but it has proven to be quite a great tool to promote residential as well as commercial use of solar technologies to generate electricity.

Mr. SAXTON. Good. We are going to be in touch with Mr. Grone about it and see if we can't use this as an example where the Air Force or the military can have some significant level of demonstration project for the American people to take a look at. I think that is a great thing.

Go ahead, I am sorry.

Mr. UDALL. No, I appreciate the commitment to pursuing this further.

Mr. Wagner, I just want to thank you for pointing out in your testimony the need to combine existing MilCon and O&M resources and look at a longer life cycle, if you will. And I think that is the opportunity here in all of these fronts, is to look at the external cost as well as the longer lifecycle cost. And then if you amortize those correctly, you can make a case that almost all of these technologies are equal to or surpass existing technologies. So thank you for doing that.

Dr. Bartis, you talk about the approach that would work, excuse me, for coal-to-liquids production, and I want to commend you because I think you have really uncovered the way to perhaps promote the private sector's involvement in this in ways that would really make sense. In particular, you talk about the loan guarantees and how they have actually created the wrong kinds of incentives, and I think history bears that out. And I hope we listen as a committee and as a Congress to those recommendations.

Did you want to make any other comments in that regard?

Mr. BARTIS. I believe the Chairman asked the question, what is the difference between now and the SynFuels Corporation in the 1980's, and hopefully, we have learned some lessons. In the 1980's, the SynFuels Corporation was basically industrial policy that said the United States is going to produce massive amounts of synthetic fuels, independent of what economics said of the environment. And what we are advocating is a much more measured approach when it comes to shale oil or coal-to-liquids in which we test the waters to see what we have there. And if we are going to do that, do what else has to be done, especially push the renewable side, push the environmental side and make sure we understand what these technologies do.

Mr. UDALL. And particularly in Colorado, we are sensitive to the oil field dynamic. There are new technologies, the so called in-situ processing of oil shale, and it has some promising potential. But the oil companies themselves are moving slowly, and certainly of the communities that were burned by this sudden dissolution of that whole effort don't want to experience that again. So I think you remind us that history is a great teacher.

Mr. Sklar, thank you for being here today and for your enthusiasm. I think Congressman Hayes would not have asked you the question that he asked the previous panel——

Mr. SKLAR. I brought toys and technology for him.

Mr. UDALL. And I do think there is a great interest in OSD and the DOD in general because they understand the vulnerabilities that we now have because of our dependence on or foreign oil and particularly in the liquid fuels area. And of course, we are discussing liquid fuels and transport fuels in one category, and then the other is electricity and power generation in another. And they are

linked, but I think the most pressing challenge we face, if you set aside the carbon equation—which I don't—is on the liquid fuels side.

I think Congresswoman Davis asked you my question, but I wanted to give you a chance to elaborate. You have outlined the work you have done with the Department of Defense, and you have talked about creating a database and putting this in the history and the opportunities here into the War College curriculum. Would you care to comment on any additional length about what you envision?

Mr. SKLAR. Well, I do want to point out that, in 2003, under the Office of the Assistant Chief of Staff for Installation Management, they also recommended a development of a standard verifiable database on new generation technologies, analytical tools dealing with reliability and robustness for distributed generation. And the U.S. Air Force, in the same year, under a security benefits study said that by adding distributive generation to diesels for critical load support added several days without traditional fuel supply capability, and I have this in my testimony.

And if 70 percent of the tonnage that the U.S. Army brings into battle is fuel, 70 percent, if there is any way to reduce that tonnage by using, you know, lubricant recycling, distributed generation to reduce traditional diesel and more advanced technologies, frankly, even for vehicles, it would be immense not only the savings but the agility of the military. And it is that recommendation that I mirror out of that 2003 study, but that I see day to day in dealing with DOD, that if we don't create the centralized database, if we don't use the bully pulpit of both Congress and OSD to highlight the good activities that we see—some of which you heard today—and then embed it in this War College program, which is the teaching vehicle for our leaders of the future, we are going to miss the boat.

And I have been involved with National Defense University. They bring me different energy experts in to interact with senior military officers. And in most cases, they are stunned about this stuff. I mean, I brought this bundled LED light that produces the same lumens for a 60th of the energy, that you can screw in. And the officers were told these are not commercial yet, that there is no screw in LED lights. Well, there are. So the private sector is using them. And I think what Mr. Wagner said is, the private sector is willing to put up its own money in many cases where they can build margin, and we ought to support that as strong and as fast as we can. And then where there is learning to be occurred, we ought to support the programs within the military, which is willing to take the risk, to put them in real world situations.

And, you know, again, if we don't do it, you will be sitting here four years from now—I will be a lot grayer and a lot less hair—saying the same thing, and you will be chiding these guys saying, why aren't they doing it? So we need your help.

And that is why, by the way, Mr. Chairman, this hearing is so important, and I thank you for doing it.

Mr. UDALL. Mr. Chairman, just 20 more seconds because I know, Mr. Chairman, the chairman has sat here for a long time this afternoon, but the chairman is known as a champion of the Special Forces branch of our military, and he understands how important

it is to winning the war on terrorism. And much of what is being discussed here today and the mobile solar panels you have here will be very, very helpful to our Special Forces efforts as they become more agile, as they are also dependent on information and some of the modern ways that we fight, and that is why this is also important in this particularly specialized area of Special Forces.

So, Mr. Chairman, thank you again for your indulgence and for holding this important hearing.

Mr. SAXTON. Thank you, Mr. Udall.

I just would comment on your last comment that one of the biggest problems Special Forces soldiers have is, when they put that knapsack on their back with a 100-plus pounds on it, a lot of that 100-plus pounds is batteries.

Mr. SKLAR. Yes, sir.

Mr. SAXTON. To the extent that we can lighten that load or replace those pounds that are taken up with batteries with other technology that does the same job, the further ahead we will be in giving them the capabilities that they need. Good point.

So thank you all for being with us. We appreciate it very much. We hope you will stand by in case we have some questions as we move forward and thanks for a stimulating discussion.

Mr. SKLAR. Thank you, Mr. Chairman.

[Whereupon, at 5 p.m., the subcommittee was adjourned.]

A P P E N D I X

SEPTEMBER 26, 2006

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

SEPTEMBER 26, 2006

CHAIRMAN JOEL HEFLEY

OPENING REMARKS

ALTERNATIVE ENERGY AND ENERGY EFFICIENCY

PROGRAMS OF THE DEPARTMENT OF DEFENSE

September 26, 2006

Chairman Saxton, I'd like to begin by thanking you, the Ranking Member, and all the members of your subcommittee, for your support in arranging this very important joint hearing. As we all know, DOD is the largest single consumer of fuel in the United States and while it's not a very glamorous subject, energy is critical to success on the battlefield.

Fuel and fuel logistics are an enormous part of the Department's operations and maintenance budget as the military consumes over 350,000 barrels of petroleum-based fuels per day. The Air Force alone sees a $600 million increase in the annual cost of doing business for every $10 increase in the price of a barrel of oil. Although the majority of energy

consumption in the Department of Defense is for transportation, installation energy requirements must also be considered as we work maintain and modernize our military facilities.

I understand that the Department is actively looking into its energy needs across the board, and working to find ways to reduce energy consumption, improve efficiency, and employ alternative fuels as they go about accomplishing their mission. I'm delighted to be here today and I look forward to hearing from our distinguished witnesses.

Opening Remarks of Congressman Jim Saxton
Chairman, Subcommittee on Terrorism, Unconventional Threats and Capabilities
House Armed Services Committee
Hearing on DoD Alternative Fuels Technologies
September 26, 2006

Good afternoon, ladies & gentlemen. My name is Jim Saxton and I am the Chairman of the Terrorism and Unconventional Threats and Capabilities Subcommittee of the House Armed Services Committee. Today, the Subcommittee will hold a joint hearing with the Subcommittee on Readiness, chaired by my good friend Joel Hefley, on the alternative energy and energy efficiency programs of the Department of Defense. We will also have an opportunity to learn about options to affect both energy supply and demand, in order to foster lasting energy security, which is a key component to national security.

Energy security and conservation of natural resources are cross-cutting issues of great concern to many members of this Committee. In fact, we received a bipartisan request, signed by

more than 20 members of this Committee, requesting this hearing. As the single largest consumer of petroleum fuels in the United States, the military has an opportunity to serve as an early adopter of alternative fuel sources and to offer a certain level of market assurance to alternative fuel suppliers. Nevertheless, DoD's fuel usage represents less than 2% of the total fuel usage in the United States. Therefore, we must set realistic expectations. The Department of Defense alone cannot shoulder the responsibility for formulating and implementing a national strategy, nor can it drive the market. However, it is appropriate for the Department to exercise a leadership role in this area and, likewise, for this Committee to exercise appropriate oversight of those efforts.

Speaking of leadership, I would like to thank the Vice-Chairman of the Subcommittee, Representative Hayes for his work on this topic. Robin has been proactive in bringing this matter to the Subcommittee's attention and in engaging the Department. This hearing follows a brief we had on the subject in June, which was also prompted by Robin. These activities are intended to be

the early steps in a multi-phased oversight effort, with regard to investments in and utilization of alternative energy and energy-efficiency technologies within the

Department of Defense. Our first panel of witnesses will provide the building blocks for a greater understanding of:

- The steps taken by the Secretary of Defense to develop a comprehensive energy security strategy,
- How the Air Force, as the largest user of fuel within the U.S. Government, is actively conducting research, development, test and evaluation of alternative fuels in order to reduce dependency on foreign oil and to maintain assured mobility, and
- How the Department procures and distributes fuel and the Defense Energy Support Center's efforts to assess the current conditions of the synthetic fuels market.

The second panel of witnesses will share non-government perspectives on:

- The Department of Defense' efforts to incorporate energy efficiency, renewable and distributed energy programs,
- Non-traditional options for increasing energy supply, and
- Options for incentivizing federal contractors to incorporate energy efficiency into government programs, in order to reduce energy demand in the federal sector.

We would ask the witnesses to begin by providing their perspectives on these issues. After the conclusion of the testimony, we will open the floor for questions and answers.

With that, I turn to my friend Joel Hefley for any opening remarks he would like to make. Joel will be followed by the Readiness Subcommittee's ranking member, Solomon Ortiz, to share his perspectives on this important issue.

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Our witnesses today are:

Panel One

Honorable John J. Young, Jr.
Director, Defense Research and Engineering
Office of the Secretary of Defense

Mr. Philip W. Grone
Deputy Under Secretary of Defense for Installations and Environment
Office of the Secretary of Defense

Mr. Mike Aimone
Assistant Deputy Chief of Staff
Logistics, Installations, and Mission Support
United States Air Force

Mr. Richard Connelly
Director, Defense Energy Support Center
Defense Logistics Agency

Panel Two
Mr. Scott Sklar
President
The Stella Group, Ltd.

Dr. James T. Bartis
Senior Policy Analyst
RAND Corporation

Mr. Mark Wagner
Member, Federal Performance Contracting Coalition
Business Council for Sustainable Energy

I would now like to invite Mr. Young to begin. Thank you.

HONORABLE SOLOMON ORTIZ

HEARING ON THE ALTERNATIVE ENERGY AND ENERGY EFFICIENCY PROGRAMS OF THE DEPARTMENT OF DEFENSE

September 26, 2006

Thank you, Mr. Chairman.

I would also like to extend a welcome to our distinguished witnesses. The energy needs of this country are one of the most important challenges facing our nation today. Energy needs influence our international policies and are key to our national defense strategy. For this reason, I am pleased that we are hearing testimony about what the Department of Defense is doing to reduce its need for external sources of energy.

The rising cost of gasoline has affected all Americans and our military is not immune. Rising energy costs are consuming a larger portion of the O&M budget, so every dollar spent on fuel means fewer dollars for operations,

training and maintenance. In a time of increasing needs and decreasing budgets the DOD must find every way possible to stretch its energy dollars.

Fuel is not only expensive, it is also heavy. Moving fuel takes an enormous logistical effort and consumes strategic lift that could be better used moving soldiers, equipment and ammunition. The most effective way to increase the deployability of our ground forces is to reduce their fuel requirements. So finding energy efficiencies isn't just about money. It also is vital to increasing the strategic capabilities of our forces.

I have been following the work of the Services in developing new energy technologies. Of particular interest is the historic B-52 alternative fuel test flight conducted by the Air Force on September 19th. DOD's testing and implementation of technology such as this will ultimately influence the private sector and benefit the economy at large. For that reason, it is vital that the Congress

continue to fund new initiatives, and for DOD to aggressively pursue them. Energy security is vital to our national defense so we must find ways to reduce our energy needs and find new technologies to meet our energy requirements.

Thank you, Mr. Chairman.

Business Council for Sustainable Energy's
Federal Performance Contracting Coalition
Written Testimony
House Committee on Armed Services
Hearing on Energy and Energy Efficiency Programs of the Department of Defense
September 26, 2006

My name is Mark Wagner, Vice President of Government Relations for Johnson Controls, Inc. My testimony is on behalf of the Federal Performance Contracting Coalition (FPCC) and the Business Council for Sustainable Energy. The Business Council was founded in 1992 to support energy efficiency, renewable energy and natural gas in both a domestic and international context. The FPCC is a group of energy service companies working together on common objectives and consisting of Ameresco, Chevron Energy Solutions, Honeywell, Johnson Controls and Noresco.

We are particularly vested in working to help U.S. military installations become more energy efficient and energy secure. To that end, I will address two things today:

1. A path to bringing energy efficiency, renewable energy and energy security to military installations; and
2. Building sustainable facilities that will save money and energy into the future

Both of these items address goals and requirements of the Department of Defense (DOD), and although can be expensive, we have some suggestions on how to accomplish these goals with minimal government investment.

Background: Recent Army Corps of Engineers Report

In a September 2005 report entitled *Trends and Implications for U.S. Army Installations,* the Army Corp of Engineers Research Laboratory (CERL) called the national and international energy situation "highly uncertain" and said that it provides challenges on both the "supply-side and demand side". Further, the report posited that the primary energy issues for the DOD are energy availability, affordability, sustainability and security.

The results of the report were summed up as follows: "Our best options for meeting future energy requirements are energy efficiency and renewable sources." The Report concluded the following about energy opportunities for the U.S. military:

- "Energy efficiency is the least expensive, most readily available."
- "Energy efficiency measures usually pay for themselves"
- Renewable options also make use of the large stretches of land in the United States, much of which is owned by the Federal government
- Renewable options are "available, sustainable and secure"

- "For efficiency and renewables, the intangible and hard-to-quantify benefits (e.g. reduced pollution and increase security) yield indisputable economic value"

The Army Corps Report recommended that DOD address energy issues by using their large markets to pull technology. The report noted that DOD should also leverage alternative financing options and diversify the sources of energy used, which include massive expansion in renewable distributed generation (including photovoltaic, solar thermal, wind, microturbines and biomass), and the large scale networking of on-site generation.

Deployment of Technology as DOD Role

The FPCC and our members are supporters of Research and Development (R&D) and we feel it should continue as energy technologies and costs are constantly being improved and breakthrough technologies are still being developed. The Department of Energy (DOE) has a relatively robust R&D activity for energy efficiency technologies and renewable energy generation. It is appropriate to leave general energy R&D to that Federal agency and concentrate DOD attention on *applied* research activities that have particular applicability to DOD. These might include adapting technologies so they are compatible with military fuels (JP8), integrating commercial technologies for specific defense deployment (such as distributed generation for force forward applications and secure operations, back up power for installation security and communications), and so forth.

However, what is critical for the Department of Defense is to *deploy* technology. In large part, technology exists today to cost effectively do most of what the Army Corp Report has recommended and what is necessary to meet the energy reduction goals set by Congress in the Energy Policy Act of 2005.

Various DOD facilities have completed innovative energy upgrades in recent years. For example:

- Elmendorf AFB, a 50-year old heating and power plant was replaced with a new energy efficient distributed generation system.
- Picatinny Arsenal, again, distributed generation and back up generation was installed to address energy and mission needs.
- Twentynine Palms Marine Corps base, a dual-fueled cogeneration and photovoltaic plant was installed.
- Fort Bragg also now has new combined heat and power for efficiency and security.
- Naval Station Guantanamo Bay, high tech windmills are now providing power more cost effectively than the expensive grid power that was heretofore available.

(Attached are additional details on these projects.)

Unfortunately, these successful projects are more the exception than the rule. We need the will and the way to <u>deploy</u> efficiency and alternative energy technologies and develop

these types of projects at more military installations throughout the country and the world. Only then will we significantly address our critical energy needs and reduce our energy expenditures on military infrastructure.

Funding Needs

How do we replicate this? How do we accomplish our goals of achieving energy efficiency, gaining on-site renewable energy sources and maintaining energy security for military installations? How do we do this while upgrading our basic infrastructure? Clearly investments must be made. But direct appropriations are, unfortunately, lacking.

The main energy efficiency program of the DOD, designed and created by the House Armed Services Committee nearly 15 years ago is the Energy Conservation and Improvement Program (ECIP). This program is designed exclusively to provide direct funding at Defense facilities to improve their energy efficiency. It is the only real program of its kind left at DOD after the demise of the Federal Energy Management Program in the mid-nineties (this program had been funded at approximately $200 million per year and no longer exists).

As for ECIP, the Office of Management and Budget recently gave the program its highest Program Assessment Rating saying it has a 3:1 savings to investment ratio. This is one of the best ratios in the Federal government; however, funding for ECIP is basically at the same level it started at nearly 15 years ago -- $50 million/yr. The Department has asked for a $10 million increase in ECIP for FY07 but to be honest, with a three to one return on investment, it should get a $100 million increase. Even at this level, however, the ECIP program would barely scratch the surface of what is needed at the Department of Defense in energy-related upgrades. By way of example, the Navy is planning to execute $150-$200 million in energy projects next year but is receiving only about $13 million in ECIP funds.

The question is the same one we, in Washington, are always asking: Where do we get the money?

Chairman Hefley held a hearing last March on maintaining historic structures on military installations. In his opening statement, Mr. Hefley highlighted the difficulty of fully funding and executing sustainment and base operations budgets. He said that DOD and Congress were urged to think "outside the box" to find ways to reduce operations and maintenance costs.

Sufficient direct appropriations are clearly not available for energy efficiency upgrades. **The alternative to direct appropriations is financing projects through the energy savings.** Programs such as Utility Energy Savings Contracts (UESC) and Energy Savings Performance Contracting (ESPC) allow for energy efficiency projects to be financed with private sector capital. These are true Public-Private Partnerships.

Energy Savings Performance Contracting

The ESPC program was specifically created by Congress to address the lack of appropriations for energy efficiency upgrades. Under the program, private sector energy service companies finance, install, and maintain new energy efficient equipment in federal facilities at no up-front cost to the government. The energy service company is paid back over time from the dollars saved by the agency on its energy and maintenance bills. The energy savings are contractually *guaranteed* to exceed cost of the contract and, by law, the project costs are required to be fully off-set by the utility bill savings. *If the energy savings do not occur, the contractor does not get paid.* In addition, the energy savings for each project are measured and verified on a regular basis. The bottom-line is that energy use is guaranteed to be reduced, the military base has new energy-efficient equipment, and it does not pay any more than it was paying for utilities before the start of the project.

The Department of Defense has been successfully using these alternative financing mechanisms as their primary means to improve their energy infrastructure, reduce their energy use per Presidential Directive, and reduce their energy costs. In fact, 70% of all Federal ESPCs are within DOD facilities. The five successful energy programs mentioned earlier in this testimony were all done with ESPC – that is, with no upfront funding from the government. These infrastructure investments of these five projects alone are worth over $200 million. They were financed by private sector capital and are being paid back with energy cost savings.

The ESPC program has good support within the Government as evidenced below:

"These contracts provide agencies with important opportunities to improve energy efficiency at thousands of Federal Buildings across our country. I encourage government officials to utilize ESPCs to meet their energy reduction goals." *President Bush, 8/3/06*

"The Committee urges the Department of Defense to utilize Energy Savings Performance Contracting whenever possible to upgrade facilities and retain base operating funding." *Senate Report on Defense Appropriations 7/25/06 (SR 109-292)*

In summary ESPC pays for itself, provides energy efficiency and can offer renewable energy and energy security. Unfortunately, like other energy efficiency programs, Federal agencies are not taking full advantage of this program.

The FPCC recommends that the Committee take steps to ensure more widespread use of the ESPC option. Very few of these recommendations even require legislative language – in fact, many of them can be implemented directly by the agencies with cover provided from the Committee.

- **<u>Require</u> agency energy reductions per the EPACT 2005 goals on every military base and measure them.** Currently, the DOD overall has a reduction goal; however, there is little ownership at the individual facility level and there

are no tangible compliance ramifications. Were energy reduction part of facility personnel's evaluation criteria, a much larger effort to save the military energy and O&M dollars would be evident.

- **Make the fear of inaction greater than the fear of action by requiring military installations to implement energy efficiency measures on a large scale**. ESPC is a voluntary program and to date, most installations have proceeded cautiously, and on a relatively small scale. Installation leadership must be empowered to take bolder steps in order to have a substantial impact on energy efficiency, security and renewable capabilities. Again, this might grow from the above recommendation and/or providing incentives for energy projects.
- **Work to make renewable energy conservation measures affordable**. The Energy Policy Act of 2005 gives double credit toward meeting goals for implementing renewable projects. We should consider how to emphasize renewable projects through the ESPC program, if achieving more on-site renewable energy is indeed a desirable outcome.
- **Take advantage of all the energy-related savings, including operations and maintenance (O&M) costs.** Although allowable by statute and regulation, many ESPC projects take longer to pay for themselves because often the ESCOs are not allowed to use the full savings stream from reducing on site operations and maintenance personnel and activities.
- **Allow appropriated dollars to be used to leverage ESPC projects.** This would mean allowing Military Construction and ECIP funds to "buy down" certain portions of an ESPC project in order to achieve maximum efficiency. This would substantially increase the number of renewable projects under the program.
- **Remove obstacles to the ESPC program**. Although it seems minor, micromanagement from Washington, DC, be it Congress or the Administration, has a very obvious dampening effect on projects.
    - For example, it has been proposed to lower Congressional Notification for ESPC projects from the current $10 million down to $7 million. This change will add to the lengthy time (18-24 months) it already takes to develop and approve smaller ESPC projects.
    - A new emerging obstacle is developing as the result of the plan to move Sustainment, Restoration and Modernization (S/R&M) and Demolition funding, from the Defense Appropriation Act to the Military Quality of Life and Veterans Affairs Appropriation Act. As a result of the Congressional realignment, it appears intermingling S/R&M and Demolition funds with other O&M accounts will no longer be possible. Agencies will no longer be able to use S/R&M and Demolition funds to make payments attributable to other O&M accounts and vice versa. As a result, the Air Force has already written policy that would prohibit the use of O&M savings on ESPC projects in anticipation of this change, which would severely impact this needed energy efficiency program.

Some recommendations for the ESPC program may require legislative language but such changes will expand the program to allow it to be more effective and do more to address the needs of military installations.

- Include energy generation, not just energy savings in ESPCs. This would allow bases to address security issues surrounding dependence on outside the fence generation and transmissions for energy.
- Allow for new construction ESPC which would provide the opportunity for ESPCs to pay some of the cost of building better, more efficient, and sustainable buildings so the Department can meet its sustainability requirement without reducing the size of facilities.

Sustainable Buildings

The FPCC wants to further address sustainability in our testimony. In January, the DOD signed a Federal Memorandum of Understanding for sustainable buildings and this has real implications for the Department's energy efficiency and alternative energy integration. The MOU commits the Department to employ integrated design principles, optimize energy efficiency and performance, protect and conserve water, enhance the indoor environment, and reduce the environmental impact of materials used in construction.

So what does it mean to erect sustainable buildings? First, it means designing, locating, constructing and operating facilities in an energy efficient and environmentally sustainable (low impact) manner. Sustainability uses life cycle approaches, consensus-based standards, and performance measurement and verification methods that utilize good science and lead to sustainable buildings. The private sector has embraced sustainability because green buildings save money.

- Energy-efficiency experts say that better construction techniques, new energy-saving devices and smarter management can reduce electricity consumption by 20 percent in older buildings and up to 50 percent in new ones, vastly reducing utility bills. *Washington Post 8/5/06*
- "The corporate world is catching on real fast. They understand the financial benefit, but they also see this as the right corporate model." *Architect Robert Fox, Washington Post 8/5/06*
- "Green is green." *Jeff Immelt, GE Chief Executive*

Sustainable Buildings are critical for military construction because these facilities will be around for a minimum of 50 years and the Department will be responsible for soaring O&M costs long into the future if the buildings are not built in a sustainable manner right from the start. Unfortunately, MilCon and O&M funds suffer from the "color of money issue". That is, they are never considered together. As a result, in military construction we are often forced to focus on first costs, which then result in higher O&M costs.

The FPCC recommends that the DOD take a corporate approach and find ways to *combine existing MilCon and O&M resources* in order to build sustainable buildings that will cost less to operate in the long term. This is critical right now. The Department, after

going through Base Realignment and Closure (BRAC) is now constructing new buildings on some facilities, and these are planned as sustainable buildings. But with tight funding, these buildings are likely to be insufficient in size, or not sustainable and therefore costly in the long run. Combining O&M with initial MilCon will allow leveraging of ESPC and other such programs.

In conclusion, we want to emphasize that the DOD should concentrate on becoming more energy efficient via deployment of, not necessarily basic research on, energy technologies. When money is short and is appropriately focused on agency mission, means do exist to reduce energy use and costs. This will leave even more money in later years for these mission specific activities.

We appreciate the opportunity to testify and would be happy to answer any questions.

Attachment #1

DOD ESPC Projects

Elmendorf Air Force Base

Elmendorf AFB partnered with Ameresco, PACAF and AFCESA to implement a $71M project that eliminated a 50 year old Central Heat and Power Plant and replaced it with 300 boilers located in 120 facilities throughout the base. The project also included the installation of 8 miles of natural gas distribution lines and the modification of the electrical substations. The project, which is reducing Elmendorf's energy consumption by over 1 million btus per year, is generating average annual cost savings of $5.6M or $123,000,000 over the course of the 22 year performance period. Ameresco managed and coordinated with multiple subcontracting firms, the local utilities and worked simultaneously in 30 facilities at a time in order to complete the project on time with a brief 5 month outdoor construction period per year. In addition to the direct and energy related savings associated with this project, EAFB avoided over $50M in repair costs and numerous safety concerns generated by the deteriorated steam distribution system.

Picatinny Arsenal, New Jersey - Arsenal-Wide Heating Decentralization Project

Through its energy analysis, design, and construction management services, Chevron Energy Solutions (ES) reconfigured Picatinny Arsenal's aging central heating system by installing 120 new steam boilers, hot water boilers, furnaces, or unit heaters to service over 250 buildings. The solution also involved renovation of over 6,000 feet of steam distribution lines; an Arsenal-wide energy management and control system serving 121 buildings; redesign and replacement of building interior heat distribution systems; coordination of all air emissions permitting; electric back-up generation to the boiler plants to ensure that steam is available for heating during electrical outages; and an 18-year ongoing operations, maintenance, and repair/replacement of all installed units and equipment. The long-term, maintenance and operations portion of the contract, which enables Picatinny to realign its work force and focus on core mission activities, consists of development and execution of preventive maintenance programs and activities, service desk response to all trouble calls for over 300 facilities, database tracking and reporting of all service and preventive maintenance activities via a web-based CMMS program, and monitoring of building automation systems for building comfort and indoor air quality.

This award-winning ESPC project, reduces harmful carbon, sulfur, and nitrogen dioxide emissions by an estimated 1 million tons; produces more than $107,748,821 of energy and operational savings, and reduces risks associated with catastrophic plant or steam distribution system failure and lack of redundancy.

Twentynine Palms Marine Corp ESPCS

At the Twentynine Palms Marine Corps Ground Combat Center in Southern California, the three ESPC projects developed by Johnson Controls are saving energy, as well as supporting the mission of this important military base.

- New chilled water plants and an air conditioning system upgrade are saving energy and have improved the quality of life for the Marines in the barracks, which are located in the southern Mojave Desert.
- A "Dual-Fueled" 7.5 megawatt cogeneration plant has improved the energy security on base because it can produce electricity by burning either natural gas from a pipeline or

diesel fuel which is stored on base. If there is a break in the gas line due to an earthquake or other disruption, the new system will enable the base to operate for up to six days without electricity or natural gas from the outside.

- The renewable energy project is a 1.1 megawatt photovoltaic plant. This is one of the highest capacity, non-utility, solar power plants in the world covering eight acres and providing one fifteenth of the base's annual electric load.

All totaled the improvements will produce energy savings of about $6.9 million per year for a total savings of $138 million over 20 years.

Fort Bragg Combined Heat and Power ESPC

Known as the home of the Airborne and Special Operations Forces, Fort Bragg is the 84-year-old U.S. Army post in Fayetteville, N.C. One of the largest Army installations in the world, Fort Bragg houses the 82nd Airborne Division and the XVIII Airborne Corps, along with the Army Special Operations Command and other rapid deployment units. Honeywell recently led the installation of a large combined heat and power (CHP) system at the post's 82nd Central Heating Plant. The CHP system, which is managed by the Fort Bragg Directorate of Public Works (DPW), went online in June 2004.

The primary goal of the DPW – responsible for almost 30 million sq ft of facilities at the post – is to provide a secure setting in which the Army can train, mobilize and deploy its forces, and continuously improve the environment and quality of life for the troops and civilians stationed at Fort Bragg. The CHP system, with its energy-efficiency and security benefits, and related infrastructure improvements, certainly supports this mission.

This $11 million CHP project is the latest phase in a wide-ranging public-private partnership between Honeywell and the DPW. Formed under an Energy Savings Performance Contract (ESPC), the partnership has allowed Fort Bragg to make $66 million in capital investments at no additional operating cost to the government or taxpayers. Through 2004, it has saved more than $57 million at the post.

US Naval Station Guantanamo Bay, Cuba

The Department of the Navy partnered with Noresco to construct a $12 million wind turbine project at US Naval Station Guantanamo, Cuba using an ESPC. Four wind turbines generate 3,800 kilowatts of electricity – enough to supply about a quarter of the peak power needed for base operations.

The project will not only save taxpayers $1.2 million in annual energy costs, but will also save 650,000 gallons of diesel fuel. In addition, it will reduce air pollution by 26 tons of SO2 and 15 tons of NOx, demonstrating the Navy's commitment to energy conservation and environmental stewardship.

The four turbines are rated to withstand winds up to 140 mph – equivalent to a Category 4 hurricane. Each turbine is completely automated. They independently sense the wind direction, turn into the wind and control the pitch of the blades for optimum efficiency.

This project is an excellent example in which the Navy successfully utilized the ESPC program to implement state of the art renewable technologies at this facility to provide secure, reliable and cost effective power to the Base.

THE WHITE HOUSE

WASHINGTON

August 3, 2006

I send greetings to those gathered for the Energy 2006 conference.

Keeping America competitive requires renewable and affordable energy. As a forum for the exchange of ideas and discussion about energy and conservation issues, this event is important to a secure energy future for our children and grandchildren. Your participation in the 2006 Energy conference and your hard work to conserve energy in the workplace will help create a better America.

Since 2001, my Administration has invested nearly $10 billion in the development of cleaner, cheaper, and more reliable alternative energy sources, and our Federal agencies must continue to lead the way in conservation and research. Last August, I was pleased to sign the Energy Policy Act of 2005, the first national energy plan in more than a decade. This law encourages conservation and efficiency, helps increase our domestic energy production, promotes alternative and renewable resources, and enables the modernization of our electricity grid. To ensure that the Federal Government sets a positive example, the Energy Policy Act established aggressive Federal energy savings goals and reauthorized the Energy Savings Performance Contract program. These contracts provide agencies with opportunities to improve energy efficiency at the thousands of Federal buildings across our country. I encourage government officials to utilize ESPCs and Super ESPCs to meet their energy use reduction goals and advance the growth and prosperity of our great country while being good stewards of taxpayer dollars and our environment.

I appreciate the sponsors and participants of this conference, and I commend all those who are committed to energy conservation and efficiency in government and across the country. Your efforts help improve our national and economic security and strengthen America for future generations.

Laura and I send our best wishes for a successful event.

Testimony by Scott Sklar, President, The Stella Group, Ltd.
Before -
The House Committee on Armed Services
Subcommittee on Terrorism, Unconventional Threats and Capabilities
Tuesday, September 26, 2006
Washington, DC

TESTIMONY STATEMENT –

I wish to thank the Subcommittee for looking into energy as a critical military issue.

I have several basic points, I wish to convey.

First, the good news.

Secretary Rumsfeld has two parallel activities underway: the Defense Research and Engineering Power and Energy Task Force, and the Defense, Science Board Task Force on DOD Energy Strategy. These are important and healthy DOD exercises, looking at the issues from 60,000 feet.

The Defense Advanced Research Program (DARPA) has had an ongoing sophisticated set of activities ranging from flexible photovoltaics on tents (from traditional thin films to the newer nanotechnology light sensitive dyes)) to fuel cells to biomass and waste utilization. These programs are far reaching, practical, and important to be continued and expanded.

The Department of Defense military services and bases have been leaders in the procurement and utilization of green energy and energy technologies. The Air Force is one of this nation's largest buyers of green power, Fort Huachuca (AZ) and Fort Bragg (NC) have been leaders in using solar thermal and electric and small wind technologies for buildings and perimeter security. China Lake (CA) has been an overall technology leader in utilizing a portfolio of energy efficiency and renewable energy applications. The Navy has recently procured waved-powered buoys in HI for electric power, and the Army has over 10,000 solar 'blankets' for powering field phones, while the US Air Force has recently ordered 150 solar LED airfield lighting units for runway edge caution lighting and taxiway edge lighting at a Forward Operating Base in the Middle East.

Specialized programs are also yielding results, such as the Air Force's Advanced Power Technology Office (APTO) at Warner Robbins AFB, as well as development of newer analytical tools at the Center for Army Analysis and the Center for Naval Analysis.

These successes come from a diverse set of professionals within the Defense structure – at all levels from technical to analytical professionals, commanders at the theater of war, base commanders and logistical staff, to politically-appointed program leaders spanning five Administrations. They deserve to be thanked, and I so do, as well as further supported, funded, and encouraged.

Additionally, five Administrations have issued Executive Orders, the most recent under President Bush are:

- May 16, 2003: #13212 Expedited Energy-Related Projects: to increase energy production and conservation and includes DOD

- September 30, 2001 #13138 PCAST Executive Order:

- July 31, 2001: Standby Power Devices: Watt for Standby Power which can include On-Site Power augmentation

- May 18, 2001: Task Force (including Defense) to Expedite Energy Related Projects

And the overarching Executive Order by President Clinton – printed Tuesday, June 8, 1999 The President (Clinton), Executive Order 13123 issued June 3, 1999, Greening the Government Through Efficient Energy Management.

These Executive Orders set the stage for focusing the federal sector on energy efficiency, renewable and distributed energy, as well as goal-setting procurement.

Second - now for the "tough love' report.

I have participated in two Department of Defense reports (ARMY INSTALLATIONS SECURITY PLANS, November 2003, Office of Assistant Chief of Staff for Installation Management -sponsored by the Assistant Chief of Staff for Installation Management (ACSIM) of the Army and the Federal Energy Management Program of the Department of Energy) and REPORT TO CONGRESS. Department of Defense. DOD Renewable Energy Assessment. Final report. 14 March 2005. Overseen by Col. Worrell and Gueta Mezzetti). These reports involved scores of dedicated DOD professions for about two years each. These reports are on a shelf, many of the staff leaders have either retired or been sent onto other assignments. This typifies the basic issue that needs to be addressed by DOD and the Congress.

First, information needs to be centralized, referenced and easily accessed. This includes all past energy reports, at least since 2000. Second, the same needs to be done for ongoing energy and technology programs -- so the different military services, the war colleges and the leadership within the Office of the Secretary of Defense can easily and topically see the status, successes and challenges of the work currently being undertaken. Third, there needs to be established a directory or database within DOD of the experts

inside and outside that participated in these reports, research, peer reviews and projects – so that others within the DOD family can access their experience and expertise. Fourth, these reports, experts and projects need to be conveyed in an ongoing program via National Defense University and the war colleges so that the emerging DOD leadership, whether they be facility managers or on the front lines – are acquainted and familiar with technology options.

For instance, this August, Marine Corps Maj. Gen. Richard Zilmer, the chief of the Multi-National Force-West in al-Anbar province, submitted an urgent request calling on the Pentagon to send more renewable energy systems to the country because they could leverage resources like sunlight or wind to produce power for bases and outposts. Commanders assert that tapping renewable energy sources would lessen dependence on fossil fuels -- a move that could reduce the amount of fuel convoys on the road and save lives. I would like to formally invite the House Armed Serves Committees and Subcommittees members and staff to see one such unit nearby in North Arlington – 10 minutes from here – which was referenced in the Major General's request – an electric generation unit powered by solar and wind, as well as another installation using fuel cell, advanced battery banks, small wind and thin film photovoltaics – to see first hand what are some of the commercial options available to be utilized by DOD and DHS.

The federal government has, as stated earlier funded many studies, I want to highlight a few conclusions, and I have a more thorough annotated list attached to this testimony:

In a 2001 study titled, "More Capable Warfighting Through Reduced Fuel Burden" sponsored by the Defense Science Board Task Force on Improving Fuel Efficiency of Weapons Platforms, stated "Ten Years after the Cold War, over 70 percent of the tonnage required to position today's US Army into battle is fuel.". (p. ES-1). Yet in a recent US Department of Energy report on Used Oil Re-refining (2006), the report says Europe has three times the used oil re-refining capacity as does the United States.

In 'A Strategy: Moving America Away from Oil' commissioned in 2003 by the Office of Net Assessment of the DOD Office of Secretary of Defense, raised the national security implications of having increasing dependence on oil and natural gas among trading partners and allies, US oil payments are used by other countries to support and buy destabilizing weapons or fund terrorists, and the reliance of both US and foreign infrastructure that is easy to disrupt and hard to mend (p. 42). During the very same year, the U Air Force sponsored, "Security Benefits of Renewable Generation" that blending photovoltacs (or other distributed generation) with diesel generation used solely in support of critical load could stretch operations for an addition seven days without a fuel supply (p 3).

The 2003 study entitled, "Army Installation Energy Security Plans" supported by the Office of the Assistant Chief of Staff for Installation Management, recommended, "develop a standardized verifiable database on new distributed generation, continue

analytical tools dealing with reliability and robustness for distributed generation (DG) technologies.

The commercial markets are growing at 30 percent per year for these new energy technologies and products. As a result, we now have the commercial technology now for practical utilization for either the military installations or in theater of war situations:

Recyling - vehicle lubricating oil – to be reused at the highest grade and with a diesel fuel byproduct rather than the lower grade recycled fuel with no. 6 fuel oil that DOD does now. Waste cooking and seed oils – small on-site biodiesel units sized to the oil seed or waste oil stream. Waste heat – using heat from pipeline pumps, diesel engines, and compressors for water heating and electricity. And, unused wood and paper packaging – small biomass gasifiers for onsite electricity production from wooden moving pallets to demolition waste

Remote power and critical infrastructure – on-soldier battery charging battery charging, uninterruptible cellular or perimeter security, pipeline water and fuel pumps, powering tents, 'drop and play' surveillance, listening posts, and generator units. Super light weight photovoltaics materials for aerial surveillance units.

Diagnostics, assessment and performance: - through using WIFI, beeper and cellular technologies can remotely track actual energy system performance, anticipate technical problems, and also assess future capacity performance of installed systems through advanced renewable resource assessment.

Building-based energy - solar water heating, solar air-conditioning either driving compressors or thermally-driving absorption coolers, ground-coupled heat pumps, thermal barrier paints and coated windows, smart controls and thermostats, and A/C ready small wind systems, and building integrated photovoltaics, bundled LED lighting, etc.

I implore the House Armed Services Committee to periodically track progress of energy adoption and implementation by the Department of Defense, and urge the Congressional Committee involved with Homeland Security to also become more attentive in this area. Collaborate with DOD on establishing a fuel portfolio which will ensure DOD is more agile, has lower logistical support needs, and far more resilient against challenges. Thank you.

RESPECTFULLY SUBMITTED -

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www.stellacapitalllc.com

The Stella Group, Ltd.. is a strategic marketing and policy firm for clean distributed energy users and companies which include advanced batteries and controls, energy efficiency, fuel cells, heat engines, minigeneration (natural gas), microhydropower, modular biomass, photovoltaics, small wind, and solar thermal (including daylighting, water heating, industrial preheat, building air-conditioning, and electric power generation). The Stella Group, Ltd. blends distributed energy technologies, aggregates financing (including leasing), with a focus on system standardization. Scott Sklar, the Group's founder and president, lives in a solar home in Arlington, Virginia and his coauthored book:The Forbidden Fuel will be re-released in 2007 for its 2nd printing, and A Consumer Guide to Solar Energy, was re-released for its third printing. His Q&A Column appears on the largest clean energy web portal: www.renewableenergyaccess.com.

Scott Sklar serves as Steering Committee Chair of the Sustainable Energy Coalition, composed of the renewable energy and energy efficiency trade associations and analytical groups, and sits on the national Boards of Directors of the non-profit Business Council for Sustainable Energy, Renewable Energy Policy Project, and the Sustainable Buildings Industry Council.

Pictures on prior pages are courtesy of:
Advanced Battery bank GridPoint (DC) www.gridpoint.com
Concentrated Solar Generator Solargenix Energy (NC) www.solargenix.com
El Salvador Biomass Power Unit Community Power Corporation (CO)

Freeflow Microhydropower on Pontoons Verdant Power (VA) www.verdant.com

Ft, Huachuca Solar Water Heating, Barnes Field House, US Army

Fuel Cell for Perimeter Security Plug Power (NY) www.plugpower.com

PV/Battery Remote Power Unit Sacred Power (NM) www.sacredpower.com

PV Field Phone Charger UniSolar (MI) www.unisolar,com

PV on Tents Konarka Techologies, Inc. (MA) www.konarka.com

PV/Wind Cellular Tower Elevated Security (VA) www.elevated security.com

PV/Wind Mobile Power Station SkyBuilt Power (VA) www.skybuilt.com

Wave Powered Buoy Ocean power Technologies (NJ) www.oceanpowertech.com

QuickTime™ and a
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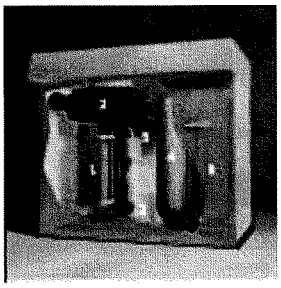
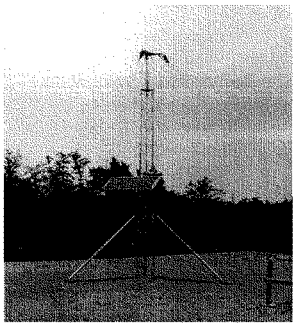
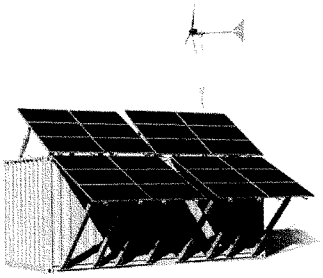


PV Field Phone Charger

Fuel Cell for Perimeter Security





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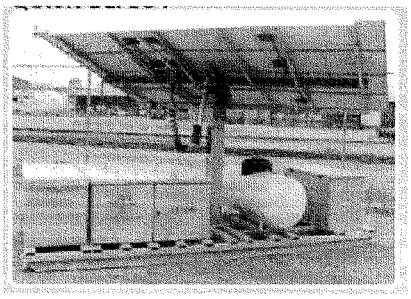
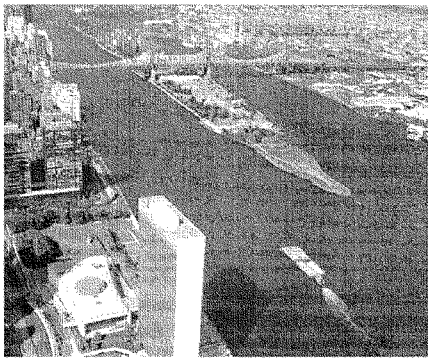
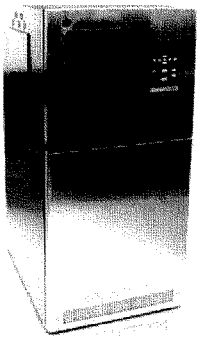
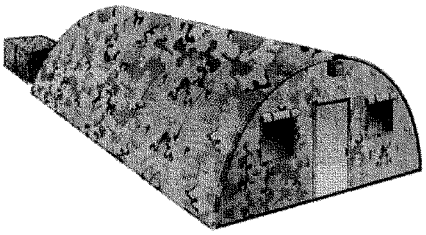




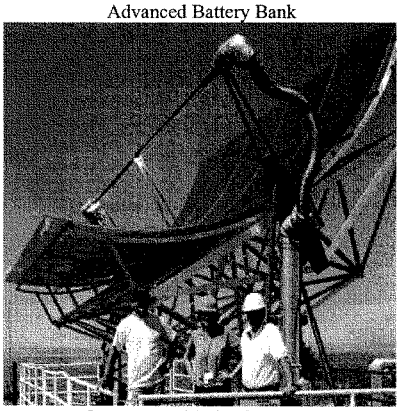
Wave-Powered Buoy



Advanced Battery Bank



PV Tents: Light Sensitive Dyes



Concentrated Solar Generator

Appendix #1

SCOTT SKLAR SELECTED DEFENSE and SECURITY BACKGROUND

ARMY INSTALLATIONS SECURITY PLANS, November 2003
Office of Assistant Chief of Staff for Installation Management.
This project was sponsored by the Assistant Chief of Staff for Installation Management (ACSIM) of the Army and the Federal Energy Management Program of the Department of Energy.
This project was led by the Energy and Security Group (ESG). The primary project team consisted of CALIBRE; Engineer Research Development Center's Construction Engineering Research Laboratory (ERDC-CERL); the University of Illinois at Urbana Champaign (UIUC); Center for Army Analysis (CAA); Sandia National Laboratory; and James Wolf and Scott Sklar as consultants to ESG.

REPORT TO CONGRESS. Department of Defense. DOD Renewable Energy Assessment. Final report. 14 March 2005. Sklar reported to Col. Worrel and Gueta Mezzetti, activity coordinators, as a senior technology and industry advisor.

NATIONAL DEFENSE UNIVERSITY - senior member of a 2006 team to assist in educating senior DOD officers and officials on distributed generation. Contact: Col. Bob Armstrong

SKYBUILT POWER.- http://www.csmonitor.com/2005/1018/p02s01-sten.html (an article on In-Q-Tel (CIA) investment in one of the companies he co-founded. Sklar is happy to provide tours of the demo unit in North Arlington which is 10 minutes from Capitol Hill.

Scott Sklar served on the staff of Senator Jacob K. Javits (NY) in the 1970's as an aide, assigned energy and military

Sklar has written numerous articles, presentations and papers including "Renewable and Distributed Energy as a Security Tactic", July 2004, Association of Energy Engineers, and "Tapping the Homeland Security Market, June 2005, Solar Today.

Appendix #2-

RENEWABLE and DISTRIBUTED ENERGY AS A SECURITY TACTIC

By Scott Sklar, President of The Stella Group, Ltd.
Washington, D.C., July 2006

Introduction

Security implementation can be viewed from many perspectives. But whatever the issue and implementation approach, the supply and access to energy is a critical component.

This paper explores the options using distributed energy, primarily from renewable energy.

The three security areas covered are:

- low-power sensors, cameras, motion detectors and chemical sniffers - **detection**
- hardening infrastructure and buildings such as back-up power, sensors, uninterruptible power, and power quality – **prevention**
- scanners, electric fences, communications and emergency preparedness – **offensive and defensive preparations and actions**

In the ultra-high-security arena, advanced batteries, solar, small wind, and even on a more limited basis, fuel cells are utilized today. But in industrialized country settings, most is still interconnected with the electric grid or through the use of diesel generators.

DETECTION

From perimeter defense to remote sensing – all sorts of devices are utilized. These devices, in general, are small power to run cameras (traditional to night vision), heat and motion detectors, chemical and biological sensors, and audio taps. As these devices have become solid state, digital, and miniaturized – use of batteries and transformers to grid interface is very common.

Obviously, batteries have limitations for long duration uses. So use of photovoltaics primarily have immense options in adding to the life batteries through trickle charging near or far from the units. Even mini-wind turbines and handheld fuel cells have begun to enter the picture.

The real issue faces the sophistication of terrorists in deterring these devices. Using explosions or "arcs" that emit high electromagnetic pulses can essentially overpower many of these devices. But more easily, is pulsing through grid interconnects of electricity which more naturally burns out sophisticated equipment. The more that is detached from the grid and can be made "longer life" will be far more agile and resistant.

Newer systems can also be hardened from electromagnetic pulsing as part of the package if forethought is given.

The higher and harder to reach any sensing and detection equipment is placed, the harder t disable. PV , mini-wind, and micro-fuel cells all have great capacity to be co-located with these devices and hardened themselves appropriately.

Traditionally wired systems are easy to disable, and greater care needs to be given to the more sophisticated and better trained individual.

The military and intelligence agencies have had vast expertise with advanced distributed power technologies which have a solid record of performance.

PREVENTION

Systems that provide rust prevention (cathodic protection), pipeline protection (density sensors), spill and agent pre-detection (chemical and biological sensors), and crime and penetration sensing (heat and motion detectors, cameras and night vision) – as stated

earlier – are generally run off of grid-intertied systems, conventional battery banks, and diesel engines.

These larger systems used in prevention of damage to pipelines, electric grid, area and perimeter security, building and facility defense – are even easier to disable than small detection systems.

Diesel engines, aside from their unreliability, generally must have their fuel tanks outside. Aside from fuel disruptions and general breakdowns, any individual with low training skills can damage diesel tanks. Not only can they disable diesel generators, but they can induce the flammable fuel to combust outside the tanks – and all this can be done from afar. Natural disasters have also shown diesel to be an absurd back-up strategy for emergency prepared- ness since they are susceptible to flooding by water and their fuel floats on water.

Larger systems that are grid intertied can have wires cut or transformers disable (which can be dome from afar). Battery banks are reliable for short power outages but not long ones. On-site PV along with small wind systems and even small fuel cells can lengthen battery life for long periods, and in some cases, indefinitely.

Clearly, it is time to invest in renewable-based back-up systems for police, fire, regional homeland security communications, and infrastructure hardening devices – in all its aspects.

Blending energy sources and having redundancy in sensing, communicating and powering should be the basic principle used by federal, state and local government – and private sector – approaches to security.

EMERGENCY PREPAREDNESS – DEFENSIVE/OFFFENSIVE

"Drop and Plop" power for the military and traditional emergency preparedness is based upon the reliance of diesel generators. In the military, more than half the support structure relates to fuel delivery. Over-reliance on diesel will cause the cost and back-up logistical to become astronomical as we face homeland security challenges as well as trends to harsher weather patterns relating to global climate change.

Primarily PV and lately fuel cells are used by the military in "theater of war" activities. NASA employs these technologies in very harsh environments. Other technologies including solar absorption cooling, heat engines, micro wind turbines, micro hydropower, and modular biomass systems are all on the verge of becoming more easily available. Aggregated purchasing and training, will lower costs, increase availability, and enhance user confidence.

Systems that provide aggressive protection such as electric fences, eye scanners, and molecular sensors must be used in a more aggressive fashion to protect critical

infrastructure. These systems can only be inviolate if power systems can be co-located and have low-maintenance and minimal fuel requirements.

Noise of traditional diesel systems actually create a lure for individuals wishing to cause disruptions. Power lines dropping from transformers are listed in most handbooks as to "what to look for" if anyone wants to disable security systems.

For those relying on diesel after natural disasters, always comment on the harsh environment of being housed near big diesels with their noise and fumes. A more sophisticated approach is needed in even traditional emergency response planning, and now a range of technologies are commercially available.

Lower weight photovoltaics, small fuel cells on hydrogen and methanol, small wind turbines that an be snapped on existing light and telephone poles, and freeflow microhydro systems that can be dropped on pontoons – are all now in the market place for very small niche applications.

CONCLUSION

The world is not a safe place but more technologies are available now than in any time in the past to provide reliable power for an increasingly digital age.

Market signals that allow US industry to evolve, hybridize, and harden technologies to meet security needs are critical.

Smarter training of procurement officials and security planners are critical to know what new technologies are available.

Military users of these new technologies must be allowed to be available for security planners and local governments, so they understand the options, limitation and benefits of these new technologies.

Greater technical support for potential users by experts within the security, distributed energy, smart controls, and wireless communications sectors must be encourages and funded.

Reliance on old technologies is a luxury that can no longer be supported. These traditional technologies – standard battery banks, diesel engines, and grid-intertied systems – are too easy to disable, are unreliable, and do not have long term "staying" power necessary for the emergencies we all may realistically face.

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Appendix #3 –

SELECTED PRESIDENTIAL (ENERGY) EXECUTIVE ORDERS

PRESIDENT BUSH –

For Immediate Release
Office of the Press Secretary
May 16, 2003
Executive Order Amending Executive Order 13212, Actions to Expedite Energy-Related Projects

By the authority vested in me as President by the Constitution and the laws of the United States, including section 60133 of title 49, United States Code, and section 301 of title 3, United States Code, it is hereby ordered as follows:
Section 1. Amendments to Executive Order 13212. Executive Order 13212 of May 18, 2001, as amended, is further amended by:
(a) in section 1, immediately before the period at the end of the section, inserting "and projects that will strengthen pipeline safety";
(b) in section 2, after "energy-related projects" inserting "(including pipeline safety projects)"; and
(c) revising section 3 to read as follows:
"Sec. 3. Interagency Task Force. (a) There is established, within the Department of Energy for adminis-trative purposes, an interagency task force (Task Force) to perform the following functions: (i) monitor and assist the agencies in their efforts to expedite their reviews of permits or similar actions, as necessary, to accelerate the completion of energy-related projects (including pipeline safety projects), increase energy production and conservation, and improve the transmission of energy;

(ii) monitor and assist agencies in setting up appropriate mechanisms to coordinate Federal, State, tribal, and local permitting in geographic areas where increased permitting activity is expected; and
(iii) perform the functions of the interagency committee for which section 60133 of title 49, United States Code, provides.
(b)(i) The Task Force shall consist exclusively of the following members:
(A) in the performance of all Task Force functions set out in sections 3(a)(i) and (ii) of this order, the Secretaries of State, the Treasury, Defense, Agriculture, Housing and Urban Development, Commerce, Transportation, the Interior, Labor, Education, Health and Human Services, Energy, and Veterans Affairs, the Attorney General, the Administrator of the Environmental Protection Agency, the Director of Central Intelligence, the Administrator of General Services, the Director of the Office of Management and Budget, the Chairman of the Council of Economic Advisers, the Assistant to the President for Domestic Policy, the Assistant to the President for Economic Policy, and such other heads of agencies as the Chairman of the Council on Environmental Quality may designate; and
(B) in the performance of the functions to which section 3(a)(iii) of this order refers, the officers listed in section 60133(a)(2)(A)-(H) of title 49, United States Code, and such other representatives of Federal agencies with responsibilities relating to pipeline repair projects as the Chairman of the Council on Environmental Quality may designate.
(ii) A member of the Task Force may designate, to perform the Task Force functions of the member, a full-time officer or employee of that member's agency or office.
(c) The Chairman of the Council on Environmental Quality shall chair the Task Force.
(d) Consultation in the implementation of this order with State and local officials and other persons who are not full-time or permanent part-time employees of the Federal Government shall be conducted in a manner that elicits fully the individual views of each official or other person consulted, without deliberations or efforts to achieve consensus on advice or recommendations.
(e) This order shall be implemented in a manner consistent with the President's constitutional authority to supervise the unitary executive branch."
Sec. 2. Judicial Review. This order is intended only to improve the internal management of the Federal Government, and is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by a party against the United States, its agencies, instrumentalities or entities, its officers or employees, or any other person.
GEORGE W. BUSH
THE WHITE HOUSE,
May 15, 2003.
# # #

Executive Order
President's Council of Advisors on Science and Technology
By the authority vested in me as President by the Constitution and the laws of the United States of America, including the Federal Advisory Committee Act, as amended (5 U.S.C. App.), and in order to establish an advisory committee on science and technology, it is hereby ordered as follows:
Section 1. Establishment. There is established the President's Council of Advisors on Science and Technology (PCAST). The PCAST shall be composed of not more than 25 members, one of whom shall be a Federal Government official designated by the President (the "Official"), and 24 of whom shall be nonfederal members appointed by the President and have diverse perspectives and expertise in science, technology, and the impact of science and technology on the Nation. The Official shall co-chair PCAST with a nonfederal member designated by the President.

Sec. 2. Functions. (a) The PCAST shall advise the President, through the Official, on matters involving science and technology policy.
(b) In performance of its advisory duties, the PCAST shall assist the National Science and Technology Council (NSTC) in securing private sector involvement in its activities.
Sec. 3. Administration. (a) The heads of the executive departments and agencies shall, to the extent permitted by law, provide the PCAST with information concerning scientific and technological matters when requested by the PCAST co-chairs.
(b) In consultation with the Official, the PCAST is authorized to convene ad hoc working groups to provide preliminary nonbinding information and advice directly to the PCAST.
(c) Members shall serve without compensation for their work on the PCAST. However, members may be allowed travel expenses, including per diem in lieu of subsistence, as authorized by law for persons serving intermittently in the government service (5 U.S.C. 5701-5707).
(d) Any expenses of the PCAST shall be paid from the funds available for the expenses of the Office of Science and Technology Policy.
(e) The Office of Science and Technology Policy shall provide such administrative services as the PCAST may require, with the approval of the Official.
Sec. 4. General. (a) Notwithstanding any other Executive Order, the functions of the President with respect to the PCAST under the Federal Advisory Committee Act, as amended, except that of reporting to the Congress, shall be performed by the Office of Science and Technology Policy in accordance with the guidelines and procedures established by the Administrator of General Services.
(b) The PCAST shall terminate 2 years from the date of this order unless extended by the President prior to that date.
(c) Executive Order 12882 of November 23, 1993; Executive Order 12907 of April 14, 1994; and section 1(h) of Executive Order 13138 of September 30, 1999, are hereby revoked.
GEORGE W. BUSH
THE WHITE HOUSE,
September 30, 2001.

# # #

July 31, 2001
Energy Efficient Standby Power Devices

EXECUTIVE ORDER
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ENERGY EFFICIENT STANDBY POWER DEVICES
By the authority vested in me as President by the Constitution and the laws of the United States of America, including the National Energy Conservation Policy Act (Public Law 95-619, 92 Stat. 3206, 42 U.S.C. 8252 et seq.), as amended by the Energy Policy Act of 1992 (EPACT) (Public Law 102-486, 106 Stat. 2776), and section 301 of title 3, United States Code, and in order to further encourage energy conservation by the Federal Government, it is hereby ordered as follows:
Section 1. Energy Efficient Standby Power Devices. Each agency, when it purchases commercially available, off-the-shelf products that use external standby power devices, or that contain an internal standby power function, shall purchase products that use no more than one watt in their standby power consuming mode. If such products are not available, agencies shall purchase products with the lowest standby power wattage while in their standby power consuming mode. Agencies shall adhere to these requirements, when life-cycle cost-effective and practicable and where the relevant product's utility and performance are not compromised as a result. By December 31, 2001, and on an annual basis thereafter, the Department of Energy, in consultation with the Department of Defense and the General Services Administration, shall compile a preliminary list of products to be subject to these requirements. The Department of Energy shall finalize the list and m
Sec. 2. Independent Agencies. Independent agencies are encouraged to comply with the provisions of this order.
Sec. 3. Definition. "Agency" means an executive agency as defined in 5 U.S.C. 105. For the purpose of this order, military departments, as defined in 5 U.S.C. 102, are covered by the Department of Defense.
GEORGE W. BUSH
THE WHITE HOUSE,
July 31, 2001.
# # #

May 18, 2001

Executive Order
Actions Concerning Regulations That Significantly
Affect Energy Supply, Distribution, or Use
By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to appropriately weigh and consider the effects of

the Federal Government's regulations on the supply, distribution, and use of energy, it is hereby ordered as follows:

Section 1. Policy. The Federal Government can significantly affect the supply, distribution, and use of energy. Yet there is often too little information regarding the effects that governmental regulatory action can have on energy. In order to provide more useful energy-related information and hence improve the quality of agency decisionmaking, I am requiring that agencies shall prepare a Statement of Energy Effects when undertaking certain agency actions. As described more fully below, such Statements of Energy Effects shall describe the effects of certain regulatory actions on energy supply, distribution, or use.

Sec. 2. Preparation of a Statement of Energy Effects.

(a) To the extent permitted by law, agencies shall prepare and submit a Statement of Energy Effects to the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget, for those matters identified as significant energy actions.

(b) A Statement of Energy Effects shall consist of a detailed statement by the agency responsible for the significant energy action relating to:

(i) any adverse effects on energy supply, distribution, or use (including a shortfall in supply, price increases, and increased use of foreign supplies) should the proposal be implemented, and

(ii) reasonable alternatives to the action with adverse energy effects and the expected effects of such alternatives on energy supply, distribution, and use.

(c) The Administrator of the Office of Information and Regulatory Affairs shall provide guidance to the agencies on the implementation of this order and shall consult with other agencies as appropriate in the implementation of this order.

Sec. 3. Submission and Publication of Statements.

(a) Agencies shall submit their Statements of Energy Effects to the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget, whenever they present the related submission under Executive Order 12866 of September 30, 1993, or any successor order.

(b) Agencies shall publish their Statements of Energy Effects, or a summary thereof, in each related Notice of Proposed Rulemaking and in any resulting Final Rule.

Sec. 4. Definitions. For purposes of this order:

(a) "Regulation" and "rule" have the same meaning as they do in Executive Order 12866 or any successor order.

(b) "Significant energy action" means any action by an agency (normally published in the Federal Register) that promulgates or is expected to lead to the promulgation of a final rule or regulation, including notices of inquiry, advance notices of proposed rulemaking, and notices of proposed rulemaking:

(1)(i) that is a significant regulatory action under Executive Order 12866 or any successor order, and

(ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or

(2) that is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action.

(c) "Agency" means any authority of the United States that is an "agency" under 44 U.S.C. 3502(1), other than those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(5).

Sec. 5. Judicial Review. Nothing in this order shall affect any otherwise available judicial review of agency action. This order is intended only to improve the internal management of the Federal Government and does not create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

GEORGE W. BUSH
THE WHITE HOUSE,
May 18, 2001.
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Executive Order
Actions to Expedite Energy-Related Projects

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to take additional steps to expedite the increased supply and availability of energy to our Nation, it is hereby ordered as follows:

Section 1. Policy. The increased production and transmission of energy in a safe and environmentally sound manner is essential to the well-being of the American people. In general, it is the policy of this Administration that executive departments and agencies (agencies) shall take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy.

Sec. 2. Actions to Expedite Energy-Related Projects. For energy-related projects, agencies shall expedite their review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections. The agencies shall take such actions to the extent permitted by law and regulation, and where appropriate.

Sec. 3. Interagency Task Force. There is established an interagency task force (Task Force) to monitor and assist the agencies in their efforts to expedite their review of permits or similar actions, as necessary, to accelerate the completion of energy-related projects, increase energy production and conser--vation, and improve transmission of energy. The Task Force also shall monitor and assist agencies in setting up appropriate mechanisms to coordinate Federal, State, tribal, and local permitting in geographic areas where increased permitting activity is expected. The Task Force shall be composed of representatives from the Departments of State, the Treasury, Defense, Agriculture, Housing and Urban Development, Justice, Commerce, Transportation, the Interior, Labor, Education, Health and Human Services, Energy, Veterans Affairs, the Environmental Protection Agency, Central Intelligence Agency, General Services

Administration, Office of Management and Budget, Council of Economic Advisers, Domestic Policy Council, National Economic Council, and such other representatives as may be determined by the Chairman of the Council on Environmental Quality. The Task Force shall be chaired by the Chairman of the Council on Environmental Quality and housed at the Department of Energy for administrative purposes.

Sec. 4. Judicial Review. Nothing in this order shall affect any otherwise available judicial review of agency action. This order is intended only to improve the internal management of the Federal Government and does not create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies or instrumen-talities, its officers or employees, or any other person.

GEORGE W. BUSH
THE WHITE HOUSE,
May 18, 2001.

PRESIDENT CLINTON -
Presidential Documents
Federal Register
Vol. 64, No. 109
Tuesday, June 8, 1999
Title 3—
The President
Executive Order 13123 of June 3, 1999
Greening the Government Through Efficient Energy Management

By the authority vested in me as President by the Constitution and the laws of the United States of America, including the National Energy Conservation Policy Act (Public Law 95–619, 92 Stat. 3206, 42 U.S.C. 8252 et seq.), as amended by the Energy Policy Act of 1992 (EPACT) (Public Law 102–486, 106 Stat. 2776), and section 301 of title 3, United States Code,

Section 101. Federal Leadership. The Federal Government, as the Nation's largest energy consumer, shall significantly improve its energy management in order to save taxpayer dollars and reduce emissions that contribute to air pollution and global climate change. With more than 500,000 buildings, the Federal Government can lead the Nation in energy efficient building design, construction, and operation. As a major consumer that spends $200 billion annually on products and services, the Federal Government can promote energy efficiency, water conservation, and the use of renewable energy products, and help foster markets for emerging technologies. In encouraging effective energy management in the Federal Government, this order builds on work begun under EPACT and previous Executive orders.

PART 2—GOALS

Sec. 201. Greenhouse Gases Reduction Goal. Through life-cycle cost-effective energy measures, each agency shall reduce its greenhouse gas emissions attributed to facility energy use by 30 percent by 2010 compared to such emissions levels in 1990. In order to encourage optimal investment in energy improvements, agencies can count greenhouse gas reductions from improvements in nonfacility energy use toward this goal to the extent that these reductions are approved by the Office of Management and Budget (OMB).

Sec. 202. Energy Efficiency Improvement Goals. Through life-cycle cost-effective measures, each agency shall reduce energy consumption per gross square foot of its facilities, excluding facilities covered in section 203 of this order, by 30 percent by 2005 and 35 percent by 2010 relative to 1985. No facilities will be exempt from these goals unless they meet new criteria for exemptions, to be issued by the Department of Energy (DOE).

Sec. 203. Industrial and Laboratory Facilities. Through life-cycle cost-effective measures, each agency shall reduce energy consumption per square foot, per unit of production, or per other unit as applicable by 20 percent by 2005 and 25 percent by 2010 relative to 1990. No facilities will be exempt from these goals unless they meet new criteria for exemptions, as issued by DOE.

Sec. 204. Renewable Energy. Each agency shall strive to expand the use of renewable energy within its facilities and in its activities by implementing renewable energy projects and by purchasing electricity from renewable energy sources. In support of the Million Solar Roofs initiative, the Federal Government shall strive to install 2,000 solar energy systems at Federal facilities by the end of 2000, and 20,000 solar energy systems at Federal facilities by 2010.

Sec. 205. Petroleum. Through life-cycle cost-effective measures, each agency shall reduce the use of petroleum within its facilities. Agencies may accomplish this reduction by switching to a less greenhouse gas-intensive, nonpetroleum energy source, such as natural gas or renewable energy sources; by eliminating unnecessary fuel use; or by other appropriate methods. Where alternative fuels are not practical or life-cycle cost-effective, agencies shall strive to improve the efficiency of their facilities.

Sec. 206. Source Energy. The Federal Government shall strive to reduce total energy use and associated greenhouse gas and other air emissions, as measured at the source. To that end, agencies shall undertake life-cycle cost-effective projects in which source energy decreases, even if site energy use increases. In such cases, agencies will receive credit toward energy reduction goals through guidelines developed by DOE.

Sec. 207. Water Conservation. Through life-cycle cost-effective measures,

agencies shall reduce water consumption and associated energy use in their facilities to reach the goals set under section 503(f) of this order. Where possible, water cost savings and associated energy cost savings shall be included in Energy-Savings Performance Contracts and other financing mechanisms.

PART 3—ORGANIZATION AND ACCOUNTABILITY

Sec. 301. Annual Budget Submission. Each agency's budget submission to OMB shall specifically request funding necessary to achieve the goals of this order. Budget submissions shall include the costs associated with: encouraging the use of, administering, and fulfilling agency responsibilities under Energy-Savings Performance Contracts, utility energy-efficiency service contracts, and other contractual platforms for achieving conservation goals; implementing life-cycle cost-effective measures; procuring life-cycle cost-effective products; and constructing sustainably designed new buildings, among other energy costs. OMB shall issue guidelines to assist agencies in developing appropriate requests that support sound investments in energy improvements and energy-using products.

OMB shall explore the feasibility of establishing a fund that agencies could draw on to finance exemplaryenergy management activities and investments with higher initial costs but lower life-cycle costs. Budget requests to OMB in support of this order must be within each agency's planning guidance level.

Sec. 302. Annual Implementation Plan. Each agency shall develop an annual implementation plan for fulfilling the requirements of this order. Such plans shall be included in the annual reports to the President under section 303 of this order.

Sec. 303. Annual Reports to the President. (a) Each agency shall measure and report its progress in meeting the goals and requirements of this order on an annual basis. Agencies shall follow reporting guidelines as developed under section 306(b) of this order. In order to minimize additional reporting requirements, the guidelines will clarify how the annual report to the President should build on each agency's annual Federal energy reports submitted to DOE and the Congress. Annual reports to the President are due on January 1 of each year beginning in the year 2000.

(b) Each agency's annual report to the President shall describe how the agency is using each of the strategies described in Part 4 of this order to help meet energy and greenhouse gas reduction goals. The annual report to the President shall explain why certain strategies, if any, have not been used. It shall also include a listing and explanation of exempt facilities.

Sec. 304. Designation of Senior Agency Official. Each agency shall designate a senior official, at the Assistant Secretary level or above, to be responsible for meeting the goals and requirements of this order, including preparing the annual report to the President. Such designation shall be reported by each Cabinet Secretary or agency head to the Deputy Director for Management of OMB within 30 days of the date of this order. Designated officials shall participate in the Interagency Energy Policy Committee, described in section

306(d) of this order. The Committee shall communicate its activities to all designated officials to assure proper coordination and achievement of the goals and requirements of this order.
Sec. 305. Designation of Agency Energy Teams. Within 90 days of the date of this order, each agency shall form a technical support team consisting of appropriate procurement, legal, budget, management, and technical rep-
306(d) of this order. The Committee shall communicate its activities to all designated officials to assure proper coordination and achievement of the goals and requirements of this order.
Sec. 305. Designation of Agency Energy Teams. Within 90 days of the date of this order, each agency shall form a technical support team consisting of appropriate procurement, legal, budget, management, and technical rep-
resentatives to expedite and encourage the agency's use of appropriations, Energy-Savings Performance Contracts, and other alternative financing mechanisms necessary to meet the goals and requirements of this order.

Agency energy team activities shall be undertaken in collaboration with each agency's representative to the Interagency Energy Management Task Force, as described in section 306(e) of this order.
Sec. 306. Interagency Coordination. (a) Office of Management and Budget. The Deputy Director for Management of OMB, in consultation with DOE, shall be responsible for evaluating each agency's progress in improving energy management and for submitting agency energy scorecards to the President to report progress.
(1) OMB, in consultation with DOE and other agencies, shall develop the agency energy scorecards and scoring system to evaluate each agency's progress in meeting the goals of this order. The scoring criteria shall include the extent to which agencies are taking advantage of key tools to save energy and reduce greenhouse gas emissions, such as Energy-Savings Performance Contracts, utility energy-efficiency service contracts, ENERGY STAR?and other energy efficient products, renewable energy technologies, electricity from renewable energy sources, and other strategies and requirements listed in Part 4 of this order, as well as overall efficiency and greenhouse gas metrics and use of other innovative energy efficiency practices. The scorecards shall be based on the annual energy reports submitted to the President under section 303 of this order.
(2) The Deputy Director for Management of OMB shall also select outstanding agency energy management team(s), from among candidates nominated by DOE, for a new annual Presidential award for energy efficiency.
(b) Federal Energy Management Program. The DOE's Federal Energy Management Program (FEMP) shall be responsible for working with the agencies to ensure that they meet the goals of this order and report their progress. FEMP, in consultation with OMB, shall develop and issue guidelines for agencies' preparation of their annual reports to the President on energy

management, as required in section 303 of this order. FEMP shall also have primary responsibility for collecting and analyzing the data, and shall assist OMB in ensuring that agency reports are received in a timely manner.
(c) President's Management Council. The President's Management Council (PMC), chaired by the Deputy Director for Management of OMB and consisting of the Chief Operating Officers (usually the Deputy Secretary) of the largest Federal departments and agencies, will periodically discuss agencies' progress in improving Federal energy management.
(d) Interagency Energy Policy Committee. This Committee was established by the Department of Energy Organization Act. It consists of senior agency officials designated in accordance with section 304 of this order. The Committee is responsible for encouraging implementation of energy efficiency policies and practices. The major energy-consuming agencies designated by DOE are required to participate in the Committee. The Committee shall communicate its activities to all designated senior agency officials to promote coordination and achievement of the goals of this order.
(e) Interagency Energy Management Task Force.

The Task Force was established by the National Energy Conservation Policy Act. It consists of each agency's chief energy manager. The Committee shall continue to work toward improving agencies' use of energy management tools and sharing information on Federal energy management across agencies.
30854 Federal Register/Vol. 64, No. 109/Tuesday, June 8, 1999/Presidential Documents
Sec. 307. Public/Private Advisory Committee. The Secretary of Energy will appoint an advisory committee consisting of representatives from Federal agencies, State governments, energy service companies, utility companies, equipment manufacturers, construction and architectural companies, environmental, energy and consumer groups, and other energy-related organizations. The committee will provide input on Federal energy management, including how to improve use of Energy-Savings Performance Contracts and utility energy-efficiency service contracts, improve procurement of ENERGY STAR? and other energy efficient products, improve building design, reduce process energy use, and enhance applications of efficient and renewable energy technologies at Federal facilities.
Sec. 308. Applicability. This order applies to all Federal departments and

Sec. 308. Applicability. This order applies to all Federal departments and
agencies. General Services Administration (GSA) is responsible for working with agencies to meet the requirements of this order for those facilities for which GSA has delegated operations and maintenance authority. The Department of Defense (DOD) is subject to this order to the extent that it does not impair or adversely affect military operations and training (including tactical aircraft, ships, weapons systems, combat training, and border security).
PART 4—PROMOTING FEDERAL LEADERSHIP IN ENERGY MANAGE-

MENT

Sec. 401. Life-Cycle Cost Analysis. Agencies shall use life-cycle cost analysis in making decisions about their investments in products, services, construction, and other projects to lower the Federal Government's costs and to reduce energy and water consumption. Where appropriate, agencies shall consider the life-cycle costs of combinations of projects, particularly to encourage bundling of energy efficiency projects with renewable energy projects. Agencies shall also retire inefficient equipment on an accelerated basis where replacement results in lower life-cycle costs. Agencies that minimize life-cycle costs with efficiency measures will be recognized in their scorecard evaluations.

Sec. 402. Facility Energy Audits. Agencies shall continue to conduct energy and water audits for approximately 10 percent of their facilities each year, either independentlyor through Energy-Savings Performance Contracts or utility energy-efficiency service contracts.

Sec. 403. Energy Management Strategies and Tools. Agencies shall use a variety of energy management strategies and tools, where life-cycle cost-effective, to meet the goals of this order.

An agency's use of these strategies
and tools shall be taken into account in assessing the agency's progress and formulating its scorecard.

(a) Financing Mechanisms. Agencies shall maximize their use of available alternative financing contracting mechanisms, including Energy-Savings Performance Contracts and utility energy-efficiency service contracts, when life-cycle cost-effective, to reduce energy use and cost in their facilities and operations. Energy-Savings Performance Contracts, which are authorized under the National Energy Conservation Policy Act, as modified by the Energy Policy Act of 1992, and utility energy-efficiency service contracts provide significant opportunities for making Federal facilities more energy efficient at no net cost to taxpayers.

(b) ENERGY STAR?and Other Energy Efficient Products.

(1) Agencies shall select, where life-cycle cost-effective, ENERGY STAR? and other energy efficient products when acquiring energy-using products. For product groups where ENERGY STAR?labels are not yet available, agencies shall select products that are in the upper 25 percent of energy efficiency as designated by FEMP. The Environmental Protection Agency (EPA) and DOE shall expedite the process of designating products as ENERGY STAR?and will merge their current efficiency rating procedures.

(2) GSA and the Defense Logistics Agency (DLA), with assistance from EPA and DOE, shall create clear catalogue listings that designate these

30855Federal Register/Vol. 64, No. 109/Tuesday, June 8, 1999/Presidential Documents

products in both print and electronic formats. In addition, GSA and DLA shall undertake pilot projects from selected energy-using products to show a ''second price tag'', which means an accounting of the operating and purchase costs of the item, in both printed and electronic catalogues and assess the impact of providing this information on Federal purchasing deci-

sions.
(3) Agencies shall incorporate energy efficient criteria consistent with ENERGY STAR?and other FEMP-designated energy efficiency levels into all guide specifications and project specifications developed for new construction and renovation, as well as into product specification language developed for Basic Ordering Agreements, Blanket Purchasing Agreements, Government Wide Acquisition Contracts, and all other purchasing procedures.
(4) DOE and OMB shall also explore the creation of financing agreements with private sector suppliers to provide private funding to offset higher up-front costs of efficient products. Within 9 months of the date of this order, DOE shall report back to the President's Management Council on the viability of such alternative financing options.
(c) ENERGY STAR?Buildings. Agencies shall strive to meet the ENERGY STAR?Building criteria for energy performance and indoor environmental quality in their eligible facilities to the maximum extent practicable by the end of 2002.

Agencies may use Energy-Savings Performance Contracts, utility energy-efficiency service contracts, or other means to conduct evaluations and make improvements to buildings in order to meet the criteria. Buildings that rank in the top 25 percent in energy efficiency relative to comparable commercial and Federal buildings will receive the ENERGY STAR? building label. Agencies shall integrate this building rating tool into their general facility audits.
(d) Sustainable Building Design. DOD and GSA, in consultation with DOE and EPA, shall develop sustainable design principles. Agencies shall apply such principles to the siting, design, and construction of new facilities. Agencies shall optimize life-cycle costs, pollution, and other environmental
(d) Sustainable Building Design. DOD and GSA, in consultation with DOE and EPA, shall develop sustainable design principles. Agencies shall apply such principles to the siting, design, and construction of new facilities. Agencies shall optimize life-cycle costs, pollution, and other environmental
and energy costs associated with the construction, life-cycle operation, and decommissioning of the facility. Agencies shall consider using Energy-Savings Performance Contracts or utility energy-efficiency service contracts to aid them in constructing sustainably designed buildings.
(e) Model Lease Provisions. Agencies entering into leases, including the renegotiation or extension of existing leases, shall incorporate lease provisions that encourage energy and water efficiency wherever life-cycle cost-effective. Build-to-suit lease solicitations shall contain criteria encouraging sustainable design and development, energy efficiency, and verification of building performance. Agencies shall include a preference for buildings having the ENERGY STAR?building label in their selection criteria for acquiring leased buildings. In addition, all agencies shall encourage lessors to apply for the ENERGY STAR?building label and to explore and implement

projects that would reduce costs to the Federal Government, including projects carried out through the lessors' Energy-Savings Performance Contracts or utility energy-efficiency service contracts.
(f) Industrial Facility Efficiency Improvements. Agencies shall explore efficiency opportunities in industrial facilities for steam systems, boiler operation, air compressor systems, industrial processes, and fuel switching, including cogeneration and other efficiency and renewable energy technologies.
(g) Highly Efficient Systems. Agencies shall implement district energy systems, and other highly efficient systems, in new construction or retrofit projects when life-cycle cost-effective. Agencies shall consider combined cooling, heat, and power when upgrading and assessing facility power needs and shall use combined cooling, heat, and power systems when life-cycle cost-effective. Agencies shall survey local natural resources to optimize use
30856 Federal Register/Vol. 64, No. 109/Tuesday, June 8, 1999/Presidential Documents
of available biomass, bioenergy, geothermal, or other naturally occurring energy sources.

(h) Off-Grid Generation. Agencies shall use off-grid generation systems, including solar hot water, solar electric, solar outdoor lighting, small wind turbines, fuel cells, and other off-grid alternatives, where such systems are life-cycle cost-effective and offer benefits including energy efficiency, pollution prevention, source energy reductions, avoided infrastructure costs, or expedited service.
Sec. 404. Electricity Use. To advance the greenhouse gas and renewable energy goals of this order, and reduce source energy use, each agency shall strive to use electricity from clean, efficient, and renewable energy sources. An agency's efforts in purchasing electricity from efficient and renewable energy sources shall be taken into account in assessing the agency's progress and formulating its score card.
(a) Competitive Power. Agencies shall take Agencies are encouraged to aggregate demand across facilities or
agencies to maximize their economic advantage.
(b) Reduced Greenhouse Gas Intensity of Electric Power. When selecting electricity providers, agencies shall purchase electricity from sources that use high efficiency electric generating technologies when life-cycle cost-effective. Agencies shall consider the greenhouse gas intensity of the source of the electricity and strive to minimize the greenhouse gas intensity of purchased electricity.
(c) Purchasing Electricity from Renewable Energy Sources.
(1) Each agency shall evaluate its current use of electricity from renewable energy sources and report this level in its annual report to the President. Based on this review, each agency should adopt policies and pursue projects that increase the use of such electricity. Agencies should include provisions for the purchase of electricity from renewable energy sources as a component of their requests for bids whenever procuring electricity. Agencies may use

savings from energy efficiency projects to pay additional incremental costs of electricity from renewable energy sources.

(2) In evaluating opportunities to comply with this section, agencies should consider: my Administration's goal of tripling nonhydroelectric renewable energy capacity in the United States by 2010; the renewable portfolio standard specified in the restructuring guidelines for the State in which the facility is located; GSA's efforts to make electricity from renewable energy sources available to Federal electricity purchasers; and EPA's guidelines on crediting renewable energy power in implementation of Clean Air Act standards.

Sec. 405. Mobile Equipment. Each agency shall seek to improve the design, construction, and operation of its mobile equipment, and shall implement all life-cycle cost-effective energy efficiency measures that result in cost savings while improving mission performance. To the extent that such measures are life-cycle cost-effective, agencies shall consider enhanced use of alternative or renewable-based fuels.

Sec. 406. Management and Government Performance. Agencies shall use the following management strategies in meeting the goals of this order.

(a) Awards. Agencies shall use employee incentive programs to reward exceptional performance in implementing this order.

(b) Performance Evaluations. Agencies shall include successful implementation of provisions of this order in areas such as Energy-Savings Performance Contracts, sustainable design, energy efficient procurement, energy efficiency, water conservation, and renewable energy projects in the position descriptions and performance evaluations of agency heads, members of the agency energy team, principal program managers, heads of field offices, facility managers, energy managers, and other appropriate employees.

(c) Retention of Savings and Rebates. Agencies granted statutory authority to retain a portion of savings generated from efficient energy and water management are encouraged to permit the retention of the savings at the facility or site where the savings occur to provide greater incentive for that facility and its site managers to undertake more energy management initiatives, invest in renewable energy systems, and purchase electricity from renewable energy sources.

(d) Training and Education. Agencies shall ensure that all appropriate personnel receive training for implementing this order.

(1) DOE, DOD, and GSA shall provide relevant training or training materials for those programs that they make available to all Federal agencies relating to the energy management strategies contained in this order.

(2) The Federal Acquisition Institute and the Defense Acquisition University shall incorporate into existing procurement courses information on Federal energy management tools, including Energy-Savings Performance Contracts, utility energy-efficiency service contracts, ENERGY STAR?and other energy efficient products, and life-cycle cost analysis.

(3) All agencies are encouraged to develop outreach programs that in-

clude education, training, and promotion of ENERGY STAR? and other energy-efficient products for Federal purchase card users. These programs may include promotions with billing statements, user training, catalogue awareness, and exploration of vendor data collection of purchases.

(e) Showcase Facilities. Agencies shall designate exemplary new and existing facilities with significant public access and exposure as showcase facilities to highlight energy or water efficiency and renewable energy improvements.

PART 5—TECHNICAL ASSISTANCE

Sec. 501. Within 120 days of this order, the Director of OMB shall:

(a) develop and issue guidance to agency budget officers on preparation of annual funding requests associated with the implementation of the order for the FY 2001 budget;

(b) in collaboration with the Secretary of Energy, explain to agencies how to retain savings and reinvest in other energy and water management projects; and

(c) in collaboration with the Secretary of Energy through the Office of Federal Procurement Policy, periodically brief agency procurement executives on the use of Federal energy management tools, including Energy-Savings Performance Contracts, utility energy-efficiency service contracts, and procurement of energy efficient products and electricity from renewable energy sources.

Sec. 502. Within 180 days of this order, the Secretary of Energy, in collaboration with other agency heads, shall:

(a) issue guidelines to assist agencies in measuring energy per square foot, per unit of production, or other applicable unit in industrial, laboratory, research, and other energy-intensive facilities;

(b) establish criteria for determining which facilities are exempt from the order. In addition, DOE must provide guidance for agencies to report proposed exemptions;

(c) develop guidance to assist agencies in calculating appropriate energy baselines for previously exempt facilities and facilities occupied after 1990 in order to measure progress toward goals;

(d) issue guidance to clarify how agencies determine the life-cycle cost for investments required by the order, including how to compare different energy and fuel options and assess the current tools;

(e) issue guidance for providing credit toward energy efficiency goals for cost-effective projects where source energy use declines but site energy use increases; and

(f) provide guidance to assist each agency to determine a baseline of water consumption.

Sec. 503. Within 1 year of this order, the Secretary of Energy, in collaboration with other agency heads, shall:

(a) provide guidance for counting renewable and highly efficient energy projects and purchases of electricity from renewable and highly efficient

energy sources toward agencies' progress in reaching greenhouse gas and energy reduction goals;
(b) develop goals for the amount of energy generated at Federal facilities from renewable energy technologies;
(c) support efforts to develop standards for the certification of low environmental impact hydropower facilities in order to facilitate the Federal purchase of such power;
(d) work with GSA and DLA to develop a plan for purchasing advanced energy products in bulk quantities for use in by multiple agencies;
(e) issue guidelines for agency use estimating the greenhouse gas emissions attributable to facility energy use. These guidelines shall include emissions associated with the production, transportation, and use of energy consumed in Federal facilities; and

(f) establish water conservation goals for Federal agencies.
Sec. 504. Within 120 days of this order, the Secretary of Defense and the Administrator of GSA, in consultation with other agency heads, shall develop and issue sustainable design and development principles for the siting, design, and construction of new facilities.
Sec. 505. Within 180 days of this order, the Administrator of GSA, in collaboration with the Secretary of Defense, the Secretary of Energy, and other agency heads, shall:
(a) develop and issue guidance to assist agencies in ensuring that all project cost estimates, bids, and agency budget requests for design, construction, and renovation of facilities are based on life-cycle costs. Incentives for contractors involved in facility design and construction must be structured to encourage the contractors to design and build at the lowest life-cycle cost;
(b) make information available on opportunities to purchase electricity from renewable energy sources as defined by this order. This information should accommodate relevant State regulations and be updated periodically based on technological advances and market changes, at least every 2 years;
(c) develop Internet-based tools for both GSA and DLA customers to assist individual and agency purchasers in identifying and purchasing ENERGY STAR?and other energy efficient products for acquisition; and
(d) develop model lease provisions that incorporate energy efficiency and sustainable design.
PART 6—GENERAL PROVISIONS
Sec. 601. Compliance by Independent Agencies. Independent agencies are encouraged to comply with the provisions of this order.
Sec. 602. Waivers. If an agency determines that a provision in this order is inconsistent with its mission, the agency may ask DOE for a waiver

of the provision. DOE will include a list of any waivers it grants in its Federal Energy Management Programs annual report to the Congress.
Sec. 603. Scope. (a) This order is intended only to improve the internal management of the executive branch and is not intended to create any right, benefit, or trust responsibility, substantive or procedural, enforceable by law by a party against the United States, its agencies, its officers, or any other person.
(b) This order applies to agency facilities in any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Northern Mariana Islands, and any other territory or possession over which the United States has jurisdiction. Agencies with facilities outside of these areas, however, are encouraged to make best efforts to comply with the goals of this order for those facilities. In addition, agencies can report energy improvements made outside the United States in their annual report to the President; these improvements may be considered in agency scorecard evaluations.

Sec. 604. Revocations. Executive Order 12902 of March 9, 1994, Executive Order 12759 of April 17, 1991, and Executive Order 12845 of April 21, 1993, are revoked.
Sec. 605. Amendments to Federal Regulations. The Federal Acquisition Regulation and other Federal regulations shall be amended to reflect changes made by this order, including an amendment to facilitate agency purchases of electricity from renewable energy sources.

Sec. 704. ''Exempt facility'' or ''Exempt mobile equipment'' means a facility or a piece of mobile equipment for which an agency uses DOE-established criteria to determine that compliance with the Energy Policy Act of 1992 or this order is not practical.
Sec. 705. ''Facility'' means any individual building or collection of buildings, grounds, or structure, as well as any fixture or part thereof, including the associated energy or water-consuming support systems, which is constructed, renovated, or purchased in whole or in part for use by the Federal Government. It includes leased facilities where the Federal Government has a purchase option or facilities planned for purchase. In any provision of this order, the term ''facility'' also includes any building 100 percent leased for use by the Federal Government where the Federal Government pays directly or indirectly for the utility costs associated with its leased space. The term also includes Government-owned contractor-operated facilities.
Sec. 706. ''Industrial facility'' means any fixed equipment, building, or complex for production, manufacturing, or other processes that uses large amounts of capital equipment in connection with, or as part of, any process
30860 Federal Register/Vol. 64, No. 109/Tuesday, June 8, 1999/Presidential Documents
or system, and within which the majority of energy use is not devoted to the heating, cooling, lighting, ventilation, or to service the water heating

energy load requirements of the facility.
Sec. 707. ''Life-cycle costs'' means the sum of the present values of investment costs, capital costs, installation costs, energy costs, operating costs, maintenance costs, and disposal costs, over the lifetime of the project, product, or measure. Additional guidance on measuring life-cycle costs is specified in 10 C.F.R. 436.19.
Sec. 708. ''Life-cycle cost-effective'' means the life-cycle costs of a product, project, or measure are estimated to be equal to or less than the base case (i.e., current or standard practice or product). Additional guidance on measuring cost-effectiveness is specified in 10 C.F.R. 436.18 (a), (b), and (c), 436.20, and 436.21.
Sec. 709. ''Mobile equipment'' means all Federally owned ships, aircraft, and nonroad vehicles.
Sec. 710. ''Renewable energy'' means energy produced by solar, wind, geothermal, and biomass power.
Sec. 711. ''Renewable energy technology'' means technologies that use renewable energy to provide light, heat, cooling, or mechanical or electrical energy for use in facilities or other activities.
The term also means the use of
integrated whole-building designs that rely upon renewable energy resources, including passive solar design.
Sec. 712. ''Source energy'' means the energy that is used at a site and consumed in producing and in delivering energy to a site, including, but not limited to, power generation, transmission, and distribution losses, and that is used to perform a specific function, such as space conditioning, lighting, or water heating.
Sec. 713. ''Utility'' means public agencies and privately owned companies that market, generate, and/or distribute energy or water, including electricity, natural gas, manufactured gas, steam, hot water, and chilled water as commodities for public use and that provide the service under Federal, State, or local regulated authority to all authorized customers. Utilities include: Federally owned nonprofit producers; municipal organizations; and investor or privately owned producers regulated by a State and/or the Federal Government; cooperatives owned by members and providing services mostly to their members; and other nonprofit State and local government agencies serving in this capacity.

Sec. 714. ''Utility energy-efficiency service'' means demand side management services provided by a utility to improve the efficiency of use of the commodity (electricity, gas, etc.) being distributed. Services can include, but are not limited to, energy efficiency and renewable energy project auditing, financing, design, installation, operation, maintenance, and monitoring.
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THE WHITE HOUSE,

June 3, 1999.

Appendix #4

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The Insider, August 17, 2006

Inside the Pentagon

Vol. 22, No. 33, August 17, 2006

ARMY PLANS TO TEST RENEWABLE ENERGY PROTOTYPES IN IRAQ, AFGHANISTAN

The Army is moving ahead with plans to develop and test renewable energy systems in Iraq and Afghanistan next year, as it attempts to cut the time fuel convoys spend on roads where they are susceptible to attacks by insurgents, Inside the Pentagon has learned.

The service's Rapid Equipping Force, which exists to deliver technology and equipment quickly to soldiers in the field, will issue a broad agency announcement later this month for renewable and hybrid energy systems small enough to be shipped to remote operating bases and outposts, an official close to the effort told ITP last week.

"The BAA will solicit proposals for innovative off-the-shelf products to provide integrated concepts for power generation that will reduce the amount of fuel shipped to remote operating bases and observation posts in a theater of operations," Air Force Capt. Brian Smith, project officer for REF's renewable and hybrid energy research, said.

Awards for the "Transportable Hybrid Electric Power Stations" BAA are slated to be announced in late September, a REF spokeswoman told ITP this week.As envisioned, REF will buy six to eight renewable and hybrid energy systems for testing by troops in Iraq, Afghanistan and the United States, Smith said. The solicitation will follow a recent request for more renewable energy systems made by a top U.S. general in western Iraq (ITP, Aug.10, p1).

Late last month, Marine Corps Maj. Gen. Richard Zilmer, the chief of Multi-National Force-West in al-Anbar province, submitted an urgent request calling on the Pentagon to send more renewable energy systems to the country because they could leverage resources like sunlight or wind to produce power for bases and outposts.

Commanders assert that tapping renewable energy sources would lessen dependence on fossil fuels -- a move that could reduce the amount of fuel convoys on the road and save lives. "A proposed alternate solution -- one that reduces the number of convoys while providing an additional capability to outlying bases -- is to augment our use of fossil fuels with renewable energy, such as photovoltaic solar panels and wind turbines, at our outlying bases," the request states. "By reducing the need for [petroleum-based fuels] at our outlying bases, we can decrease the frequency of logistics convoys on the road, thereby reducing the danger to our Marines, soldiers, and sailors."

MNF-W officials relied on research and data compiled by REF when formulating their request, according to Smith. REF's Transportable Hybrid Electric Power Stations project seeks to combine existing commercial and military technology in "new and unique ways," Smith said. Officials are interested in systems that are reliable, mobile and easy to set up and maintain, he added. Combining existing technologies like a military generator with a battery bank can reduce fuel consumption by 20 percent to 30 percent, according to an REF fact sheet.

Harnessing natural resources such as ample wind and sunlight in Iraq and Afghanistan may reduce fuel consumption by 30 to 60 percent, the document adds. REF will invest $3 million in the prototypes to build, test,evaluate, ship and assess systems, Smith said. The funds also may go toward procuring more test systems and training personnel, he added.

Once REF receives feedback from operators in the field, the organization's leadership will decide if more money needs to be invested in the technology's spiral development -- or if system development and procurement should be transferred to another Army office, Smith said.

Although REF officials declined to say what available systems could meet requirements to be listed in the upcoming BAA, MNF-W in its request singled out a product called Mobile Power System (MPS) as one that could meet its needs.

The system is a renewable energy technology manufactured by Arlington, VA-based SkyBuilt Power. MPS "provides renewable energy solutions consisting of solar, wind, fuel cells, and micro-hydro power, with or without fuel-based systems," the MNF-W request states. The power station can be transported in a standard shipping container, which can then be used to support solar panels, wind turbines or gasoline generators, said Dave Muchow, president and CEO of SkyBuilt Power, told to ITP Aug. 8. Once the system is deployed, the transporting container could be used for a myriad of other, non-energy related functions, including housing a command and control center, he said.

In the MNF-W request, commanders said 183 such systems could meet the energy needs of troops in its area of operations. When the BAA awards are announced and development work begins, REF officials will attempt to improve existing systems to make them suitable for military users, Smith said.

Some of these efforts include reducing system setup times. REF is pursuing renewable and hybrid energy technology because such sources "get more bodies off the battlefield," Smith said. More than 70 percent of tonnage required to position the Army for battle is fuel according to a 2001 Defense Science Board study.

In addition to renewable energy systems, operators in Iraq andAfghanistan are calling on REF to adapt available technologies like folding solar cells and small, rechargeable batteries for military use, he said.

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Appendix #5

Department of Defense Studies and Relevant USDOE and DHS Papers

I have listed some of the more relevant studies for the House Armed Services Committee to review:

2006

Used Oil Re-refining Study to Address Energy Policy Act of 2005, Section 1938. US Department of Energy, Office of Fossil Energy. July 2006

Renewable and Distributed Energy as a Security Tactic, by Scott Sklar, President of The Stella Group, Ltd., Washington, D.C. , revised in July 2006

2005

DoD Renewable Energy Assessment. Report to Congress. Final Report, Department of Defense. March 14, 2005, and Implementation Plan, February 16, 2005.

National Infrastructure Protection Plan. Draft for Public Comments. US Department of Homeland Security. November 10, 2005 established from Interim NIPP issued February 2005.

Quantifying the Air Pollution Exposure Consequences of Distributed Energy Generation. University of California Energy Institute. Garvin A Heath, Patrick W. Granvold, Abigail S. Hoats, and William W. Nazaroff. May 2005 (note: focus on diesel gen sets, fuel cells, and microturbines).

2004

Renewable Role in Energy Security. By W. Michael Warwick, Pacific Northwest Labs, July 2004

Federal Energy and Water Management Award Winners. FEMP. US Department of Energy. October 28, 2004.

2003

Army Installation and Energy Security Plans. Office of Assistant Chief of Staff for Installation Management. September 2003.

Security Benefits of Renewable Energy. A Case Study. Prepared for US Air Force. Civil Engineering Supprt Agency Headquarters, under a related Services Agreement with the US Department of Energy. PNL/Batelle. Lu, Warwick, Steese, Arey, Dagle, Jarrell and Weimer. October 2003.

A Atrategy: Moving America Away from Oil. Office of Net Assessment, Office of the Secretary of Defense. Department of Defense. Issued by The Arlington Institute. August 2003.

2001

More Capable War Fighting Through Reduced Fuel Burden. The Defense Science Board Task Force on Improving Fuel Efficiency of Weapons Platforms. January 2001.

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TITLE IX - ADDITIONAL APPROPRIATIONS

The following table provides details of the supplemental appropriations in this title.

[In thousands of dollars]

Account	Conference
Military Personnel:	
Military Personnel, Army	4,346,710
Military Personnel, Navy	143,296
Military Personnel, Marine Corps	145,576
Military Personnel, Air Force	351,788
Reserve Personnel, Army	87,756
Reserve Personnel, Marine Corps	15,420
National Guard Personnel, Army	295,959
Total Military Personnel	5,386,505
Operation and Maintenance:	
O&M, Army	28,364,102
O&M, Navy	1,615,288
O&M, Marine Corps	2,689,006
O&M, Air Force	2,688,189
O&M, Defense-Wide	2,774,963
O&M, Army Reserve	211,600
O&M, Navy Reserve	9,886
O&M, Marine Corps Reserve	48,000
O&M, Air Force Reserve	65,000
O&M, Army National Guard	424,000
O&M, Air National Guard	200,000
Iraq Freedom Fund	50,000
Afghanistan Security Forces Fund	1,500,000
Iraq Security Forces Fund	1,700,000
Joint Improvised Explosive Device Defeat Fund	1,920,700
Total Operation and Maintenance	44,260,734
Procurement:	
Aircraft Procurement, Army	1,461,300
Procurement of WTCV, Army	3,393,230
Procurement of Ammunition, Army	237,750
Other Procurement, Army	5,003,995
Aircraft Procurement, Navy	486,881
Weapons Procurement, Navy	109,400
Procurement of Ammunition, Navy & Marine Corps	127,880
Other Procurement, Navy	319,965
Procurement, Marine Corps	4,898,269
Aircraft Procurement, Air Force	2,291,300
Missile Procurement, Air Force	32,650
Other Procurement, Air Force	1,317,607
Procurement, Defense-Wide	145,555
Total Procurement	19,825,782

[In thousands of dollars]

Account	Conference
Research, Development, Test and Evaluation:	
RDT&E, Navy	231,106
RDT&E, Air Force	36,964
RDT&E, Defense-Wide	139,644
Total RDT&E	407,714
Other Department of Defense Programs:	
Drug Interdiction and Counterdrug Activities, Defense	100,000
Related Agencies:	
Intelligence Community Management Account	19,265
General Provisions	
Transfer Authority for GWOT Supplemental [Non add]	[3,000,000]
Grand Total	70,000,000

REPORTING REQUIREMENTS

The conferees direct the Secretary of Defense to provide a report to the congressional defense committees within 30 days of enactment of this legislation on the allocation of the funds within the accounts listed in this title. The Secretary shall submit updated reports 30 days after the end of each fiscal quarter until funds listed in this title are no longer available for obligation. The conferees direct that these reports shall include: a detailed accounting of obligations and expenditures of appropriations provided in this title by program and subactivity group for the continuation of the war in Iraq and Afghanistan; and a listing of equipment procured using funds provided in this title.

The conferees expect that in order to meet unanticipated requirements, the Department of Defense may need to transfer funds within these appropriation accounts for purposes other than those specified in this report. The conferees direct the Department of Defense to follow normal prior approval reprogramming procedures should it be necessary to transfer funding between different appropriations accounts in this title.

RESET

The high operating tempo resulting from training and subsequent deployment to Iraq and Afghanistan, combined with severe environmental conditions, results in an equipment wear out factor that is several times the peace time rate. Combat losses add to the overall deterioration in the readiness rating of entire categories of equipment ranging from night vision devices to communications equipment to combat and support vehicles. While units deploying to combat theaters and in the combat theaters are fully equipped with the most capable equipment, units at home station are often faced with equipment shortages or unready equipment. These shortages limit the capacity of units to conduct readiness training, and in the case of the National Guard, may limit the capacity of units to perform state emergency missions. Units returning from deployment go through the reset process in which equipment is repaired and battle losses are replaced in order to return the unit to full readiness posture.

The conferees are concerned that the reset effort has not kept up with the requirements generated by the ongoing Global War on Terror, especially in the Army and Marine Corps for which nearly continuous ground combat operations have been especially hard on equipment. The conferees understand that the necessary capacity is available at industry and government facilities to repair or replace the worn out equipment. The House and Senate each included funds for reset in their version of the Defense Appropriations Act for fiscal year 2007. The conferees have worked closely with the Army and Marine Corps to examine reset funding requirements and the services' capacity to execute those funds and accomplish the reset mission as quickly as possible to ensure military readiness. Within title IX, the conferees have provided $17.1 billion for additional fiscal year 2007 reset funding for the Army and $5.8 billion for the Marine Corps, amounts identified by these services as necessary to meet their fiscal year 2007 requirements. The con-

ferees recommend this substantial funding increase in order to ensure the readiness of the armed forces. The conferees note that this critical funding has been provided without a formal request from the administration and urge the Department of Defense to include funding in future budget requests to address reset requirements and ensure that readiness goals are achieved.

MILITARY PERSONNEL

The following table provides details of the supplemental appropriations in this title.

[In thousands of dollars]

Account	Conference
Military Personnel, Army:	
Foreign Language Proficiency Pay	60,949
Pay and Allowances	4,035,061
Other Military Personnel Costs: SGLI Extra Hazard Payments and Traumatic Injury Protection	250,700
Total Military Personnel, Army	4,346,710
Military Personnel, Navy:	
Foreign Language Proficiency Pay	28,796
Other Military Personnel Costs: SGLI Extra Hazard Payments and Traumatic Injury Protection	114,500
Total Military Personnel, Navy	143,296
Military Personnel, Marine Corps:	
Foreign Language Proficiency Pay	3,256
Pay and Allowances	88,120
Other Military Personnel Costs: SGLI Extra Hazard Payments and Traumatic Injury Protection	54,200
Total Military Personnel, Marine Corps	145,576
Military Personnel, Air Force:	
Pay and Allowances	202,300
Foreign Language Proficiency Pay	20,488
Other Military Personnel Costs: SGLI Extra Hazard Payments and Traumatic Injury Protection	129,000
Total Military Personnel, Air Force	351,788
Reserve Personnel, Army:	
Other Training and Support: Special Training (Pre/Post Mobilization Training)	87,756
Total Reserve Personnel, Army	87,756
Reserve Personnel, Marine Corps:	
Unit and Individual Training	15,420
Total Reserve Personnel, Marine Corps	15,420
National Guard Personnel, Army:	
Authorized End Strength	251,000
Other Training and Support: School Training	44,959
Total National Guard Personnel, Army	295,959
Total Military Personnel	5,386,505

OPERATION AND MAINTENANCE

The following table provides details of the supplemental appropriations in this title.

[In thousands of dollars]

Account	Conference
Operation and Maintenance, Army:	
Operating Forces	8,308,000
LOGCAP	2,700,000
Theater Communications	620,000
Personnel Support	1,690,000
Airlift and Sealift	3,100,000
Rapid Fielding Initiative	500,000
Depot Maintenance	4,154,200
Reset (Unit and Intermediate Maintenance)	3,690,000
Army Pre-positioned Stocks	344,800
Recapitalization	695,000
Body Armor and Personal Force Protection	1,000,000
Servicewide Transportation	747,380
Classified Programs	305,722
Commander's Emergency Response Program	500,000
Hemostatic Agents (from Senate Sec. 9014)	9,000
Total Operation and Maintenance, Army	28,364,102
Operation and Maintenance, Navy:	
Operating Forces	304,490
Mission and Other Flight Operations	340,000
Combat Support Forces	297,000
Aviation Depot Maintenance (for Marine Corps)	380,000
Coast Guard Support	90,000
Ship Prepositioning and Surge	2,300
Training and Recruiting	4,900
Administration and Servicewide Activities	110,200
Classified Programs	41,598
Counter IED Collection and Exploitation	44,800
Total Operation and Maintenance, Navy	1,615,288
Operation and Maintenance, Marine Corps:	
Operating Forces	1,324,000
Reset/Personnel Combat Equipment	85,000
Depot Maintenance	471,000
Field Logistics	366,104
Prepositioning	18,897
Recruiting and Advertising	34,458
Training Support	87,023
Servicewide Transportation	191,558
Base Support	104,400
Hemostatic Agents (from Senate Sec. 9014)	2,000
Classified Programs	4,566
Total Operation and Maintenance, Marine Corps	2,689,006

[In thousands of dollars]

Account	Conference
Operation and Maintenance, Air Force:	
Operating Forces/Flying Hours	790,600
Combat Communications	200,000
Combat Forces Depot Maintenance	480,400
Airlift Operations	862,900
Training and Recruiting	26,500
Classified Programs	177,289
Administration and Servicewide Activities	107,400
U-2	43,100
Total Operation and Maintenance, Air Force	2,688,189
Operation and Maintenance, Defense-Wide:	
DISA	38,800
DLA	26,100
DLSA	11,000
DODEA Family Advocacy Program and Counseling Assistance for Military Families	50,000
DHRA	9,800
WHS	9,300
Joint Advertising, Market Research and Studies Program (from Senate Sec. 8120)	7,500
Classified Programs	802,463
Special Operations	900,000
DCSA Coalition Support	900,000
Sudan Peacekeeping	20,000
Total Operation and Maintenance, Defense-Wide	2,774,963
Operation and Maintenance, Army Reserve:	
Operating Forces Support	71,600
Pre-Deployment and Post-Deployment Training	140,000
Total Operation and Maintenance, Army Reserve	211,600
Operation and Maintenance, Navy Reserve:	
Operating Forces Support	8,036
Classified Programs	1,850
Total Operation and Maintenance, Navy Reserve	9,886
Operation and Maintenance, Marine Corps Reserve:	
Initial Issue/Personnel Protection Equipment	42,000
Pre-Deployment Training	6,000
Total Operation and Maintenance, Marine Corps Reserve	48,000

[In thousands of dollars]

Account	Conference
Operation and Maintenance, Air Force Reserve:	
Pre-Deployment and Post-Deployment Training	65,000
Total Operation and Maintenance Air Force Reserve	65,000
Operation and Maintenance, Army National Guard:	
Authorized End Strength	220,000
Operating Forces Support	104,000
Pre-Deployment and Post-Deployment Training	100,000
Total Operation and Maintenance, Army National Guard	424,000
Operation and Maintenance, Air National Guard:	
Pre-Deployment and Post-Deployment Training	200,000
Total Operation and Maintenance, Air National Guard	200,000
Iraq Freedom Fund:	
Joint Rapid Acquisition for Global War on Terror	50,000
Total Iraq Freedom Fund	50,000
Afghanistan Security Forces Fund	1,500,000
Iraq Security Forces Fund	1,700,000
Joint Improvised Explosive Device Defeat Fund	1,920,700
Total Operation and Maintenance	44,260,734

HOME STATION READINESS TRAINING, LOGISTICS, AND RESET

In this title the conferees recommend $44,260,734,000 in the operation and maintenance accounts. In addition to substantial funding required to support continuing combat and security operations in Afghanistan and Iraq, the conferees understand that significant amounts are required in support of a range of home station activities, including unit mobilizations, specialized pre-deployment training, transportation, reset, and post-deployment training. The funding provided in this title, particularly the substantial funding for repair of equipment, will ensure recovery to established readiness standards for full spectrum combat operations around the world. To the extent that training, maintenance and reset activities displace normal peacetime training events, the amounts provided in home station operation and maintenance lines in title II of this conference report have been reduced. The Department of Defense should allocate title IX operation and maintenance funding accordingly to ensure full support for pre-deployment and post-deployment operations, as well as for continuing combat and security operations in support of the Global War on Terror.

AFGHANISTAN AND IRAQ SECURITY FORCES FUNDS

The conferees provide $1,500,000,000 for the Afghanistan Security Forces Fund and $1,700,000,000 for the Iraq Security Forces Fund. These funds will continue the training of indigenous security forces and provide equipment and infrastructure essential to developing capable security forces in Afghanistan and Iraq. The conferees direct the Department to continue to provide comprehensive financial plans for the security forces funds as directed in the Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Public Law 109–234). The conferees further expect that up to $2,000,000 of the funds provided for the Afghanistan Security Forces Fund be available for infrastructure improvements for the Afghanistan military legal system, as proposed by the Senate.

COMMANDER'S EMERGENCY RESPONSE PROGRAM

The conferees recommend $500,000,000 to continue the Commander's Emergency Response Program (CERP). The conferees direct the Department to submit quarterly reports on CERP not later than 15 days after the end of each fiscal quarter to the congressional defense committees. The quarterly reports should include detailed information on the source of funds for the program, the allocation and use of funds during that quarter, the recipient of the funds, and the specific purposes for which the funds were used.

PROCUREMENT

The following table provides details of the supplemental appropriations in this title.

[In thousands of dollars]

Account	Conference
Aircraft Procurement, Army:	
CH-47 Replacement/Mods/Battle Losses (17 aircraft)	511,500
AH-64 Replacement (18 aircraft)	621,000
UH-60 Blackhawk - Battle Losses (15 aircraft)	225,000
UH-60 Blackhawk - Army National Guard (5 aircraft)	95,100
Aviation Ground Support Equipment	2,200
Air Traffic Control	6,500
Total Aircraft Procurement, Army	1,461,300
Procurement of Weapons and Tracked Combat Vehicles, Army:	
Bradley Base Sustainment	1,402,500
Abrams Integrated Management Program, incl. TUSK and IED prot.	574,700
Abrams SEP M1A2, incl. Combat losses	700,000
Stryker--Combat Losses	82,130
Stryker Slat Armor	25,000
Carrier Mods	132,200
FIST Vehicle Mods	130,000
Improved Recovery Vehicle	272,400
MK-19 Grenade Machine Gun (40mm)	10,050
M240 medium machine gun (7.62mm)	21,600
M4 carbine mods	15,450
M249 SAW machine gun (5.56mm)	22,200
M2 50 caliber machine gun mods	5,000
Total Procurement of WTCV, Army	3,393,230
Procurement of Ammunition, Army:	
CTG, 5.56MM, All Types	107,300
CTG, 7.62MM, All Types	56,800
CTG, .50 CAL, All Types	62,550
CTG, 20MM Phalanx	11,100
Total Procurement of Ammunition, Army	237,750
Other Procurement, Army:	
Tactical Trailer/Dolly Sets	56,800
Semitrailer FB/BB/Cont Trans 22 1/2 T	87,000
Semitrailer, Tankers	53,600
Up-Armor HMMWVs: M1114, M1151, M1152	1,074,900
Up-Armor HMMWV Fragmentation Kits and Gunner Protection Kits	214,000
Family of Medium Tactical Vehicles	794,700
Truck, Firefighting, Tactical	6,000
HMMWV Recap	455,000
HEMTT ESP	131,200
Family of Heavy Tactical Vehicles	647,600
Family of Heavy Tactical Vehicles Trailers	12,500
Armored Security Vehicles	83,000
Truck, Tractor, Line Haul	138,200
Items less than $5 million (tactical vehicles)	8,000
Towing Device - Fifth Wheel	174
SINCGARS Family	124,500

[In thousands of dollars]

Account	Conference
Radio Improved, HF Family	48,200
Combat Survivor Radios	8,270
Information System Security Program	1,100
Force XXI Battle Command BDE and Below (FBCB2)	80,000
Mortar Fire Control System	6,300
NAVSTAR Global Positioning System (Space)	12,700
Prophet Ground	48,250
Knight Family	50,000
TC AIMS II	124
Night Vision Devices	160,500
Fire Finder Radar	9,600
CBRN Soldier Protection	50,300
Tactical Unmanned Aerial System (TUAS) (MIP)	50,150
Ground Standoff Mine Detection System	26,400
GSTAMIDS Route Clearance Team Equipment	66,100
Laundries, Showers, and Latrines	12,300
Field Feeding Equipment	1,800
Items less than $5 million (engineering support)	800
Distribution Systems, Petroleum and Water	42,600
Water Purification System	800
Combat Support Medical	21,900
Shop Equipment Contact Maintenance Truck (MYP)	32,100
Welding Shop, Trailer MTD	2,100
Items less than $5 million (maintenance equipment)	25,700
Grader, MTZD, HVY	10,000
Loader, Scoop Type	5,000
Hydraulic Excavator	2,600
Cranes	4,200
High Mobility Engineer Excavator (HMEE)	1,400
Construction Equipment ESP	17,500
Generators and Associated Equipment	21,600
Rough Terrain Container Handler	64,500
All Terrain Lifting Arm System	33,200
Integrated Family of Test Equipment	4,700
Physical Security Systems	1,000
Mod of In-Service Equipment (OPA 3)	4,600
Fire Support C2 Family	7,000
Tactical Bridge, Float Ribbon	70,900
Classified Programs	64,527
Single Army Logistics Enterprise (PBUSE)	36,000
HMMWV and Tactical Truck Crew/Convoy Training Simulator ($1,500,000 is available only for convoy training simulators for the National Guard)	10,000
Total Other Procurement, Army	5,003,995

[In thousands of dollars]

Account	Conference
Aircraft Procurement, Navy:	
War Consumables	34,916
P-3 Series Modifications	62,500
AV-8B Attrition Recovery	15,507
AV-8B Oil Tester/JETSCAN	1,400
AV-8B Litening on Station 4	4,200
TAV-8B 30KVA Generator	3,470
TAV-8B Depot Maintenance	10,700
CH-46E Aircraft Sustainment	11,850
CH-46E Engine Electrical Overspeed Protection	3,866
CH-46E M240D Machine Gun	750
CH-53E AMARC	5,620
CH-53E iMDS	8,900
CH-53 EAPS Seals	2,100
CH-53 T-64 Engine Reliability Improvement	5,100
CH-53D rate gyro	1,150
H-1 Y/Z Procurement	68,600
H-46 Crash Attenuating CC & AO Seats	2,752
KC-130-J procurement	71,800
Misc Aviation Sustainment Support Packages	35,800
MV-22 Aircraft Procurement	71,000
MV-22 Pre Block A to Block B Mods	54,600
MV-22 Spares	10,300
Total Aircraft Procurement, Navy	486,881
Weapons Procurement, Navy:	
Hellfire II -- Marine Corps	100,000
Pioneer UAV Sustainment	9,400
Total Weapons Procurement, Navy	109,400
Procurement of Ammunition, Navy and Marine Corps:	
5.56mm, All Types	16,437
7.62MM, All Types	10,675
.50 Caliber	4,947
Grenades, All Types	13,145
Artillery, All Types	11,956
Linear Chages, All Types	4,216
40mm, All Types	9,227
60mm, All Types	9,876
81mm, All Types	17,474
120mm, All Types	11,034
Ctg 25mm, All Types	1,322
9mm, All Types	471
Rockets, All Types	7,062
Demolition Munitions, All Types	7,668

[In thousands of dollars]

Account	Conference
Fuzes, All Types	1,136
Non Lethals	1,137
Item Less Than $5 Million	97
Total Procurement of Ammunition, Navy and Marine Corps	127,880
Other Procurement, Navy:	
Physical Security Equipment	28,865
Classified Programs	21,500
Construction & Maintenance Equipment	48,584
Items under $5 million	19,203
Material Handling Equipment	1,000
Tactical Vehicles	186,213
Littoral Battlespace Sensing	500
Al Asad Facility Transfer	14,100
Total Other Procurement, Navy	319,965
Procurement, Marine Corps:	
AAV7A1 PIP	39,448
Air Operations C2 Systems	35,279
Amphibious Support Equipment	28,257
Bridge Boat	22,717
Bulk Liquid Equipment	20,174
Comm Switching and Control Systems	218,671
Comm & Electrical Infrastructure Support	53,580
Command Post Systems	102,357
Common Computer Resources	40,162
Container Family	7,741
Environmental Control Equipment	30,998
EOD Systems	652,067
Expeditionary Air Defense System	2,924
Family of Construction Equipment	98,914
Family of Field Feeding Systems	2,598
Family of Internally Transportabe Vehicles (ITV)	10,845
Family of Tactical Trailers	92,807
Field Medical Equipment	6,902
Fire Support System	43,265
HIMARS	215,350
Intelligence Support Equipment	81,720
Items Less Than $5M (BLI 523000)	775
Items Less Than $5M (BLI 667000)	26,891
Items Less Than $5M (BLI 462000)	14,183
Javelin	46,500
LAV PIP	73,300

[In thousands of dollars]

Account	Conference
Logistics Vehicle Replacement	48
M1A1 Firepower Enhancements	1,154
Material Handling Equipment	68,818
Medium Tactical Vehicle Replacement	15,226
Mod Kits (BLI 206100)	78,266
Mod Kits (BLI 312300)	159,434
Mod Kits (BLI 465200)	43,185
Mod Kits (BLI 665400)	7
Modular Weapon System	51,590
Motor Transport Modifications	163,600
Night Vision Equipment	210,501
Power Equipment Assorted	12,569
Radar Systems	21,093
Radio Systems	854,719
Repair and Test Equipment	96,609
Tactical Fuel Systems	37,455
Training Devices	165,653
Unit Operations Center	267,200
Up Armored HMMWV: M1114, M1151, M1152	557,521
Weapons Enhancement Program	2,703
Weapons and Combat Vehicles under $5 million	122,493
Total Procurement, Marine Corps	4,898,269
Aircraft Procurement, Air Force:	
C-17 Procurement (10 Aircraft)	2,094,000
Predator UAV	131,900
Predator UAVs for SOCOM	65,400
Total Aircraft Procurement, Air Force	2,291,300
Missile Procurement, Air Force:	
Predator Hellfire Missiles	32,650
Total Missile Procurement, Air Force	32,650
Other Procurement, Air Force:	
HMMWV, Up-Armored	5,650
HMMWV Armored	4,200
Classified Programs	1,307,757
Total Other Procurement, Air Force	1,317,607

[In thousands of dollars]

Account	Conference
Procurement, Defense-Wide:	
MH-47 Service life extension program	4,100
Time delay firing device/Sympathetic detonation	6,000
Persistent Predator Operations and Intelligence (PPOI)	13,400
Payload Integration - Predator	6,000
Specialized Ballistic Protection	2,200
Counter-Ambush Weapons System	6,300
MH-47 Radio Frequency countermeasures	8,000
M134 DT Miny-Gun Replacement	12,400
Miniature Milti-Band Beacons	8,900
Small Arms-Laser Acquisition Marker	5,300
SU-232 / PAS Thermal Clip On Night Vision Device	6,100
Classified Programs	66,855
Total Procurement, Defense-Wide	145,555
Total Procurement	19,825,782

C–17 PROCUREMENT

The conference agreement provides an additional $2,094,000,000 for 10 C–17 aircraft in title IX to support airlift requirements in the Global War on Terror. The Air Force is encouraged to rapidly procure these additional aircraft in the most efficient method possible. Reprogramming of these funds for uses other than procurement of C–17s, and ancillary equipment, is expressly prohibited without prior approval of Congress.

The conferees are concerned that the Department of Defense study establishing the strategic airlift requirement may be flawed and may seriously understate the need for C–17 aircraft. The Government Accountability Office has raised questions about the study and has suggested that Congress exercise caution in using that study to make investment decisions. The conferees direct the Department of Defense to continue funding C–17 production in the fiscal year 2008 budget.

NATIONAL GUARD AND RESERVE EQUIPMENT

The Senate included a general provision which provided that $2,440,000,000 of the procurement funds in title IX shall be available for the National Guard and the Army Reserve for National Guard and Reserve equipment. The House provided $500,000,000 in National Guard and Reserve Equipment for the Army National Guard to continue an effort begun in fiscal year 2006 to meet the "Essential 10 Equipment Requirements for the Global War on Terror" as identified by the National Guard Bureau. The conferees direct that $2,940,000,000 of the procurement funds provided in title IX shall be available only for the Army National Guard and the Army Reserve, and that $500,000,000 of those funds shall be available for the purposes identified in House Report 109–504 under the heading "National Guard and Reserve Equipment". The conferees further direct the Chief of the National Guard Bureau to submit a report specifying the items to be procured with this funding and a fielding plan for this equipment not later than 60 days after the enactment of this Act.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION

The following table provides details of the supplemental appropriations in this title.

[In thousands of dollars]

Account	Conference
RDT&E, Navy:	
Classified Programs	110,000
Situational awareness improvements at forward operating bases in Iraq	2,000
AV-8(B) litening on station 4	6,656
AV-8(B) low pressure compressor	1,200
EA-6(B) acceleration of advanced IRCM capability	80,900
EA-6(B) AAR-47(V)2 missile warning system (ASE)	20,000
AV-8(B) digital ITER 1760 (JDAM) precision weapons	10,350
Total RDT&E, Navy	231,106
RDT&E, Air Force:	
Classified Programs	36,964
Total RDT&E, Air Force	36,964
RDT&E, Defense-Wide:	
Classified Programs	139,644
Total RDT&E, Defense-Wide	139,644
Total RDT&E	407,714

131

TESTIMONY

Policy Issues for Alternative Fuels for Military Operations

JAMES T. BARTIS

CT-268

September 2006

Testimony presented to the House Armed Services Committee, Subcommittee on Readiness and Subcommittee on Terrorism, Unconventional Threats and Capabilities on September 26, 2006

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James T. Bartis[1]
The RAND Corporation

Policy Issues for Alternative Fuels for Military Operations

Before the Committee on Armed Services
Subcommittee on Readiness
and
Subcommittee on Terrorism, Unconventional Threats and Capabilities
United States House of Representatives

September 26, 2006

Chairmen and distinguished Members: Thank you for inviting me to speak on the important subject of developing and using unconventional fuels that can substitute for crude oil. I am a Senior Policy Researcher at the RAND Corporation and have over 25 years of experience analyzing and assessing energy technology and policy issues. My remarks today are based on recent and ongoing research that RAND has been conducting with support from the U.S. Departments of Energy and Defense. My views on this topic are also shaped by my experience in watching the rise and fall of the U.S. Synthetic Fuels Corporation during my public service in the U.S. Department of Energy.

Today, I will discuss alternative fuels for military transportation, the prospects and policy issues associated with developing a coal-to-liquids industry to meet military fuel needs, and approaches Congress could take to address these issues. My key conclusions are that (1) coal-to-liquids offers one important opportunity as a substitute for crude oil; (2) there are also challenges that must be overcome if a coal-to liquids industry is to be developed in the United States, (3) there are a number of actions the Federal government could take to further develop and explore this option; and (4) it would be unwise to proceed precipitously with a "crash" program of investment in coal-to-liquids at this time.

Military Fuel Options

Liquid fuels for transportation generally fall into one of two categories, the gasoline group or the distillate fuel oil group. We are all familiar with the gasoline group. These are highly volatile fuels

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that ignite easily and therefore are suitable for spark-ignition engines. Nationwide automotive demand for gasoline is about 9 million barrels per day. The distillate fuel oil group includes diesel and jet fuel, as well as home heating oil. Nationwide demand for distillate fuel oils is nearly 6 million barrels per day. A particular formulation of jet fuel known as JP-8 and its close relative JP-5 fuel nearly all the mobile weapon and combat support systems in our armed forces, be they aircraft, ships, tanks, or other vehicles. These fuels are preferred for combat operations because they have a very high energy density per unit volume and because they are less subject to accidental ignition, compared to gasoline.

Looking at resources in the United States, only two technically viable alternatives to crude oil exist for producing significant amounts of JP-8 in the near to medium term. One option is to tap abundant and rich oil shale deposits in Colorado, Utah, and Wyoming. The other option is based on a method known as Fischer-Tropsch synthesis. This method either uses coal or a combination of coal and local agricultural wastes or other types of biomass.

Beyond the co-feeding of biomass with coal, no other technically viable approaches are ready today for using renewable resources to produce significant amounts of JP-8 or similar fuels in the distillate fuel oil group. In particular, the potential for bio-diesel produced from vegetable oils is severely limited because of low oil yields per cultivated acre and because of the amount of suitable arable land available in the United States. Moreover, at the current state of technology development, there is no fermentation-type process, such as the distillation-based methods used for ethanol production, capable of producing a product that would be suitable for formulating or blending with a distillate fuel oil for transportation, including aviation. These opportunities may expand in the future with further advances in renewable energy-producing technologies.

Very promising near-term development work on oil shale is underway, but pending success in this work, oil shale remains a very expensive option for producing liquid fuels. For this reason, the remainder of my testimony will address options for coal-to-liquids fuel production.

Prospects and Policy Issues for a Commercial Coal-to-Liquids Industry

The prospects for a commercial coal-to-liquids industry in the United States remain unclear. Three major impediments block the way forward:

1. Uncertainty about the costs and performance of coal-to-liquid plants;
2. Uncertainty about the future course of world oil prices;

3. Uncertainty about whether and how greenhouse gas emissions, especially carbon dioxide emissions, might be controlled in the United States.

Given the importance of these three uncertainties, an immediate national commitment to rapidly put in place a multi-million-barrel-per-day coal-to-liquids industry would be very counterproductive. Rather, Congress should consider a more measured approach to developing a coal-to-liquids industry, similar to the approach recommended in the recent RAND study on oil shale development.[2] The focus of that measured approach would be to foster early operating experience by promoting the construction and operation of a limited number of commercial-scale plants. This approach would provide an effective way to deal with the uncertainties listed above.

Gaining early operating experience from a few coal-to-liquid plants would reduce the cost and performance uncertainties that currently impede private-sector investments. At present, the knowledge base for coal-to-liquid plant construction costs and environmental performance is very limited; it is based on engineering design work intended to guide federal R&D efforts rather than support investment decisionmaking. Early operating experience would promote post-production learning, leading to future plants with lower costs and improved performance. Post-production cost improvement—sometimes called the learning curve—plays a crucial role in the chemical process industry, and we anticipate that this effect will eventually result in a major reduction of the costs of coal-derived liquid fuels. Most important, by reducing cost and performance uncertainties and production costs, a small number of early plants could form the basis of a rapid expansion of a more economically competitive coal-to-liquids industry, depending on future developments in world oil markets.

But just as it is in the national interest to promote early production experience, it is just as important that this early experience be limited to a few plants. Each of these coal-to-liquids plants would be a major endeavor. To take advantage of economies of scale, a commercial-scale plant would likely be sized to produce at least 30,000 barrels per day of liquid products. While the costs of such a plant are highly uncertain, we estimate investment costs of at least $3 billion for a first-of-a-kind plant. Subsidizing unconventional fuel production could be very expensive, especially for the initial set of production plants. A mere $10 per barrel subsidy for a single small commercial plant producing 30,000 barrels per day would add up to a taxpayer burden of about $100 million per year.

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[2] Oil shale development is addressed in a recent RAND report, *Oil Shale Development in the United States: Prospects and Policy Issues,* Santa Monica, CA: RAND MG-414-NETL, 2005.

A second reason for a measured approach to industry development is to avoid adverse economic impacts that would be associated with a dramatic increase in orders for specialized materials and equipment. Combined with losing the opportunity for post-production learning, rapid increases in the costs of such materials and equipment, plus rising costs to attract certain specialized categories of workers, would lead to increased plant capital and operating costs and a requirement for even higher federal subsidies. Such cost increases could spill over to other sectors in the U.S. economy as well.

In contemplating a significant expansion in coal-to-liquids production, we also need to be aware that a large increase in coal use may not be consistent with the need to reduce worldwide greenhouse gas emissions. Increasing coal use while also reducing greenhouse gases will require technically viable, safe, and cost-effective means for carbon capture and sequestration. An advantage of the Fischer-Tropsch approach is the relatively low additional costs required to capture carbon dioxide generated at the plant site that would otherwise enter the atmosphere. Therefore, the first few coal-to-liquids plants might be able to put that carbon dioxide to good use, such as enhancing petroleum yields in U.S. oil fields. However, until carbon sequestration on a large scale is demonstrated as technically viable, safe, and cost-effective, we must recognize the possibility that coal use for both power generation and liquid fuel production may not be a sustainable path for the United States or, for that matter, the world.

Options for Federal Action

The Federal government could take several productive measures to address the three major uncertainties—production risks, market risks, and global warming—so that industry can move forward with a limited commercial production program. A key step, as noted above, is reducing uncertainties about plant costs and performance by designing, constructing, and operating a few coal-to-liquid plants. An engineering design adequate to obtain a confident estimate of costs, to establish environmental performance, and to support federal, state, and local permitting requirements will cost roughly $30 million. The Federal government should consider cost-sharing options that would promote the development of a few site-specific designs. The information from such efforts would also provide Congress with a much stronger basis for designing broader measures to promote unconventional fuel development.

The Federal government could take a number of approaches to reduce the risk to owners of coal-to-liquids plants of a sustained drop in world crude oil prices. The challenge is to protect the taxpayer by minimizing federal expenditures, while at the same time providing appropriate incentives to motivate private investment. Purchase agreements, which basically involve a

guaranteed minimum purchase price, are one approach for mitigating financial risk that we understand is being considered by the Department of Defense. This approach can be an effective for reducing risks to plant investors. I am unable to comment on what price guarantee level best serves the public good or how price guarantees might be combined with other incentives. However, I do caution against the use of federal loan guarantees. Firms with the technical and management wherewithal to build and operate first-of-a-kind coal-to-liquids plants—and then move forward with subsequent plants—generally have access to needed financial resources. Loan guarantees can induce the participation of less capable firms, while isolating the project developer from the risks associated with cost overruns and shortfalls in plant performance. The public then ends up with the bill if the project fails.

If the Federal government is prepared to promote early production experience, then expanded federal efforts in other areas would also be needed. Most important, consideration should be given to accelerating the development and testing (including large-scale testing) of methods for long-term sequestration of carbon dioxide. This could involve using an early coal-to-liquids production plant as a source of carbon dioxide for the testing of sequestration options.

At present, federal support for research in coal-to-liquids production is minimal. A coal-to-liquids research and development program focusing on high-risk, high-payoff opportunities for cost reduction and improved environmental performance would significantly enhance the learning/cost reduction potential associated with early production experience. Such an effort would also support the training of specialized scientific and engineering talent required for long-term progress. Support for coal-to-liquids could be combined with efforts to enhance long-term research and development directed at approaches for producing distillate fuels from renewables, including low-volatility alcohols.

In closing, I commend the Committee for addressing the important topic of reducing demand for crude oil. The United States has before it many opportunities—including coal and oil shale, renewables, improved energy efficiency, and fiscal and regulatory actions—that can promote greater energy security. Coal-to-liquids can be an important part of the portfolio as the nation responds to the realities of world energy markets, the presence of growing energy demand, and the need to protect the environment.

**HOLD UNTIL RELEASED
BY THE COMMITTEE**

JOINT STATEMENT

**HONORABLE JOHN J. YOUNG, JR.
DIRECTOR, DEFENSE RESEARCH AND ENGINEERING**

**MR. PHILIP W. GRONE
DEPUTY UNDER SECRETARY OF DEFENSE
(INSTALLATIONS AND ENVIRONMENT)**

**BEFORE THE SUBCOMMITTEES ON
TERRORISM, UNCONVENTIONAL THREATS AND CAPABILITIES
AND
READINESS
OF THE HOUSE ARMED SERVICES COMMITTEE**

September 26, 2006

INTRODUCTION

Mr. Chairmen, distinguished members of the Subcommittees, thank you for this opportunity to appear before you to discuss the Department's energy efficiency and security efforts. We appreciate the opportunity to come before you to discuss some of the specific energy-related research and development (R&D) activities of the Department. It is also a good opportunity to recognize that the DoD has had a long-term investment in science and technology (S&T) supporting energy efficiency and security by describing some illustrative technology efforts. We will also discuss the preliminary findings of the DoD Energy Security Task Force. The work of this Task Force is not yet finalized, but the Task Force has developed a comprehensive picture of the DoD energy-related investment and is looking at a wide spectrum of ideas and opportunities to pursue greater energy efficiency and flexibility.

Energy security, efficiency, and the use of renewable resources have been of interest to the Administration long before the recent publicity. The National Security Strategy signed in March 2006 sets forth a challenge for the nation to expand the types and sources of energy and to foster private investment that can help develop the energy needed to meet the global demand. In addition, the National Security Strategy calls for opening, integrating, and diversifying energy markets to ensure energy independence for the U.S.[1]

[1] National Security Strategy of the United States of America, March 2006, pages 26-29

In an August 30 interview with NBC Nightly News, President Bush noted energy independence as a national security issue he wanted to see solved in the next two and a half years. Less than a week later, at a Labor Day celebration in Southern Maryland, he said the "country's reliance on foreign oil jeopardizes our capacity to grow" and the "Administration has a plan to spend money on new technologies."

The need for energy doesn't end at America's borders. We also need energy to support our deployed forces. In early August, Marine Corps Major General Richard Zilmer, Al-Anbar Province Commander, submitted an urgent request for renewable energy systems for remote forward deployed forces, due to the vulnerability of supply lines to insurgent attack by ambush or roadside bombs. He said that "reducing the military's dependence on fuel for power generation could reduce the number of road-bound convoys," thereby minimizing the danger to our service members. The Army's Rapid Equipping Force (REF) is responding by refining a plan to deliver and test a few transportable hybrid electric power stations in theater in about six to nine months. The REF assessed R&D programs by the Defense Advanced Research Projects Agency (DARPA), the Army's Research, Development and Engineering Command (RDECOM) and the Central Intelligence Agency to identify existing mobile renewable power systems that could be quickly modified to support the power requirements highlighted by Major General Zilmer. We anticipate follow on R&D and procurement based on lessons learned with the first few systems.

THE ENERGY MARKET

Worldwide demand for oil is rising, particularly in emerging far eastern countries. Globally, about 85 million barrels of oil are used daily, with the U.S. consuming about 21 million barrels per day. About 58 percent of the oil used by the U.S. is imported. The Department of Defense is the single largest consumer of energy in the United States, at slightly more than 0.3 million barrels per day. Looking to the future, the International Energy Agency estimates the worldwide consumption will grow to 100 million barrels per day[2]. A large part of the worldwide demand growth is projected to come from India and China.

Globally, oil supply and demand are roughly in balance. Hence, short-term perturbations to the supply or distribution sources result in significant perturbations in price. In addition, worldwide refining capacity is at 97 percent, which results in a market that can have wide price fluctuations with small changes in the end-to-end oil availability.

The Department of Defense consumption of energy represents about 1.2 percent of the total used in the United States. In fiscal year 2005, the Department spent $10.9 billion on energy – equating to 919 trillion British Thermal Units (BTUs) and roughly 125 million barrels of oil.

Figure 1 shows the energy use by application. Mobility fuels – for aircraft, ships, and vehicles – account for 74 percent of the Department's total energy usage. Buildings and facilities add another 22 percent. Figure 2 shows the energy use by fuel type. As is seen with this figure, jet fuel accounts for 58 percent of DoD's consumption. This does

[2] JASONs report on energy alternatives, August 2006

not all go to aircraft because to reduce logistics requirements on the battlefield, jet fuel is used for a variety of "non-aircraft" platforms, including tanks, other ground vehicles, and generators. Thirteen percent of DoD's energy usage is for marine diesel to power ships, with electricity accounting for 11 percent of the consumption. Since 71 percent of the DoD consumption is in the form of fuel, crude oil price levels becomes an important factor to the DoD. For every $10 per barrel increase in the cost of fuel, DoD operating costs increase by roughly $1.3 billion in the year of execution. So, as crude oil fluctuated from $40 to $70 per barrel over the last year, the Department's energy bill increased significantly.

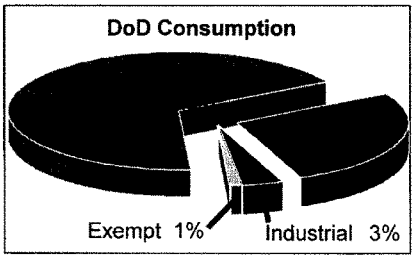

Figure 1. DoD Energy Use by Application (Fiscal Year 2005)
Source: DUSD(I&E) Fiscal Year 2005 Energy Usage Data

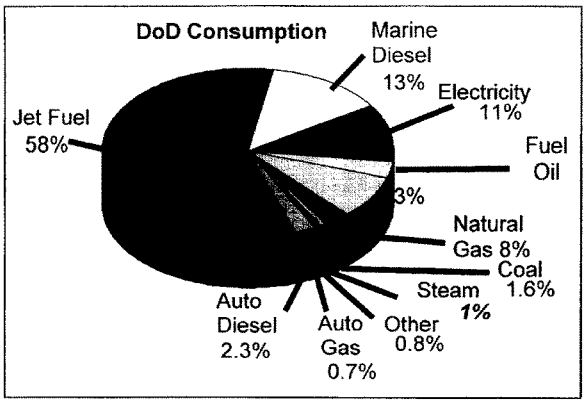

Figure 2. DoD Energy Use by Fuel Type
Source: DUSD(I&E) Fiscal Year 2005 Energy Usage Data

DOD ENERGY INITIATIVES

To address the financial and operational challenges generated by cost and availability of oil and other forms of energy, the Department stood up two task forces to consider the issue from different perspectives: the Energy Security Task Force and the Defense Science Board Task Force on DoD Energy Strategy.

The Under Secretary of Defense for Acquisition, Technology and Logistics directed the Defense Science Board (DSB) to establish a Task Force on DoD Energy Strategy. The DSB Task Force, comprised of subject matter experts external to DoD, is focused on energy strategy and policy and plans to conclude in February or March 2007. The DSB Task Force will re-examine DoD energy usage and develop strategies and recommendations. Specifically, the DSB Task Force will identify strategic transition

opportunities through technologies, barriers to transition, systemic second and third order effects across strategic, operational, tactical and life cycle cost performance vectors, as well as their potential for commercialization.

In April 2006, Secretary Rumsfeld tasked the Director of Defense Research and Engineering to lead an internal task force, called the Energy Security Task Force, with the goal of defining an investment roadmap to lower the Department's fossil fuel requirements and to identify alternate energy sources. The multidisciplinary task force involves senior leaders from a wide range of expertise, including financial, science and technology, acquisition, logistics, installations and environment, and operational within the military departments, defense agencies, Joint Staff and the Office of the Secretary of Defense. We would commend each of these offices for their energetic and creative participation in the Energy Security Task Force. The Energy Security Task Force will report out in late September.

To date, the Energy Security Task Force has completed a baseline analysis of ongoing DoD efforts to reduce fuel and energy consumption and will provide specific recommendations and options that will comprehensively improve energy efficiency and enable the production and use of alternate fuels. The Task Force used an analytical framework with potential cost and benefit analysis to identify and prioritize options. The Task Force has developed a taxonomy to address the issue and provide a consistent terminology based on supply demand, and availability. The Task Force is taking the approach that we need to impact the supply/demand ratio by increasing supply or

reducing demand. Demand reduction can come through such efforts as increasing energy efficiency of weapons systems, support platforms, and facilities. Supply security includes future energy sources and the distribution system.

The Task Force found that the Department has not been idle; the DoD has already reduced energy consumption and increased efficiency for both installations and platforms over the past several decades. The DoD also has plans to invest over $2 billion on energy-related efforts between fiscal years 2007 to 2011, including the Energy Conservation Investment Program, the Energy and Power Technology Initiative, and DARPA programs in energy conservation and alternative energy.

Fiscal Year 2007 President's Budget Request for Energy-Related Programs

Appn	Fiscal Year 2006 (Approp)	Fiscal Year 2007 (Request)	Fiscal Year 2008-2011 (Request)*	Includes
RDT&E	547.3.3	378.3	1,061.1	Energy and power technologies, assured fuels vehicle fuel cells
MilCon	50.0	60.0	340.0	Energy Conservation Investment Program
O&M	3.8	2.5	368.1	Facility Energy Initiatives, Army Energy Campaign, Low speed vehicle
DOD ENERGY FUNDING	**601.1**	**440.8**	**1,769.2**	

* FY 2008-2011 is the cumulative four-year funding.

INSTALLATIONS' ENERGY INVESTMENTS

The Energy Security Task Force found that the Military Services have already made significant advances in energy efficiency. Reducing energy consumption of both fuels and electricity has been, and continues to be, important to DoD. On the facilities side, by 2005, the Department has reduced facilities energy use by 28.3 percent from the

1985 baseline (measured by energy use per square foot), and the Energy Policy Act of 2005 has reset the baseline and increased the target reduction. The Deputy Under Secretary of Defense for Installations and Environment implemented the use of sustainable design practices for military construction – meaning that we design, construct and maintain facilities that minimize energy and resource consumption and use environmentally preferred products and materials. These practices will yield immediate savings and will reduce energy consumption by 30 to 50 percent.

Renewable Energy

The DoD is one of the major leaders of the federal government in renewable energy. Our installations received almost nine percent of their electricity from renewable sources in fiscal year 2005, which compares favorably to the national average of six percent. In addition, the Department instituted a goal to achieve 25 percent from renewable sources by 2025, setting the pace for the rest of the federal government and industry.

While the DoD does purchase some "green energy" locally, there are a number of base-level renewable projects that are very cost effective. For instance, the Navy has an operating geothermal power plant at China Lake, California and is building one at Naval Air Station Fallon in Nevada. The geothermal plant at China Lake provides enough energy to operate the entire base. In addition, there are several wind facilities in Guantanamo Bay, Cuba, Naval Base Coronado, San Clemente Island California, FE Warren, Ascension Island, and eight additional projects under consideration. DoD has

multiple solar facilities and initiatives at several locations, including our bases in California, Texas and Arizona.

Finally, the DoD continues to research novel forms of renewable energy. The Navy has a Small Business Innovative Research project called "OTEC," which stands for the Ocean Thermal Energy Conversion program. OTEC is being tested at Diego Garcia Navy Base in the Indian Ocean. Effectively, the OTEC project seeks to use temperature differences between the ocean surface and deeper water to produce electricity. While it is still too early to determine how effective OTEC will be, it demonstrates the Department is exploring novel ideas.

Energy Achievements

DoD has achieved significant savings using the Energy Conservation Investment Program (ECIP), with projects savings, on average, at least $2.30 for every dollar spent. The success of this program led the DoD to increase investment, with $60 million requested for FY 2007, increasing $10 million annually to $100 million in FY 2011. ECIP is a competitive bid program that invests in energy efficient upgrades for existing facilities. For instance, in FY07 the Army is programmed to implement a 200 kilowatt photovoltaic system sized to supply for chillers in two buildings for the Army Medical Center and School at Fort Sam Houston, Texas.

We have also made wide use of Energy Savings Performance Contracts (ESPCs) which allows us to use industry funding to pay for equipment to reduce life cycle costs of facilities and pay them back from the accrued savings. Since 1998, industry has invested

$1.7 billion across the federal government through ESPC with a net savings of $1.5 billion; 70% of the activity was in DoD. As an example, in FY 2005, the Air Force entered into a solar energy ESPC at Luke AFB, Arizona. Under this project, the Air Force installed a 122 kilowatt photo voltaic system to power portions of the base.

The Department has been recognized as a federal energy leader, as evidenced by numerous federal energy awards. Our installations have received Presidential Awards for Leadership in Federal Energy Management, representing projects that achieved $9M annual savings in DoD energy use. In 2005, four of the five Presidential Awards were given to DoD installations, including to the U.S. Navy Region Southwest which reduced installation energy use by 10 percent, achieved through maintenance of older systems and an energy awareness campaign, resulting in enough savings to power 1,100 houses for a year. Marine Corps Base Pendleton installed high-efficiency light bulbs, used natural light in hanger bays, and upgraded air conditioning units—the net effect of these efforts saved enough energy to power 1,300 homes.

The Federal Energy and Water Management Award is given annually by the Department of Energy to honor individuals and organizations making significant contributions to the efficient use of energy. The DoD was awarded seven of the 16 federal awards in 2005. One such award was for Fort Lewis, Washington's use of Energy Savings Performance Contracts to upgrade the space heating infrastructure and control valves on heating, steam, and hot water to reduce their overall energy use by 19 percent, saving approximately $500,000 annually.

These are just a few of the numerous accomplishments within the Installations' Community that are reducing operating and maintenance costs over the life cycle of our facilities.

PLATFORM ENERGY INVESTMENTS

The Services have also taken steps to address platform life cycle cost associated with fuel consumption. Since 74 percent of DoD's energy costs arise from platform mobility, this is very important. Several efforts are underway in R&D and early procurement phases to improve energy efficiency. Platforms using lightweight materials will consume less fuel. Fuel efficient engines, novel structural modifications, and alternate sources of fuel should also decrease DoD consumption of fossil fuel. A few on-going research and engineering efforts are highlighted below.

Demand Reduction

Turbine engine technologies are key to providing improved fuel efficiency and the ability to use alternative fuels in DoD aircraft. The Versatile Affordable Advanced Turbine Engine (VAATE) program is a tri-Service science and technology initiative, partnering with industry, that provides strategic planning and coordination of DoD and U.S. government turbine engine technology efforts. Within VAATE, there is a project called the Highly-Efficient Embedded Turbine Engine (HEETE) initiative, which is developing high pressure ratio, high temperature core technology with the potential to improve specific fuel consumption up to 25 percent. These technologies are applicable to aircraft that account for over 80 percent of Air Force fleet fuel utilization, as well as a

large number of Navy and Army aircraft. Demonstration of component technologies will begin in 2008, culminating in a full engine demonstration as early as 2014; with transition opportunities of component technology along the way, producing fuel efficiency in incremental steps.

The Navy's energy conservation program resulted in a 15 percent increase in fuel efficiency on selected ships through the utilization of stern flaps and bulbous bow technology on surface ships. Applying a stern flap to most any hull form creates lift to the aft portion of the ship and reduces propeller cavitations. As a result, hydrodynamic drag is reduced, improving power utilization. Projected net annual fuel savings, for DDG-51 Flight I/II ships will be approximately 7.5 percent, resulting in a potential savings of almost $195,000 per year per ship. Reductions in drag are also being achieved by the use of a bulbous bow to lower the wave-making resistance of a ship's hull. Engine fuel consumption calculations show the bow results in fuel use reduction of nearly 4 percent, with a yearly fuel savings of approximately 100,000 gallons per year per ship. The bulbous bow illustrates that not all energy saving efforts are "high technology," but energy savings can come from ingenious application of existing technology.

The Department recognizes the potential energy efficiency payoff associated with lightweight materials and structures and has been long investing in materials research that will provide high performance, strategic mobility, and energy savings to meet warfighting needs. Applied research in advanced cellular materials, carbon-fiber reinforced composites, and titanium manufacturing technology should provide greater

strength-to-weight ratios for military platforms. Platforms using lightweight materials should benefit from improved performance and decreased fuel consumption.

The Department recognizes the potential energy efficiency payoff associated with lighter weight vehicles and other weapon systems. We will continue to invest in research on lightweight materials and structures to provide high performance, strategic mobility, and energy savings to meet warfighting needs. Applied research in advanced cellular materials, which have complex internal walls or miniature trusses like a stadium roof on a microscopic scale, is being demonstrated currently for ship topside applications, such as jet-blast deflectors. The application of carbon-fiber reinforced composites and titanium alloys, especially novel titanium manufacturing technology, will enable us to apply these aerospace materials affordably to ground vehicles and ships. Platforms using these advanced materials will benefit from both improved performance and decreased fuel consumption.

Titanium is 40 percent lighter than steel but with comparable strength. A titanium alloy can easily possess twice the fatigue strength of common steel and is the fourth most abundant metallic element on earth behind aluminum, magnesium and iron. Although abundant, titanium has been an expensive material limited to aircraft, spacecraft, and a few other niche applications, because it is very difficult and energy intensive to purify it from its ores. The Department, especially through the Defense Advanced Research Projects Agency (DARPA), is supporting promising new manufacturing processes that will reduce the cost of titanium alloys to under $10 per pound, compared to the current $30 or more for aerospace alloys. This will provide a cost-effective, lighter and stronger

alternative to steel for nearly all DoD platforms. In a study commissioned by the DoD[3], the National Research Council estimated that a very realistic 15-20 percent weight reduction in an Army truck could increase overall fuel efficiency by 2-5 percent. Multiplied across our future fleets such savings will be beneficial to logistics and our overall energy dependency.

Supply Security

The Air Force is leading a DoD effort to test synthetic fuels in DoD aircraft and tactical vehicles. The Air Force completed a ground engine test of 50/50 blend of conventional fuel and Fischer-Tropsch-based synthetic fuels (synfuel) at Tinker AFB and conducted B-52 flight demonstrations last week. The synfuels used a converted liquid natural gas to oil conversion, but could also use coal-to-liquid or tar sands as the source. The synfuel test is important because the U.S. has a great deal of natural resources that, if economically viable, could be used to create synthetic fuels, such as coal and natural gas. While there are issues that must be addressed with synthetic or alternative fuels, including higher production of carbon dioxide than found in conventional fuel, as well as different lubrication processes, the Department is taking the lead in testing the fuels, which is helping to provide the impetus to develop a commercial market. The testing will help address the environmental and logistics issues.

The first flight test occurred on September 19 which demonstrated the applicability of synthetic fuel for military aviation use. In conjunction with this testing

[3] **Use of Lightweight Materials in 21st Century Army Trucks.** Committee on Lightweight Materials for 21st Century Army Trucks, National Research Council, 2003.

campaign, the Defense Energy Support Center (DESC) released a request in June for information to determine industry capability to produce 200 million gallons of synthetic jet fuel in fiscal year 2008. This request will be discussed in greater detail by the other panel members, but does indicate the DoD intent. We are also working to mitigate the environmental impact associated with the Fischer-Tropsch method of gasification by identifying uses or disposal options for the carbon-dioxide produced by the process, which is more than is produced by refinement and use of petroleum based fuels.

In addition to energy savings directly applicable to platforms, the use of more efficient power sources, such as batteries and fuel cells can reduce the power and energy demands of the Department. The Transformational Energy and Power Technology Initiative (EPTI) was initiated by the Director of Defense Research and Engineering in 2002 in order to make significant improvements in energy & power component technologies. EPTI develops power and energy devices to reduce the logistics burden and dependence on fossil fuels, while significantly expanding warfighting capabilities. EPTI's three principal thrusts are in power generation, energy storage, and power control and distribution. The EPTI thrusts are enablers for transforming capabilities such as hybrid-electric and electric drive for ground and sea vehicles; electric armaments and directed energy systems; and power and energy sources with high densities for multi-day operations of ground forces. Fuel economy will be achieved through a combination of efficient components and system design and fuel saving operational practices.

These efforts only illustrate a small portion of Department's research program efforts to enhance our energy independence.

ENERGY STRATEGY

While the Energy Security Task Force has not yet completed efforts to provide programmatic options, the Task Force formed an overarching energy strategy that addresses energy holistically, examining both demand reduction and supply security. The main themes are to increase platform efficiency, accelerate installations' energy initiatives and establish an alternate fuels program.

Increase Platform Efficiency

As stated previously, the Military Services have considered platform energy efficiency, but we are looking for ways to go faster. For instance, the standard price charged by DESC includes a small overhead cost to get the fuel to various distribution points globally, but the Military Services are responsible for the costs to distribute the fuel among the fleet. This impacts life cycle costs. We are building a process to consider the delivered cost of fuel in life cycle cost estimates for acquisition programs. In addition, the Energy Security Task Force is identifying a variety of programmatic options aimed at further increasing fuel efficiency of aircraft engines, demonstrating hybrid-electric ground vehicle technologies, lightweight materials and material coatings to reduce friction.

Accelerate Installations' Initiatives

The Installations' Community has led the way in energy efficiency by establishing and implementing a comprehensive energy strategy, with focus on improving energy conservation, reducing energy demands, higher renewable energy use, and, simply, better energy awareness for our people. Installations and facilities are in the energy security business for the long haul, as exemplified by the DoD's implementing policies directing the use of sustainable design practices. We want to "build" on their progress by increasing the use of Energy Savings Performance Contracts, enabling DoD to have more cost effective long-term facilities operation and maintenance with no up front costs. We are also exploring additional enhanced-use leasing opportunities and public/private ventures to develop cost effective renewable energy sources.

We have not ignored our non-tactical vehicle fleet on our installations. Most of our new non-tactical vehicles are able to use alternate fuels, such as ethanol; however, there are currently few commercial fueling stations that carry these fuels. We think the commercial market should eventually support the distribution of alternate fuels. In addition, we are focusing on technologies that may increase fuel efficiency like nano fuel additives and internal combustion engines enhancements. For example, the DoD is exploring fuel intake technology, for non-tactical vehicles, which improves fuel atomization for more complete combustion. This aftermarket equipment may increase fuel efficiency by 10 percent.

Establish Alternate Fuels Program

To ensure energy programs progress, we are considering establishing an Assured Fuels Task Force as follow-on to the Energy Security Task Force. We anticipate the Assured Fuels Task Force will be multidisciplinary, responsible for coordination, maturation and testing synthetic fuels, measuring DoD energy progress, and advocating platform energy efficiency. The Energy Security Senior Steering Group (an oversight body to the Energy Security Task Force) will stay engaged, and determine how the organization should evolve.

The Energy Security Task Force is considering various power systems to generate energy. We intend to build on the findings of the Rapid Equipping Force transportable hybrid electric power stations and fund additional generators. There are also several proven commercial technologies that can turn trash into oil or energy. We are considering these technologies as a way to reduce waste and environmental hazards while creating energy that could help power our generators.

CONCLUSION

Over the next few years, the Department plans to test and demonstrate new technologies for reducing energy consumption for our weapons systems and at facilities. If the technologies are successful, DoD could realize substantial annual savings in energy costs in the long run with full implementation, and many of the programs may start yielding net savings soon. Some of these technologies may also reduce maintenance costs and the associated logistics tails. We intend to initiate procurement programs and

"spiral in" successful technologies. In addition, testing and certifying energy sources for our military platforms, may help to catalyze U.S. industry to produce these fuels, enabling us to move toward the goal of energy independence, as directed by President Bush.

In closing, Mr. Chairmen, we sincerely thank you for this opportunity to highlight our successes and outline our plans for the future. We appreciate your support of our energy initiatives and investments, and I look forward to working with you as we increase energy security and reduce operating costs for the Department.

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HOUSE ARMED SERVICES COMMITTEE
TERRORISM, UNCONVENTIONAL THREATS AND CAPABILITIES AND
READINESS SUBCOMMITTEES

STATEMENT OF

MR. RICHARD CONNELLY

DIRECTOR, DEFENSE ENERGY SUPPORT CENTER

DEFENSE LOGISTICS AGENCY

HEARING BEFORE THE

TERRORISM, UNCONVENTIONAL THREATS AND CAPABILITIES AND

READINESS SUBCOMMITTEES

OF THE

HOUSE ARMED SERVICES COMMITTEE

SEPTEMBER 26, 2006

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TERRORISM, UNCONVENTIONAL THREATS AND CAPABILITIES AND
READINESS SUBCOMMITTEES

Good afternoon, Chairman Saxton, Chairman Hefley, Mr. Ortiz, Mr. Meehan, and distinguished members of the Committee. I am Richard Connelly, Director of the Defense Energy Support Center (DESC), a field activity of the Defense Logistics Agency (DLA). I am pleased to have the opportunity to appear today to describe to you the efforts of the Defense Logistics Agency in support of Air Force and Navy efforts to introduce synthetic fuel into the streams of jet and marine fuels that we buy on behalf of the Department of Defense (DOD).

DESC's mission is to provide the DOD, and other government agencies, with comprehensive energy solutions in the most effective and efficient manner possible. These solutions include contracting support and management of all petroleum-based fuels, additives and other energy products and services including jet fuels, distillates, missile fuels, chemicals, gases, gasoline, diesel fuels, heating fuels, natural gas, coal and electricity. DESC also manages utilities, privatization and other installation energy conservation efforts. As such, I am responsible for assuring that the DOD has a strategic network and capability to provide the uninterrupted supply of clean fuel delivered to our military forces wherever and whenever they need it.

DESC continues to support the DOD in the Global War on Terrorism by providing fuel to the warfighter in support of Operation Enduring Freedom and Operation Iraqi Freedom, as well as other contingency and peacetime operations around the world.

The surging cost of crude oil over the past few years has made DESC's mission particularly challenging. Even though we pride ourselves on acquiring fuel for our troops at prices which meet or beat the industry averages, a crude oil commodity market reacts to world market events that impact both domestic and off-shore crude sources, which means the U.S. cannot control the world oil marketplace and must pay the sometimes painful market price. Since the domestic crude supply is more than adequate to fuel the military's domestic needs, domestically produced alternative fuels are useful to the military if they are cheaper than the petroleum products they replace, but they are not needed to keep the military's domestic operations running. Domestic fuel, whether it be petroleum-based or from alternative sources, cannot supply needs in Iraq and Afghanistan, so for those applications DOD must buy fuel on the world market.

DESC has been working for some time with Air Force, Navy, Department of Energy (DoE), and industry experts examining the potential for alternative domestic energy sources that might economically provide some relief from our dependence on the global marketplace for crude. Among these alternative technologies is the conversion of the United States' abundant domestic coal reserves to synthetic fuel using the Fisher-Tropsch Coal-to-Liquid manufacturing process.

In April of this year, the Air Force requested DESC poll industry regarding its ability to provide DOD with 100 million gallons of synthetic jet fuel (JP-8) beginning in January 2009, along with capacity estimates for future years. The Navy subsequently asked that DESC include 100 million gallons of synthetic JP-5 in the request. The

Request for Information, or RFI, was released May 2006 and responses were due by August 10, 2006.

The RFI asked the respondents a number of questions including what their proposed feedstock would be, where their plant would be located, when their planned streams of synjet would become available, and what risk mitigation strategies they would be seeking to make such an enterprise practical from a business perspective. There was significant interest with 28 firms responding, 22 of which intended to manufacture synthetic fuel. Twenty of the 22 proposed using the Fisher-Tropsch Coal-to-Liquid manufacturing process, and 18 said they would use domestic coal. If such endeavors could acquire appropriate financing, the aggregate stream of synjet by 2016 would far exceed the amount necessary to supplant 50 percent of domestic DOD crude oil-derived jet consumption, which equals 38 million barrels per year out of the total 76 million barrels per year. The Energy Information Agency (EIA) projects in its Annual Energy Outlook 2006 that without subsidies or special contracts, U.S. production of Coal-to-Liquid fuels will be 277 million barrels per year by 2030.

The respondents identified significant risk mitigation requirements before they could engage in the development of a Fisher-Tropsch Coal-to-Liquid capability in the United States. Most identified a need for long-term contracts (15 to 25 years) with guaranteed minimum annual DOD purchases. In addition, most wanted a guaranteed minimum price for their product during the contract term. In essence, the respondents

could not provide their own risk mitigation and have requested that DOD assume most of the risk.

Both of these requirements are understandable from the manufacturer's perspective, but would expose DOD to a significant risk of paying much more than the market price for fuel. The primary barriers to commercial introduction of the technology have been: the uncertainty of world oil prices; the high cost of production coupled with high initial capital cost ($70 to $90 thousand dollars per barrel of daily capacity for the first U.S. plant, for a total cost of $3 to $8 billion for a full scale plant); and the long decision-to-production lead times (which could be in the seven year range). However, they both put most of the risk mitigation responsibility in the hands of the public sector and less of the responsibility on the private sector. The manufacturers want the length of the contract term to be commensurate with the term of the financing they need to pay back the major capital investment (15 to 25 years). The guaranteed minimum price would be to protect the industry initiative from a dip in the crude oil commodity market below the level of economic viability – precisely the scenario that doomed an attempt in the early 1980s to encourage synthetic fuel production when the futures markets were not yet available for private risk mitigation. We estimate that the crude oil price threshold to support development in the future to be in the $53 - $57 per barrel range. Oil prices are volatile and highly uncertain. For example, the NYMEX price of oil for delivery in December 2012, six years from now, has fallen to around $60 per barrel, 15% lower than they were just six weeks ago. If there were a long-term decline in the price, the U.S. taxpayer would lose large sums of money supporting the threshold.

Both of these risk mitigators—long-term contracts and minimum purchase price—are currently beyond our authority. DESC is legislatively limited to five year contracts and must pay fair and reasonable prices for its fuel. In addition, both of these requirements are outside our normal purchase practices for jet fuel which are tied to the market price of jet fuel. Many respondents also cited the availability of tax credits and DoE loan guarantees as essential to their ability to enter the synfuel business.

Furthermore, if you remove long-term market uncertainty, petroleum-based products may still be more economic than coal-derived liquids. For example, if there was a solicitation for competitive, long-term, guaranteed contracts for domestically produced diesel fuel, it is possible that plants producing coal-derived liquids would win those contracts, but it is also possible that domestic oil production would win the contracts and simply expand production to higher cost areas.

Another developmental challenge is that of carbon capture. The Fisher-Tropsch Coal-to-Liquid process produces almost twice as much carbon dioxide as the crude oil refining process. There is no current requirement for carbon capture in either process but there is concern in the industry that such will be required in the relatively near future and this requirement would raise the price of manufacturing a barrel of synfuel. Not requiring carbon sequestration in the contract would pose additional risk for the potential manufacturer should it be required in the future, and the price estimates cited earlier do

not include these costs, which may add about $5 per barrel. In addition, Fisher-Tropsch fuels do not have the lubricating capacity of current fuels.

Senior leadership in the DOD is still considering various options for the way forward. The limit of contract terms to five years and the requirement to pay market price were legislated for important policy reasons, which might have to be reconsidered if DOD were to enter into long-term guaranteed contracts for fuel. If the desired end is to mitigate the price fluctuations we currently experience through long-term guaranteed contracts for fuel (which might or might not be won by manufacturers by using Fisher-Tropsch Coal-to-Liquid technology), it increases the risk of paying above-market prices for fuel. If the desired end is solely to promote an industry that would produce a stream of synthetic jet fuel chemically indistinguishable from the crude-oil derived fuel using Fisher-Tropsch technology, the cost to the taxpayer may be significantly higher than the fair market price for similarly performing petroleum-based fuel. In either case, we would need to return to Congress for the legislative authorities previously discussed.

As we wait for a clearer picture of the way forward, and with the concurrence of the Air Force and Navy, we will solicit for synthetic jet fuel within the bounds of current authorities to determine if there is any interest. There is little doubt that the Fisher-Tropsch Coal-to Liquid manufacturing process can produce significant quantities of synthetic fuel that is fungible and interchangeable with the current supply of crude oil derived fuel. Without long-term contracts with price floors, financing Fisher-Tropsch Coal-to Liquid manufacturing processes will require confidence by the financial markets

that crude oil prices will remain above the threshold range of $53-57 per barrel over the long term (15 to 25 years). Long-term contracts with price floors would expose DOD to a significant risk of paying much more than the market price for fuel. The recent precipitous drop in the price of crude oil underscores the risk to the U.S. taxpayer of price floors and demonstrates why the financial markets are not confident that there will be sustained elevated prices and have not to date funded coal-to-liquids plants in the U.S.

In closing, DESC is dedicated to providing continuous energy support to the warfighter and will strive to fulfill its mission in every way possible.

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE SUBCOMMITTEE ON TERRORISM,

UNCONVENTIONAL THREATS AND CAPABILITIES

AND

SUBCOMMITTEE ON READINESS

COMMITTEE ON ARMED SERVICES

UNITED STATES HOUSE OF REPRESENTATIVES

SUBJECT: ALTERNATIVE ENERGY AND ENERGY EFFICIENCY

STATEMENT OF: MR. MICHAEL A. AIMONE, ASSISTANT
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INSTALLATIONS AND MISSION SUPPORT
UNITED STATES AIR FORCE

SEPTEMBER 26, 2006

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UNITED STATES HOUSE OF REPRESENTATIVES

WITNESS STATEMENT OF
MR. MICHAEL AIMONE,
ASSISTANT DEPUTY CHIEF OF STAFF
LOGISTICS, INSTALLATIONS & MISSION SUPPORT
BEFORE THE
SUBCOMMITTEE ON TERRORISM AND UNCONVENTIONAL THREATS
AND CAPABILITIES AND SUBCOMMITTEE ON READINESS
SEPTEMBER 26, 2006

Chairman Hefley, Chairman Saxton, Congressman Ortiz, Congressman Meehan, and distinguished members of the committee, I thank you for the opportunity to appear today to describe to you the Air Force new Energy Strategy for the 21st Century, and some preliminary results from our recent flight of a B-52 Stratofortress bomber using a blend of synthetic and crude-oil based jet fuel.

As stated, I am Mike Aimone, and I work for the Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters United States Air Force. I have 37 years of experience working for the Air Force as a facility engineer and logistician, and have the responsibility for guiding the Air Force Energy Program.

In the aftermath of the Hurricanes that impacted the Gulf of Mexico last summer, the Secretary of the Air Force directed extraordinary actions by all Airmen to help mitigate the resultant energy issues that faced the Air Force and the Nation. One of his first actions was to direct the Under Secretary of the Air Force, Dr. Ron Sega, to oversee an aggressive new energy strategy.

Dr. Sega immediately directed the stand up of a Senior Focus Group on energy to address these concerns. The group, which consists of the 3-star General Officers of key staff offices, along with the Chief Scientist of the Air Force, has met five times and published an energy strategy to guide our Department's energy efforts.

The vision that drives the new Air Force Energy strategy is: "creating a culture where Airmen make energy a consideration in every action."

Our strategy is two-fold: First, ensuring energy supply side assurance to critical fuel and utilities is achieved to meet Commandant Commander's requirements, and second, identifying aggressive demand side conservation initiatives focused on aviation operations, ground transportation fleet management, and an accelerated installation energy conservation program.

Recently the Secretary of the Air Force issued a Letter to Airmen on energy conservation. The Secretary summarized the myriad of energy initiatives undertaken in the past year, and implored every Airman to develop new ways to personally and organizationally use energy more efficiently.

Two weeks ago, the Vice Chief of Staff of the Air Force proclaimed October as Energy Awareness Month in a continued effort to cement our vision of creating an environment where Airmen conserve energy as an integral part of their daily activities.

Mr. Chairmen and members of the Subcommittees, I am sure you are most interested in the Air Force's dramatic flight of a B-52 Stratofortress bomber powered partially by synthetic fuel manufactured from a pilot Synthetic Fuels manufacturing facility operating in Tulsa, Oklahoma. This flight took place on Tuesday, September 19, 2006.

Earlier this year the Secretary of the Air Force directed Air Force Materiel Command to take on a project to procure synthetic fuel, static ground test the fuel on engine test stands at the Oklahoma City Air Logistics Center at Tinker AFB, Oklahoma City, Oklahoma, and, if ground tests were successful, conduct an aviation flight demonstration at the Air Force Flight Test Center, Edwards Air Force Base, California. To ensure maximum crew safety in the first US military jet aircraft powered by synthetic manufactured liquid hydrocarbons, the test was conducted using a 50/50 blend of crude-oil refined jet fuel and synthetically manufactured product. Also, the first flight was arranged so that only a single pod of 2 engines were powered by the blend. The remaining 6 engines of the aircraft used crude-oil refined jet fuel. The first flight occurred on the morning of Tuesday, September 19, 2006, and while there was an unrelated mechanical issue with the aircraft, 3 hours of flight time occurred demonstrating the applicability of Synthetic fuel for military aviation use.

At the writing of this statement, two additional flights are planned, including flying the aircraft on all 8 engines powered by a 50/50 blend of synthetic and crude-based fuel. To date, the aircraft has flown over 6 hours, and combined with over 50 hours of

engine tests on the ground, we have not seen any deleterious effects on the engine, fuel system or in the ground support equipment.

On a technical note the synthetic fuel manufactured by the Fisher-Tropsch process has no sulfur and aromatic content, thus, in its "neat" form, it does not create smog producing Sulfur Dioxide or particulate matter.

This aviation flight demonstration is the first step the Secretary of the Air Force envisions to achieve the goal where at least 50% of our aviation fuel is derived by domestic assured sources of supply by 2016. More flight-testing and airworthiness certification of the fuel is required, and the Air Force has outlined a multi-year effort to make our goal a reality.

We know we cannot accomplish our vision without the full support and cooperation of industry, and specifically with respect to aviation operations, without the support of the Federal Aviation Administration. We have partnered with industry throughout our planning and flight testing, and next month we will meet with the commercial aviation industry for the second time in Atlanta, Georgia, under the auspices of the Air Transport Association and the Federal Aviation Administration. Our collective goal in these meetings is to ensure we build a road map to early and successful adoption of synthetic fuels for the aviation transportation sector.

To better understand the industry, we have under taken two additional efforts. First, with the support of the Services, the Defense Logistics Agency conducted an extensive market survey through a Request for Information. I am pleased to be joined at the witness table today by my colleague and friend, Mr. Dick Connelly. Mr. Connelly will report to you on the results of that market survey. Secondly, we have partnered with the Department of Energy and the Environmental Protection Agency in an effort to quantify the technical and economic issues associated with Synthetic fuel.

Mr. Chairmen, and members of the Subcommittees, I stand ready to answer any questions you might have.

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