Patuxent Policy Group
White Paper

Volume IV, Number I
February 2014

Implications of the North American Energy Boom for the U.S. Navy

Produced by:
The Center for the Study of Democracy
St. Mary's College of Maryland

A policy white paper based on the
Patuxent Policy Group
August 21, 2013
St. Mary's College of Maryland

Patuxent Policy Group
White Paper

Volume IV, Number I
February 2014

Implications of the North American Energy Boom for the U.S. Navy

Table of Contents

Participants i

Introduction ii

Main Findings 1

Current U.S. Energy Production Profile and Market Implications 2

Implications and Risks for the U.S. Military 4

Energy Efficiency Improvements in the U.S. Navy 5

The Value of Energy Efficiency Improvements to the U.S. Navy 7

International Implications of the U.S. Energy Boom 8

Conclusion & Recommendations 9

This document reflects the perspectives of the panelists and participants and identifies findings and conclusions of interest to military planners, defense policy strategists and energy experts. The views expressed in this paper reflect the output of a group discussion and are not intended to represent the views of any particular individual. Dr. Michael Cain and Ms. Bonnie Green produced this paper.

Participants

Participants:

Chair/Moderator: VADM Lee Gunn, USN, (ret), President, Institute for Public Research (IPR), Center for Naval Analysis (CNA)

Panelists:

Dr. Richard B. Andres, Senior Research Fellow, Center for Strategic Research (CSR), Energy & Environmental Security, INSS
Lt Gen Ken Eickmann, USAF (ret), Deputy Director, Center for Energy Security, University of Texas, Austin
Dr. Leo Goff, Program Manager, Military Advisory Board, CNA
Mr. Thomas Morehouse, Jr., Principal Deputy, Operational Energy Plans and Programs, OSD
Mr. Michael Ratner, Specialist in Energy Policy, Congressional Research Service (CRS)
RADM Kevin Slates, Director, Chief of Naval Operations Energy & Environmental Readiness Division (OPNAV N45)
Dr. Eric Wachsman, Director of University of Maryland Energy Research Center, University of Maryland (UMD)
Ms. Mitzi Wertheim, Professor, Practice for Sustainability, Enterprises and Social Networking, Naval Postgraduate School (NPS)

Additional Participants:

Mr. Gawdat Bahgat, Professor, National Security Affairs, Near East South Asia Center for Strategic Study, National Defense University (NDU)
Dr. Ed Barrett, Board of Directors, The Patuxent Partnership
Mr. Paul Bollinger, Special Assistant Energy Assurance, Maryland Energy Administration
Dr. Michael Cain, Director, Center for the Study of Democracy, St. Mary's College of Maryland (SMCM)
RADM Wendi Carpenter, USN (ret), President, State University of New York Maritime College
Maj Gen John Casciano, USAF (ret), Board of Advisors, Center for the Study of Democracy, SMCM
Mr. Tony Cifone, Deputy Assistant Commander for Research and Engineering, Naval Air Systems Command (NAVAIR)
Mr. Dan Dawson, Chief Technology Officer, Wyle
RADM Steve Eastburg, USN (ret), Executive Vice President, Engineering Solutions, Smartronix
Dr. Leah Eller, Assistant Professor of Chemistry, SMCM
Mr. George Gellrich, Vice President, Calvert Cliffs Nuclear Power Plant
Ms. Bonnie Green, Executive Director, The Patuxent Partnership
Ms. Karen Holcomb, Executive Director, Leadership Southern Maryland
Maj Gen Duane Jones, USAF (ret), University of Texas, Austin
CAPT Christopher "CJ" Junge, Vice Commander, NAWCAD
Mr. Richard A. Kamin, Energy and Fuel Lead, NAVAIR
Dr. Randy Larsen, Associate Professor of Chemistry, SMCM
Mr. Kal Leikach, Sabre Systems, former Deputy Commander, NAVAIR
CAPT Ted Mills, USN (ret), NASA
Ms. Elaine McCubbin, Program Manager, Office of Strategic Industries & Innovation, Clean Technology & Renewable Energy, MD Department of Business and Economic Development
Ambassador Ken Peltier, Former Director, NATO Office of Resources
Ms. Cheryl Rosenblum, Director, Strategic Development, CNA
Mr. Scott Sanders, Vice President for Strategic Innovation, Wyle
Ms. Linda Vassallo, Director, Calvert County Department of Economic Development
Mr. Paul Waxman, Energy Manager, NAWCAD
Mr. Dan Weekley, Vice President of Government Affairs, Dominion

Implications of the North American Energy Boom for the U.S. Navy

Introduction

The Patuxent Policy Group, a collaboration of The Patuxent Partnership, the Center for the Study of Democracy and Leadership Southern Maryland hosted a group of experts at St. Mary's College of Maryland on August 21, 2013 to discuss the implications of the U.S. energy boom for the U.S. Military and U.S. foreign policy.

The working group, facilitated by Vice Admiral Lee Gunn USN (ret.), President of the Institute for Public Research at CNA, convened participants from academia, government and industry, with a broad range of perspectives and experience on energy production, national energy security, and defense operations and logistics. Much of the discussion focused on identifying the potential benefits and risks increasing domestic energy supplies would have on the U.S. Military, and how those benefits and risks might specifically impact the U.S. Navy and Marine Corps.

I. Main Findings

1. Increases in the supply of domestic oil and gas will have positive long-term implications for the U.S. economy, with imports of both expected to decrease. However, the U.S. economy will continue to rely on fuel imports through at least the end of the decade. The portfolio of suppliers will likely change and reduce risk.
2. The North American energy boom, including natural gas, cannot mitigate most energy supply risks associated with military operations abroad. The logistics, challenges, and associated costs of moving fuel from the production point to the fleet will remain a significant factor in naval operations.
3. Given the ongoing budget considerations, there has to be a culture change regarding energy usage within the Navy and the Marine Corps. Energy costs and availability must become a key decision factor in the acquisition process. A mixed portfolio of energy efficiency strategies must address these risks in operations.
4. Increasing supplies of natural gas are likely to help fuel the U.S. economy. The U.S. is expected to become a net exporter of natural gas by the end of this decade. Natural gas cannot reasonably be expected to fuel military ships and planes. Redesigning the Navy fleet to burn natural gas is not feasible, given the significant costs, time required and risks involved. However, marginal changes to domestic fleet vessels are possible.
5. Energy installations and infrastructure represent a major vulnerability for the U.S. military. Recent studies suggest the grids supplying military bases are highly vulnerable to attack and disruptions. A disruption, such as a long-term power outage, could have a potentially adverse effect on the security and readiness of the military.
6. Recognizing the need to reduce risks associated with energy requirements, the U.S. Navy is implementing strategies to increase alternative energy supplies and to build energy efficiency improvements into future force structure and operations. These efforts will help reduce the U.S. Navy's energy demands. The largest impact on energy efficiency will be realized when there is a change in the culture and human relationships within the Navy and Marine Corp with regard to energy resources.
7. Energy efficiency strategies are expected to save 5 million barrels of "oil equivalent," while alternative fuel initiatives associated with deployment of the Great Green Fleet (GGF) are projected to save an equivalent of 8 million barrels of oil by 2020. This two-pronged strategy is expected to reduce liquid petroleum demands by at least 13 billion barrels in the next decade.
8. The increasing oil supplies in North America will allow the U.S. to continue decreasing its reliance on suppliers from the Middle East, increasing global capacity in oil and gas. This added capacity may lead to decreasing energy prices and increased energy security, and result in diversifying global supplies of oil and gas. Nonetheless, the culture of unlimited energy resources being available must change.
9. Decreased revenues from oil and gas may exacerbate instability in the Middle East, complicating U.S. relationships and policies in the region. It also may provide the U.S. with greater political leverage over OPEC and its members.
10. There is the risk that plentiful natural gas will lessen demands for energy efficiency improvements in the economy and 'crowd out' renewable energy production. Earlier energy shortages, dating back to the late 1970's, resulted in various plans to save energy and develop alternative energy. Most of these programs were abandoned as supplies increased. A sustained focus on renewable and fuel economies is critical in view of declining DoD budgets and an emphasis on climate change and the environment.

II. Current U.S. Energy Production Profile and Market Implications

Over the past few years, improved technologies have allowed energy companies to unlock new natural gas and oil resources in North America. These new sources will have a profound effect on the U.S. economy and ultimately, on U.S. foreign policy. These new technologies, based on advances in geologic imaging, advanced directional drilling and hydraulic fracturing, promise increased production of hydrocarbons in North America. According to the International Energy Association (IEA), North America's oil supply will grow by nearly 4 million barrels per day between the years 2012 to 2018, amounting to nearly 50% of global output growth over that period. To get a sense of the significance of this growth, consider that the United States is expected to overtake Saudi Arabia as the world's largest oil producer in 2017.

The situation in natural gas production in the United States is even more dramatic than oil production in North America. The Energy Information Agency (EIA) reports that natural gas production from new shale discoveries now contributes 35% of all U.S. gas supplies, up from 23% in 2010. This represents a much more rapid increase in supply compared to oil. Shale gas is expected to make up almost 50% of all natural gas production in the U.S. by 2035. According to most analysts, U.S. production of natural gas will surpass Russian production in 2015, while total production of hydrocarbons in the U.S. surpassed Russia in 2013. The growth of oil and gas production in the U.S. has been both rapid and dramatic, and this trend is expected to continue at least through the next several decades.

There are important implications of this production boom for both domestic and international energy markets. U.S. imports of oil and gas can be expected to decrease, with the U.S. expected to become a net exporter of natural gas by the end of this decade. Increasing oil supplies in North America also will allow the U.S. to decrease its reliance on suppliers from the Middle East, potentially contributing to greater global oil capacity in the next decade. Increasing supplies of domestic gas have contributed to a decoupling of gas and oil prices within the U.S., with natural gas prices moving significantly lower in recent years because of shifts in production. This price shift has already influenced the production of electric power, with a 21% increase in gas powered electricity in 2012 and corresponding decreases in demand for coal fired generation capacity. This shift from coal to natural gas is expected to increase in the next decade. The high demand for U.S. coal exports to China and Europe will remain steady, as it is comparatively cheaper than oil or gas. The U.S. will have to negotiate that production dilemma as well as others as the nation reduces its energy requirements and moves to cleaner resources, while exporting coal to countries that already face major pollution and environmental risks.

Finally, lower natural gas prices have also contributed to increased investments by energy intensive industries including petrochemical companies, manufacturing companies and refining companies, resulting in greater foreign direct investments in the U.S. These foreign investments associated with lower gas prices can be expected to provide considerable benefits to the U.S. economy.

III. Implications and Risks for the U.S. Military

Adequate and affordable energy supply enables the U.S. government to protect the country and to project military power without compromising their objectives. Providing sufficient energy to military facilities and operations is crucial to national defense and to military operations here and abroad. While the energy boom in the U.S. will provide numerous benefits to the U.S. government and the U.S. economy, it will likely have more limited value to the U.S. military. Indirectly, the DoD will benefit overall from lower energy costs and greater access. There are several factors associated with military operations that account for differences in these outcomes.

(1) Increasing supplies of natural gas are likely to boost the U.S. economy, but cannot be expected to fuel military ships and planes. Redesigning engines to burn natural gas would take considerable investment and would not be cost beneficial for the military in the near to mid-term. (2) For military operations abroad, each service must procure fuels from non-U.S. sources and face logistic challenges in moving fuel supplies from the U.S. fleet as well as various foreign destinations. This not only presents multiple risks to the military; it also mitigates the value of decreasing prices associated with production gains in the U.S. (3) Other than price decreases that could occur from the increase in supply, decreasing energy prices and increases in the reliability of domestic fuel supply will not decrease risks to U.S. military energy infrastructure or logistics abroad.

The Department of Defense (DoD) is the largest consumer of energy in the U.S. government, using more than 90% of all fuel consumed by the federal government, primarily to support aviation and the fleet. For example, the energy profile of the U.S. Navy represents 22% of all USG fuel consumption, with almost 85% going to tactical aviation and maritime operations. Getting fuel to troops and facilities abroad involve numerous risks to the U.S. military. Yet minimizing vulnerabilities to energy supplies both domestic and foreign also presents special challenges and risks.

What special energy risks confront the U.S. military abroad? The first is associated with access to fuel sources. Insofar as it is practical, the U.S. military purchases fuel from suppliers located near to their military operations. If it is where the U.S. already has an operating base, the supply is likely to be reliable and relatively risk free. However, if the operations are in a region with instability or where there is an outright threat to U.S. forces, obtaining fuel locally could be considerably more unreliable and dangerous, raising the costs to conduct the operation. Even when the supply is reliable, there are risks and costs associated with transport and storage of the fuel.

The second type of risk occurs when the U.S. military operates in locations where there is no access to fuels or where the risks associated with disruptions in supply are too high to consider local sources. For example, fuel supplies to operations in Afghanistan were significantly affected when the U.S. military was denied access into the country from nearby Karachi, Pakistan or Manas Air Base in Kyrgyzstan. When countries deny or limit access, fuel supply options dwindle and become considerably more expensive and logistically complex.

Viewed from the strategic level, most oil products must be transported by sea, often through geographic 'choke' points. For example, the Strait of Hormuz supplies over 32% of the globally traded oil, with limited supplies going to U.S. and the majority to Asian markets that regularly supply fuel to the U.S. military. The U.S. Navy has traditionally viewed these choke points as vulnerable points in its supply lines and has required operational readiness to defend them. These vulnerabilities on the sea also extend to tankers themselves, with new asymmetrical threats emerging to global oil supplies. The military is therefore required to guard against the risks

associated with oil transport to the U.S. and other global markets.

The third type of risk is associated with infrastructure vulnerabilities near military bases within the U.S. The military often relies on local energy installations and infrastructure. In many instances, the local infrastructure has been "cobbled together" over time with little consideration to the overall national infrastructure. The National Defense Privatization Act mandated that energy and utility provision should not be a core capacity of the U.S. military. In compliance with this Act, DoD gradually moved away from providing these services, becoming increasingly dependent on private sector utilities. This required military installations to coordinate energy and infrastructure security with private sector suppliers, which can put U.S. military operations at risk.

Recent studies suggest that private energy installations near military bases are often vulnerable to attack, with insufficient security to protect these energy assets. It is estimated that almost 90% of all military bases have a single power feed, putting the facilities at high risk from supply disruptions. Fiber optic cables easily can be cut, causing disruption in communications. Transformers that supply energy can be easily disabled, with replacement parts often difficult or impossible to acquire quickly. In older facilities, replacement parts may not available at all.

A recent GAO study found that in the past three years at least 24 of 34 critical domestic assets of U.S. military have experienced power problems lasting more than 72 hours. In other words, the grid supplying military installations in the United States is highly vulnerable and requires investment and action to improve reliability.

Greater production of oil and gas in the U.S. will likely have value to DoD operations in the U.S. through reduced costs, but it will have considerably less value for military operations abroad and it will not reduce the energy vulnerability of U.S. military installations at home or overseas.

IV. Energy Efficiency Improvements in the U.S. Navy

To reduce the vulnerabilities and risks associated with energy supplies and the conduct of military operations that will persist in spite of the North American energy boom, the U.S. military is pursuing strategies to decrease demand, increase alternative energy supplies and build energy efficiency improvements into future force structure and operations.

The U.S. Navy has provided leadership in the energy supply challenge by setting several ambitious goals. Energy conservation ashore and at sea is the primary goal. The Navy aims to reduce its consumption of fossil fuels by fifty percent by the year 2020. In addition, Navy leaders determined that they would apply passive and active technologies to not only increase energy efficiency but also improve the fight capability of its military assets. If successful, this approach would not only cut costs, it also would effectively extend the options available to its operational commanders by extending the tactical reach of the Navy, and help meet additional energy demands imposed by new assets. Below are some examples of the U.S. Navy's energy program.

1. Passive technologies such as improved hydrodynamics through the use of stern flaps and propeller coatings or changing out traditional incandescent bulbs for newer LED lights will continuously reduce consumption. There are also promising technologies such as solid oxide fuel cells (SOFC) that can increase efficiency across numerous Navy platforms. For example, when combined with internal combustion engines, SOFC can yield power two to three times more efficiently. The Office of Naval Research (ONR) recently demonstrated SOFC technology developed for tactical generators like those used at forward-operating bases in Afghanistan that will cut the fuel used in current diesel system nearly in half. That not only saves money, but it can potentially save the lives of those responsible for fuel transports. Thirty-five percent of casualties in Afghanistan occurred during fuel transport missions. There are also possibilities for efficiency gains for unmanned aerial systems (UAS) and underwater power systems through new fuel cell technology.

LT JG Smith explains energy-efficient systems aboard the guided-missile destroyer USS Chafee (DDG 90) to Secretary of the Navy (SECNAV) the Honorable Ray Mabus. (U.S. Navy Public Affairs photo, www.public.navy.mil)

2. Active technologies give commanders the option to engage technology when necessary or desired to improve efficiencies. This includes techniques that decrease fuel use through new efficiency diagnostics. For example, broad-spectrum, high fidelity trainers can replicate operating environments to help operators improve the efficiency of aircraft or ships. There are also new hybrid, electric drive engines under development that can be used to increase efficiencies of ships when needed.

3. Actionable technologies provide information or options to commanders—these initiatives will not save fuel unless the information is analyzed and utilized. For example, energy dashboards, smart voyage planning, incentivized energy conservation and a variety of other measures to reduce power propulsion demands in aviation and the fleet can provide important energy cost savings.

4. Secretary of the Navy Mabus has an ambitious goal of a sweeping cultural change throughout the Naval Services, where energy is part of every consideration and decision is perhaps the most ambitious. Education and training programs are being developed and implemented that will result in people being more conscious about the use of energy across the military and the impact to the DoD budget. To be long lasting, culture change requires leadership. The Naval Postgraduate School's (NPS) new Energy Academic Group (EAG) is developing a Navy Center of Excellence for Energy Graduate Education and Research. NPS also provides SECNAV Energy Executive Education Seminars to senior Navy leaders to give them a greater understanding of energy issues enabling them to lead the culture change needed to improve Naval Combat capability in the future. New training programs that increase energy awareness and encourage conservation practices among Navy leadership can provide important energy efficiency savings throughout the fleet. This is both a top down and a bottom up change that requires ongoing reinforcements to ensure a complete culture change on fuel requirement utilization.

V. The Value of Energy Efficiency Improvements to the U.S. Navy

The operational benefits of energy efficiency measures when they are built into the program design of maritime and aviation assets means reduced fuel consumption, increased fighting capability and ultimately more options for commanders during operations. The Navy's energy program adds "Endurance" and "Resilience" to the four traditional strategic vectors that make up military capability, "Speed," "Stealth," "Precision," and "Networking." For example, increasing efficiency reduces demand for oilers in the fleet and allows a strike group to become more resilient in the event of supply chain disruptions. A fifteen percent improvement in fuel efficiency for the fleet results in two additional days of steaming time for a ship. In other maritime environments, increasing fuel efficiency reduces the number of times a strike group must refuel. This enables strike groups to spend longer time on station or longer time at higher speeds. Aircraft can maneuver for longer periods, re-engage for a second attack or fly farther to intercept incoming aircraft. Increasing aviator efficiencies also allows a carrier to remain farther away from the target, lessening risks.

The development of alternative fuels by the military also will lessen dependence on traditional heavy fuels, while allowing for increased flexibility of supply. The Navy has continued to pursue renewable fuel sources including biofuel alternatives. Alternative fuels must meet strict performance objectives: these fuels must be a drop-in replacement (i.e. no major engine/plant rework), operationally transparent to the operator, meet current fuel performance requirements and easily mixed or alternated with petroleum fuel. These requirements are critically important to keep costs down so (1) there is no change to aircraft or ship configuration needed, and (2) no change to existing transport or storage infrastructure. Changes of this magnitude would increase dramatically the overall cost of alternative fuels their reducing their value to the Navy.

New maritime and aviation acquisitions continue to improve operational capability for the Navy. However, these improved capabilities often have resulted in greater fuel demands for new planes and ships—sometimes by as much as 110 percent. U.S Navy assets will continue to be heavily dependent on dense liquid fuel and the continued importance of energy efficiency measures to lower costs and mitigate risks in the coming decades.

The energy efficiency strategies outlined above are expected to save 5 million barrels of oil equivalent, while alternative fuel programs associated with deployment of the Great Green Fleet (GGF) initiatives are projected to save 8 million barrels of oil equivalent by 2020. This two-pronged strategy is expected to result in a small decrease in overall liquid fuel demands by the Navy in the next decade.

In spite of the success of the Navy's energy program, there has been criticism by some members of Congress who say that Navy's investment in alternative fuels for the GGF is too high at a time when oil prices are declining. Additionally some argue that the bio-fuels can actually damage the diesel engines. Without these programs it would be difficult to accomplish Secretary of the Navy Maybus' goal of half the Navy fleet using alternative fuels by 2020. The Navy is working with the Department of Agriculture to reduce the price of the bio-fuel so that it is competitive with oil-based jet fuel. The Navy has also worked to justify the scientific investment as a long-term answer to reducing costs associated with Naval operations so that the U.S. military capability can be sustained and strengthened.

VI. International Implications of the U.S. Energy Boom

Until recently, the U.S. and Europe experienced decreasing domestic oil and gas production and increasing dependence on gas and oil imports. Along with gas and oil price increases, these trends highlighted U.S. and European energy vulnerability and the transfer of resources to oil rich OPEC countries. With the relentless growth of energy demand in Asia, tight supplies of gas and oil were expected in global markets over the near term. Western strategic interests focused on securing supplies of oil and gas abroad, while stabilizing global energy markets through improvements in energy efficiency and alternative green energy production.

With the rapid increase in North American oil and gas production, these trends can be expected to change. The new energy production boom in North America will likely have important repercussions on global markets and international relations, influencing global prices, state revenues and changing global energy balances.

One likely outcome of this energy boom is decreasing U.S. oil and gas imports from the Middle East and South America, adding to spare global capacity in oil and gas. This added capacity may be absorbed by China's increasing energy demands. If the new technology used in the U.S. to unlock new types of oil resources and increase recovery rates in existing fields is applied elsewhere in the world – which is very likely – it could push up other nation's estimates of oil production. Any excess capacity would place pressure on energy prices.

In OPEC and other petro-dependent states, shifting energy prices could result in a drop in revenue and trigger popular discontent and possible political instability in the more fragile nations. Specific U.S. responses to political instability in oil producing states are difficult to predict, however, U.S. engagement to stabilize the state or region would likely be considered with the manner of that engagement dependent on the situation. Regardless of what may or may not happen, increasing energy supplies ultimately will shift the global balance between traditional suppliers and consumers. U.S. oil and gas will help diversify the global supply and that will increase energy security for some states. Further implications of the shift are difficult to predict at this time.

Another important implication of increasing North American energy supplies is additional risk associated with global warming. For example, the proposed Keystone pipeline linking the U.S. to oil sands from Canada presents important global challenges by supplying greater amounts of oil to world markets. This is some of the dirtiest oil in the world, with the potential to release large amounts of CO2 into the atmosphere. Moreover the increasing use of cheap natural gas in the U.S. will put corresponding price pressures on alternative energy sources. Carbon release contributes to climate change, and enthusiasm for renewable fuels is tempered by our temporary glut of oil and gas. This was the case in the late 70's when the U.S. went from energy shortages to increased availability of resources. As a result various alternative energy projects were terminated because it became too expensive once oil supplies were back on line. The Department of Energy was established as a cabinet level department as a result of this crisis. There is the risk that plentiful natural gas will lessen demands for energy efficiency improvements in the U.S. economy and 'crowd out' renewable energy production. Brazil is currently facing such a challenge as oil costs have dropped to levels that have decreased demands for ethanol production, after a long steady increase in production and prices.

VII. Conclusion & Recommendations

The North American energy boom will generate great benefits for the U.S. economy and will increase its energy security, but will not decrease the need for the U.S. military to reduce the costs and risk of energy supply and logistics ashore and at sea. Conserving energy will actually strengthen U.S. military capability by making it more resilient and enduring. Conserving energy through more efficient use of the current military infrastructure, investing in alternative energy technologies, and integrating alternative energy technologies into future military platforms, weapons, and systems is a mixed strategy that will provide a hedge against new and emerging geopolitical and environmental threats.

The Navy's energy program has been very successful in increasing alternative energy supplies and building energy efficiency improvements into future force structure and operations. The largest impact on energy efficiency will be realized when there is a change in the culture and human relationships within the Naval Services with regard to energy resources. Navy leadership has been determined to demonstrate its vision for improving its energy security in spite of criticism from some members of Congress.

To ensure success for the U.S. Navy and for the military services, there must be demands for culture change in the way Americans use and view energy. The country needs to think strategically about how to maximize the benefits of this energy boom for the long term. The U.S. can use the economic benefits to implement technological improvements (active, passive, and actionable) that will stretch its energy resources, and make investments in more energy efficient infrastructure. Strong opinion leaders within the military, government, and the business community must help lead and reinforce the culture change in the way Americans think about and use energy.

Conference attendees recommend that a Navy centric forum be convened on how to change the culture from energy resource as a commodity to considering energy resource and costs as enablers. This approach is critical to increasing Navy and Marine Corps mission capabilities despite budget challenges, and will reinforce the Naval Services energy goals.

Center for the Study of Democracy

A joint project of St. Mary's College of Maryland and Historic St. Mary's City

The Center for the Study of Democracy was founded as a joint initiative of St. Mary's College of Maryland and its partner institution, Historic St. Mary's City, the site of Maryland's first capital. The purpose of the Center is to explore contemporary and historical issues associated with democracy and liberty in national and international contexts. The Center provides a forum for presentations by government officials, journalists, and scholars; publishes scholarly writings on subjects of civil governance; encourages and supports public participation in political processes; and engages undergraduate students in study and research on related subjects.

The Patuxent Partnership

The Patuxent Partnership works with government, industry and academia on initiatives in science and technology, hosts programs of interest to Naval Air Systems Command (NAVAIR) and the broader DoD community, supports workforce development including education initiatives and professional development. Visit www.paxpartnership.org.

CENTER FOR THE STUDY OF DEMOCRACY

A joint project of St. Mary's College of Maryland and Historic St. Mary's City

THE PUBLIC HONORS COLLEGE

St. Mary's College of Maryland

at Historic St. Mary's City