

Creating Spartan Energy Warriors

Highlights from the 2011 Naval Energy Forum

ON 5 MAY 1961, astronaut Alan Shepard, Jr., became the first American in space. His suborbital flight lasted just 15 minutes, but it led to President John F. Kennedy's challenge to Congress and the nation just twenty days later—"I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to the Earth."

In 2009, in the wake of small Navy successes in energy efficiency and alternatives, Secretary of the Navy (SECNAV) Ray Mabus announced Navy energy goals that were every bit as ambitious as President Kennedy's challenge. And like the National Aero-

navics and Space Administration of the 1960s, today's Navy has risen to the challenge. At the 2011 Naval Energy Forum, hundreds of senior military, federal agency, Congressional leaders, and other professionals met to discuss challenges, successes, and the way ahead for achieving the Navy's and the nation's energy future.

Then-Rear Admiral Philip H. Cullom, Director, Chief of Naval Operations Energy and Environmental Readiness Division (OPNAV N45), began the Forum with remarks about imperatives for change. He shared a number of global factors impacting U.S. policy, as well as the Navy's

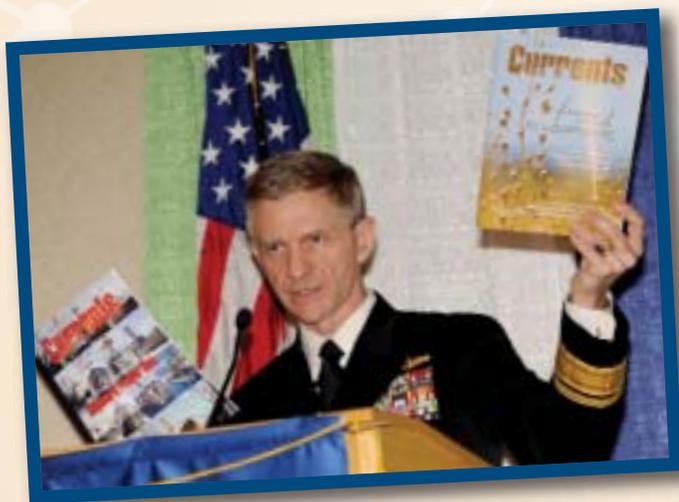
Energy Program—increasing demand for energy by some of the most populous countries around the world, increasing oil prices and a global struggle to control energy costs, and increasing interruptions to access to reliable energy sources. "Given these new energy realities, there are many changes ahead. The



Secretary of the Navy Ray Mabus.

bottom line remains combat capability and energy security; therefore, we must take a broader look at energy and at what we can and should do," said Cullom. "We must have the vision to think about where we want the Navy to be in 2020 and 2030. Without that long view, we'll continually be making the short steps that are not enough to get us to where we need to go." (Note: As of 7 March 2012, Cullom was promoted to Vice Admiral and took over as Deputy Chief of Naval Operations for Fleet Readiness and Logistics (N4).)

Remarks by the Secretary of the Navy underscored the importance of the Navy's energy program. The Honorable Ray Mabus remarked, "We are a military organization. And we're doing



Vice Admiral Phillip H. Cullom with issues of *Currents* magazine.

this so that we can be a better military, so that we can fight better, so that we can perform the duties and the mission given to us by this country, now and into the future.”

Chief of Naval Operations (CNO) Admiral Jonathan Greenert agreed. “Simply put, we have got to be ready. And readiness and energy are clearly linked,” said Greenert.

During the Forum, speakers and participants discussed the Navy’s commitment to meeting Secretary of the Navy’s and the Chief of Naval Operations’ energy goals. What follows is a synopsis of the various programs and initiatives intended to improve energy efficiency and achieve energy independence.



Chief of Naval Operations Jonathan Greenert and Vice Admiral William Burke.

SECNAV Energy Goals

AS THE U.S. GOVERNMENT is working to reduce energy consumption and lead the Nation toward energy independence, the Secretary of the Navy (SECNAV) has outlined five energy goals. These goals seek to enhance and better enable our combat capabilities, to provide greater energy security. Outlined below are examples of how the Navy is moving forward to achieving each of the goals.

1. Increase Alternative Energy Use Department of the Navy (DON)-wide

By 2020, 50 percent of total DON energy consumption will come from alternative sources.

- Decrease energy consumption through installation of energy efficient technologies and development of policies that encourage energy awareness and conservation.
- Continue aggressive pursuit by Marine Corps of technologies that will help achieve greater energy efficiency while increasing combat effectiveness in the theater.
- Partner with industry, commercial aviation, and other government agencies to develop a demand signal to alternative fuel industry and encourage growth of a domestically produced, cost competitive biofuel industry.

2. Increase Alternative Energy Ashore

By 2020, DON will produce at least 50 percent of shore-based energy requirements from alternative sources; 50 percent of DON installations will be net zero.

- Continue installation of energy efficient upgrades to buildings and facilities.
- Encourage military members and families to conserve energy through incentives and other programs to empower them to save and be aware of their own energy consumption.

- Produce or consume one Gigawatt of new, renewable energy to power naval installations across the country using existing authorities such as Power Purchase Agreements, enhanced use leases, and joint ventures.

3. Sail the “Great Green Fleet”

By 2012, DON will demonstrate a Green Strike Group in local operations and sail it by 2016.

- Complete biofuel blend testing of all Great Green Fleet components by the end of FY 2012, building upon Navy’s successful test of the F/A-18 E/F Super Hornet, RCBX (small assault craft), MH-60S Seahawk helicopter, MV-22 Osprey, T-45 training aircraft, F/A-18 C/D legacy Hornet, EA-6B Prowler, and MQ-8B Fire Scout unmanned aircraft on alternative fuels.

4. Reduce Non-Tactical Petroleum Use

By 2015, DON will reduce petroleum use in the commercial vehicle fleet by 50 percent.

- Increase purchase and use of flex fuel vehicles, hybrid electric vehicles, and neighborhood electric vehicles.
- Expand alternative fuel infrastructure to support these vehicles.

5. Energy Efficient Acquisition

- Create a standardized process for determination of lifecycle energy costs, fully-burdened cost of energy and other energy related characteristics of potential platforms, weapons systems, and buildings.
- Encourage contractors to minimize energy footprint and factor energy into the acquisition decision making process.



Vice Admiral David Architzel.

In addition to successfully testing and certifying its aircraft to fly on biofuel blends, Naval Aviation is actively pursuing a full spectrum of technologies to increase aircraft efficiency. (For more insights, read the Fuels Certification Program section in this article and our cover story in this issue of *Currents*.) Efforts are currently underway to increase the engine efficiency of the both the F/A-18 Super Hornet and F-35 Joint Strike Fighter. Also under evaluation are innovative coatings for the airframes' exteriors that reduce friction and drag. Flight simulator enhancements are being introduced across the fleet that will reduce the need for actual flight hours without impacting combat readiness. Even the equipment used to launch aircraft from carriers is being re-designed for energy efficiency. At the 2011 Forum, Vice Admiral Architzel shared the progress on the electromagnetic aircraft launching system,

We need to insist upon using every tool in the toolbox to maximize energy conservation while meeting our mission.

—Vice Admiral David Architzel

Naval Aviation

Naval Aviation is at the forefront of introducing energy efficiency advancements to its fleet of over 3,700 fixed and rotary wing aircraft. The approach has been systematic and holistic, as every aspect of the program is a target for efficiency gains and every member responsible for energy consciousness. At the 2011 Naval Energy Forum, Vice Admiral David Architzel, Commander of the Naval Air Systems Command (NAVAIR), stated, “Our plan is to fly all Navy aircraft on biofuels. Navy aircraft will be designed and sustained to achieve maximum energy efficiency. And as a leader in innovation, Naval Aviation will continue to be the global force for good.”

In 2011, Naval Aviation strengthened this commitment to operational energy conservation by launching the Aircraft Energy Conservation Program (Air ENCON). Through fleet training and outreach opportunities, Air ENCON will develop and institutionalize energy conservation best practices across the fleet. Energy-optimizing mission planning, increased utilization of synthetic training, and more efficient refueling are just a few of the initiatives demonstrating the aviation community’s proactive approach to conservation.

a technology that uses a short burst of compressed energy to propel aircrafts up to launch speeds and is ten times more energy efficient than the steam catapults used today.

“The knowledge is out there, and we need to insist upon using every tool in the toolbox to maximize energy conservation while meeting our mission,” said Architzel.



Admiral John C. Harvey.



Rear Admiral Ann Phillips.

Maritime Initiatives

“Improving our energy efficiency, and investing in alternative fuels, increases our ability to execute prompt and sustained combat at sea.” These words, offered by Admiral John C. Harvey, Commander, U.S. Fleet Forces, at the 2011 Naval Energy Forum, reinforce the fundamental mindset behind the entire Navy Energy Program—energy is a strategic resource that enhances combat effectiveness. Pursuing and achieving operational energy efficiencies reduces vulnerabilities while increasing capabilities, resulting in a more lethal, more effective, maritime fleet.

While confident that such a future is attainable, Admiral Harvey recognizes that there is no “silver bullet” solution to the Fleet’s vast energy demands in the present. But as he acknowledged, “Small steps can get you big results.” By installing solid state lighting, using Shipboard Energy Dashboards that display energy loads and Smart Voyage Planning decision aids that determine most fuel-efficient transit routes, and back-fitting the fleet with energy efficient hybrid drives,

propeller coatings, and stern flaps, the Fleet has already begun to realize the benefits of its investments and will continue to do so as new and innovative advancements come online. Rear Admiral Ann Phillips, Director, Surface Warfare Division, concurs with the incremental approach, “These ships burn large amounts of fuel every year, so even a small savings will add up to a considerable amount over time.”

Expeditionary

Innovative energy and water solutions for the individual operatives who are forward deployed at the tip of the spear help to eliminate the logistical tether and allow them to operate with increased speed, flexibility, and lethality. As articulated by Colonel Robert Charette, Director of the U.S. Marine Corps Expeditionary Energy Office, “Aggressively pursuing renewable and energy efficient technology is about making a more combat effective Marine Corps. This means a Marine Corps that is lighter and more self-sufficient than today, can operate in austere locations, and stay longer at less risk.”

Validation of these efforts is already being reported back from the front lines. In recent operations in Afghanistan, India Company 3rd Battalion/5th Division brought with them several experimental

solar energy technologies designed to decrease their energy footprint. These prototypes included SPACES, a flexible panel used for charging small items such as batteries and radios, and GREENS, a larger solar array capable of powering a platoon-sized Combat Operations Center. India Company’s evaluation of, and training with, these samples was so overwhelmingly positive that it prompted large-scale implementation when the battalion actually deployed.

Consistent with the Marine Corps expeditionary energy successes, Secretary Mabus announced at the 2011 Naval Energy Forum plans to deploy a SEAL team utilizing a myriad of advanced energy and water technologies. This endeavor is part of a “Net Zero Energy-Net Zero Water” initiative where the SEALs, once deployed, will be entirely self-sufficient for their mission power and water requirements. The Navy Energy Coordination Office (located within OPNAV N45) is working in conjunction with the Naval Facilities Engineering Command, the Expeditionary Warfare Division (OPNAV N85), and the Naval Special Warfare Command to identify and



Colonel Robert Charette.

procure the equipment that will fulfill this objective, including man-portable water purification systems, solar/DC-powered refrigeration units, and universal small battery charging units.

Shore

There are more than seventy shore-based installations spread around the globe. Most of these facilities draw upon a fragile and overly burdened commercial electrical grid for the

energy supply for shore installations is an essential piece the Navy's Energy Program. As Vice Admiral William French, who at the time of the Forum served as Commander, Navy Region Southwest (now serving as Commander, Navy Installations Command) stated, "At the end of the day, it's all about energy security. We don't want to have to spend time worrying about our grid or our backup grid, and we need energy security to do that..."

and reduce dependence on the commercial grid.

Eliminating wasted energy reduces consumption on Navy facilities, further reducing vulnerability to man-made or natural catastrophes. The Navy invests funds in purchasing and installing advanced metering systems which can, in real time, monitor energy consumption down to the building level. These data will inform strategic facility management decisions that

To be considered net-zero, the installation must match or exceed the energy it consumes with energy generated on or near the installation from alternative energy sources.

energy they need to support the Fleet. This reliance on an external energy supply presents a significant vulnerability: any interruption—be it from human error, natural disaster, or targeted enemy attack—could cripple critical Navy infrastructure, such as communications, radar, and other defense-related networks. Protecting

The SECNAV, CNO, and other Navy leaders have recognized this potential vulnerability and have made facility energy security a priority. The Secretary of the Navy has set ambitious goals of protecting critical infrastructure via reliable and redundant power systems and by establishing 50 percent of Navy bases as net-zero by 2020. To be considered net-zero, the installation must match or exceed the energy it consumes with energy generated on or near the installation from alternative energy sources. The Navy is also investing in alternative energy production through wind turbines, geothermal systems, and small-scale solar arrays that supplement energy generation

can result in the capture of significant energy savings. Further, new shore construction will be built to mandatory energy efficiency specifications.

Fuel Certification Program

While the aviation, maritime, expeditionary, and shore communities have their own unique efficiency challenges, they also share in a common energy need—liquid fuel. From aircraft to submarines, amphibious assault vehicles to re-supply jeeps, liquid fuel is a nearly universal requirement in both combat and support operations. Wary of the price fluctuations that stem from a volatile commercial market and finite world supply, SECNAV and CNO have put forth ambitious goals for reducing total consumption while simultaneously increasing the percentage fuel derived from renewable sources.

Significant advancement has been made towards these goals. In the last



Vice Admiral William French.

twenty-four months alone, NAVAIR has completed flight testing of 50/50 biofuel blend for use in all Navy tactical aircraft with universally successful results. Similar progress has been made on the Maritime side; in the last two years, biofuel blends have been successfully demonstrated on an Experimental Riverine Command Boat (RCB-X), a Landing Craft Air Cushion (LCAC), and, in the largest demonstration of biofuels to date, a Self Defense Test Ship (USS Paul F. Foster). Given that the maritime and aviation communities constitute about 93 percent of the Navy's total petroleum consumption, these advancements represent a critical milestone in achieving these targets.

The Navy's vision stretches beyond the short-term horizon and it is committed to perpetually qualifying and fielding even more game-changing energy solutions. Future testing will be conducted on additional promising fuel production technologies and sources with the goal of expanding the field of potential power generators for Naval ships and aircraft.

Command, Control, Communication, Computers, Combat Systems & Intelligence

A strategic analysis of the energy used by command, control, communications, computers, combat systems, and intelligence (C5I) systems across the Navy may reveal potential energy savings in traditionally unexplored areas. Energy efficiency can be optimized in these environments in the same manner that an aircraft or submarine can be, and the savings realized are just as valuable. Rear Admiral Matt Klunder, who at the time of the Forum served as Director of Intelligence, Surveillance, and Reconnaissance Capabilities (OPNAV N2/N6) (and now serves as Chief of Naval Research), discussed how a Navy that optimizes C5I systems might reduce its energy demand, "It means maybe that a building gets a lot smaller, maybe the power required for that building is a lot less, and maybe there's a lot fewer people inside that building."

OPNAV N45 is currently baselining the Navy's C5I energy consumption and conducting an analysis of how it impacts the Navy's total energy consumption. For example, the energy required to power Navy/Marine Corps Intranet end-user devices (desktop computers, monitors, laptops) represents nearly one-and-a-half percent of total Navy energy use ashore. Capturing even incremental efficiency improvements in C5I environments, via unobtrusive measures like shutting off machines in the evenings and weekends, could achieve



Rear Admiral Matthew L. Klunder.

significant reductions, allowing valuable resources to be redirected to other areas of critical need.

Data center consolidation is another undertaking that will lead to C5I energy savings. Led by OPNAV N2/N6, and with the support of numerous other organizations, the Navy will reduce the current duplication of time, effort, and resources by consolidating and optimizing its Information Technology environment across the country. The office of the Deputy Chief of Naval Operations for Information Dominance has called for a plan to reduce Navy storage facilities by 25 percent and increase server utilization by 40 percent or more as part of a government-wide effort first promulgated by the White House in 2011.

Acquisition

In the current fiscal environment, it has become even more important to ensure that the components of our future force are frugal energy users. Because energy costs and fuel prices continue to rise, and budgets are increasingly pressurized, energy efficiency is one factor that stretches acquisition accounts. As a result, a June 2011 memorandum released by Assistant Secretary of the Navy for Research, Development, and Acquisition Mr. Sean Stackley ordered the Navy to "take substantive measures to include energy performance in the acquisition of platforms and weapon systems." This memorandum mandates the calculation of Fully-Burdened Cost of Energy (FBCE) and requires the Navy to use FBCE to evaluate the affordability of alternatives and make tradeoff decisions. Additionally, when considering modernization and upgrades to existing systems, Navy System Commands must factor in energy efficiency.



Vice Admiral Phillip H. Cullom, Rear Admiral William French, and Colonel Robert Charette.



Former Senator John Warner addressing a question from the audience.



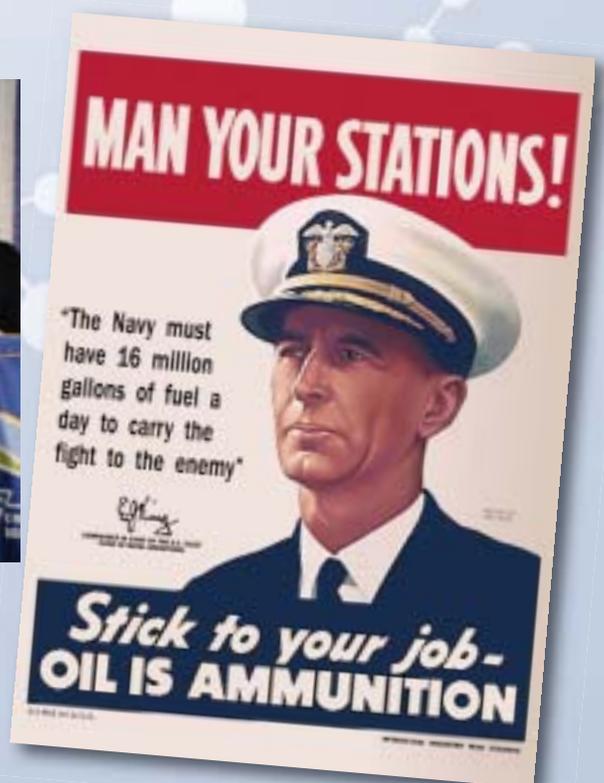
Former Senator John Warner and Vice Admiral David Architzel.



Vice Admiral Phillip H. Cullom, Mr. Tom Hicks (Deputy Assistant Secretary of the Navy (Energy)), Dr. Henry Kelly (Acting Assistant Secretary and Principal Deputy Assistant Secretary for the Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy) and Ms. Sarah Bittleman, Senior Advisor to U.S. Department of Agriculture Secretary Tom Vilsack.



Vice Admiral Phillip H. Cullom, former Senator John Warner, and the World War II "Oil for Ammo" poster.



As the resource sponsor for all readiness and logistics for the Navy, the Chief of Naval Operations for Readiness and Logistics (OPNAV N4) must increasingly consider energy factors as it continues to, in the words of Assistant Deputy Chief of Naval Operations for Readiness and Logistics Ms. Jo Decker, “ensure that our force structure—including ships, aviation, weapons, supply—are funded, maintained, trained, and ready to respond to the Combatant Commanders’ requirements.” This responsibility applies not just to today’s force, but to tomorrow’s force as well. As Ms. Decker pointed out at the 2011 Naval Energy Forum, OPNAV N4 must work with Chief of Naval Operations for Integration of Capabilities and Resources (OPNAV N8), requirement sponsors, and platform sponsors to successfully anticipate and fund future requirements. By building energy efficiency into calculations of platforms’ total ownership costs, OPNAV N4 is helping to institutionalize the Spartan warrior mindset into the Navy acquisitions paradigm.

Resourcing Energy Capabilities

Speaking at the Forum, Vice Admiral John Terence Blake, Deputy Chief of

Naval Operations for Integration of Capabilities and Resources, described his position as “the Chief Financial Officer for the Navy.” In that capacity, Vice Admiral Blake must negotiate the slim trade space between readiness and fiscal pressures, such as the current ten-year federal discretionary spending cap. Energy costs comprise a significant portion of this limited room for maneuver.

In order to properly resource energy capabilities, Vice Admiral Blake revealed that the Navy must design fuel efficiency in the “front end” of the acquisitions process, rather than trying to have it forced out “at the back end by the commander in the field.” For this reason, OPNAV N8 has championed efficiency initiatives, dedicating \$900 million in this fiscal year and \$3.7 billion across the

Future Years Defense Program, to energy investment in tactical systems at sea and ashore, with the goal of ensuring maximum combat capability with minimum energy expenditure. In the words of Vice Admiral Blake, “The Navy is committed to the energy program and investing in

areas that make sense for the Navy. And at the end of our day, the job of the Navy is to protect the nation, and responsibly invest in those programs and platforms that will defend against our most likely evolving threats. Energy is definitely a part of that equation.”

Science and Technology

“We invest in technologies, and the development and discovery of technologies,” said Dr. Richard Carlin, Department Head of the Sea Warfare and Weapons Department at the Office of Naval Research (ONR), during the 2011 Naval Energy Forum. In that capacity, the ONR Science and Technology (S&T) Organization helps provide the necessary S&T to reach toward SECNAV’s energy goals. After the announcement of the SECNAV energy goals in 2009, ONR made power and energy one of its focus pillars; as such, the group continues to invest heavily in research and development of programs such as hybrid-electric ships, fuel cell cars, next-generation electronics using silicon carbide, and efficient tactical vehicles. ONR also



Vice Admiral John Terence Blake.



Ms. Jo Decker.

has contributed to the Navy's biofuel program by providing research supporting certification of the fuels and engaging in inter-agency efforts, such as helping the U.S. Department of Agriculture determine how to sustainably grow biomass. In fact, ONR supports a collective Spartan warrior mindset, as Dr. Carlin revealed, "reaching out to all of our partner services, all of our partners in the other agencies around the federal government, and of course with states and universities and everybody that we work with" to help discover and develop the S&T necessary to attain the energy goals. (For more insights about ONR's achievements in the energy arena, check out our spotlight interview of former Rear Admiral Nevin Carr and Dr. Richard Carlin in

the winter 2012 issue of *Currents*.)

Culture Change

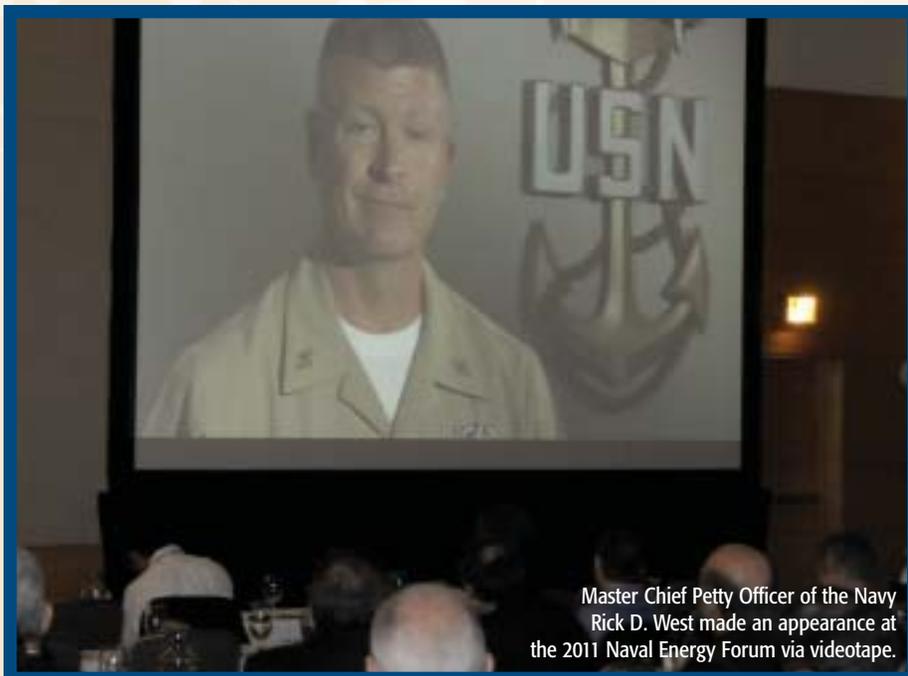
Modifying an organization's goals without changing its culture will accomplish very little. It is for this reason that leaders such as Commander, U.S. Fleet Forces Command, Admiral John C. Harvey and Master Chief Petty Officer of the Navy (MCPON) Rick D. West addressed the importance of changing the culture of the Navy to achieve an 'energy frugal' mindset.



Dr. Richard T. Carlin.

As Admiral Harvey indicated at the 2011 Naval Energy Forum, the young Sailors who form the "great core of our force... grew up green." Thus, the culture change challenge lies in institu-

Modifying an organization's goals without changing its culture will accomplish very little.



Master Chief Petty Officer of the Navy Rick D. West made an appearance at the 2011 Naval Energy Forum via videotape.

tionalizing the "green" nature of our Sailors into daily deckplate practices, in moving this concept up the chain of command, and helping Navy Sailors, officers, civilians, and families at all levels realize the tactical and strategic impacts of energy use and conservation. The end goal of culture change, as Admiral Harvey pointed out, is to make energy conservation and efficiency practices part of the natural, instinctive behavior of all Navy personnel—the resulting 'energy-smart Navy' will have "an overwhelming strategic advantage over potential adversaries."

Before leaving on a trip to the Middle East where MCPON West was scheduled to meet with Sailors stationed there, he videotaped his comments

We must evolve today if we are to be an agile Spartan Naval Force for the 21st Century.

—Vice Admiral Phillip H. Cullom

that were later replayed at the Forum. Those comments focused on Sailors' individual responsibility in achieving national energy security. "In order for us to remain a global force for good, we all need to think about energy—our energy security, efficiency, and independence," he said. MCPON encouraged Sailors to "think and live energy awareness," and invited Vice Admiral Phillip H. Cullom to discuss energy matters with the Navy's Fleet, Force, and Command Master Chiefs at the MCPON Leadership Mess

Symposium, which occurred shortly after the Forum.

The Navy is now aggressively pursuing culture change through many efforts. The aviation community is stimulating change by revitalizing its Air ENCON program. The surface community is adding an energy component to the Battle E award to encourage ships to more closely consider how they use energy. In order to educate future energy leaders, the Naval Postgraduate School is initiating two energy-related master's degrees. Additionally, in order to promote a Navy-wide energy culture and provide a forum for Sailors and deckplate leaders to share their best ideas for increasing combat capability along with energy efficiency, MCPON West is standing up a Senior Enlisted Energy Executive Steering Committee to advise the Navy's Task Force Energy.

a new Naval energy direction. Energy is a strategic resource that enhances combat capability. Whether afloat or ashore, from commanding officers to the future Sailors enrolled at the Academy, this mindset must resonate through the Fleet and strengthen its ability to maintain, train, and equip combat-ready Naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. Last year's Forum attendees heard firsthand the advancements that have been made to-date. This fall, the 2012 Naval Energy Forum (scheduled for 17–18 October 2012 in Washington, D.C.) will celebrate the even greater progress made towards securing a safe, sustainable energy future for the Navy and the country she protects. 

Photos by Mattox Photography

Future Energy Milestones & Events

TO MONITOR FUTURE milestones and events, such as the Green Strike Group demonstration (scheduled for this summer as part of the 2012 Rim of the Pacific Exercise) and the fourth annual Naval Energy Forum (scheduled for 17–18 October 2012 in Washington, D.C.) go to www.greenfleet.dodlive.mil/energy or www.facebook.com/navalenergy.

Conclusion

"We must evolve today if we are to be an agile Spartan Naval Force for the 21st Century." This forward-leaning directive, articulated first in Vice Admiral Phillip H. Cullom's opening remarks and then echoed by nearly all the 2011 Naval Energy Forum's other distinguished presenters, speaks to both the critically and immediacy of

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