



Sustainability Infrastructure in the Federal Sector: The Navy's Journal

Prepared for:

**Environment, Energy Security, & Sustainability
Symposium**

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Agenda



- ***Navy Energy Profile***
- ***Energy Mandates***
- ***SECNAV Energy Goals***
- ***Background of Navy Sustainability***
- ***Navy Sustainable Operations Today***



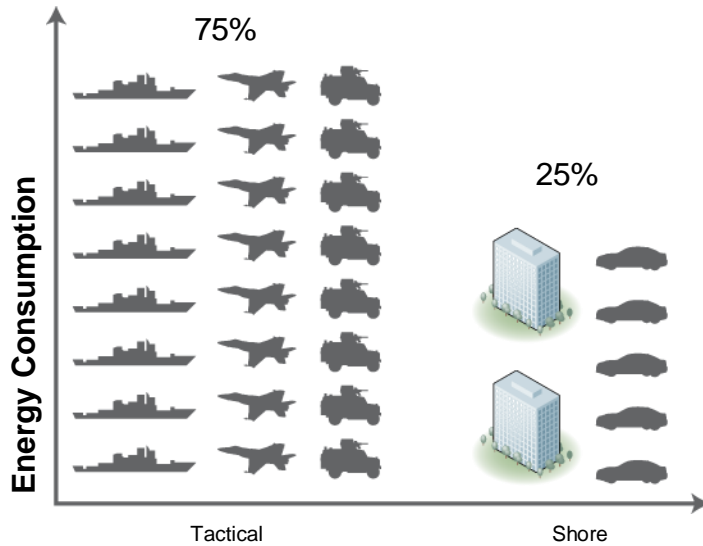




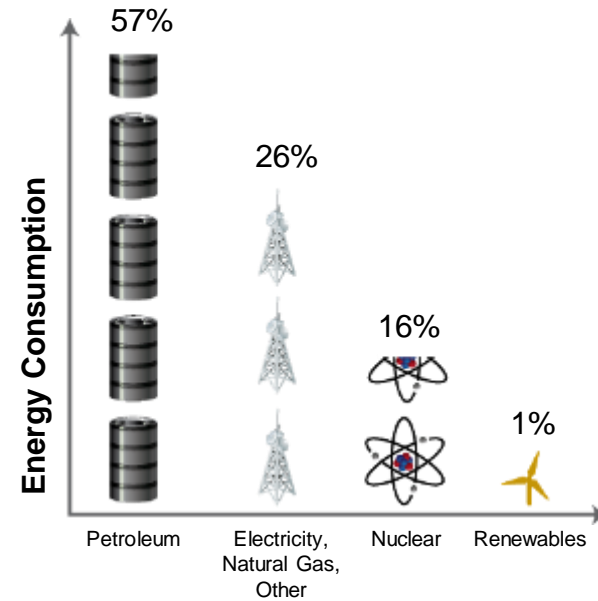
Naval Energy Profile



Overall Energy Consumption



Overall Energy Sources

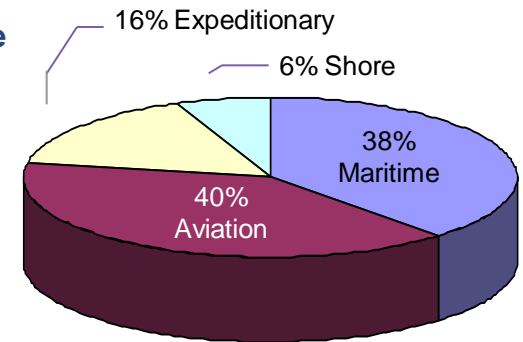
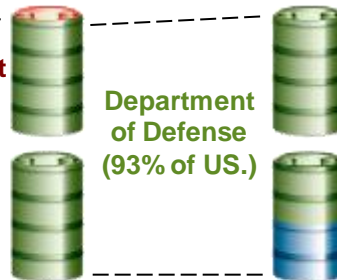


U.S. Petroleum Consumption



U.S. Government
(2% of U.S.)

Navy Petroleum Consumption in Perspective





Energy Mandates



Legislative/ Executive Directives	Provisions / Goals
E.O. 13423	<ul style="list-style-type: none"> • Improve energy efficiency through reduction of facility energy intensity by 3% annually and 30% by end of FY2015. FY2003 baseline. • Consume ≥ 50% of renewable energy from <u>new</u> renewable sources. • Reduce the fleet's total consumption of petroleum by 2% annually through the end of FY15. FY2005 Baseline.
E.O 13514	<ul style="list-style-type: none"> • Established an agency-wide GHG emissions percentage reduction target (Scope 1 & Scope 2) by FY20. FY08 baseline. • Reduce water consumption 26% by 2020. FY10 baseline. • Reduce the use of fossil fuels. • Implement high performance sustainable Federal building standards.
Energy Independence Act of 2007	<ul style="list-style-type: none"> • Reduce total energy use in federal buildings by 30% by 2015. FY03 baseline. • Beginning in FY10, each Federal agency shall reduce petroleum consumption and increase alternative fuel consumption.
National Defense Authorization Act 2010	<ul style="list-style-type: none"> • Produce or procure 25% of the total energy from renewable energy sources beginning in 2025. • Explore expeditionary use of solar and wind to provide electricity.



SECNAV Energy Goals



Energy Efficient Acquisition

Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings

Sail the “Great Green Fleet”

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

Reduce Non-Tactical Petroleum Use

By 2015, DON will reduce petroleum use in the commercial fleet by 50%

Increase Alternative Energy Ashore

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

Increase Alternative Energy Use DON-Wide

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



50% Alternative Energy Use DON-wide





50% Alternative Energy And Net Zero





50% Petroleum Reduction in Non-Tactical Vehicles





Sail the Great Green Fleet





Sail the Great Green Fleet



Earth Day 2010: Green Hornet flies supersonic at Naval Air Station Patuxent River





Energy Efficient Acquisitions



- ***Navy will change the way contracts are awarded by incorporating energy as an evaluation factor***
- ***Working with industry in meeting energy efficiency targets***





Background of Navy Sustainability



- ***Navy and USMC sustainability***
 - ***1998/1999 Great Lakes recruit barracks first certified (LEED Version 1.0)***
 - ***LEED-Silver required since 2006***
 - ***First Military department to require LEED-Silver certification of new construction***
 - ***Exploring Energy Codes***
- ***16 Buildings currently certified by USGBC LEED rating system***
 - ***9% of the certified government buildings***
 - ***Expecting an increase averaging 2 buildings a year in certification***
 - ***300 projects registered with USGBC***
 - ***2 are hangars (industrial buildings)***
- ***2004 – 2008: Trained 700 people in USGBC accreditation***
- ***2010 – 4 Buildings certified (3 Gold, 1 Silver)***



Advanced Metering Programs



Total: ~22K advanced meters across ~38K Navy facilities throughout Navy

Northwest (3 Sites)

\$31.1M Award July 09 (ARRA)

- 1,340 electric meters
- 280 gas meters
- 520 water meters
- 120 steam meters
- 41% of buildings metered

Washington (5 Sites)

\$14.8M Award Sept 09 (OMN)

- 964 electric meters
- 4 gas meters
- 38 water meters
- 11 steam meters
- 72% of buildings metered

Southwest (10 Sites)

\$25M Award Sept 09 (ARRA)

- 1,625 electric meters
- 339 gas meters
- 830 water meters
- 8 steam meters
- 31% of buildings metered

Southeast (16 Sites)

\$33.8M Award Sept 09 (ARRA)

- 2,709 electric meters
- 475 gas meters
- 914 water meters
- 23 steam meters
- 40% of buildings metered

All Advanced Meters Done by Oct. 2012

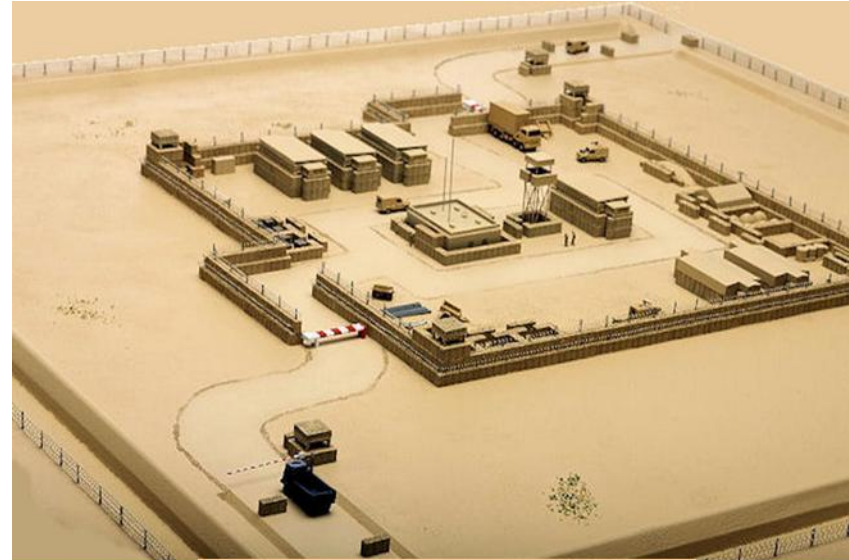


Sustainable Operations and Facilities



➤ **USMC Experimental Forward Operating Base (EXFOB)**

- *Initial phase in March determined the baseline requirements.*
- *Final Phase in August will be held in MCAGCC Twenty-Nine Palms to gather data on experimental systems.*



Notional Expeditionary FOB

➤ **USMC Net Zero Energy Installations** **Pilot: MCAS Miramar, CA – DoD-DOE Initiative to develop Net Zero communities/installations.**





Roofing System Design Policy



➤ ***USMC roof design policy states all new construction and major renovation projects will incorporate one of three energy-saving technologies:***

- 1. Photovoltaic Panels*
- 2. Solar Thermal Cool Roof Coatings*
- 3. Insulated Roof Systems*

➤ ***Vegetative roofing systems will also be considered for storm water run-off mitigation benefits***



Water and Waste Efficiency



Based on design and construction data from the LEED Project Criteria, our USGBC LEED certified buildings are averaging:

- ***30% energy consumption reductions below the baseline building performance rating in ASHRAE 90.1-2004.***
- ***20% water use reductions below the baseline using the fixture performance requirements in the Energy Policy Act of 1992.***
- ***50% construction waste diversion from disposal.***
- ***20% recycled content of construction materials.***
- ***20% of construction materials are extracted, processed and manufactured regionally.***



Navy Alternative Energy Ashore



Solar



- **Currently, 4-5 MW in over 20 locations**
- MGAGCC Twenty-Nine Palms – 1.1 MW
- Naval Base Coronado – >1.0 MW
- NAVFAC Pearl Harbor – 309 kW
- **60 MW of PV currently being added with solar MAC (ARRA funds)**

Geothermal



- **270 MW at NAWS China Lake**
 - Four power plants
 - Feeds California grid
 - DoD Lead Agency for Technology Transfer and Development
 - **Projects under development: 20-30 MW potential apiece:**
- NAF EI Centro, MCAGCC 29 Palms, MCAS Yuma

Wind



- **Roughly 6 MW currently online**
- NAVSTA Guantanamo Bay – 3.8MW (diesel hybrid)
- MCLB Barstow – 1.5 MW
- San Clemente Island – 675 kW
- **RFI for VA Capes to be released in June 2010**
- **22 Anemometer studies underway**

Ocean



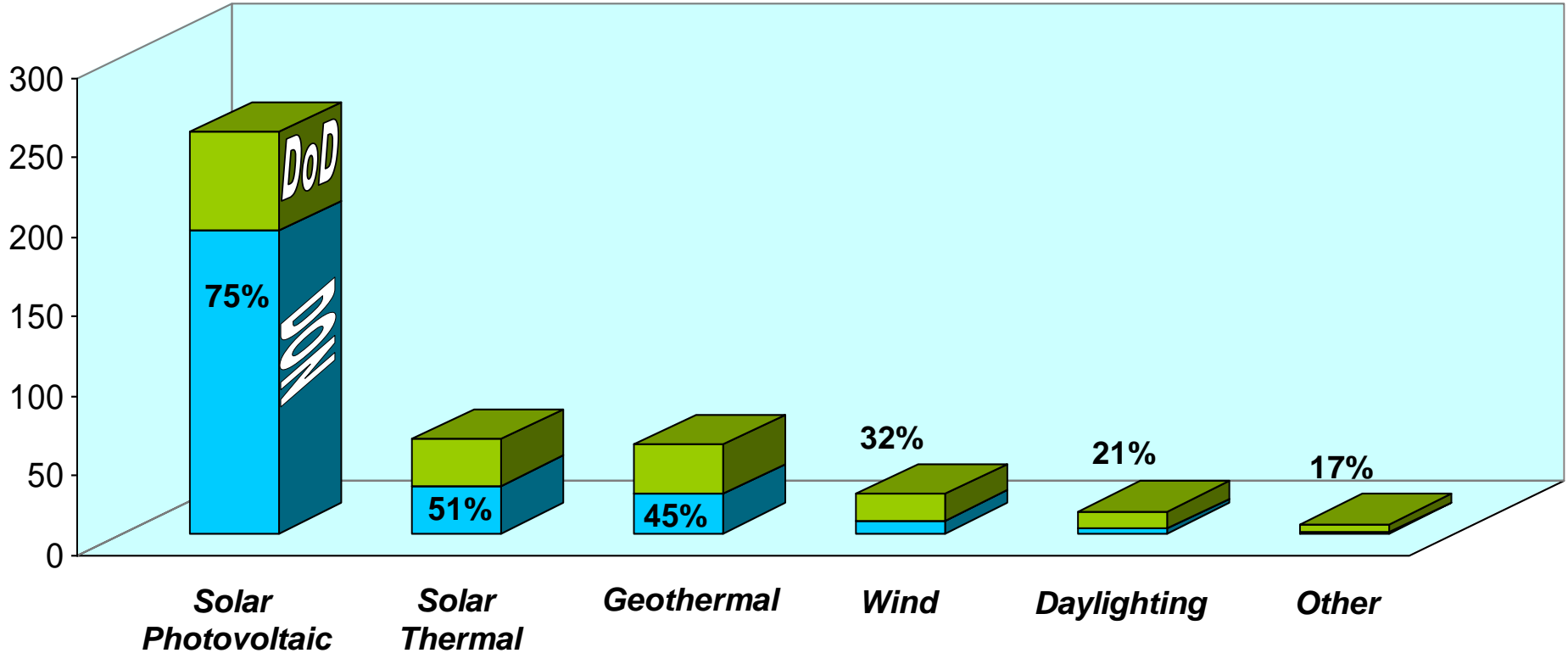
- 3rd Generation Wave Power Buoy pilot, MCB Kaneohe Bay, Hawaii
- Exploring hydro-kinetic at Puget Sound – 2012
- Ocean Thermal Energy Conversion(OTEC) in Hawaii, currently in design phase, 2017 pilot



DoD Renewable Energy Initiatives



DON Renewable Energy Initiatives in Perspective to the DoD



- 57% of the DoD Renewable Energy Initiatives are under the DON.
- 53% of DON Renewable Energy Initiatives are fully operational.

* Source: Defense Infrastructure: Department of Defense's Renewable Energy Initiatives. GAO Brief GAO-10-681R (April 26, 2010)



Education and Training



- **Smart Voyage Planning (SVP)** – Software application that utilizes ship performance data combined with real-time info to compute optimal fuel.
- **Simulation** – Training aviators to maximize their ability to be combat effective while reducing energy resources.
- **Incentivized Energy Conservation Program (i-ENCON)** – Produces a culture of energy conservation through education, incentives, and facilitating the exchange of best practices.
- **Human Behavior** – Working with the DoD on developing methods to change human behavior towards energy consumption.
- **Energy Efficiency Training** – Developing a online training on energy efficiency.





Questions



BACK UP SLIDES





DON Tactical Initiatives



Near-Term

Long-Term

Tactical	Conservation & Efficiency	<ul style="list-style-type: none"> Hybrid electric drive prototype installed on DDG(h) for at sea testing Add'l platform modifications i-ENCON, scheduling and voyage planning systems, MSC energy auditing Stern Flaps, Hull Coatings, Efficient HVAC, F-18 Bring-Back Weight 	<ul style="list-style-type: none"> Hybrid electric drive installed on DDG(h) (FY14) Twelve additional DDG(h) by 2020 F414 aircraft engine modifications (complete 2019) Integrated Generator and ECU, On-board vehicle power, Advanced LCAC Systems
	Alternatives	<ul style="list-style-type: none"> Green Hornet demonstration (fuel, testing & certification) Green CSG demonstration Dependent on biofuel availability and tactical certification 	<ul style="list-style-type: none"> Expanded field testing of biofuel blends in aviation and maritime platforms Dependent on biofuel availability and tactical certification





DON Shore Initiatives



Near-Term

Long-Term

Shore	Security, Efficiency, and Compliance	<ul style="list-style-type: none"> • Annual facility energy audits • Advanced metering • Facility Efficiency Upgrades • Alternative Fuel, Flex fuel, hybrid, all-electric Vehicles and pumps • DDC/SCADA/AMI Integration as first stages of “Smart Grid” 	<ul style="list-style-type: none"> • Base “Smart Grids” which allow demand management and critical load prioritization • Every base doubles their 2003 efficiency • Navy shore energy consumption cut in half • Modern Smart Building systems which coordinate occupancy levels with lighting, HVAC, and power
	Alternatives	<ul style="list-style-type: none"> • Energy Conservation Initiative Program (ECIP) in Solar, Wind and other Renewable Energy • Ground Source Heat Pumps and Solar Hot Water Heating wherever viable • Renewable Energy R&D • Ocean Thermal Exchange Conversion (OTEC) Component development • Solar PV on multiple SW Bases • Net-Zero demonstration base 	<ul style="list-style-type: none"> • Geothermal energy development on 4-5 additional Installations in the Southwest • Wind turbines on all locations with viable wind potential and operational space • OTEC - Full-scale plants in HI and Guam • Shallow geothermal at multiple bases • Net Zero Installations • 50% Alternative Energy Ashore • Integration of Renewable and energy storage systems for energy security





Partnerships



➤ **Federal Agencies**

- **USDA: Biofuels (MOU completed)**
- **DoE – DoD: Strengthen coordination on energy efforts**
- **SBA “Green Portal”: Small business contract opportunities**



U.S. Small Business Administration



➤ **Universities**

- **UC Davis – Lighting Technology Center**
- **Case Western Reserve University**

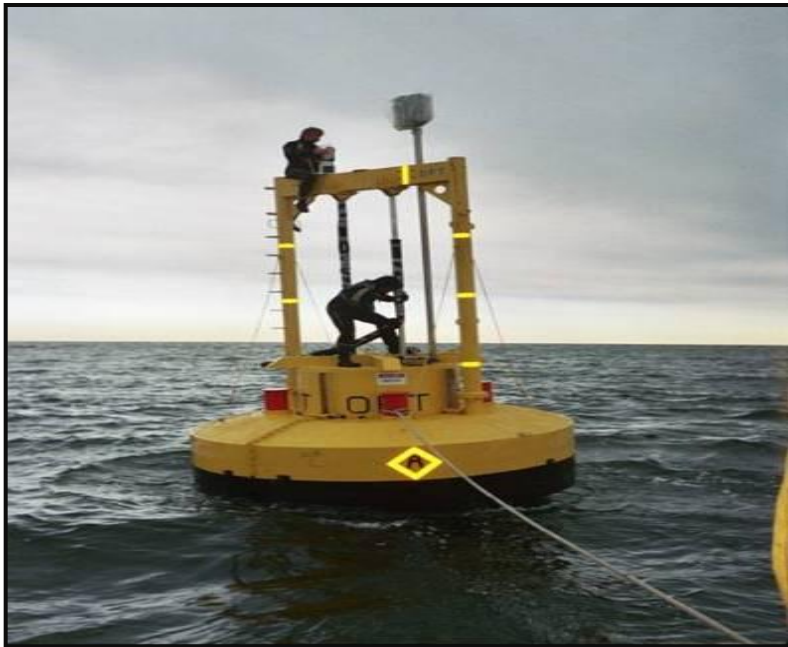




Small Business Initiatives



Evaluating ways to facilitate partnerships and opportunities



- *Navy Small Business Independent Research*
- *Marine Corps Base Hawaii – Kaneohe Bay*
- *Wave Powerbuoy, 40 kW test device*

Test bed initiative – Experimental Forward Operating Base Quantico





Navy Energy Awards



- ***The Navy won 28% of all Presidential awards and 30% of all Federal Awards presented over the last 9 years***
- ***2009 Platt's Global Energy "Green Energy" award***
- ***White House Closing the Circle Award – 2006***
- ***2004 Platt's Global Energy "Industry Leadership Award" – (companies from 12 nations competed for this award)***
- ***Alliance To Save Energy "Star of Energy Efficiency" award - 2003 (Johnson Controls and Frito-Lay were co-Winners with Navy)***



Navy Energy Challenges



Path forward on energy goals must address several challenges

Renewable Energy Certificate Ownership

- **Fostering renewable energy generation**
- **Receiving credit**

Bureau of Land Management

- **Ownership rights on withdrawn land**

Acquisition Excellence

- **Preferred suppliers program**
- **Policy surrounding contractor energy footprint**
- **Fully Burdened Cost of Fuel**

Biofuel Efforts for Great Green Fleet and Petroleum Consumption

- **Market conditions and commodity availability**
- **Infrastructure support**

Renewable Energy Generation



Physical Electricity



Environmental Attributes

