The Department of Navy Energy Development and Military Operations

Prepared for:

Virginia Commission on Energy and Environment

July 8, 2010

Agenda

- *Navy Energy Profile*
- *Energy Mandates*
- *SECNAV Energy Goals*
- *Navy Shore Energy Program in Virginia*
- *Potential Conflicts Between Development and Military Operations*


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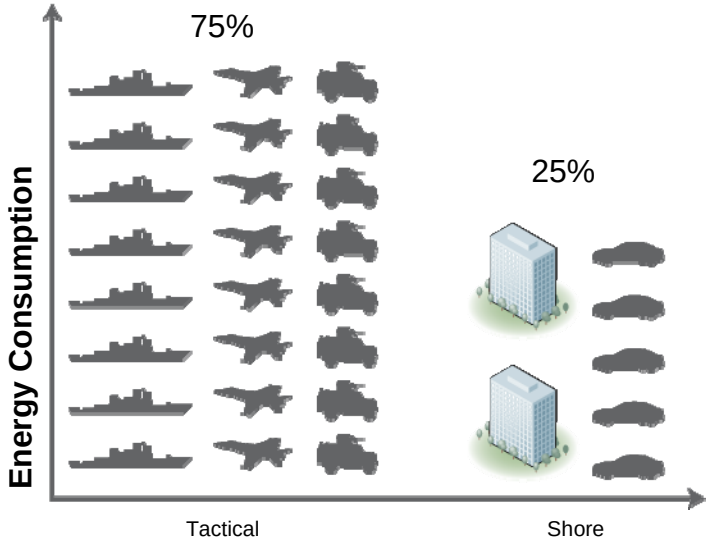
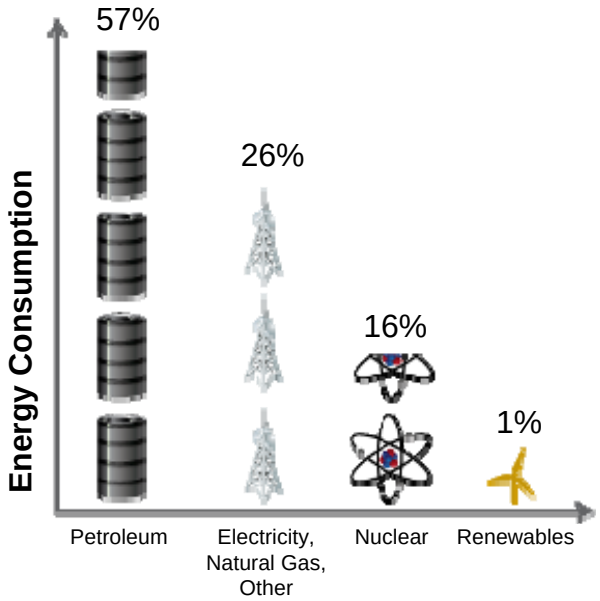
Naval Energy Profile

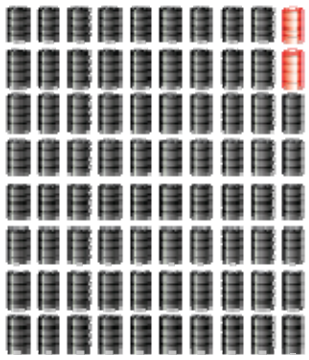
Overall Energy Consumption



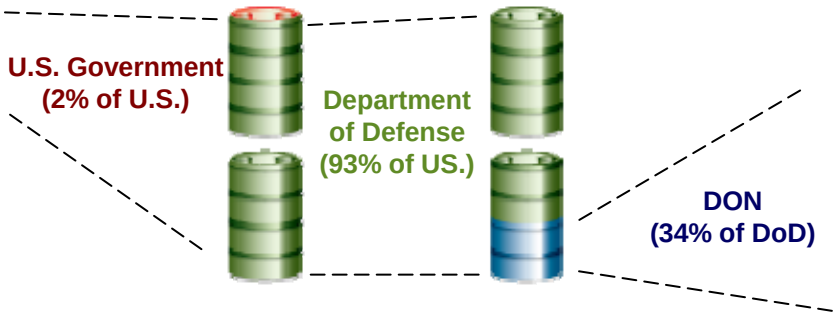
Overall Energy Sources

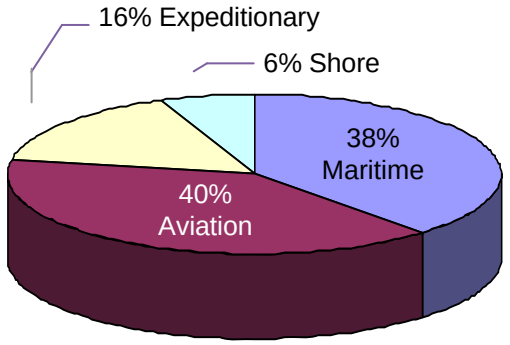


U.S. Petroleum Consumption



Navy Petroleum Consumption in Perspective





Energy Mandates

Legislative/ Executive Directives	Provisions / Goals
E.O. 13423	•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 new renewable sources. •Reduce the fleet's total consumption of petroleum by 2% annually through the end of FY15. FY2005 Baseline.
E.O 13514	•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	•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	•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

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)**

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**

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 El Centro, MCAGCC 29 Palms, MCAS Yuma

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

Navy Shore Energy Program in Virginia
Energy Security – Awareness – Efficiency

Energy Security

- Redundant underground transmission & distribution feeds to critical piers and facilities in Norfolk
- NDW (NSWC Dahlgren) as pilot for DDC/SCADA/AMI integration
    - First stages of a secure base “Smart Grid” to allow demand management and critical load prioritization

Awareness, Learning and Communication

- Building Energy Manager (BEM) Training and Implementation Program

Improved Command Energy Management

- Advanced Metering Infrastructure upgrades (FY10 NSWC Dahlgren, FY11 Hampton Roads)
- Annual Facility Energy and Water Audits (small scale in FY09, 25%/year starting in FY11)

Navy Shore Energy Program in Virginia

Energy Security – Awareness – Efficiency

Renewable and Sustainable Resources

- $26M ARRA project for Photovoltaic Power (study and generation facilities) for Hampton Roads
- Energy Conservation Investment Program projects (ECIPs) at NAB Little Creek-Fort Story, NAS Oceana-Dam Neck, NAVSTA Norfolk and Norfolk Naval Ship Yard

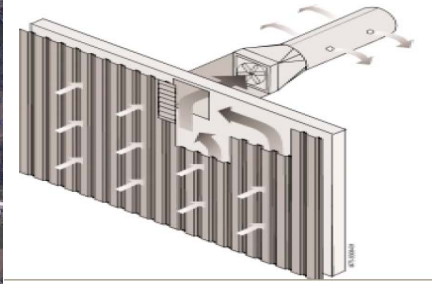
Conservation Activities

- Extensive use of Third Party Financed Projects (ESPC/UESC/PPA) to increase efficiency and viable renewable energy
- Mandatory Energy enhancements for FY09+ MILCON/ major renovations (USGBC LEED Silver)
- $24M ARRA Steam Plant Decentralization Project at NAVSTA Norfolk
- $8.6M ARRA Central HVAC upgrade project at NSA Norfolk

Navy Shore Energy Program in Virginia

Renewable Energy Initiatives



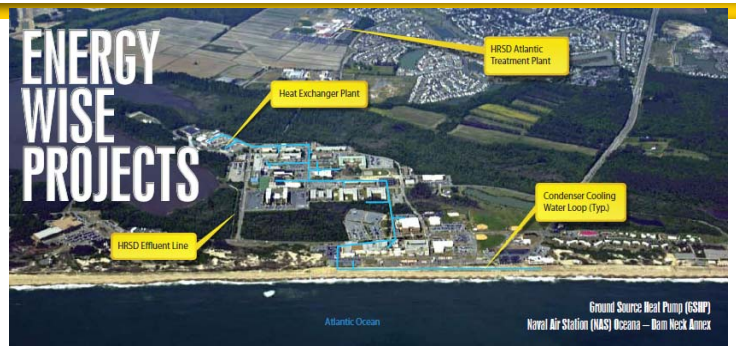



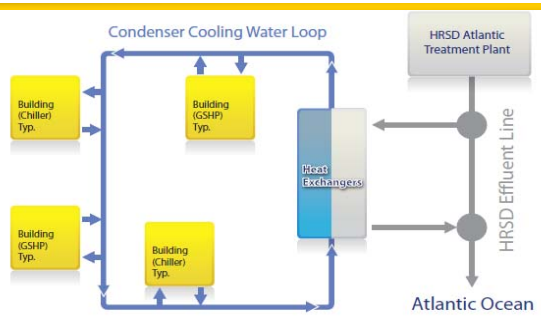
Four 2009-10 ARRA Solar Energy projects planned for VA bases (2350 KW total)

- Naval Station Norfolk – $1.1M Solar Power and Lighting (ARRA ECIP) to save a total of 3372 Mbtu annually (~ $83K)
- Naval Shipyard Norfolk – $1.3M Solar Power and Lighting (ARRA ECIP) to save a total of 4570 Mbtu annually (~$112K)
- Hampton Roads Area – $26.1M Install Photovoltaic System (ARRA MCON) to study local viability and then construct solar power generation at multiple bases
- Naval Air Station Oceana - $825K Solar Ventilation Preheat (ARRA ECIP) to save 4310 Mbtu annually (~$75K)

Navy Shore Energy Program in Virginia

Renewable Energy Initiatives - NAS Oceana GSHP





NAS Oceana ESPC's – Oceana I (FY04), Dam Neck (FY06) and Oceana II (FY09)

- Replaces fossil fuel consumption with renewable energy
- Allowed closure of old central steam plants (Dam Neck and Oceana II)

- Oceana I (~$13M) – Saves 55,360 MBTU/YR (~$1.1M/YR in avoided costs)
  - Put 470 KSF of buildings on Ground Source Heat Pumps (GSHP) for HVAC
- Dam Neck Annex ($33M) - Saves 244K MBTU/YR (avoids $2.3M energy and $0.5M in operating costs)
  - Utilizes heat from HRSD Atlantic Treatment Plant Effluent for GSHP's without drilling
- Oceana II ESPC ($44M) - Includes buildings not included in the Oceana I Scope
  - Construction scheduled to complete by June 2011
  - Saves 155,950 MBTU and 19,574 KGAL in water annually

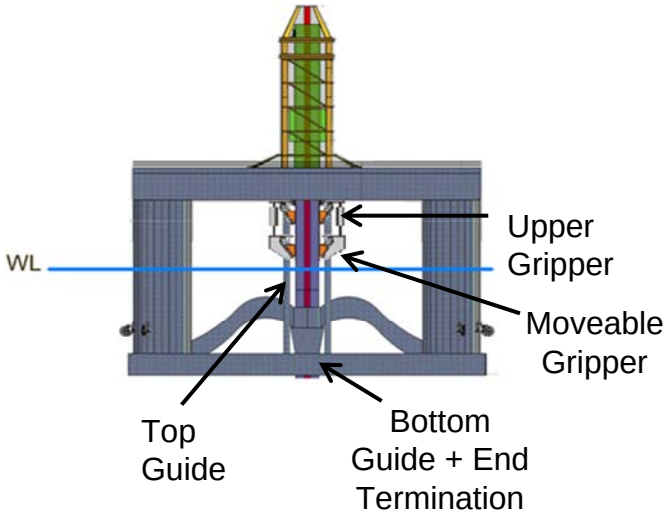
NAS Oceana reduced Energy Intensity by 42% from 2003 to 2008 (projecting 50% by 2011) and water consumption by 9.5% since 2007

Navy Shore Energy Program in Virginia

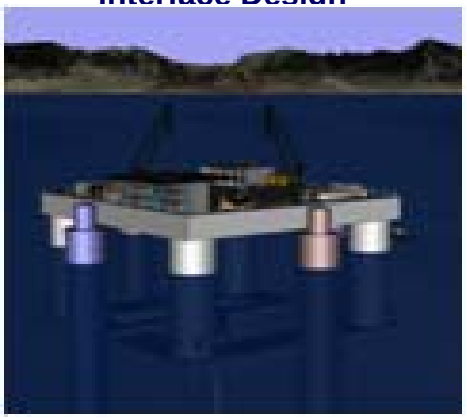
Ocean Thermal Energy Conversion - OTEC

Ocean Thermal Energy Conversion (OTEC)

- **A 24-7, ocean-based renewable energy technology**
- **Potential to reduce oil dependence at tropical and island installations (such as Pearl Harbor, GITMO, Guam and Diego Garcia)**
- **Technology proven at small scale, but must be increased to be cost effective**
- **Current need is:**
  - A major customer to exhibit interest
  - Critical component demonstration and pilot plant design
- **Lockheed Martin (Manassas, VA) - Prime for $8.1M project to develop key OTEC components for Navy**
  - Funded by ARRA
  - To perform Critical component design of cold water pipe and pipe/platform interface
  - Eventual overall system design for 10MW pilot plant



OTEC Cold Water Pipe/platform interface Design



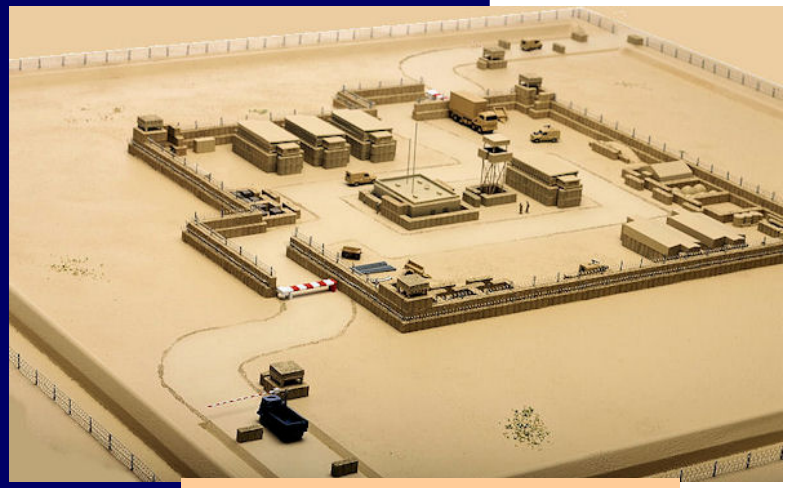
OTEC Pilot Plant Concept

USMC Experimental Forward Operating Base (FOB)
Quantico, Virginia

Concept: Marine Corps Combat Development Command Establishing a Operation Enduring Freedom-like Expeditionary Forward Operating Base (FOB). Partner with Marine Corps Systems Command (Warfighting Lab), Office of Navy Research, and Army

Purpose: Evaluate Material solutions to facilitate energy efficient water purification/distribution, power, climate control, etc. Vendors demonstrate energy efficient technology such as:

- **Lightweight Water Purification Systems**
- **Lightweight Water Packaging Systems**
- **Improved Temporary Facilities Insulation**
- **More efficient Climate Control Systems**
- **Renewable and Alternative Power Sources**



Notional Expeditionary FOB

Timeline: Operational in early March 2010 at MCB Quantico Combat Town

Goal: Rapidly prove expeditionary energy products and systems to facilitate accelerated deployment to the Afghan, Iraq and future theater of operations. Desired end state -- fewer tactical convoys and associated casualties.

Navy Shore Energy Program in Virginia

Marine Corps Projects - MCB Quantico

In-Place

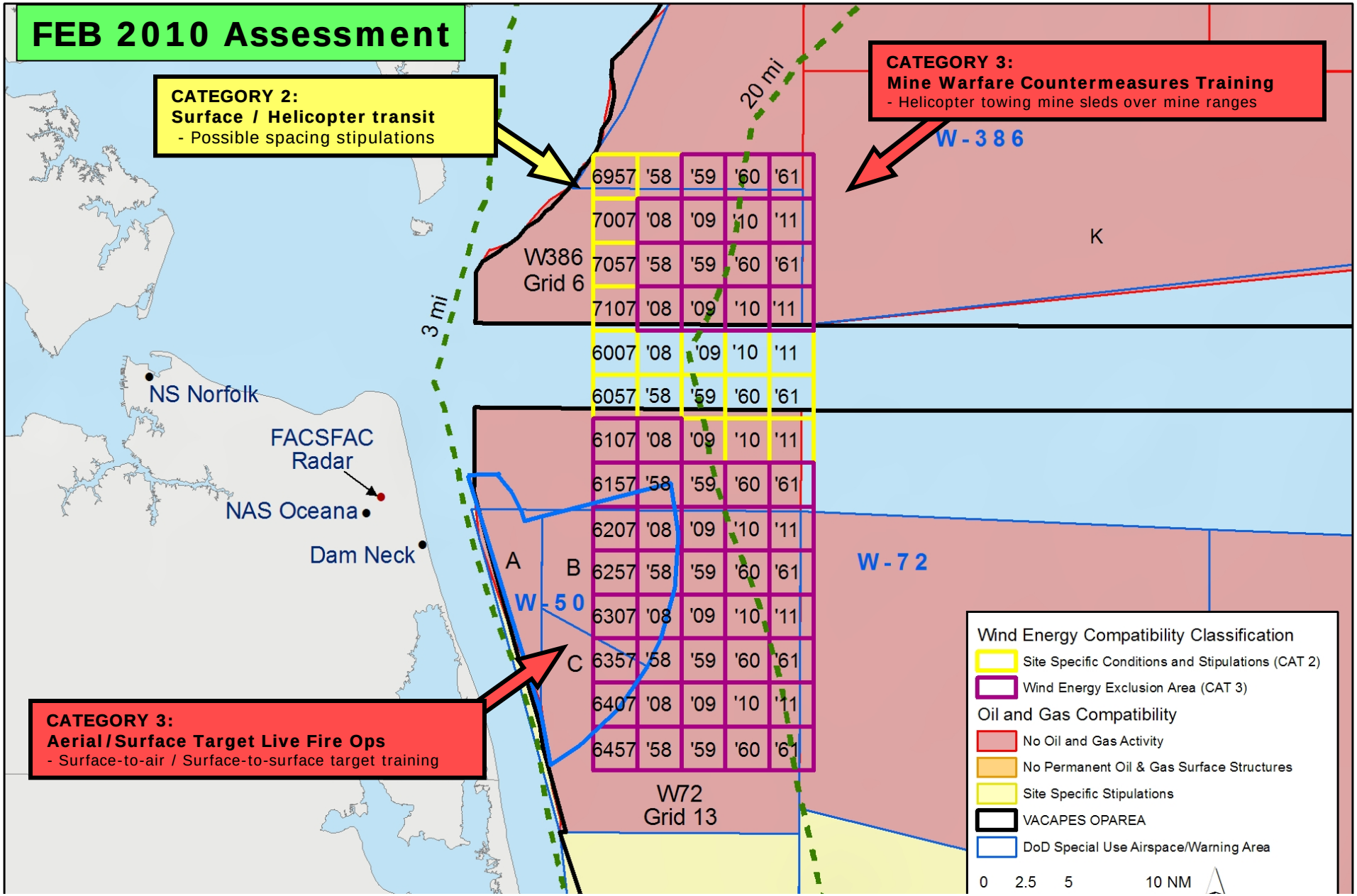
- Boiler Plant Decentralization Energy Savings Performance Contract (ESPC) - reduced operations and energy costs over $4M/year
- 20KW Solar Power Project at USMC Marathon Building
- Solar Lighting for Parade Deck, OCS

20KW Roof Mount Solar, Marathon Building

Current and Future

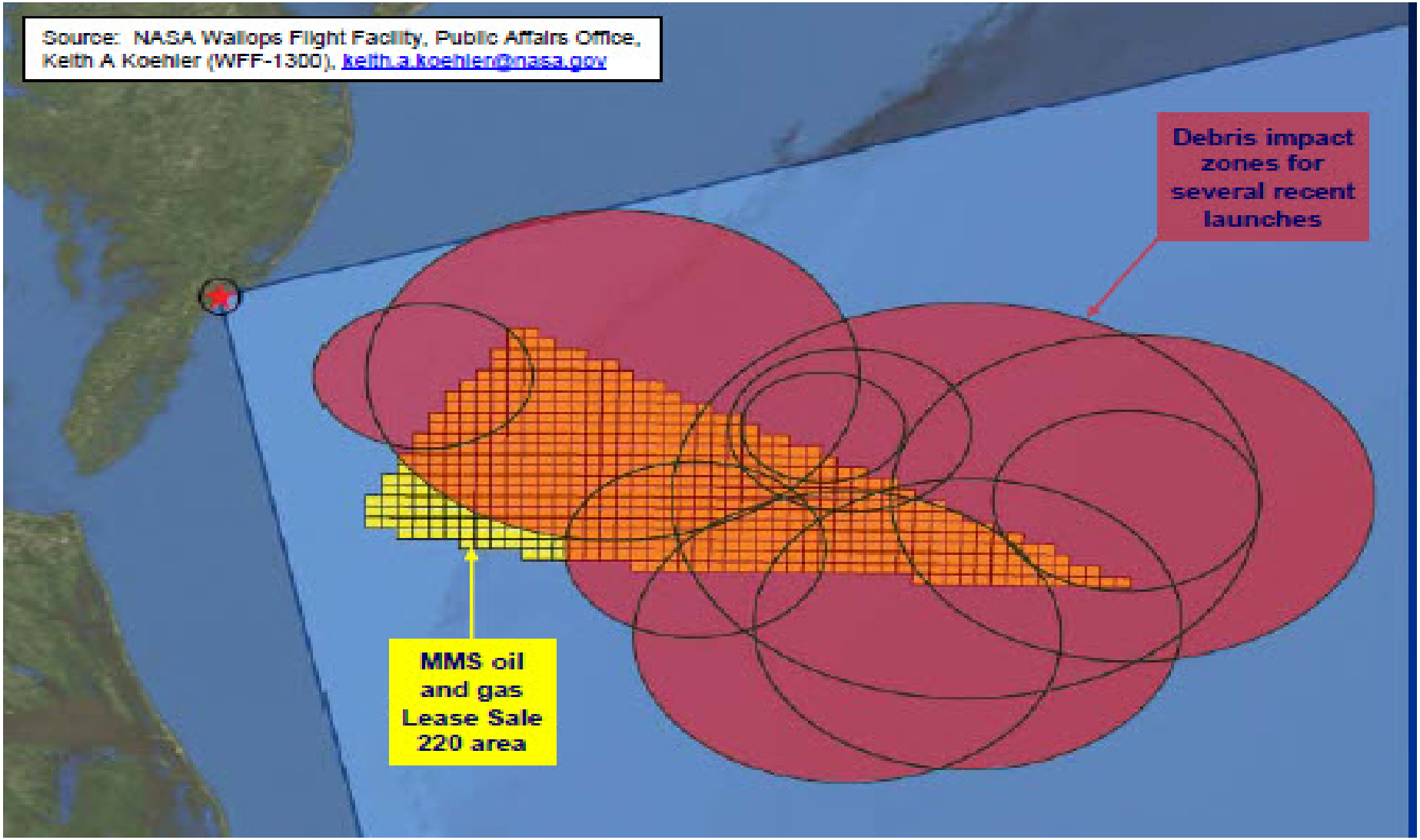
- FY09 - Energy Efficient Magnetic Bearing Chiller replacements
- FY09 - MILCON Energy Enhancements for Photovoltaics and Ground Source Heat Pumps
- FY10 - Advanced Metering Infrastructure
- FY12 - Street and Parking Lot LED Area Lighting

Offshore Energy Development and Military Operation



RELEASABLE

NASA-Wallops Range Hazard Area



Questions