Navy Shore Energy Program

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Navy Shore Infrastructure

11 Regions…
77 Bases…
2.1 Million Acres
141 Runways…
197 Piers…

POPULATION SERVED
332K Active Duty
436K Family Members
440K Navy Retirees

Installation Management Budget = $8.3 B/yr
Plant Replacement Value = $124 B
$412
$57
$168
$20
$19
$141
$251
$8

Navy Shore Energy - Costs

~ $1.2B/ YR
Energy Dependence

U.S. Petroleum Consumption

DoN Petroleum Consumption

Overall Energy Consumption

Overall Energy Sources
Higher finding and lifting costs will likely mean a higher average price over the next 30 years.

The average price between 1974 – 2008 was $45, industry experts predict that a $65-$80 price band will be necessary to access and develop new oil reserves. New technology will be key.

Global oil demand growth is shifting to emerging markets, while US consumption is expected to have little or flat growth.

A $10/barrel increase costs Navy $75M/year ashore!

Source: Consumer Price Index, Bureau of Labor Statistics (July 2009)
Definition of Energy Security

Energy Security

Ensuring secure, sufficient, reliable, and sustainable energy for Naval tactical forces and shore installations.

Energy security is focused on transforming vulnerabilities associated with energy supply and demand into strategic and operational advantages.

Secure Energy
Energy protected from physical and cyber threats.

Sufficient Energy
Energy in quantity and quality required to project and maintain operational effectiveness.

Reliable Energy
Energy that can be produced, procured, distributed, and stored for consumption for an extended period of time regardless of security environment.

Sustainable Energy
Energy that minimally impacts the environment in either the short- or long-term.
## Background and Issues

### Current Mandates

| **Energy Reduction Goals** | • Reduce Consumption by 3% per year or 30% by 2015  
• Reduce water consumption by 2% annually  
• All new construction and renovations greater than $2.5M required to reduce fossil fuel consumption by 55% in FY10 & 100% by 2030 |
| **Renewables** | • Purchase renewable electric: 3% now & 7.5% by FY13  
• At least 50% of renewables from new sources  
• Install renewable fuel pumps at all fleet fueling centers |
| **Metering** | • Electric meters on all buildings by end of 2012  
• Natural gas and steam meters on all facilities by 2016 |
| **Sustainable Facilities** | • Lease spaces required to have Energy Star label  
• Comprehensive energy and water evaluations on all buildings on a 4-year cycle  
• 15% of bldg inventory to be sustainable by 2015  
• Buildings designed 30% better than ASHRAE Stds |
| **Vehicles** | • Purchase 100% Alternative Fuel Vehicles  
• Reduce annual petroleum consumption 20% by 2015 |
| **GHG** | • EO Coming... Legislation Coming...  
• Reduce Scope 1, 2 and 3 emissions? |

### What will all this cost?

- **Policy - $67M/YR**
- **Law - $449M/YR**
- **Total - $516M/YR**

*DoD and/or DoN policy in blue  
Public Law in black*
Renewable Energy Generation

- DOD NDAA FY07 Goal
- DOD NDAA FY07 Goal Progress
- EP Act FY05 Goal Progress
- Future Percentage of DoN Renewable Required
- EP Act FY05 Goal
Requirements Identification

- Installation by Installation Audits
- Advanced Metering Systems
- DDC/ SCADA Integration
- EMS Systems for all new and select existing facilities
- “Smart Grid” Systems tying Installations/ Regions/ Navy
- Sustainable Operations and Maintenance

Requirement ID & Cost - Procurement - Verification
Energy Tool Bag

- **ECIP** – MILCON scope energy projects
  - OSD managed, Navy share is around $21M/yr. Dedicated to renewables.
- **Public/Private Ventures** – 30 year authority. Service can purchase or authorize sale of energy and receive a share of the contractor’s gross revenue. (e.g. China Lake geothermal)
- **Power Purchase Agreements** – Navy agrees to buy energy at a negotiated price.
- **Enhanced Use Lease** – Navy makes available underutilized land for contractor development. Navy receives in-kind-consideration.
- **Repair and Modernization** – Annual reinvestment $’s must be used wisely on initiatives.
- **Energy awareness & training program**
- **Technology validation** – new energy products are evaluated to proof claims and to determine applicability.
- **Metering** – Installing advanced Electric, Water, Natural gas and steam meters.

Optimize output through Right Tool & Right Crew…
Recent Navy Energy Achievements

- Reduced energy consumption per gross square foot by 12.75%
- Operate world class Geothermal plant (270 MW) in China Lake. Awarded additional 35MW plant in Fallon, NV.
- Constructed large solar electric system (2 MW total in San Diego), 5 PV carports (350 kW San Diego metro) and a 3.8 MW wind farm (GTMO).
- $20M/yr Energy Conservation Improvement Program renewable projects.
- Currently co-generating 38 MW on Navy land - additional 39 MW cogen plant at Yokosuka in FY09.
- All FY10 MILCON projects (29 total) programmed for LEED Silver
Near Term Energy Initiatives

- Advanced Installation and Region Energy Plans
- Renewable energy projects:
  - New geothermal projects NAF El Centro and NAS Fallon
  - 20MW Photovoltaic ESPC at Rota
  - FY09 Large renewable initiative: Goal is to develop a 15-100MW renewable project(s) in southwest, to include siting solar PV around China Lake geothermal wells and utilizing existing geothermal transmission line.
  - Wind project opportunities under consideration
  - Ocean Thermal Energy Conversion (OTEC)
Navy Shore Energy Future

Future Energy Program

• Near-Term
  - Advanced metering
  - Energy audits

• Beyond
  - Gas, Steam, and Water Metering
  - Energy audits
  - Renewable Energy Generation
  - Energy Management Ashore
  - Energy Conservation Efforts
  - Re-commission Energy Systems
  - LEED Silver for Existing Buildings
  - Facility Upgrades
  - ECIP
  - Geothermal
  - Utilities System Improvements
  - New Financed ESPC/UESC Projects
  - Right Crew… Right Place…

Navy Energy Strategy
UNDER CONSTRUCTION

PR-11 & POM-12

Reduce energy consumption and intensity
Increase alternatives
Renewable and alternative Energy

- Geothermal (China Lake)
- Wind (GITMO)
- Solar Photovoltaic (25 Installations)
- Solar Thermal (8 Installations)

FY09/10 Investments (ARRA)

- Advanced metering
- Renewable and alternative energy
  - Geothermal
  - Solar Photovoltaic
- Energy efficiency
- Water efficiency

Near-Term Future Investments Planned

- Advanced metering
- Energy audits

Diminishing RoR requires increased funding and/or new approach pattern
Strategic Approach

Ambitious Goals – Must invest and shift “Culture”

2008 Total Consumption = 44.74 Million MMBtu

2008 Total Energy Efficiency (Energy Intensity) = 126.2 kBtu/sf

2008 Renewable Energy 17%
Strategy must match Infrastructure

Total Gross Square Feet: 415,568,034 | Annual Energy Use (Million MMBtu): 44.74 | Average Energy Intensity: 107.66 (kBtu/sf) | Number of Buildings: 50,537

Building Data

- **Installation building age range**
  - 27% of buildings < 20 years old
  - 24% of buildings 21 – 40 years old
  - 32% of buildings 41 – 60 years old
  - 17% of buildings > 60 years old

- **Installation building square footage**
  - 47% of buildings < 2,000 sf
  - 21% of buildings 2,001 – 4,000 sf
  - 9% of buildings 4,001 – 6,000 sf
  - 9% of buildings 6,001 – 10,000 sf
  - 13% of buildings >10,000 sf

- **Number of stories**
  - 1 story: 71% of buildings
  - 2 stories: 25% of buildings
  - > 2 stories: 4% of buildings

- **Footprint**
  - 46% of buildings < 2,000 sf
  - 24% of buildings 2,001 – 4,000 sf
  - 11% of buildings 4,001 – 6,000 sf
  - 19% of buildings > 6,000 sf
Analyze Usage – Develop a Way Ahead

- Use average unit cost and energy intensity to identify installations with higher than average costs per kBtu and energy intensities

- Evaluate facilities with either high intensity or high unit cost in second phase
  - No trends discovered in geography or installation function

Reducing the energy intensity of high intensity installations to the average intensity of 126 kBtu/sf would reduce energy consumption by 34.2%, and save over $314 M annually in energy costs
Conduct an energy management assessment for Navy shore facilities:
– Analyze consumption
– Research and analysis on a range of energy efficiency and alternative energy investments to meet goals and legislative mandates
– Developed a strategic solutions approach and noted constraints and barriers
– Create an energy roadmap linking consumption patterns with renewable energy and energy efficiency options

Primary Data Sources

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Leaders Analyze Installation Energy Data

Develop Benchmarks and Baselines of Shore energy intensity, consumption, and independence
Energy Efficiency Way-Ahead

Must evaluate entire portfolio of solutions based on our infrastructure

- Size represents impact of strategic solution

Building Envelope Solutions
HVAC Solutions
Energy IT Solutions
Lighting Solutions
Utility Solution
Solutions evaluated but not selected
Renewables - How We Get There

- Geothermal (300MW potential)
- Ocean Power (50-60 MW near term)
- Wind (20 MW)
- Solar (10 MW)

# of Potential Applications

- Large power projects have fewer applications
- ROI typically increases with power output potential

Power Output

- 6000+ systems (10MW)
- ~400MW near-mid term capacity
Questions?

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