Navy Shore Energy Program

CAPT Ken Branch
Deputy Director
Navy Shore Readiness Division

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Navy Shore Infrastructure

11 Regions…

77 Bases…

2.1 Million Acres

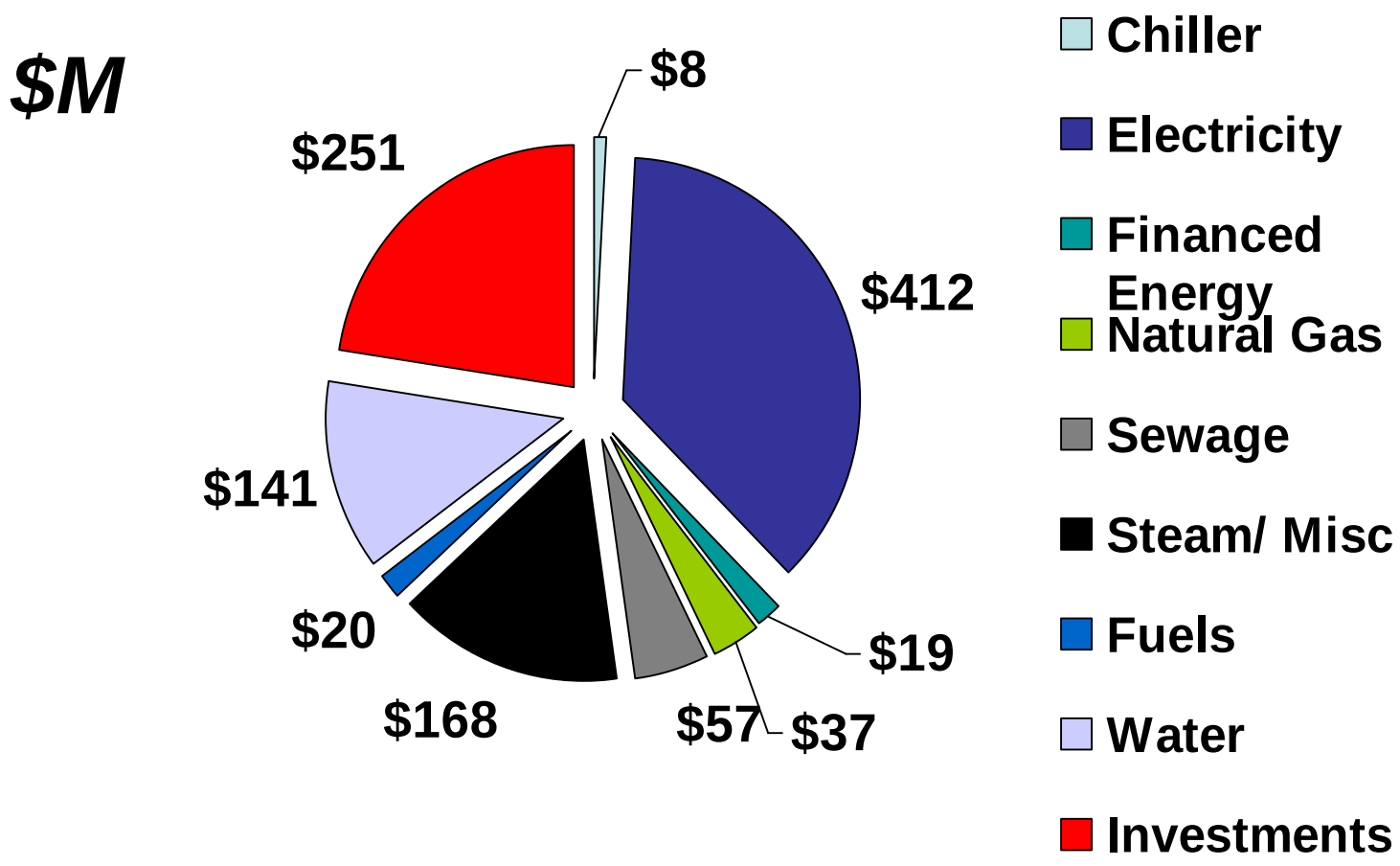
141 Runways…

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

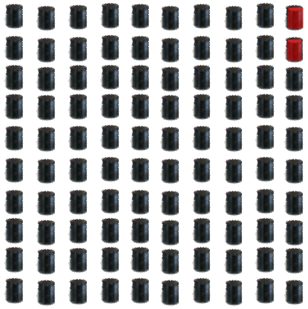
Navy Shore Energy - Costs



~ $1.2B/ YR

Energy Dependence

U.S. Petroleum Consumption

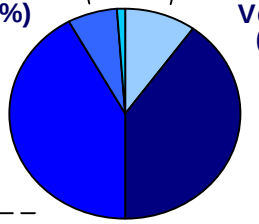


U.S. Government
(2% U.S.)

Department of Defense
(93% U.S.G.)

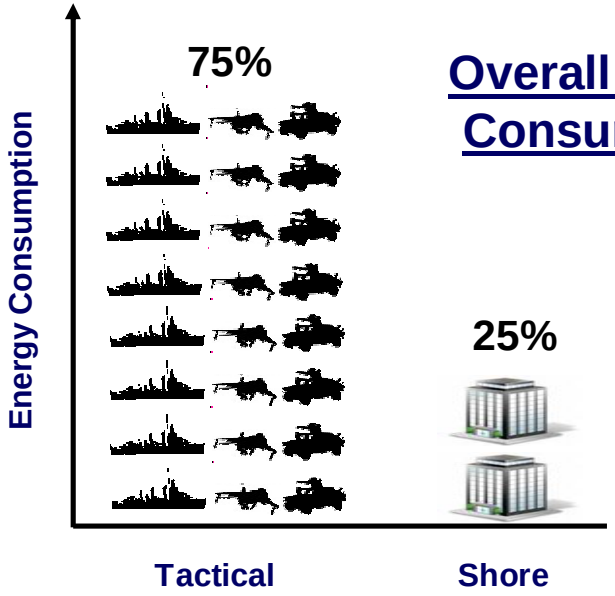
DoN Petroleum Consumption

DoN
(34% of DoD)

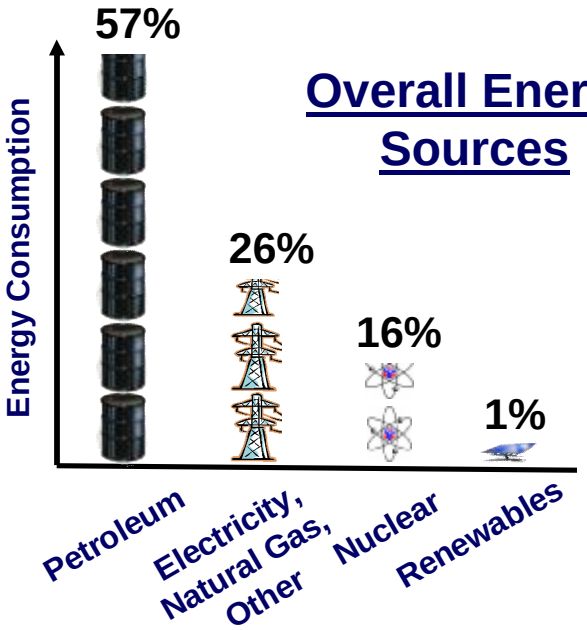


34.5 million bbls/yr.

Overall Energy Consumption

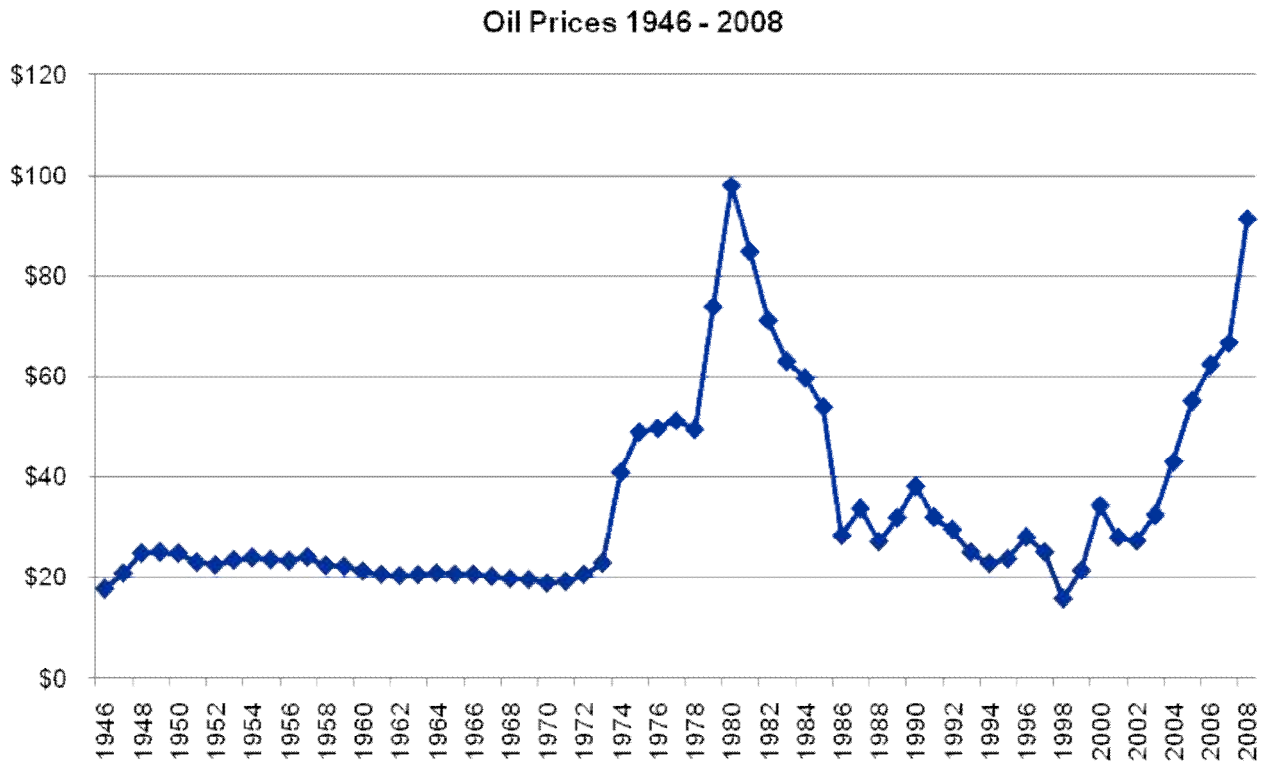


Overall Energy Sources



Susceptibility to Uncertainty

- 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

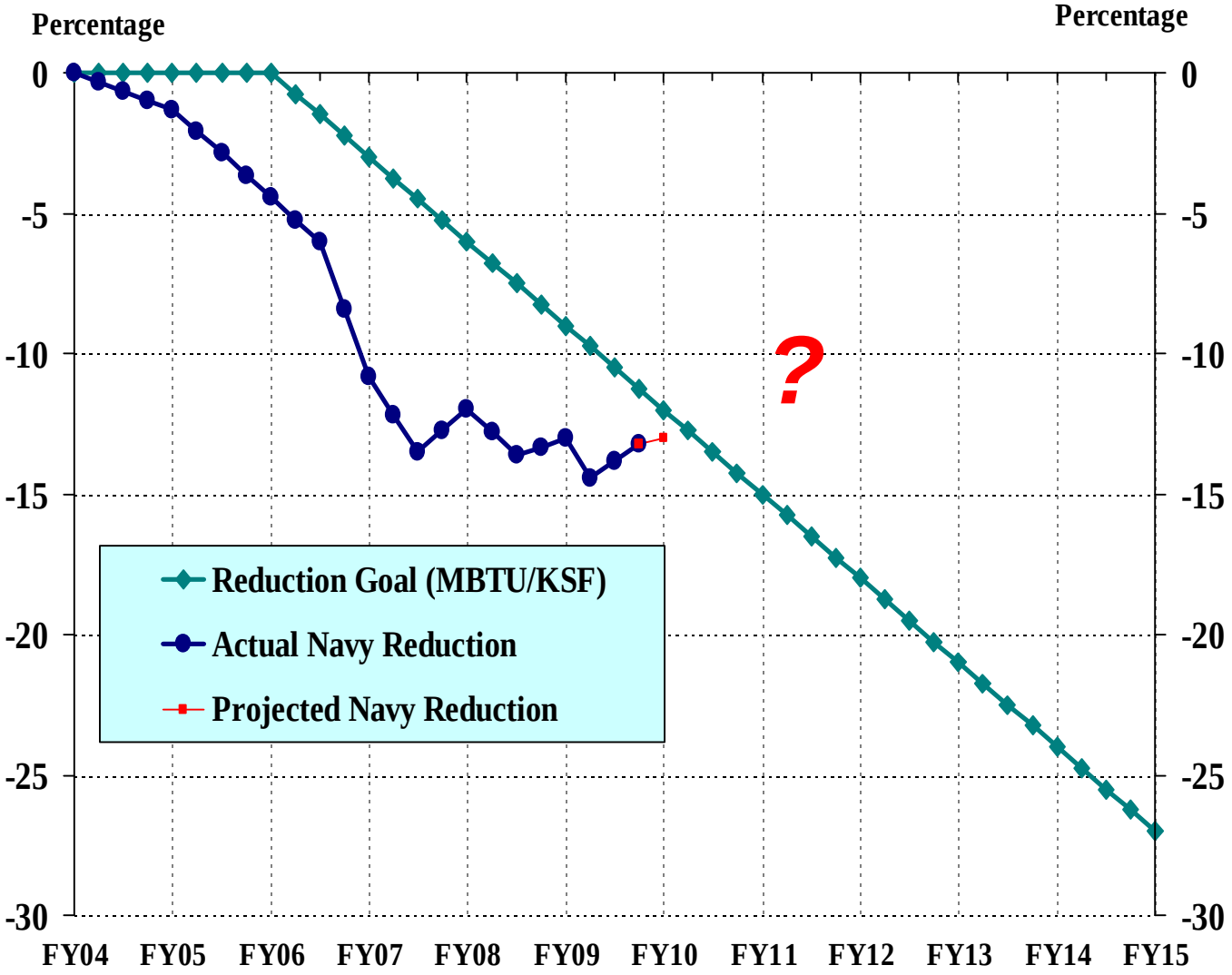
Law - $449M/YR

Total $516M/YR

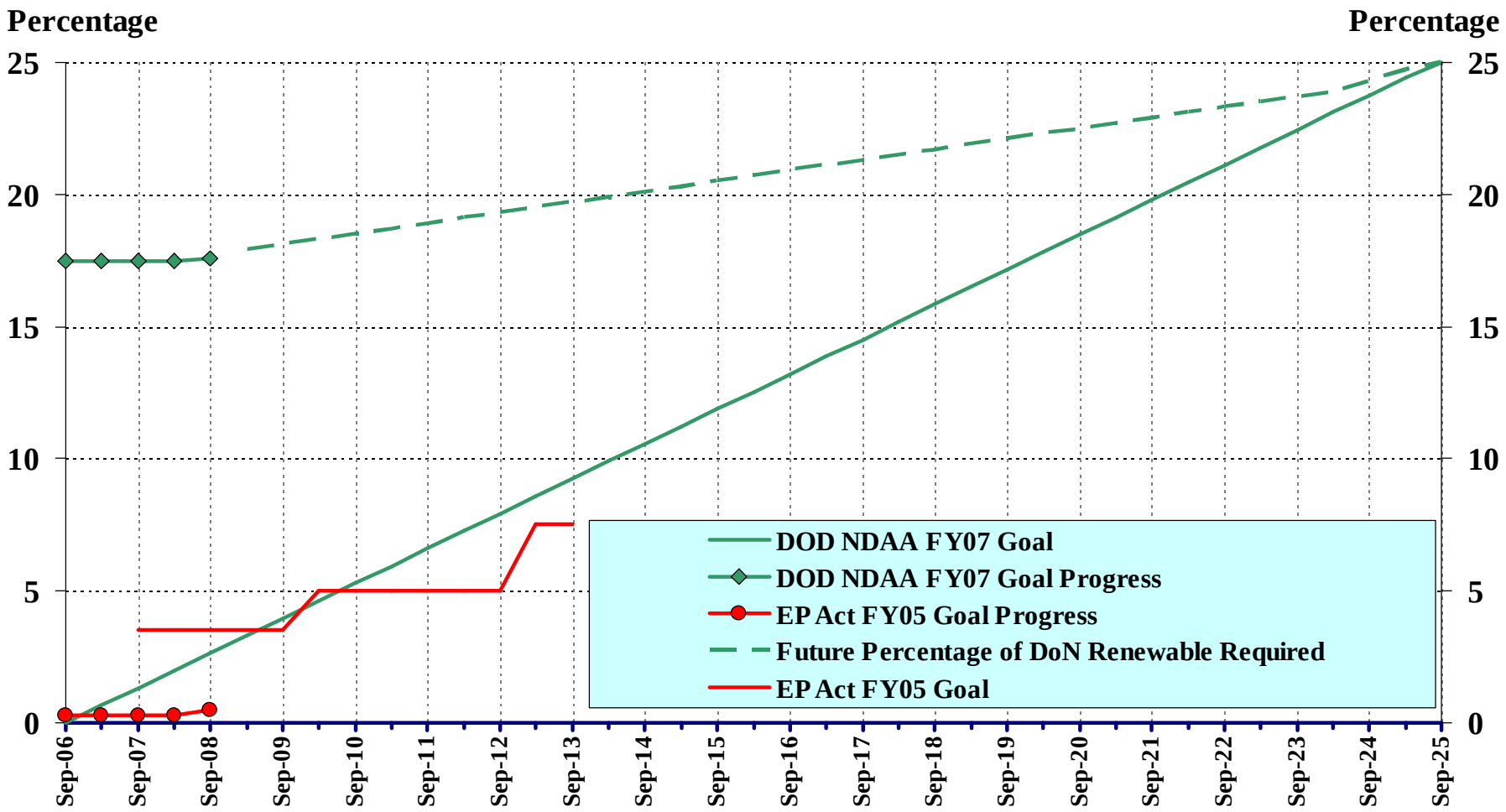
DoD and/or DoN policy in blue

Public Law in black

Energy Reduction



Renewable Energy Generation



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.
- **ESPC/UESC** – 25/10 year authority. Alternative financed projects. Contractors investment paid off from savings
- **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

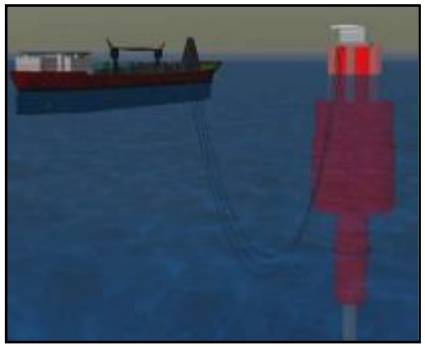
- Advanced Installation and Region Energy Plans
- Renewable energy projects:

•New geothermal projects NAF El Centro and NAS Fallon

•20MW Photovoltaic ESPC at Rota

•Wind project opportunities under consideration

•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.



•Ocean Thermal Energy Conversion (OTEC)

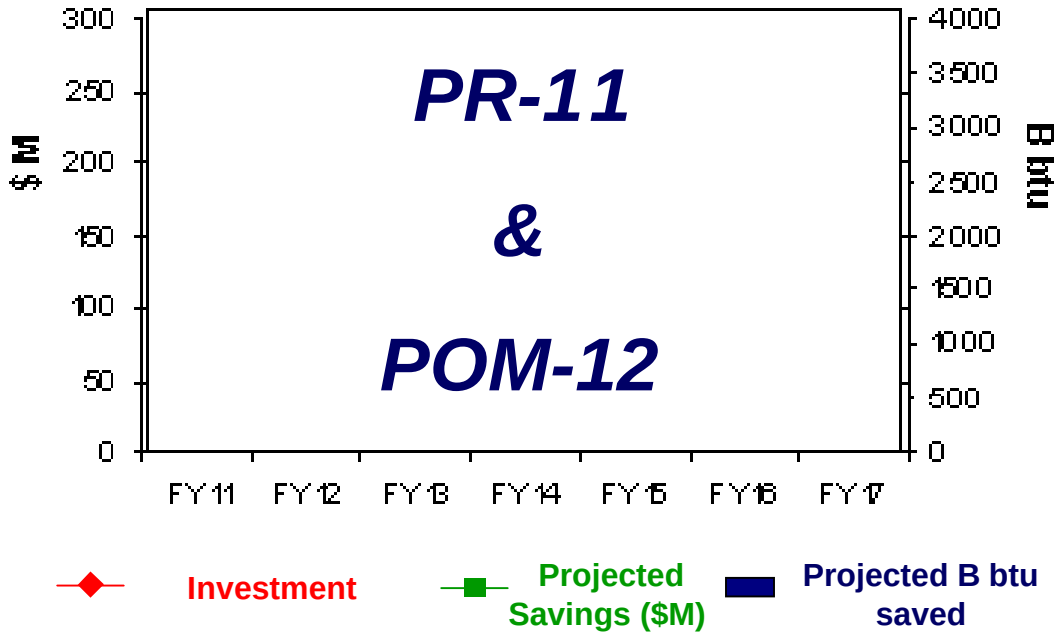
Navy Shore Energy Future

Future Energy Program

- **Near-Term**
  - ØAdvanced metering
  - ØEnergy audits
- **Beyond**
  - ØGas, Steam, and Water Metering
  - ØEnergy audits
  - ØRenewable Energy Generation
  - ØEnergy Management Ashore
  - ØEnergy Conservation Efforts
  - ØRe-commission Energy Systems
  - ØLEED Silver for Existing Buildings
  - ØFacility Upgrades
  - ØECIP
  - ØGeothermal
  - ØUtilities System Improvements
  - ØNew Financed ESPC/UESC Projects
  - ØRight Crew… Right Place…

Navy Energy Strategy

UNDER CONSTRUCTION



Reduce energy consumption and intensity
Increase alternatives

"Past Success not an indicator of future…"

Renewable and alternative Energy

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

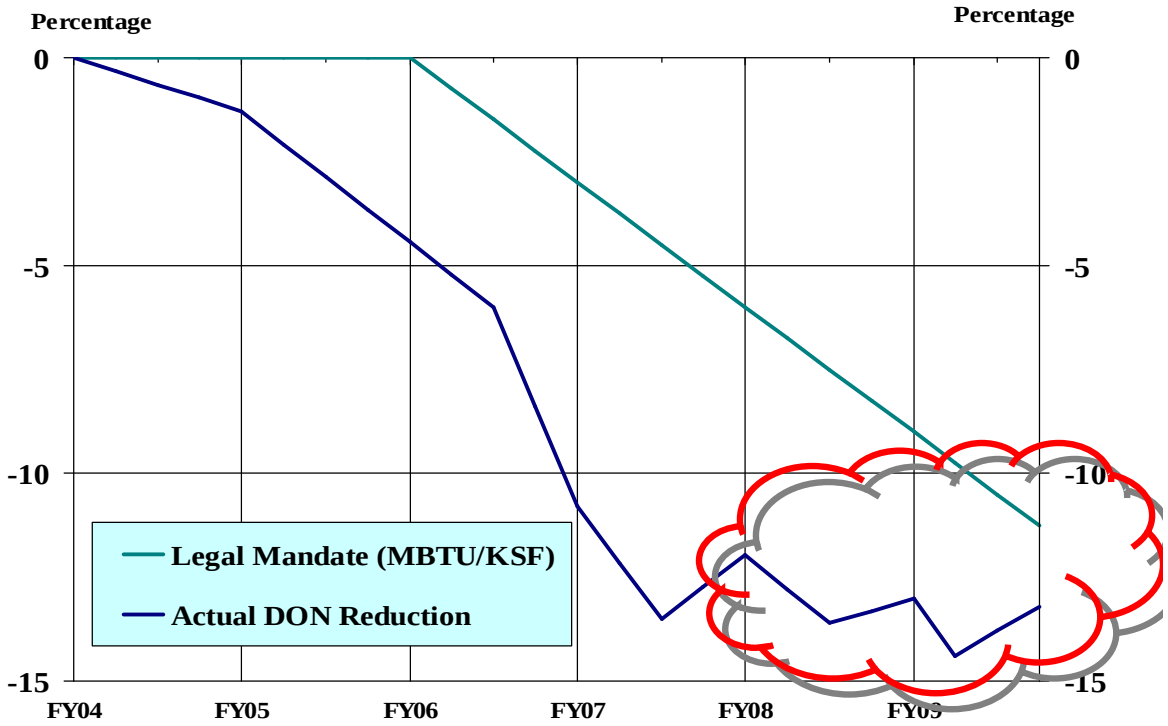
FY09/10 Investments (ARRA)

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

Near-Term Future Investments Planned

- Ø Advanced metering
- Ø Energy audits

Actual Energy Intensity Reduction



As of 1st Quarter FY09, data is presented quarterly

Diminishing RoR requires increased funding and/ or new approach pattern

Strategic Approach

Ambitious Goals – Must invest and shift "Culture"

Increase Shore Energy Security

- **Reduce shore energy consumption** → 2008 Total Consumption = 44.74 Million MMBtu
- **Increase shore energy efficiency** → 2008 Total Energy Efficiency (Energy Intensity) = 126.2 kBtu/sf
- **Increase use of energy from renewable and alternative sources of shore energy consumption** → 2008 Renewable Energy 17%
- **Provide reliable energy for at least 75% of critical infrastructure**

Reduce Carbon Footprint

Strategy must match Infrastructure

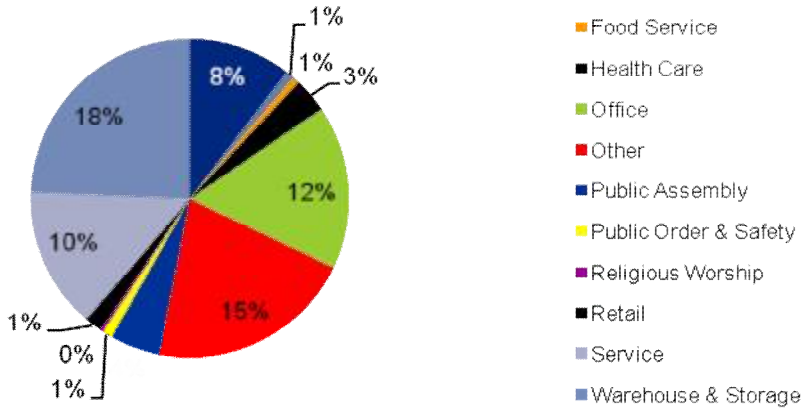
Total Gross Square Feet: 415,568,034 | Annual Energy Use (Million MMBtu): 44.74 | Average Energy Intensity: 107.66 (kBtu/sf) | Number of Buildings: 50,537

Building Data

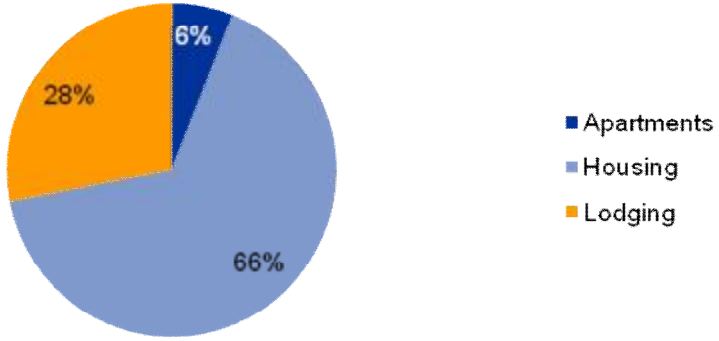
- **Installation building age range**
  - 27% of buildings < 20 years old
  - 24% of buildings 21 – 40 years old
  - 32% of buildings 41 – 60 years old
  - 17% of buildings > 60 years old
- **Installation building square footage**
  - 47% of buildings < 2,000 sf
  - 21% of buildings 2,001 – 4,000 sf
  - 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

Building Composition

Non-Living Spaces

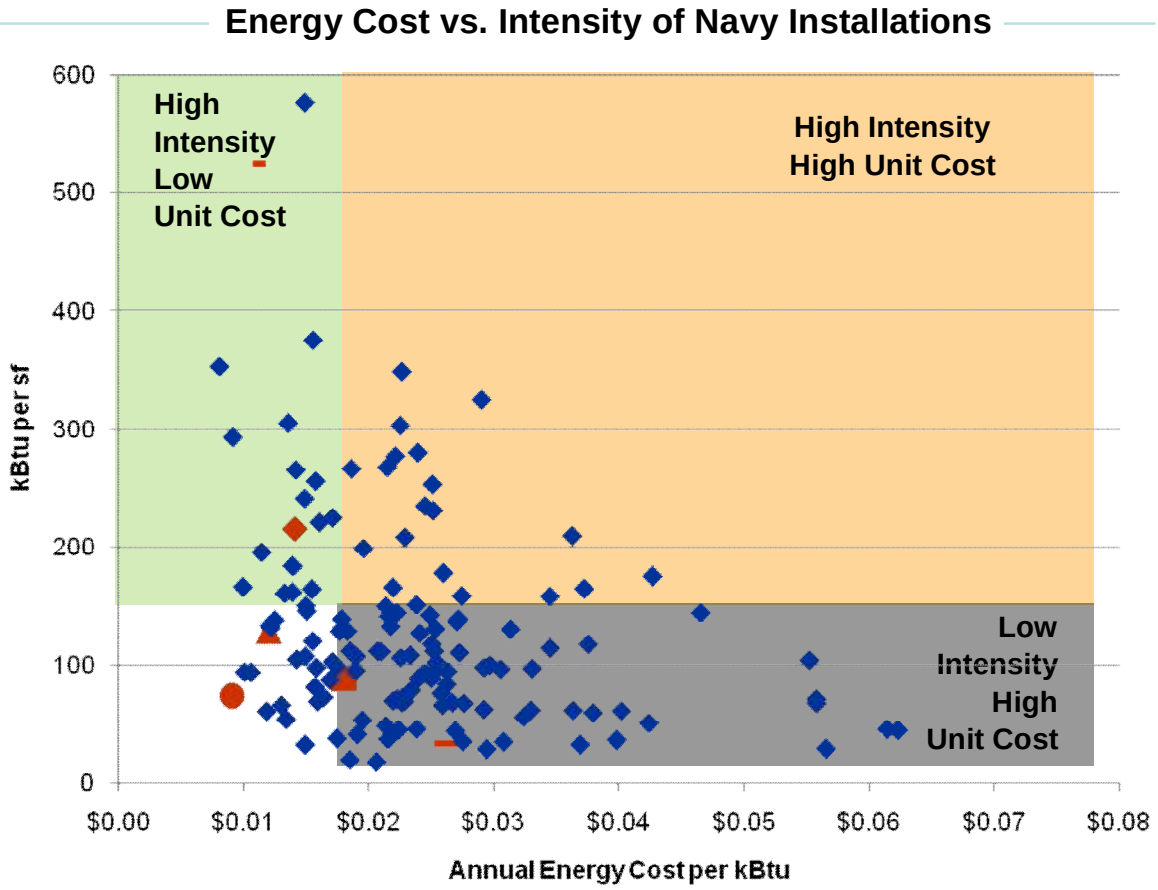


Living Spaces



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

Task and Methodology

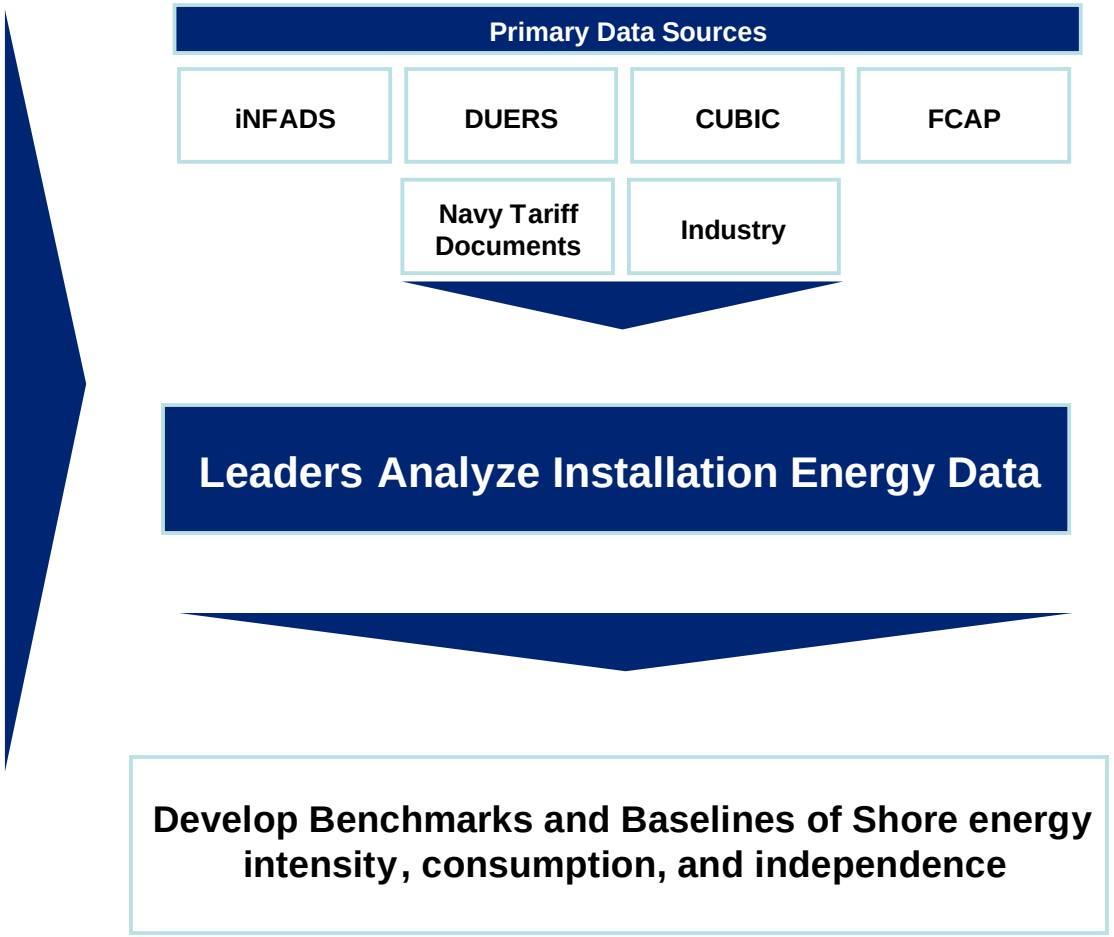
Conduct an energy management assessment for Navy shore facilities:

–Analyze consumption

–Research and analysis on a range of energy efficiency and alternative energy investments to meet goals and legislative mandates

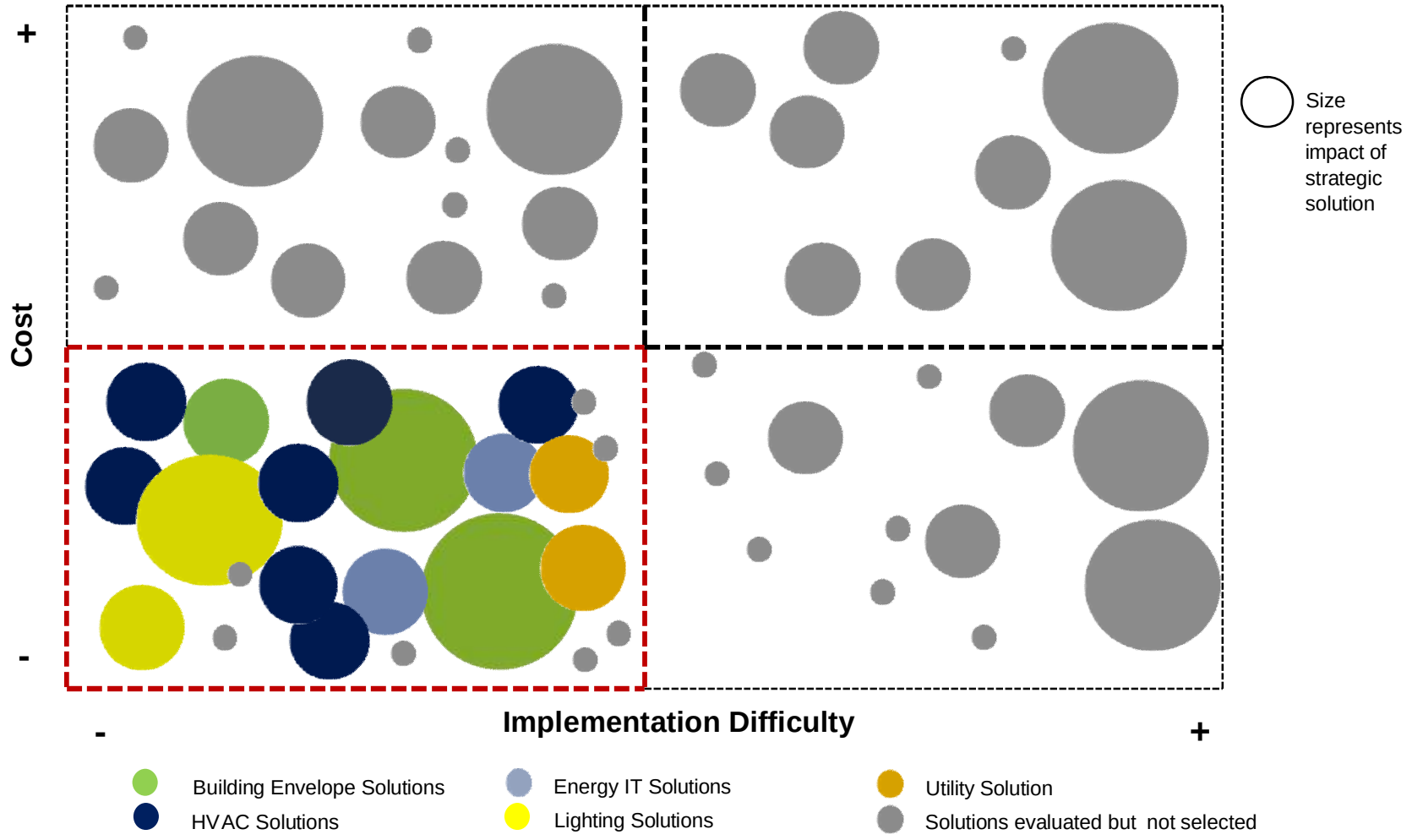
–Developed a strategic solutions approach and noted constraints and barriers

–Create an energy roadmap linking consumption patterns with renewable energy and energy efficiency options

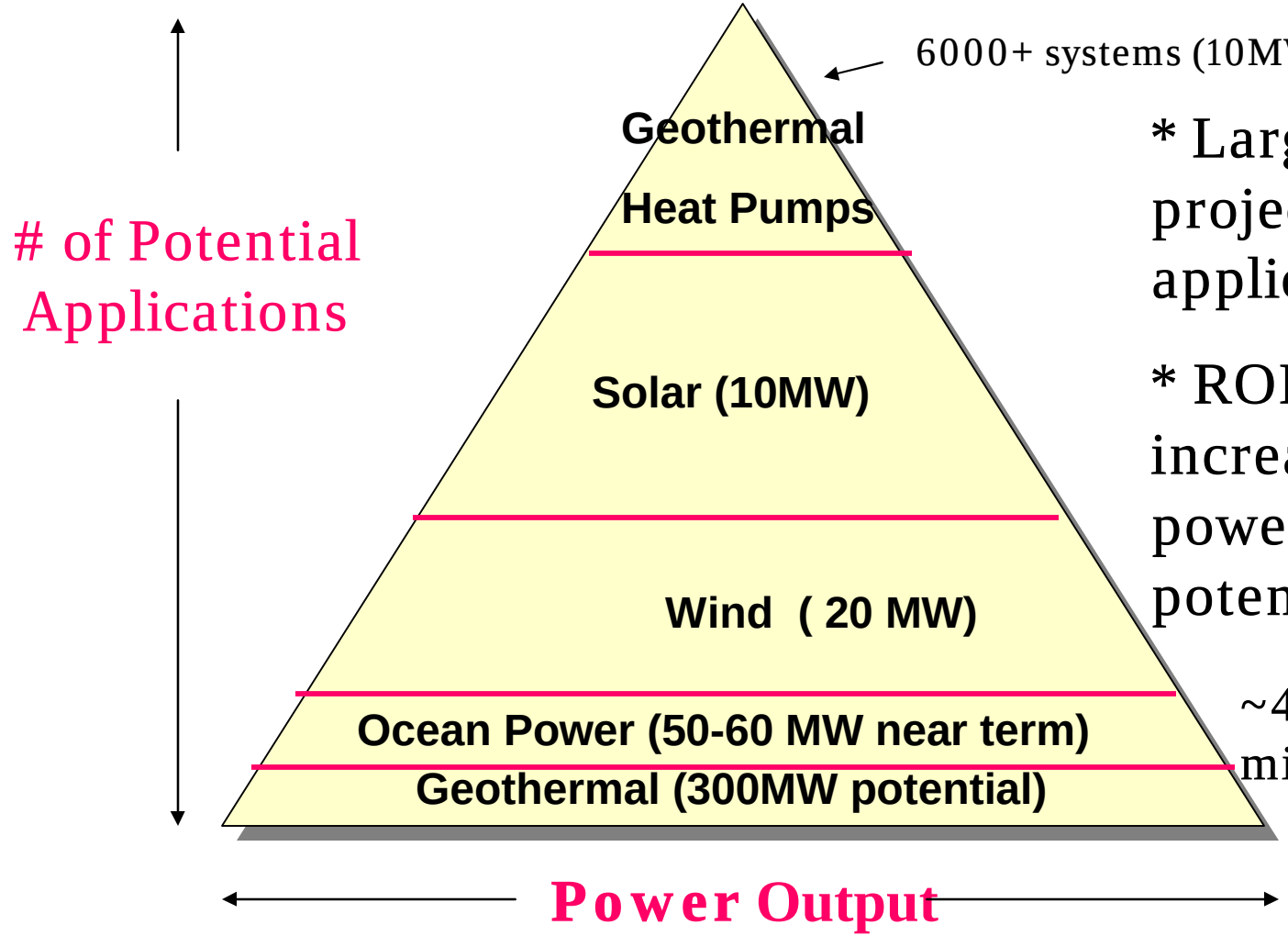


Energy Efficiency Way-Ahead

Must evaluate entire portfolio of solutions based on our infrastructure



Renewables - How We Get There

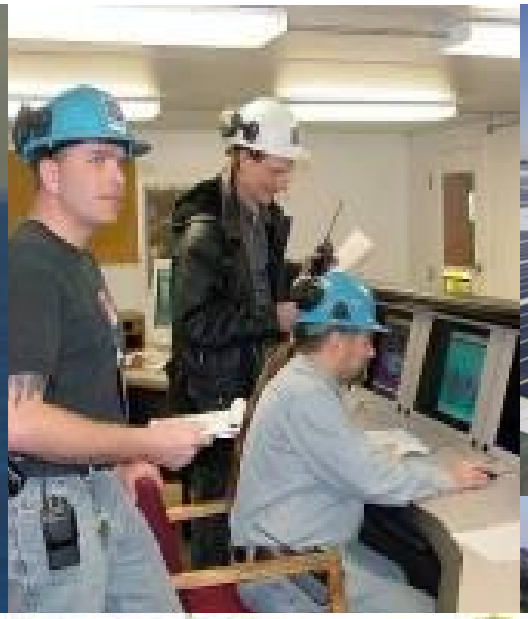


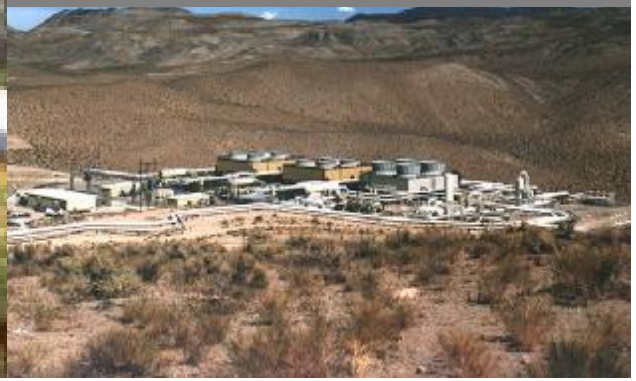
* Large power projects have fewer applications

* ROI typically increases with power output potential

~400MW near-mid term capacity

Technology





Final Thoughts!

1. Energy Management and Facility Management are inextricably linked
2. “Net Zero” intent must be clear
3. “Smart Grid” is about control, who has the control is the key factor
4. Green House Gas emission calculations need rigor
5. Energy Security success is determined first by the threat

Thank you for the opportunity to speak with you today!

CAPT Ken Branch, CEC, USN
(202) 685-1024
Kenneth.branch@navy.mil