



Department of Navy Energy Initiatives and Leadership

Rear Admiral Chris Mossey
Commander, Naval Facilities
Engineering Command and
Chief of Civil Engineers
10 July 2012

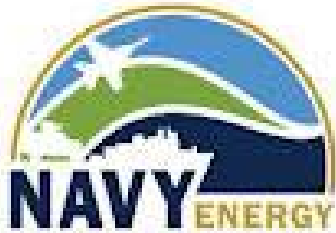
Leading Change

Institutionalizing an Energy Culture

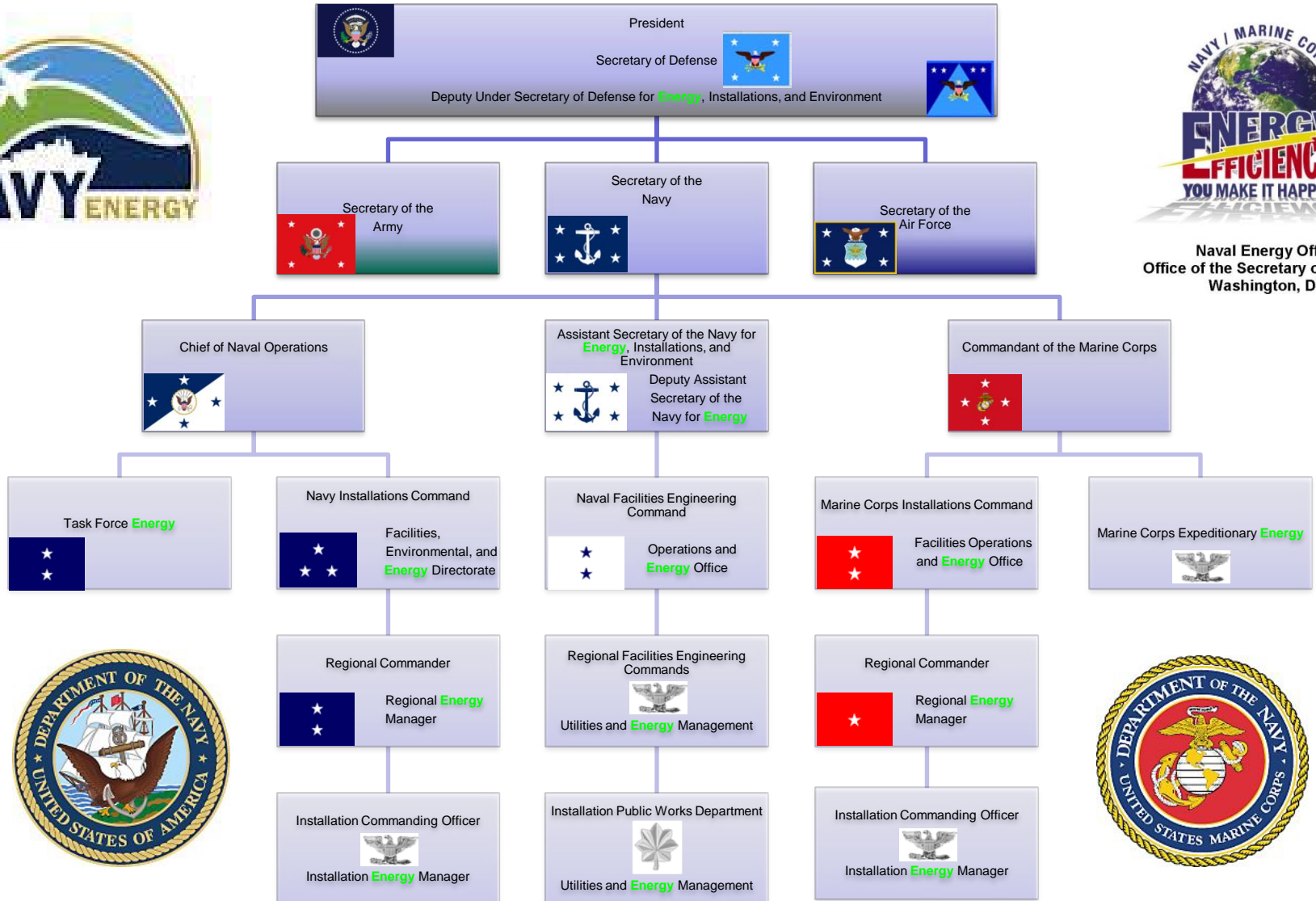


- **Driven from the top**
 - Active, consistent senior leadership engagement
 - Clear commander's intent and good Strategic communications
- **Organizational Alignment**
 - Governance at all levels (from the enterprise level to the building level)
- **Clear and ambitious goals and metrics**
 - What you will achieve and when
 - Bold initiatives/stretch goals to challenge, motivate, compel change
- **Unambiguous strategy**
 - Everyone must understand how you will reach your goals
- **Resources and Tools**
 - Resources must match priorities
 - Sustained investment required
 - New approaches will be necessary
 - Barriers must be removed

DoD Energy Leadership



Naval Energy Office
Office of the Secretary of the Navy
Washington, DC



Department of Navy Energy Guidance



Message from the Secretary of the Navy



I am committed to the Department of the Navy taking a leadership role in energy reform, not just within the Department of Defense, but in our country, in order to reduce our reliance on fossil fuels.

The underlying reasons for reform are clear. Our energy sources are not secure, we need to be more efficient in energy use, and we emit too much carbon. Over-reliance on fossil fuels is bad strategy, bad business, and bad for the planet. The Department of Defense alone uses 93 percent of the Federal Government's energy and is the largest single consumer of energy in the United States. Effecting change within the Navy and Marine Corps will have a significant and lasting impact upon our national energy consumption and national energy policy.

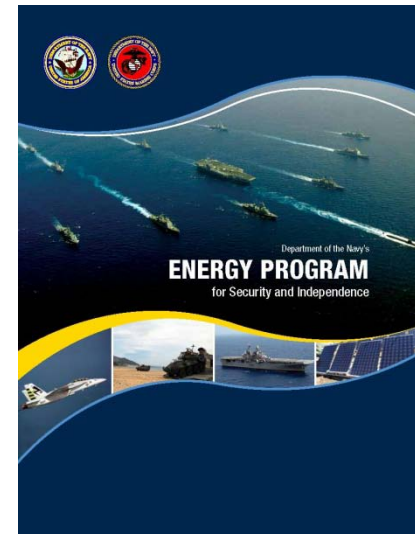
I challenge each of you to enter the discussion ready to take bold steps to reduce use of fossil fuels and advocate for changes to established practices. Algae, grain, cellulose, seawater, waves, wind, solar, and geothermal are some of the sources of the future; we need you to put your minds and your imagination to work to figure out how to harness them. More importantly, I challenge you to think beyond existing technologies and to dream of what today might seem unimaginable.

Reforming energy use and policy within the Department of the Navy will assure the long-term energy security of the United States, encourage development of efficiencies, and promote environmental stewardship. In doing so, we will improve the combat and operational effectiveness of our Forces and maintain our position as the finest Navy and Marine Corps in the world.

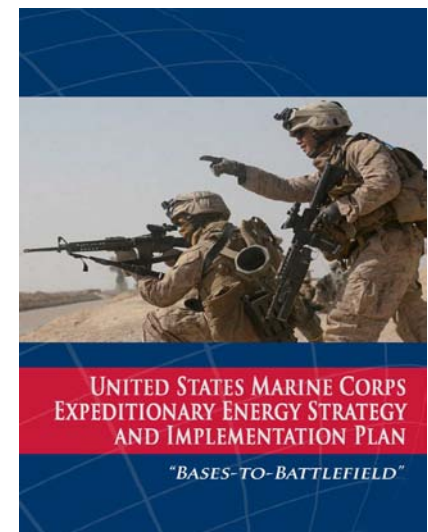
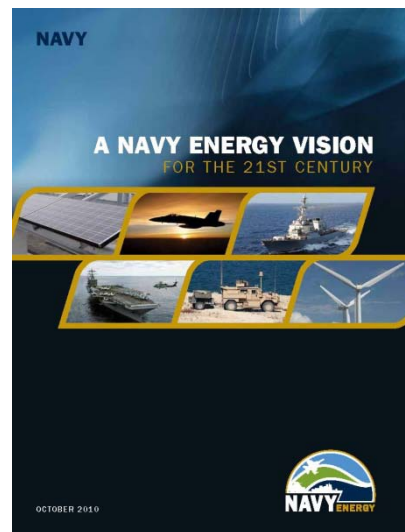


Honorable Ray Mabus
Secretary of the Navy

Chief of Naval Operations



Commandant of the Marine Corps



DoN Energy & Water Reduction Goals



- **Executive Order 13423 (2007):**

- 30% Energy Reduction by 2015
- 16% Water Reduction by 2015

- **Executive Order 13514 (2009):**

- 28% Green House Gas Reduction by 2020
- 26% Potable Water Reduction by 2020
- 20% Industrial, Landscaping, and Agricultural Water Reduction by 2020

- **EISA 2007:**

- Audit 25% of Top 75% Energy Consuming Facilities Each Year

SECNAV Energy Goals (Nov 09)

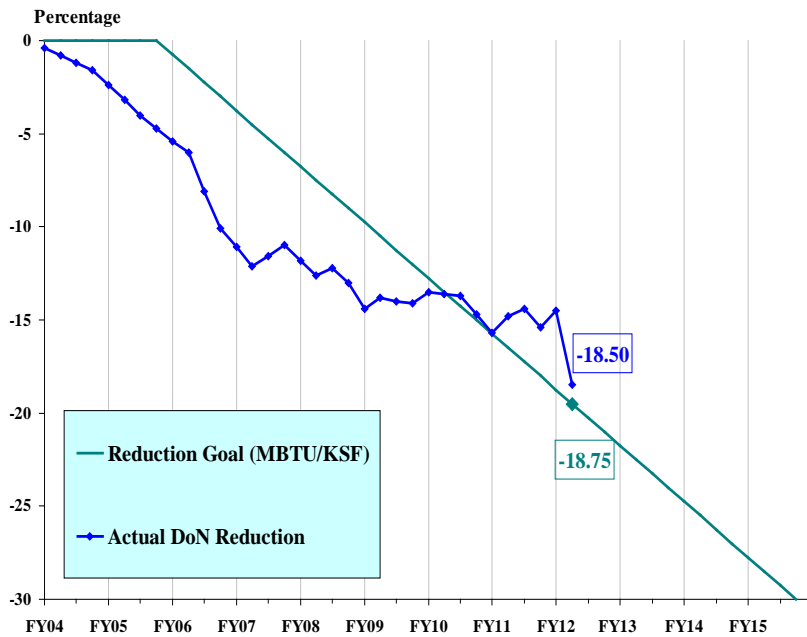
- **Evaluate lifetime energy cost and footprint in all contract awards;**
- **Create "Green Strike Group" by 2012; deploy by 2016;**
- **By 2015, cut petroleum use in commercial vehicle fleet by 50%;**
- **By 2020, 50% of shore energy from alternative sources; 50% Installation "Net Zero"**
- **By 2020, 50% of total energy consumption from alternative sources**

Shore Energy Metrics



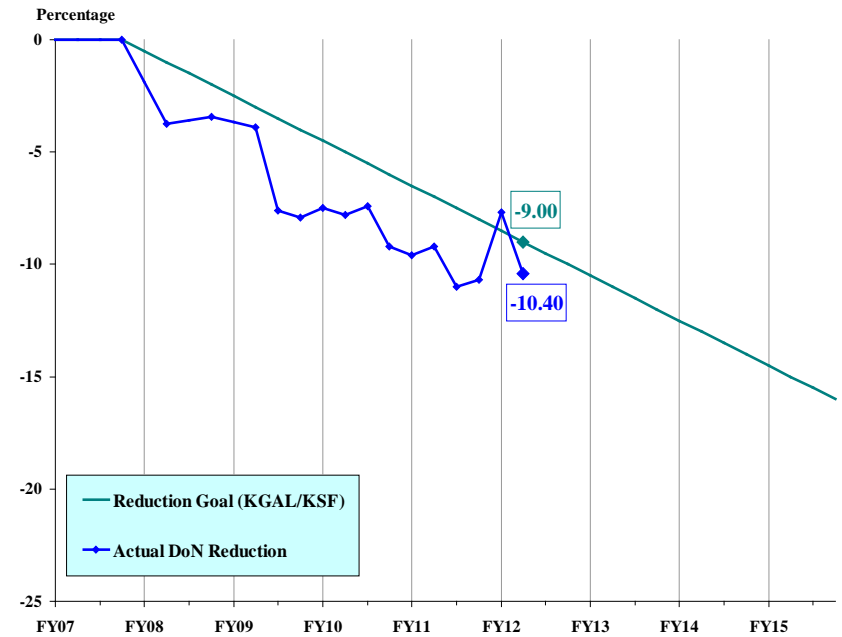
DoN Energy

Progress towards Energy Intensity Reduction



DoN Energy

Progress towards Water Intensity Reduction



Navy Shore Energy Strategy



Three Legs to Achieve Energy Security and Compliance:

1. Energy Efficiency: Priority #1; sustained, deliberate investment (ROIs measured) required to achieve goals

Smart Energy Initiative

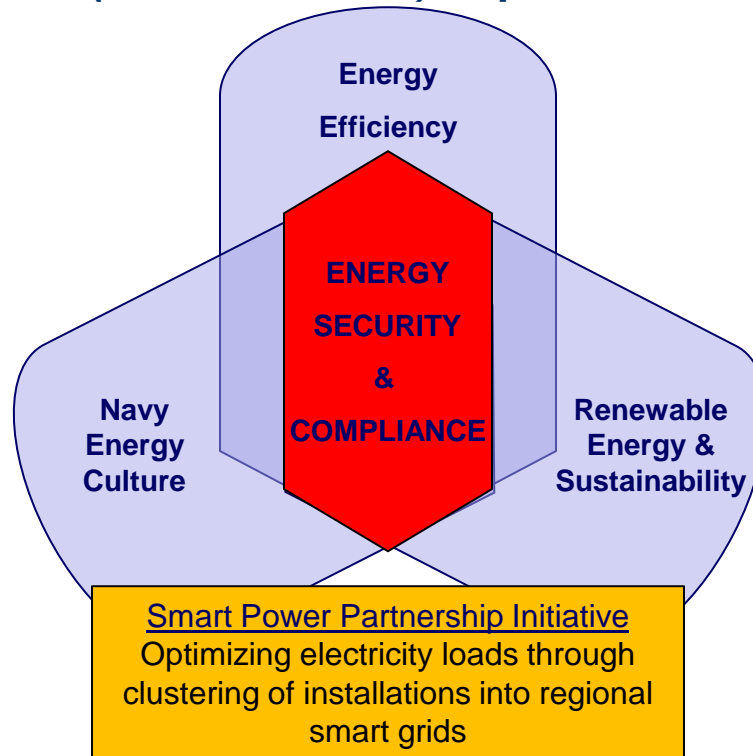
Real time energy information visibility and analysis to change behavior and reduce costs

1 Gigawatt Initiative

Producing or purchasing enough renewable energy to power the equivalent of a quarter of a million homes

2. Navy Energy Culture:

- Focused leadership engagement enabled by usage and cost visibility
- Demand response offers larger savings but depends on operational flexibility & risk tolerance



3. Renewable Energy and Sustainability:

- Keys to long term cost reduction and energy security
- Invest in mature technologies with limited risk
- Leverage third party financing

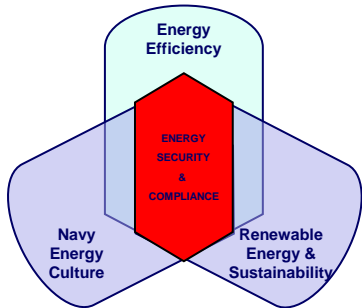
Mission assurance requires energy security for critical infrastructure

- Navy/National grids are vulnerable; can be strengthened through strategic partnerships
- Utilities systems at 100 DoN bases vary in quality and reliability; many challenges

Energy Conservation & Efficiency



Reduce intensity 30% by 2015 (03 baseline), (DoN 18.5%); 50% by 2020



Flex Fuel Vehicles
 > E-85 (85% ethanol, 15% gasoline).
 > Approximately half Navy's light/medium inventory (23K) alternatively-fueled



Building Sustainability

> The Wounded Warriors campus at MCB Camp Pendleton
 > Cost avoidance:
 • 110K/year in operating costs
 > saved 1 million gal/year
 > Renewable energy providing over 1/3 of the total load.



Energy Conservation & Efficiency

- > Bldg Efficiency
- > Energy Audits
- > Sustainable Building Design
- > ESPC & UESC
- > Trans & Fuels
- > Water Consrvn
- > Ship lineup for Shore Power
- > Demand Response
- > Smart Energy Systems
 - DDC, AEMCS
 - ADR

Yokosuka CoGen
 > 39 MW of electrical power and 109,000 pounds of steam/hr from the waste heat.
 > Estimated annual cost savings is over \$12 million
 > Cost savings projected over the contract term (22 years) estimated to be at \$343 million.



Ship to Shore

> The pier-side electrical distribution system San Diego
 > Measures electrical load and total consumption.
 > Waterfront metering
 > Feedback mechanisms led to in port equipment changes, saving energy since 2007.



Efficiencies: Sustained investment strategy targeting buildings & systems; measurable ROI

FY13 Energy Infrastructure Investments



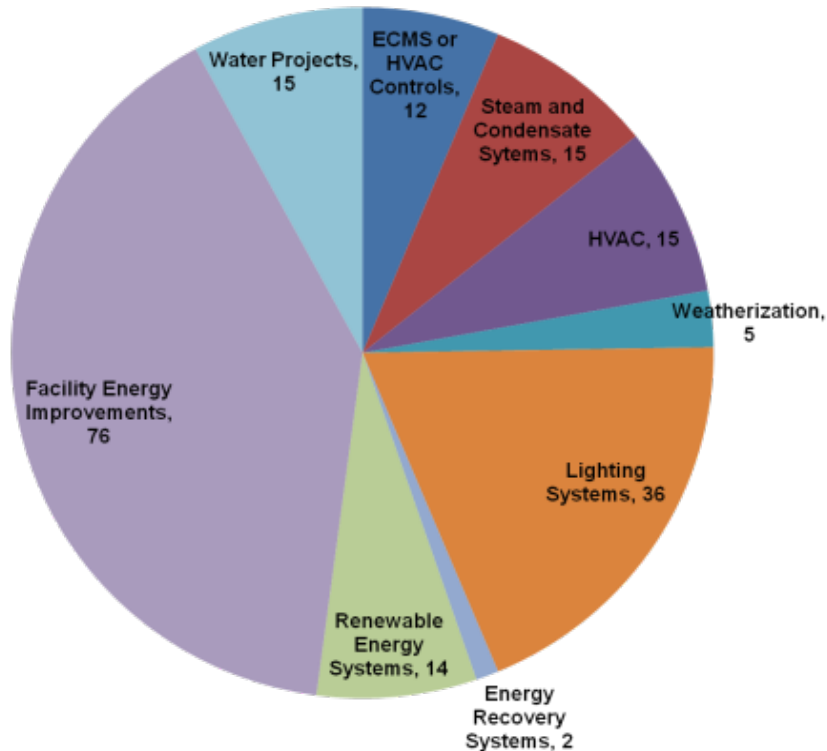
• Facilities Upgrades - \$328M

- ~200 Projects, \$73.4M Projected Annual Cost Avoidance/Savings
- 2,615,000 MBTU Saved Annually

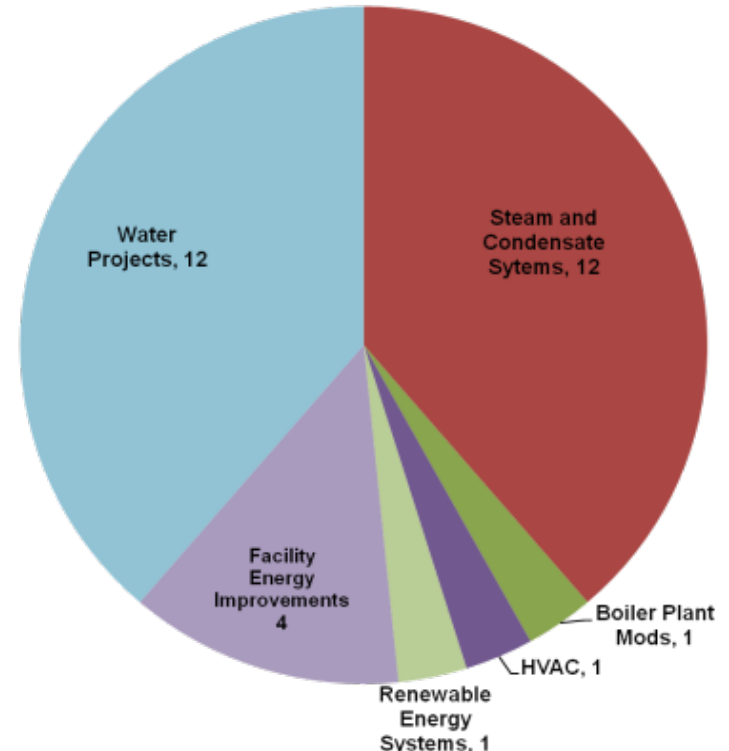
• Utility System Upgrades - \$41.0M

- 31 Projects, \$4.0M Projected Annual Cost Avoidance/Savings
- 193,200 MBTU Saved Annually

FY13 eROI Portfolio by Project Type



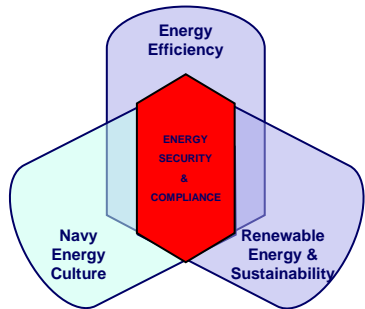
FY13 eROI Portfolio by Project Type



Energy Culture & Behavior

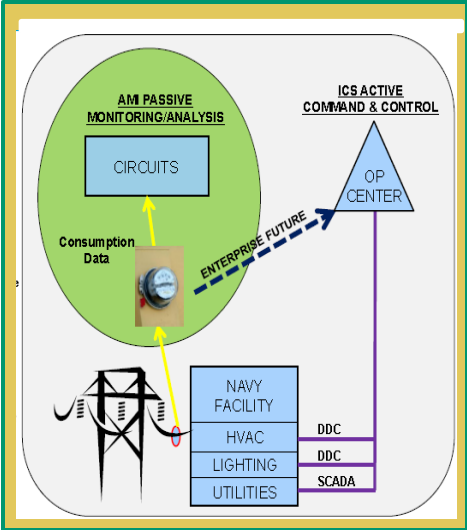
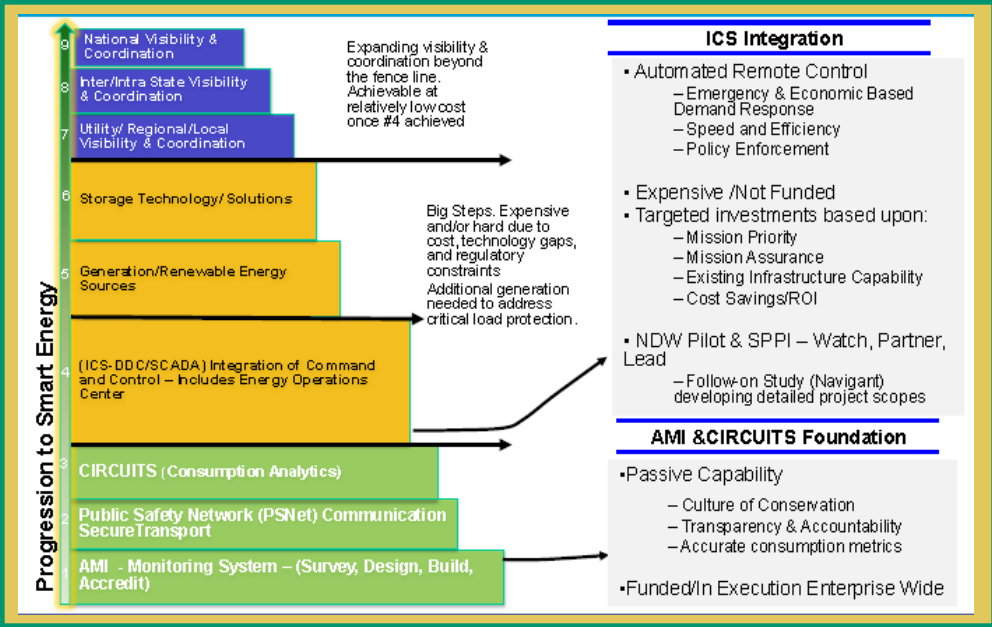


Consumption to conservation via transparency and accountability



Energy Culture & Behavior

- Support Region and Installation Commanders
- Utility and Energy Operations Center
- AMI
- PSNet
- CIRCUITS
- Real Time Information Visibility
- Data and Billing
- NDW Pilot



Security

- Improved monitoring at facility level
- Cyber protection of utility systems architecture and operations

Operational

- Improved meter accuracy
- Automated meter reporting
- Reduced cost of meter reading
- Integrated foundational network
- Control function ready
- Real time information Visibility

Cultural

- Residential Energy Conservation Program Mock billing – 7.6% reduction over four months
- Refined tenant utility usage
- Reduced energy consumption
- Comprehensive historical data
- Standardized allocation for billing

Culture: Education, leadership tools, Navy Smart Energy

Navy Smart Energy

Industrial Control System (ICS) Foundation



Commodity Production, Distribution, and Consumption

Meter Data Management (MDM)



CIRCUITS

AMI Meters

Via NMCI

via PSNET



Collection of ICS Devices



Smart Power Partnership



Power Industry
(e.g. Utility Supplier & Regulators)

SCADA & DDC Control

Sensor Points

Point Aggregation



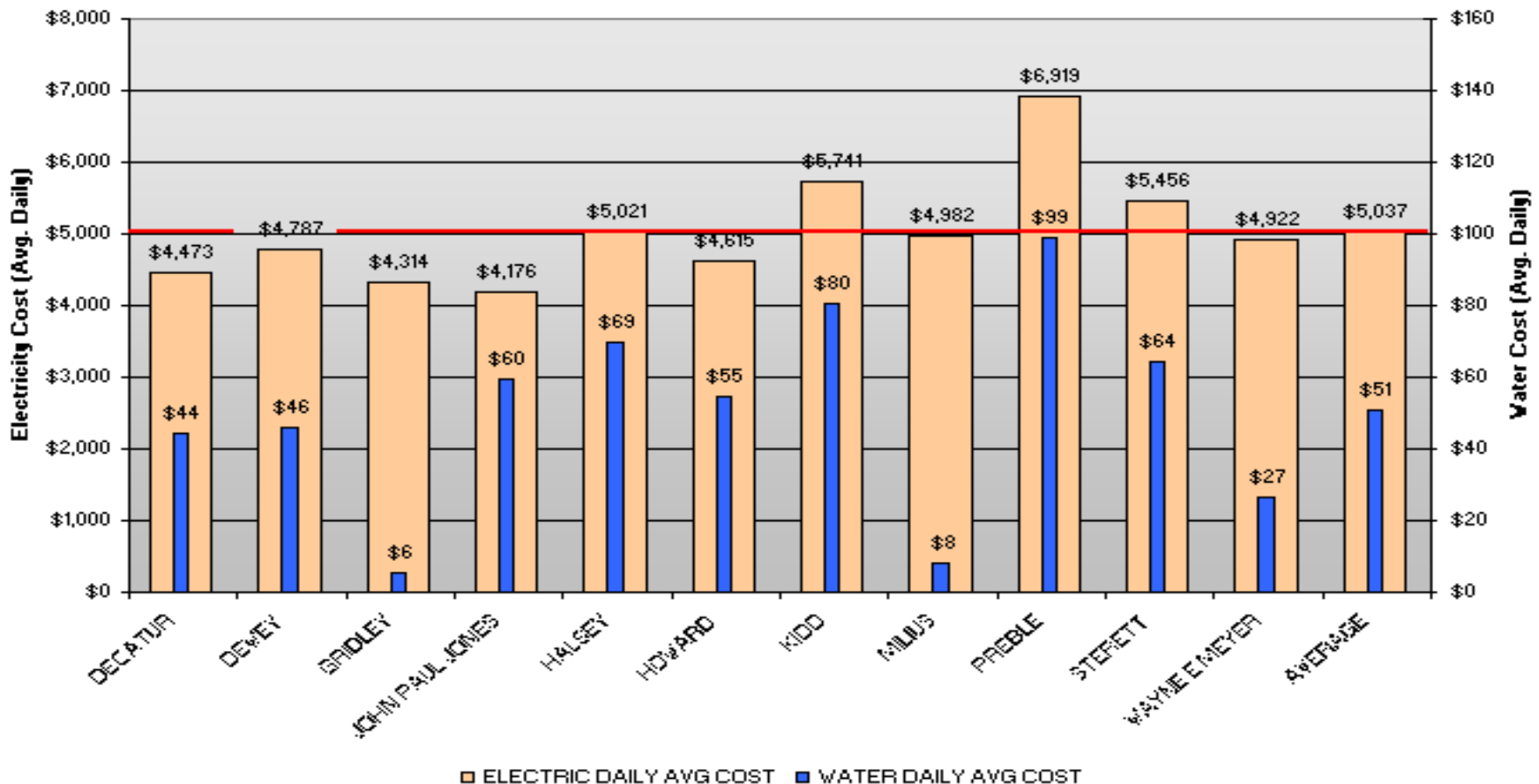
- We operate a complex network of power production, distribution, consumption, sensors, and controls
- SCADA, DDC & AMI devices are simply sensors on a common system which can be connected for automatic or manual component/system control
- Data aggregation into useful forms for analysis and decision support
- Operator screens display all system data in required format in real-time

Shipboard Shore Energy Management

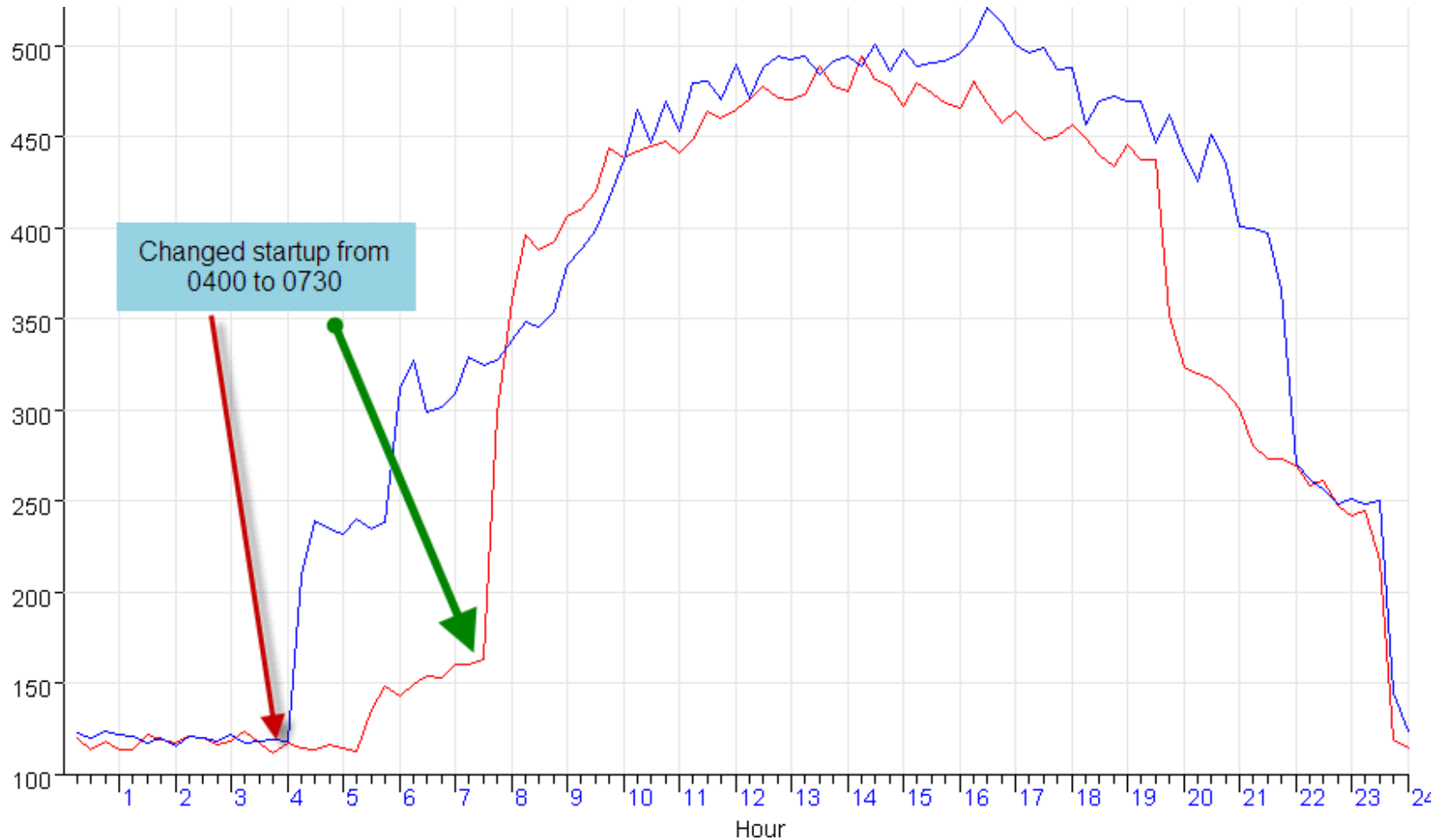


- Operator Mindset -- Conserve at Sea, Unlimited Energy Pierside
- 50 Ships in San Diego used \$5M of shore power in Jan 2011; \$1.8M/3 CVNs; \$1.2M/12 DDGs
- Shipboard Shore Energy Management Saved \$7M in first three years; 1 LHD saved \$53K/mth

DDG January Average Daily Utilities Costs

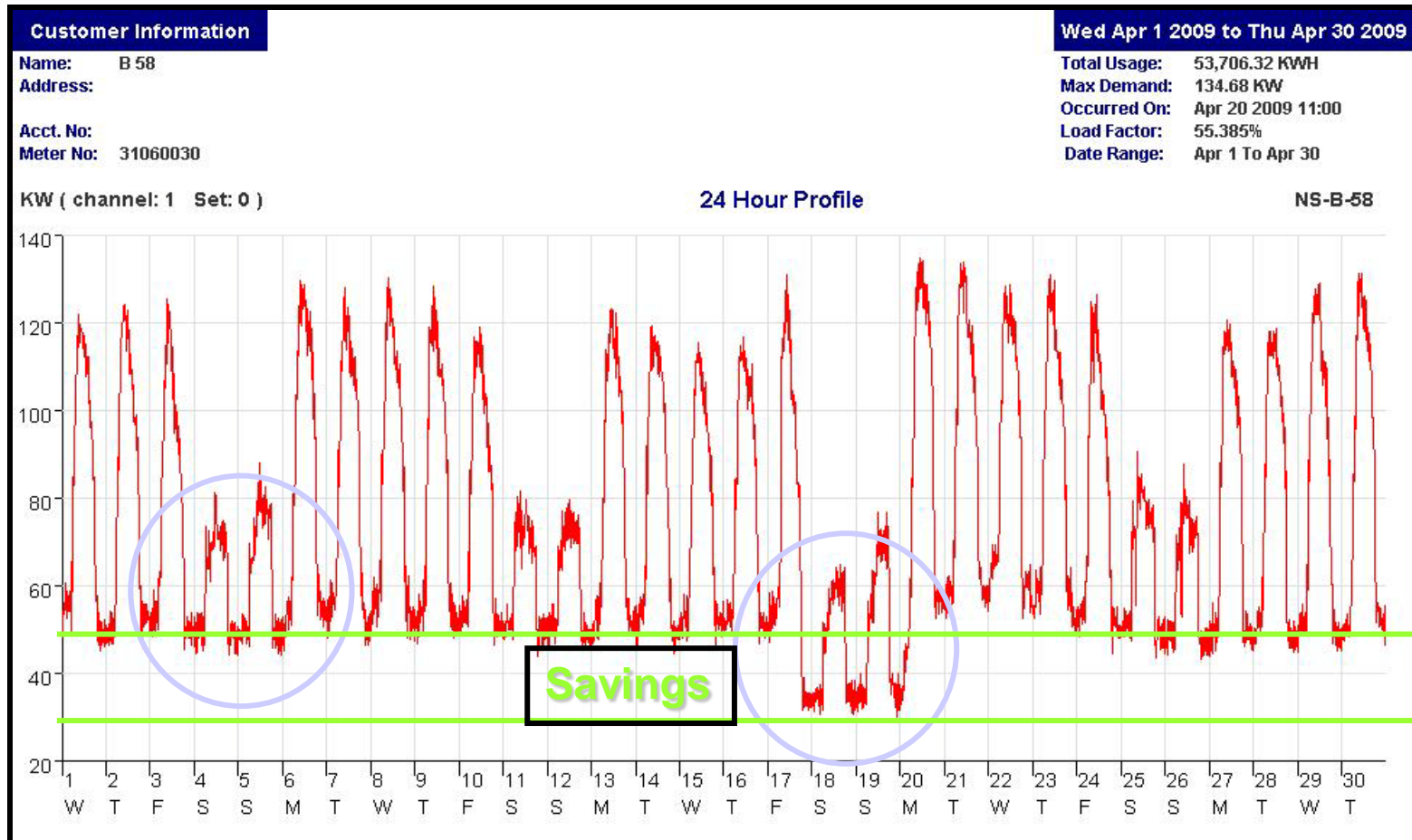


Navy Exchange Energy Management



Review of time of use energy load profiles lead to a shift in start time for lighting and air handlers. The Store manager implemented operational changes.

Computer Shut Down Savings

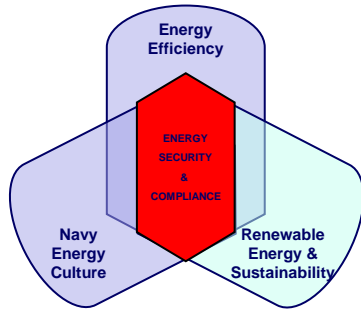


**Naval Base San Diego pilot study confirmed ~20 KW load reduction.
Savings across Naval Base San Diego - 2-million KWH and \$290K
Savings across Region – 9-million KWH and \$1.2M**

Renewable Energy & Sustainability

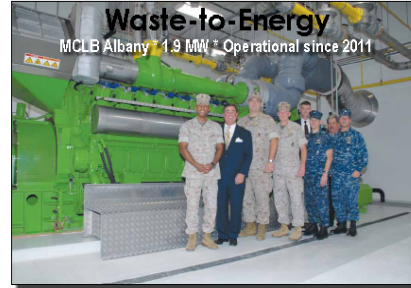


50% RE production by FY20; 25% RE production by FY25 (DoN status is 18.6%)



Wind
San Clemente * .7 MW * Operational since 1999

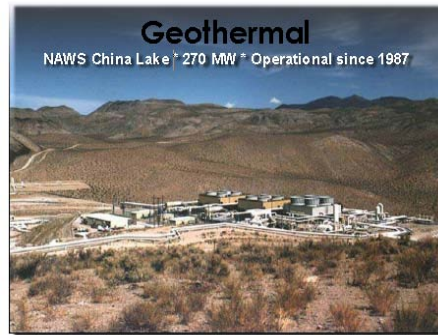
Wind - Wind turbines at San Clemente Island provide approximately 11% of the island's annual electricity needs and save over \$100,000 annually. DoN has 22 anemometer studies currently underway to identify additional opportunities.



Waste-to-Energy
MCLB Albany * 1.9 MW * Operational since 2011

Landfill CoGen - This is the first DoN landfill gas cogeneration plant and is projected to save an estimated \$1.8 million annually. The Navy and Marine Corps continue to explore additional waste-to-energy options and most recently held an industry forum in July 2011.

- DoN's Energy Code is 16% more stringent than CA's Title 24 – the most stringent state energy code in U.S.
- 25 Buildings certified by USGBC LEED rating system
 - 9% certified gov't
 - 300 projects registered
 - 2 hangars



Geothermal
NAWS China Lake * 270 MW * Operational since 1987

Geothermal - The four power plants at NAWS China Lake produce enough power to for 180,000 homes. The Navy and Marine Corps continue to explore additional geothermal options at NAF El Centro (CA), MCAS Yuma (AZ), and NAS Fallon (NV), and most recently held an industry forum in July 2011.



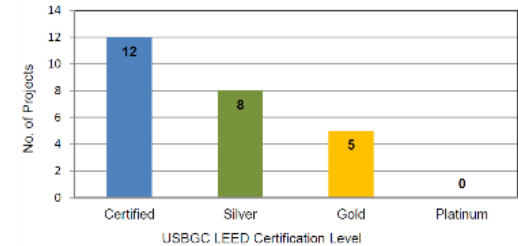
Solar
MCAGCC 29 Palms * 1.1 MW * Operational since 2003

PV Arrays - Planned projects, including those under the solar MAC for southwestern Navy and Marine Corps installations, are expected to yield a cumulative \$20.8 million in savings over the contract term. Over 100MW of capacity are associated with these projects.

Renewable Energy & Sustainability

- Geothermal PO
- 3rd Party Financing
- Power Purchase Agreements
- 1 GW Initiative
- RE & Net Zero Studies / Plans
- Strategic Partnerships
- SPPI
 - Regulatory
 - Legislative
 - Wheeling

The Navy has 25 projects certified with the US Green Building Council for LEED



- Certified projects include:**
- Child Development Centers
 - Bachelor's Quarters
 - Administration Buildings
 - Hangars

Renewable Energy & Sustainability: Third Party Financing, LCCA, BCA, Sustainable Design

Smart Power Partnership Initiative



- Group geographic clusters of Navy and Marine Corps installations in Regional Smart Grids capable of sharing power and protecting mission critical loads
- Expand on partnerships with the electric power industry and regulators to promote cost effective, reliable, sustainable power

Goals:

- ✓ **Enhance Energy Security:** for Mission Critical Loads.
- ✓ **Reduce Costs:**
 - Emergency Demand Response
 - Economic Demand Response
 - Direct Market Engagement
 - Utility Company Engagement
- ✓ **Increase & integrate renewables:** seeking to virtually move power from point of generation to point of use.
- ✓ **Exportability:** Define fundamental smart/micro-grid capabilities for DoN and develop a methodology to prioritize investments based on area-specific payback analysis.



QUESTIONS?

