

From the 1 Gigawatt Task Force: A Strategy for Renewable Energy

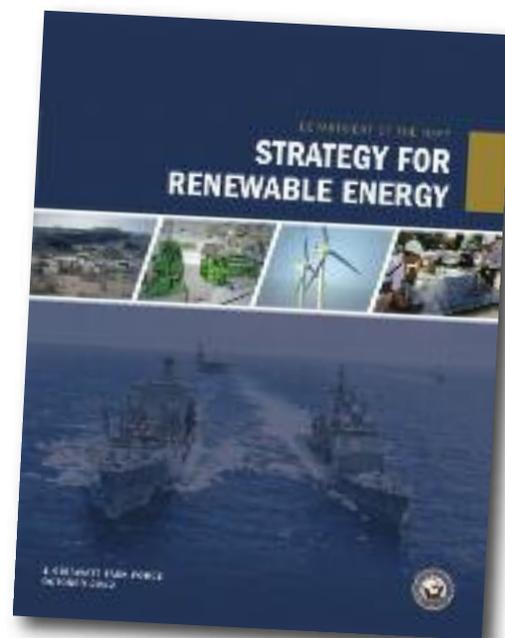
Meeting Secretary Mabus' Energy Goals for Installations

THE DEPARTMENT OF the Navy (DON) has completed and published its Strategy for Renewable Energy by which Navy and Marine Corps installations will procure or produce 1GW of renewable energy by 2020 to meet Secretary Mabus' energy goals.

President Obama, in his State of the Union address to Congress in January 2012, said that the “Navy would purchase enough renewable energy capacity to power a quarter of a million homes,” or enough renewable energy to power a city the size of Orlando, Florida. This commitment from the President

sources. These are indeed lofty goals—difficult but achievable.

To address these goals and the President's commitment, Secretary Mabus chartered the 1 Gigawatt Task Force to develop a strategy by the end of Fiscal Year (FY) 2012 for DON to purchase or facilitate the production of approximately 1GW of renewable energy (RE) for use on Navy and Marine Corps installations. Chaired by the Assistant Secretary of the Navy (Energy, Installations and Environment (ASN EI&E)), its principal membership includes Secretariat, Navy, and Marine Corps leadership.



No one ever did anything big by being timid.

—Secretary Ray Mabus

supports the five energy goals set forth by Secretary of the Navy Ray Mabus in October 2009. Among these goals is that, by 2020, 50 percent of DON energy consumption will come from alternative sources, and that DON will produce at least 50 percent of shore-based energy requirements from alternative

In October 2012, the 1 Gigawatt Task Force published DON's Strategy for Renewable Energy. The document describes what we need to do, details the RE “landscape” in which we're working, explains the reasons why it's important, and lays out critical tasks by which our Navy and Marine Corps leadership will begin to

implement this essential journey toward energy security and energy independence. It is a beginning—but it is also truly a living document which will change, grow, and evolve as time progresses and circumstances evolve; much effort will be required in the months and years ahead. As Secretary Mabus high-

Landfill gas is the fuel source for the 1.9MW generator at MCLB Albany, Georgia. The system also uses waste heat to produce steam for buildings on the base.

lighted at the Navy Energy Forum 17 October 2012, “no one ever did anything big by being timid.” The Department is squarely behind the Secretary to reach all five goals on time.



A Dual Focus

To achieve Secretary Mabus’ goal of producing 50 percent of the Navy’s shore energy requirements from renewable sources, the Navy must both reduce its demand for energy while simultaneously greatly increasing the generation of RE on or near its installations.

Since 1980, and with a particular push within the past few years, DON has focused heavily on maximizing energy efficiency. DON has implemented \$1.6B of life-cycle efficiency improvements and reduced energy intensity (energy per square foot) by 18.5 percent since 2003. Furthermore, DON is a leader in Federal use of energy

contracts (energy conservation investment program (ECIP), energy service performance contracts (ESPC) and utility energy service contracts (UESC)), having implemented 165 ECIPs, 70 ESPCs, and 275 UESCs since 1998. This effort has been and remains absolutely necessary for several reasons. First, the cheapest kilowatt is the one that is never burned, and energy savings are the most direct, effective method to protect scarce resources. Second, many of DON’s buildings and facilities use electricity at unacceptably high intensities, and are therefore logical and important targets for improvement. Lastly, as part of the Navy’s ongoing efforts to be good neighbors to our host cities and regions, the Navy must be able to respond quickly and intelligently to emergencies and support utility-wide efforts to control incidents affecting the commercial grid.

With the Navy’s efficiency programs on track and maturing, it must now direct its focus to electrical genera-

Secretary Mabus’ Energy Goals

THE UNITED STATES Navy and Marine Corps rely far too much on petroleum, a dependency that degrades the strategic position of our country and the tactical performance of our forces. The global supply of oil is finite, it is becoming increasingly difficult to find and exploit, and over time cost continues to rise.

So in order to improve our energy security, increase our energy independence, and help lead the nation towards a clean energy economy, the Department of the Navy established the following five ambitious energy goals that will move the Navy and Marine Corps away from a reliance on petroleum and will dramatically increase our use of alternative energy.

1. **Energy Efficient Acquisition.** Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings.
2. **Sail the “Great Green Fleet.”** DON will demonstrate a Green Strike Group in local operations by 2012 and sail it by 2016.
3. **Reduce Non-Tactical Petroleum Use.** By 2015, DON will reduce petroleum use in the commercial fleet by 50 percent.
4. **Increase Alternative Energy Ashore.** By 2020, DON will produce at least 50 percent of shore-based energy requirements from alternative sources; 50 percent of DON installations will be net-zero
5. **Increase Alternative Energy Use DON-Wide.** By 2020, 50 percent of total DON energy consumption will come from alternative sources



A 13.8MW solar PV array under construction at NAWS China Lake, California. Acting Assistant Secretary of the Navy (Energy, Installations and Environment) Roger Natsuhara cut the ribbon for this project on 19 October 2012.

tion on or near DON installations. This is a key component of what will ultimately become a truly secure energy posture for the Department. The ability to sustain critical missions

in the face of prolonged commercial grid outages is not possible without on-site, independent generation capacity. Renewable energy projects can greatly assist in filling that need.

The Renewable Energy Landscape and the 1GW Strategy

Today, DON produces just over 20 percent of the electricity it consumes from renewable sources. Our single largest production facility is the Coso Geothermal Plant located on Naval Air Weapons Station (NAWS) China Lake, California. Coso generated 270MW at its peak production level, but now produces about 170MW because the heat source has diminished; it continues to shrink by about one to two percent per year. The Navy has three waste-to-energy plants which produce a combined 45MW of base-load electricity, and the balance of DON's renewable energy production comes from solar photovoltaic (PV) systems at dozens of installations ranging in size from a few kilowatts to 4.6MW, and two wind systems (U.S. Naval Station Guantánamo Bay and Marine Corps Logistics Base (MCLB) Barstow, with capacities of 3.8MW and 1MW respectively).

What Does "One Gigawatt" Mean?

ELECTRICAL POWER IS sometimes discussed in terms of consumption (expressed in kilowatt-hours (kWh) and megawatt-hours (MWh)) and generation (expressed in kilowatts (kW) and megawatts (MW)). Adding to the complexity, generation has several categories including base-load, peak, and stand-by or reserve. Some renewable electricity generation falls into the peak category because of its intermittent nature; it does not produce base-load, grid-stabilizing power and frequently requires stand-by generation capacity to back it up in the event of cloud cover or insufficient wind. Others such as hydro, biomass or geothermal fall into the baseload category. A renewable energy capacity factor indicates the actual energy output over a period of time versus its nameplate generation capacity. Overall, wind and solar power produce electricity at about 25 to 30 percent of "nameplate" capacity.

According to the Energy Information Agency, the average American household consumed 11,496 kWh in 2010, the latest year for which data are available. Multiplied by "a quarter-million" as the President mentioned, the amount of 24-7 generation capacity needed to meet that demand is just over 328 MW. Because DON expects most of its new renewable energy production to come from intermittent sources, 328 MW factors up to approximately one gigawatt of intermittent generation at a 30 percent capacity factor. This estimate is approximately the capacity of RE needed to meet the Secretary's 50 percent goal. As the strategy moves into implementation, higher-factor projects (e.g., geothermal, biomass, or waste-to-energy) contribute toward the 1GW goal at a rate approximately three times that of intermittent sources. Such projects also significantly enhance an installation's true energy security since the power is more often available.

Since the introduction of Secretary Mabus' five energy goals, only a few small renewable energy projects have been successfully executed, and most of those were local initiatives at the installation level. However, nine significant (greater than 1MW) projects are under contract or under construction across DON today. These include a wind project at the Atlantic Undersea Test and Evaluation Center range in the Bahamas (1MW). The other eight projects use solar PV; the largest of which is a 13.8MW PV system at NAWS China Lake which came on-line in late October 2012.

The 1GW Strategy tasks Navy and Marine Corps leadership to continue this positive trend in facilitating the production of renewable energy generation at Navy and Marine Corps installations. As part of their energy plans, installations and regions will carefully assess which technology or combination of technologies will be most suitable and cost effective in their areas, and then identify the best opportunities for RE projects. While the core of the 1GW strategy focuses on developing large projects (greater than 20 MW capacity) in the Navy's RE resource-rich areas to achieve significant progress toward the 1GW total, they alone will not be enough. Also critically important is the identification and development of a variety of smaller projects on bases everywhere that will incrementally bring DON closer to its absolute goal. Where possible, these smaller projects might be aggregated regionally to streamline the whole process and attract better third-party financing.

The best overall contractual arrangements are typically through a 10 USC §2292a power purchase agreement (PPA),

At over 260 feet high, the 3.8MW wind turbine system at Naval Station Guantanamo Bay, Cuba can provide as much as a quarter of the base's power during high-wind months.

Kathleen Rhem



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but joint ventures for the sale of electricity through 10 USC §2916 or enhanced-use leases through real estate arrangements might work well in some situations. (Note: 10 USC 2922a enables the military Services to enter into long-term contracts (up to 30 years) for the development of energy production facilities on Department of Defense or private lands and the purchase of energy generated from such facili-

ties.) These third-party arrangements enable DON to realize its RE goals with little to no cost to the taxpayer, as developers incur the upfront costs inherent to any project. The Department cannot fully realize its energy security and independence potential without the expertise and ingenuity of its neighbors and fellow citizens, therefore partnerships with industry and local communities will essential to our success.



The 170MW geothermal power plant at NAWWS China Lake is the largest generator of clean, renewable energy in the DON.

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Looking Toward the Future

Future projects in the conceptual stage include PV systems potentially on the order of 100 + MW at Marine Corps Air Station (MCAS) Yuma (the Barry Goldwater Range) in Arizona and Naval Air Station (NAS) Lemoore in California. These bold ideas face some hurdles—regional grid capacity to carry the excess electricity generated, and relatively low rates in central California for example—but we’re pressing ahead with environmental assessments and detailed business analyses to develop a full, detailed understanding of all the market factors and developers’ potential interest.

Other projects in the conceptual stages include other, smaller PV arrays at various locations in Hawaii, additional waste-to-energy projects in conjunction with existing ones at MCLB

Albany, Georgia, and MCAS Miramar, California. Overseas bases are also looking for opportunities, particularly in host countries whose governments have supportive renewable energy policies such as Spain and Japan.

The essential requirement as described in the Strategy for Renewable Energy is that every region, installation, and engineering office throughout the Department must collaborate with their host communities, industries, utilities, and other Department of Defense installations where possible, to explore and eventually develop RE capability and capacity wherever it makes sense to do so, economically and in terms of energy security and independence. Renewable energy is a critical piece of the energy security architecture and in most cases will take the longest amount of time to develop. The other

pieces—energy efficiency, energy storage (as it becomes economical at the multiple-megawatt scale), and smart microgrids—all have their roles to play. But without an on-site generation capability our installations will still be reliant on external sources of energy.

For a copy of the Strategy for Renewable Energy, contact the Office of the Deputy Assistant Secretary of the Navy (Energy) at the information provided below. For more information on the Department of the Navy’s energy program visit <http://greenfleet.dodlive.mil>. 

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