

NUWC Newport Partners with National Grid to Tackle Energy Conservation

Annual Energy Savings of Plan Estimated at \$1.5 Million

THE NAVAL UNDERSEA Warfare Center (NUWC) Newport, Rhode Island is utilizing a utility energy services contract (UESC) with their local utility provider to help meet the energy-saving goals set by the Secretary of the Navy (SECNAV) and other government agencies.

In 2012, NUWC Newport took steps to achieve aggressive goals set by the

executes the actual construction—estimated at about \$13.2 million for the NUWC Newport project. The utility then assures the equipment performance and standards of service. In a UESC, the benefitting client repays the utility over the term of the contract from the revenue that would have otherwise been used to pay for the old, higher level of utility consumption.

the initial investment. The IGA report identifies, evaluates, and documents various infrastructure improvement and cost reduction strategies. The ECMs presented in the report will blend energy reduction measures with measures that save or avoid non-energy operational costs. At completion, the project will provide a viable program to help NUWC Newport meet

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SECNAV for conserving energy, including a 50 percent reduction in shore energy consumption per square foot by the year 2020.

Among the many initiatives NUWC Newport will use to meet the challenge is a UESC with National Grid, NUWC's electricity and natural gas utility provider. A UESC is a partnership between the Navy and the utility company, which assesses the opportunities for conservation, designs the measures, fronts the capital costs, and

National Grid has a portfolio of monetary incentives for various energy conservation measures (ECM) that will be utilized to reduce the government's repayment obligations for the ECMs proposed.

National Grid and Siemens Industry, Inc. recently completed the investment grade audit (IGA) phase for NUWC Newport's UESC project to document the cost effectiveness of proposed ECMs to the standards set by the commercial lenders who will finance

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The IGA identified the following seven categories of ECMs:

1. Building controls upgrades
2. Heating, Ventilation, and Air Conditioning (HVAC) improvements
3. Lighting retrofits
4. Building envelope upgrades



NUWC Newport, part of Naval Station (NAVSTA) Newport, sits on the shores of Narragansett Bay in Newport, Rhode Island. Its 189.5 acres supports 77 buildings. This project aims to produce annual savings projected at \$1.5 million and \$13 million in estimated energy savings over the life of the project.

5. Steam system upgrades
6. Motor and drive improvements
7. Water conservation

Together, these ECMs have a projected annual energy savings of \$1.5 million. This translates to a 20.4 percent reduction in annual energy costs. The total project cost is estimated at \$13.2 million, leading to an overall project simple payback of 7.1 years after operational savings and a National Grid monetary incentive package of \$1.0 million is applied.

Building controls upgrades would provide improved temperature control and scheduling of HVAC systems at 14 NUWC Newport buildings. The existing direct digital control systems (DDC) for HVAC systems will be utilized for these improvements which include:



Improved makeup water controls installed on NUWC Newport's Building 1320 cooling tower are projected to save \$12,800 per year.

- Optimizing the startup and shut-down procedures for HVAC equipment
- Implementing demand control ventilation that varies ventilation flow below peak maximum based on feedback from sensors
- Adding control of exhaust fans to the existing DDC to reduce run time and reduce exhaust of conditioned air during unoccupied periods.

The improvements also involve calibrating or replacing air temperature sensors to improve space temperature control

to set points, reduce waste caused by temperature under-shoot and overshoot, and improving equipment scheduling to better match space occupancy patterns.

These measures also include replacement of aged and deteriorated air handling units (AHU) that have reached or exceeded their useful economic life, and replacement of aged water source heat pumps with units incorporating enhanced energy conserving features. Other measures include the installation of high-efficiency chillers to replace deteriorated older generation chillers, installation of destratification fans to recycle warm air from the ceilings

The SECNAV's Energy Goals

AS THE DEPARTMENT of the Navy (DON) works to reduce energy consumption and lead the nation toward energy independence, the SECNAV has outlined five energy goals. These goals seek to enhance and better enable our combat capabilities, to provide greater energy security. Outlined below are examples of how the Navy is moving forward to achieving each of the goals.

1. Increase Alternative Energy Use DON-wide

By 2020, 50 percent of total DON energy consumption will come from alternative sources.

- Continue aggressive pursuit of both large and small scale renewable energy projects on or near DON installations.
- Partner with industry, commercial aviation, and other government agencies to develop a demand signal to alternative fuel industry and encourage growth of a domestically produced, cost competitive biofuel industry.
- Decrease energy consumption, both ashore and afloat, through installation of energy efficient technologies and development of policies that encourage energy awareness and conservation.

2. Increase Alternative Energy Ashore

By 2020, DON will produce at least 50 percent of shore-based energy requirements from alternative sources.

- Continue installation of energy efficient upgrades to buildings and facilities.
- Encourage military members and families to conserve energy through incentives and other programs to empower them to save and be aware of their own energy consumption.

- Produce or consume one Gigawatt of new, renewable energy to power naval installations across the country using existing authorities such as Power Purchase Agreements, enhanced use leases, and joint ventures.

3. Sail the "Great Green Fleet"

By 2012, DON will demonstrate a Green Strike Group in local operations and sail it by 2016.

- In 2012, DON successfully demonstrated a Green Strike Group at the Rim of the Pacific exercise off Hawaii.
- The DON remains focused and on track to sail the Great Green Fleet by 2016—ushering in the "new normal" where biofuels will be a constant and regular part of our operational platforms.

4. Reduce Non-Tactical Petroleum Use

By 2015, DON will reduce petroleum use in the commercial vehicle fleet by 50 percent.

- Increase purchase and use of flex fuel vehicles, hybrid electric vehicles, and neighborhood electric vehicles.
- Expand alternative fuel infrastructure to support these vehicles.

5. Energy Efficient Acquisition

Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings.

- Create a standardized process for determination of lifecycle energy costs, fully-burdened cost of energy and other energy related characteristics of potential platforms, weapons systems, and buildings.
- Encourage contractors to minimize energy footprint and factor energy into the acquisition decision making process.



NAVSTA Newport's steam plant.

of high bay spaces, and conversion of one AHU from constant to variable volume to reduce airflow and fan power as cooling load decreases.

A base-wide lighting assessment was performed to identify areas in which lighting efficiency could be improved beyond what was achieved by NUWC Newport in two previous generations of efficiency upgrades, and to identify areas where operating hour reductions are viable. The proposed improvements will include better efficiency of both interior and exterior lighting as well as the enhanced use of motion sensors and photocell controls to reduce operating hours based on occupancy and conditions.

Building envelope upgrades will include application of rigid insulation to the outer shell of several buildings as well as base-wide weather-stripping, sealing, and localized insulation repair/replacement to limit building air infiltration, reduce thermal losses, and prevent damage by water penetration through the building envelope.

To identify steam system upgrade possibilities, assessments of steam traps interior to buildings where NUWC



New insulated valve cover, steam trap and pipe insulation at NUWC Newport. The UESC project inventoried, tested, and tagged 520 steam traps, replaced 175 faulty steam traps, installed 350 feet of steam pipe insulation, and installed 302 insulated valve covers.



A failed, out of service chiller (right) will be replaced with a new chiller with dual, variable frequency drive-modulated oil free compressors with levitating magnetic bearings (identical to the unit in the center). This new chiller will provide improved turndown and part load efficiency.

Water conservation measures are planned for implementation widely throughout NUWC Newport-occupied buildings on the base. Toilets, aerators, and shower heads will be replaced with low flow units. In two buildings, a total of 11 urinals consuming only a pint per flush will be installed. The cooling tower on the roof of NUWC Newport's largest building will have new



As part of its UESC project, NUWC Newport will install this type of energy efficient chiller with a control panel in Building 1319.

basin level switches installed along with motor-operated valves (to supplant unreliable float-actuated valves) for makeup flow control. A high level alarm with auto dialer notification will warn if the level control has failed allowing the tower water to spill into the overflow drain. In the existing setup, wastage down the overflow drain inlet is nearly undetectable without going to the roof and climbing on a ladder to visually observe the cooling tower basins.

In addition to the measures indicated above, the IGA analysis encompassed other potential ECMs including several involving renewable energy. These measures were found to be insufficiently cost-effective for inclusion in the UESC contract vehicle. The analytical data and calculations have been retained

Newport has maintenance funding responsibility were performed. Steam traps that have failed or are leaking will be replaced. In addition, exposed steam piping, valves, and interior fittings will be insulated to reduce thermal losses.

Motor and drive improvements have been identified in 11 buildings where variable frequency drives will be installed and select motors will be replaced with premium efficiency motors.

for use in evaluating potential non-financed projects that have allowable payback periods up to 25 years.

NUWC Newport facilities use a mix of electricity and steam that is purchased and/or generated by the Naval Facilities Engineering Command (NAVFAC) public works office serving NAVSTA Newport. Both energy streams are paid for out of NUWC Newport's Navy Working Capital Fund budget based on how much the Command uses.

The primary goal of the UESC project is to reduce the energy and water usage at NUWC Newport using measures determined to be cost-effective.

Electricity is purchased from National Grid and distributed to end users from the Navy-owned infrastructure. Steam is distributed using a Navy-owned piping network, originating at NAVSTA Newport's central steam plant which operates from October through May. On-base potable water and sewer systems are also operated by the NAVFAC public works office and NUWC Newport is billed by NAVFAC for amounts actually used.



About 250 new heat pumps with improved efficiency and integral condenser water controls will be installed in NUWC Newport's Building 1320 along with tamper resistant programmable thermostats.

The primary goal of the UESC project is to reduce the energy and water usage at NUWC Newport using measures determined to be cost-effective. Executive Order 13423 requires federal agencies to meet building energy use targets established by the National Energy Conservation Policy Act as amended by the Energy Policy Acts of 1992, 2005 and 2007.

Going even further, Executive Order 13514 directs agencies "to establish an integrated strategy towards sustainability and to make reduction of greenhouse gas emissions a priority." The ECM recommendations in the UESC project will provide NUWC Newport with the ability to reduce annual electricity consumption by 15 percent, decrease annual steam consumption by 35 percent and result in an estimated reduction

of 4,500 metric tons of carbon dioxide greenhouse gases per year. NUWC Newport's UESC project includes building envelope work such as window/door weather stripping and joint sealing. The scope of work is based on a methodical survey. This photo illustrates the use of tracer smoke to identify leaks. This work is projected to save \$183,000 per year.

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NUWC Newport is one of two divisions of the Naval Undersea Warfare Center. NUWC Newport's mission is to provide research, development, test and evaluation, engineering and fleet support for submarines, autonomous underwater systems, undersea offensive and defensive weapons systems, and countermeasures.



NUWC's other division is located in Keyport, Washington. 

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