

# PROFILE

## Norfolk Naval Shipyard

Portsmouth, Virginia



*NNSY performs authorized work in connection with construction, conversion, overhaul, repair, alteration, dry docking, and outfitting of ships and craft.*

**CLIENT** United States Navy

**FACILITY** Norfolk Navy Shipyard (NNSY)  
Portsmouth, VA

This shipyard in the Hampton Roads area is the nucleus from which has grown the largest naval base the world has ever known, the Navy's oldest and largest hospital, and a major supply center. NNSY has over 400 buildings encompassing 6.5 million sq ft.

**PROJECT** Design/build through an energy savings performance contract (ESPC)

**TECHNOLOGIES** Phase 1: DDC Upgrades; Lighting Retrofits, Controls, Daylighting and Re-wiring; Water Conservation, Compressed Air System Repairs; and VAV Coil Cleaning and Re-balancing

Phase 2: DDC Upgrades including New Electric Meters; Lighting Retrofits, Controls, and Daylighting; Compressed Air System Repairs; and Utility System Enhancements – Steam Improvements

**TIMELINE** Phase 1: Construction from October 2006 to May 2008

Phase 2: Construction from January 2010 to June 2011

**PROJECT COST** Phase 1: \$5,931,053

Phase II: \$7,372,046

**SAVINGS** Phase 1: \$676,656 (first year); \$9,500,910 (12 year term)

Phase II: \$686,709 (first year); \$12,971,002 (15 year term)

**SUMMARY** Projects were consistent with the current federal energy legislation and Navy energy policy to increase energy efficiency; install renewable projects where applicable; and reduce dependence on foreign oil. Specific NNSY

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## DETAILS

financial goals were achieved: 15 year finance term maximum, and reduced vulnerability to rising utility rates. Specific strategic goals were achieved: enhance competitiveness of NNSY through guaranteed energy cost with lower O&M cost; target high energy use buildings; include a variety of ECMs expandable to the entire base for a Phase II project (accomplished); and avoid skimming the “cream” by implementing only short payback energy measures. Additionally, because the Phase 1 project was ahead on schedule, Ameresco was able to complete an NNSY initiated contract modification during construction for miscellaneous HVAC and lighting re-wiring in the NNSY headquarters building with minor impact to the initial project schedule.

### Phase I:

High Efficiency Lighting Retrofit and Controls Upgrade ECM: This ECM was implemented in 16 buildings and provided for the replacement or retrofit of existing light fixtures with high-efficiency lamps, ballasts, and reflectors. In areas that were overlit, according to Illuminating Engineering Society of North America (IES) standards, fixtures were de-lamped. Also, this ECM added occupancy sensor controls to minimize lighting use during periods of non-occupancy. Lighting level photo-controls were installed to take advantage of ample daylighting available to make better use of the sun’s renewable energy.

DDC Upgrades ECM: This ECM was implemented in 5 large high energy use buildings and expanded the existing direct digital control (DDC) system that monitors and supervises the heating, ventilating, and air conditioning (HVAC) systems. It implemented sequences / strategies or corrected deficiencies in existing controls to minimize energy use and energy costs, including start-stop control and temperature setback. O&M costs are also being reduced through improved supervision and diagnostic capability and reduced equipment runtime.

Water Conservation ECM: This ECM was implemented in 42 buildings and provided for the retrofit or replacement of plumbing fixtures with low-flow components to reduce water flow including new china, new valves, shower heads and aerators. It results in cost savings for both water supply and sewage. Additionally, this ECM saves steam and electric heating costs by reducing hot water flow.

Compressed Air System Repairs ECM: This ECM was implemented in 10 buildings and provided for a compressed air system leak survey and repairs. Energy is saved by reducing leakage losses which, in turn, reduces the required output of the central air compressors, air dryers, and cooling towers. It also improves the performance of end-use processes by increasing available pressure.

### Phase II

The ESPC awarded for Norfolk Naval Shipyard (NNSY) is the second ESPC at NNSY and also includes St. Julien’s Creek Annex and utility upgrades at Portsmouth’s Naval Hospital collectively referred to as NNSY. The project will cost the shipyard \$12.8.M over a 15-year contract term. The project consists of four (4) energy conservation measures (ECMs): high-efficiency lighting upgrades, compressed air improvements, utility system enhancements-steam improvements, and DDC upgrades.

High Efficiency Lighting Retrofit and Controls Upgrade ECM: The high-efficiency lighting ECM includes: retrofitting 17,731 existing lighting fixtures with high-efficiency lamps, ballasts, and reflectors; replacing HID’s with T-5 high output fixtures equipped with occupancy sensors; and lighting controls to minimize lighting use during non-occupied times to take advantage of natural daylighting opportunities, a renewable technology. Phase II identification labels will be placed on the retrofits to delineate between Phase I and other lighting fixtures.

Compressed Air System Repairs ECM: The compressed air improvement ECM includes repairing air leaks from the compressed air piping system and associated valves and fittings at three (3) buildings at the shipyard. Also included is an annual compressed air survey to identify leaks during the term of the contract.

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Utility System Enhancements – Steam Improvements: The utility system enhancements-steam improvement ECM consists of replacing approximately 2,200 feet of steam and condensate lines and associated valves and traps at the Naval Medical Center Portsmouth with a pre-engineered pipe insulation system. The project will also eliminate two valve pits. The current lines will be capped and abandoned in place by the contractor. Infrared leak testing will be conducted every 5 years during the term of the contract.

DDC Upgrades ECM: The DDC upgrade ECM consists of the installation of new DDC controls for Heating, Ventilating, and Air Conditioning (HVAC) at fourteen (14) buildings at the shipyard. The new system will be interconnected to the existing Siemens Building Technologies System via the existing fiber optic backbone located throughout the Shipyard. A new fiber optic cable will be routed to incorporate one building where fiber doesn't exist. The system will implement features or correct deficiencies in existing controls in order to minimize energy costs, including start-stop control of HVAC systems and temperature setback for unoccupied hours. This ECM will include the installation of approximately 59 digital energy monitors (DEMs) in conjunction with the DDC Controls Upgrades. Final building locations for the meter installations will be determined jointly between Ameresco and NNSY at the time of installation.

In addition to typical Navy / industry M&V protocols employed for the ECMs, the project includes annual energy awareness on-site training to re-enforce the goals of this ESPC and to enhance the protection of the energy savings throughout the term of the contract.