USMC Bases Apply Latest Technology to Manage Energy Resources

System developed at Pacific Northwest National Laboratory addresses needs of military

By Richard Meador, Program Manager, Pacific Northwest National Laboratory

"Doing more with less" is a mantra heard by executives all across the country. It applies just as well to the United States military. In the 1990s, the Marine Corps in particular was looking for ways to cut energy use while facing growing load demands.

When military bases closed, many of the personnel were shipped to existing bases, which had to construct new buildings or overpopulate existing facilities. The result was a growing demand on the central energy plants at the same time Federal legislation and executive orders required a reduction of 35% in energy consumption in the Federal sector.

The answer for the Marine Corps was to call on engineers at the Pacific Northwest National Laboratory (PNNL) to develop a new technology to solve chronic load problems and implement better operations and maintenance practices. PNNL is operated by Battelle, of Columbus, Ohio, for the U.S. Department of Energy.

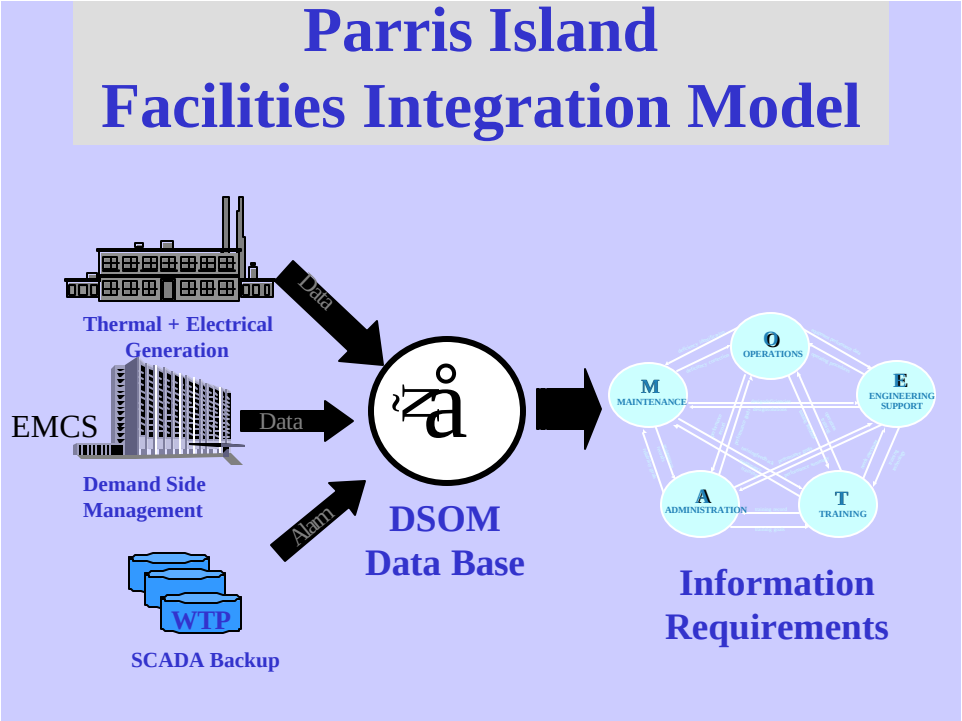
PNNL engineers designed the Decision Support for Operations and Maintenance, or DSOM®, a software system that integrates operations, equipment diagnostics, and maintenance programs. DSOM® was originally installed at the Marine Corps' Air Ground Combat Center in Twentynine Palms, CA, in 1994. In 2001, the DSOM® technology was selected by R&D Magazine as one of the 100 most technologically significant new products of the year.

At Twentynine Palms, the system deferred capital construction costs of $1 million that would have been required to meet new energy demands, and paid back the original investment in less than 4 years. What's more, the plant has had no critical equipment failures since the system was installed, thereby providing an extremely high level of reliability. The Marine Corps realized the benefit of looking ahead to how an investment today can mean fewer problems and greater savings down the road. As a result, a larger, more complex DSOM® system was applied at MCRD Parris Island in Beaufort, SC.

Parris Island is becoming the most energy efficient base in the U.S. Marine Corps. The initial project at Parris Island involved installing DSOM® II in the Central Energy Plant (CEP) in 2000 to aid in efficient generation of electricity to maintain peak demand below a penalty demand limit. Over the last few years, several DSOM® related projects have been undertaken at Parris Island to further reduce supply and demand energy consumption, and to provide better control over their co-generation and building systems.

PNNL's work at Parris Island was expanded to minimize electrical demand, minimize environmental impact, and to allow for a more effective distribution of limited manpower. The four major areas of activity are:

- Upgrading the CEP to the DSOM® II system,
- Upgrading the Wastewater Treatment Plant (WTP) Supervisory Control And Data Acquisition (SCADA) system with a DSOM® II-related technology,
- Installing the DSOM® II system in the remote Weapons Area Steam Plant (WAP),
- Installing a site-wide Energy Management and Control System (EMCS) for major energy intensive buildings and barracks at Parris with control activated by the DSOM® system at the CEP.



All of these components are tied in to the same information management system to allow a centralized management system to preside over the entire Parris Island energy landscape. Information is available for operations, maintenance, engineering, training, and administrative users. Having the WTP and WAP systems fully monitored by CEP staff has allowed manpower reductions to be absorbed with little to no impact on safety, reliability, and efficiency of services provided.

The DSOM® II system provides electrical demand information to the EMCS system in a load shedding schema that actually lowered the peak demand limit by 1 megawatt. At a predetermined level of demand, after engaging the EMCS initial load shedding schema, the DSOM® II system indicates to the CEP operators they must generate electricity up to maximum generation capacity in guided stages. At that point, if necessary, the EMCS load shedding software activates additional energy cutbacks up to a final level that

actually shuts down some equipment to prevent exceeding the peak demand limit. The first buildings under this EMCS load shedding scheme went on line in June 2001, and even with only control over a limited load, the program has resulted in preliminary savings figures of about $180,000 of electricity and lowering the peak demand for the summer months from 9.2 to 8.2 MW. As additional buildings come on line throughout the rest of this project, additional savings from this load shedding/CEP generation scheme are expected to be realized.

A similar EMCS upgrade program is in progress at Marine Corp Air Station Beaufort, SC. By the time peak demand periods approach spring of 2002, both Parris Island and the Beaufort Air Station will have a significant number of buildings on line, resulting in the capability to orchestrate a major reduction in energy usage. Parris Island and Beaufort Air Station Energy Management staff have taken a very proactive role in these energy reduction activities, working closely with PNNL and contractor staff to make implementation of these energy reduction technologies a successful reality.

PNNL-SA-36040 March 2002