Enabling Decision Making in Navy Energy—The GIS Way
How the Navy Shore Geospatial Energy Module Is Making It Happen
By Amy Hrdlicka, GIS, Inc.

Energy awareness is becoming a major focus for government entities across the United States as the need to combat rising costs and increasing demands place it at the forefront of policy objectives. Budget constraints across the military services put further emphasis on the need to secure the nation’s energy supplies and create federally mandated programs. The US Navy Energy Program’s mission is to “ensure energy security and achieve legal compliance to support the warfighter.”

The Goals of the Navy’s Energy Program
Commander, Navy Installation Command (CNIC), has responded by creating the CNIC Energy Program. The CNIC Energy Program was instated to provide guidance, policy, and tools for implementing mandated energy reduction and sustainability practices within the navy. The main goals of the program are to achieve a 50 percent reduction in energy consumption and be at 50 percent usage of renewable energy, thereby placing the navy at 50 percent net zero participation by 2020.

To meet these goals, CNIC adopted a Facility Energy Strategy that consists of innovation, expansion, and awareness. Measures are implemented at facilities to reduce energy...
demands across installations such as replacing old windows and installing new heating systems. In addition, the navy is seeking out and utilizing renewable and alternative sources like wind turbines and solar panels. As the program expands, energy usage will become highly visible, and the culture will change.

Advancing new technologies is key to the program’s goals in all areas. Installing smart meters on buildings will streamline the capture of data. Leveraging the business systems that contain energy consumption information and combining them with others will create powerful tools for the program managers. The program aims to provide a means of measurement and verification and, most importantly, the knowledge base to make more informed decisions.

ArcGIS Streamlined Data Meeting the Navy’s Goals

The CNIC Energy Program manager, Sandrine Schultz, had a vision of an overarching geospatial tool that would provide the navy with centralized information access for tracking, measuring, and planning to meet the program’s goals. Previously, there was no effective way of visualizing and displaying the important tabular data in the business systems that tracked energy usage. Schultz knew GIS, Inc., was already supporting the Navy GeoReadiness Enterprise System, including the GeoReadiness Explorer (GRX), hosted and maintained by Naval Facilities Engineering Command (NAVFAC). GRX is NAVFAC’s enterprise map viewer application, containing worldwide geospatial data and services for business lines across the navy.

Schultz contracted GIS, Inc., to review current capabilities, define requirements, and build energy dashboard functionality within GRX. GRX is constructed on a .NET Framework using Adobe Flex 4.5.1, ArcGIS API for Flex 2.5, and ArcGIS Server 9.3.1. The geospatial solution would leverage that existing framework and ultimately become the Navy Shore Geospatial Energy Module (NSGEM).

As the NSGEM team started development, the data sources were gathered and compared. Initial benchmark scores were calculated for energy consumption and goals for reduction set. This in turn established the baseline metrics needed to go forward with the program’s mission. A gap analysis was performed initially to identify disparities between the main data sources: iNFADS, the navy’s real property database; CIRCUITS, the
utility allocation and billing system; and the GeoReadiness worldwide geospatial data. This effort pinpointed further needs and issues and generated the Data Quality Score shown in the current interface. Data validation and correction are key components, and one of the most challenging aspects, to providing NSGEM functionality.

“What’s very important is for people to become accountable for their data,” Schultz says of the navy data owners. “Their data is really telling their story.”

Processes were then built to extract, transform, and load the tabular data from the business systems into spatial data that is then published through ArcGIS for Server as a map service. The published map service contains layers depicting energy consumption and reduction efforts at the regional, installation, and facility levels. The map publishing process is done via a web application called Map Publisher. The GRX map viewer is the front end of the system, and while the bulk of the NSGEM functionality revolves around the dashboard and various tables and charts, it does leverage this existing map viewer base to display and navigate to spatial data.

Agnes Sullivan, Regional Energy Program manager, Commander Navy Region Mid-Atlantic, says NSGEM is “really useful because you can visually see and manipulate the tool in various ways that serve the user. It is not limited to generic automated reports and can customize or drill down to whatever levels you need to see.”

The Post-NSGEM Release Outcome
Upon the initial release of NSGEM in November 2012, it became apparent that myriad individuals throughout the navy echelons have a stake in its functionality and
future, with each echelon requiring different reporting and analysis needs. One measure taken to support headquarters was the creation of regional energy map books (REMBs). ArcGIS 10.1 and customized Python scripting were leveraged in an automation process for map book creation that employs the NSGEM data. These automated processes provide high-level, quality cartographic outputs for the leadership at CNIC and NAVFAC to be able to view statistics and consumption information in PDF format for which users do not have to access a separate application.

“NSGEM is transforming navy facilities energy management the same way search engines transformed Internet searches. With NSGEM...we are able to see the status of our energy efforts quickly and easily. [This] enables...energy managers with a view of the future,” said Paul Waxman, energy manager for Naval Air Command.

While the primary function of NSGEM and the REMBs is heightened awareness and easier accessibility of energy consumption information, Schultz says the overarching end goal is to increase data credibility while identifying potential savings on energy consumption. NSGEM provides the US Navy Energy Program with a one-stop shop for viewing and using consumption data to make more informed decisions. CNIC and NAVFAC now have the ability to reveal the story of data that has been trapped in a business system and to smoothly and dynamically transition across all necessary temporal (many years), spatial (zoom in/zoom out), and organizational (world, region, installation, and facility) scales.

NSGEM is geospatially enabling the Energy Program with tools to track and measure progress to reduction goals, pinpoint specific areas for improvements or restorations, view new and alternative energy sources geospatially, create sustainable practice methods, and increase overall energy usage awareness. “Geospatial capabilities are changing the way that we all do business...We turned data into decisions,” said Schultz.

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