

# Chiller Plant and VAV Conversions

## Eglin Air Force Base, Florida



### Savings Information

- Annual Energy and Operational Savings over \$669,500

### Project Size

- \$6.8 Million

Southern Company of Atlanta, Georgia, competitively selected ESG to develop a Feasibility Study and an Implementation Proposal, complete design documents, and construct a project for Eglin Air Force Base based on ESG's reputation, qualifications, and business relationships with Southern Company. ESG's Feasibility Study, Implementation Proposal, and Task Order Award were accomplished in only ten months. Most notably, neither the Feasibility Study nor the Implementation Proposal generated any negative review comments. The ESG Team worked with Eglin AFB to identify and prioritize their greatest needs in developing a high-value solution. In contrast to previous ESPC work by other contractors, the ESG project includes long-payback capital replacement projects (boilers and chillers) and a technically challenging chilled water variable flow distribution project.

### Strategies & Solutions

Five energy conservation projects were implemented: A chilled water optimization project; Chiller replacements; Boiler replacements; Energy management controls upgrades; And lighting upgrades. Although no savings guarantees were required under this contract, ESG estimates annual savings of approximately \$669,500, in addition to over \$400,000 in future capital cost avoidance. Eglin AFB is actively engaged in using alternative financing contract vehicles to meet federally mandated energy reduction goals and improve HVAC infrastructure system reliability. The Energy Policy Act (EPA) of 2005 and hurricane-related events in the Gulf Coast spurred Eglin's desire to implement the work quickly and continue future energy conservation efforts. ESG successfully constructed the project while maintaining an excellent rapport with facility leadership, maintenance staff, and building occupants. This team approach generated rewarding results, as the aggressive construction schedule was met with all parties pleased with the final renovation work.

### Key Installed Technologies

- Audited 62 buildings totaling 2.4M sqft
- Installed two 450-ton VSD chillers
- Converted a chilled water plant operation to variable flow by installing over 60 two-way pressure-independent control valves and three new variable speed chilled water pumps
- Installed two 100-BHP steam boilers
- Installed a new Invensys DDC controls in nine facilities, and integrated these into the LAN based EMCS. Enhanced remote monitoring capability at existing central station
- Retrofitted or replaced 12,310 lighting fixtures and implemented daylight harvesting and occupancy controls



# Chilled Water Upgrade & Lighting

## Eglin Air Force Base, Florida



### Savings Information

- Annual Energy and Operational Savings over \$503,00

### Project Size

- \$6.5 Million



The personnel assigned to this project have done an outstanding job. The field surveys were very thorough and as a result they have provided a complete and viable project. They did an excellent job of coordinating with all responsible parties and keeping us apprised on the status of this project. Their professionalism and exactness to detail along with their technical abilities were demonstrated.

**James A. Mardis,**

*Eglin Cathodic Engineer*

Gulf Power Company of Pensacola, Florida, competitively selected ESG to develop a Feasibility Study and Implementation Proposal, complete design documents, and construct a second project for Eglin Air Force Base (AFB). The selection was based on ESG's reputation, qualifications, business relationships and, most importantly, exceptional work on Energy Conservation Measure (ECM) 1, which was completed on time and under budget in 2007. The ESG team worked with Eglin AFB to develop a plan that prioritized energy and infrastructure needs. ECM 2 combined traditional Energy Conservation Projects (ECPs), such as lighting retrofits and infrared heat installations, with innovative solutions such as roof-mounted solar collectors to provide hot water for the Non-Commissioned Officers (NCO) Club. This project also included long-payback capital replacement ECPs, such as HVAC system replacements, and a technically challenging chilled water variable-flow distribution project for a critical communications facility.

### Strategies & Solutions

Seven ECPs were implemented: Lighting retrofit; HVAC system replacements; HVAC controls and commissioning; Chilled water plant replacement; Boiler replacements; Infrared heating installation; And solar water heating. Although no savings guarantees were required under this contract, ESG estimates annual cost and future capital cost avoidance savings of over \$503,000.

### Key Installed Technologies

- Retrofitted or replaced thousands of lighting fixtures, and implemented day-light harvesting controls in an aircraft hangar.
- Installed a new 20-ton split system heat pump with new mechanical room duct-work, electric duct heaters, and network-ready DDC controls system with associated graphics for the existing Graphical User Interface.
- Converted existing 1,200-ton constant-flow system to variable-flow by installing two-way pressure-independent chilled water valves, pumps, chillers, and cooling towers in a variable primary-flow configuration.
- Installed three new gas-fired hot water boilers, gas piping, stacks, vents, hot water piping, and other related components.
- Installed new Invensys Network 8,000 DDC systems, and recommissioned several existing building control systems.
- Installed new gas-fired, low-intensity infrared heating systems in two maintenance facilities.
- Installed roof-mounted solar collectors, a solar storage tank, circulating pump, and related hot water piping, equipment, and controls to serve the NCO Club.



Energy Systems Group (ESG) is a leading energy services provider that specializes in energy efficiency, sustainability, and infrastructure improvement solutions in the government, education, healthcare, commercial, and industrial sectors. ESG offers a full range of sustainable infrastructure solutions including waste-to-energy, distributed generation, and renewable energy.

# Controls RCx & Chiller Replacement

## Eglin Air Force Base, Florida



### Project Size

- \$0.7 Million

### Environmental Benefits

The controls system components upgrade will reduce energy costs by updating and maintaining set-back/set-up space temperatures and humidity levels. The new chilled water systems will greatly improve Eglin AFB's energy reliability while reducing energy consumption.



The project was well managed and exceeded customer expectations.”

**James A. Mardis,**  
Eglin Cathodic Protection  
Engineer

Eglin Air Force Base (AFB), Gulf Power Company, and the Mid-Bay Bridge Authority (MBBA) of Niceville, Florida signed a three-party agreement for a value-based transaction (VBT) to transfer funds from MBBA's lease of Eglin AFB property to Gulf Power Company in exchange for performing work at the Base. Gulf Power Company selected ESG to develop a detailed design package, submit construction documents, and build an infrastructure improvement project for Eglin AFB. ESG has already constructed two projects at the Base under its Utility Energy Savings Contract (UESC) with Gulf Power in 2007 and 2009, which have generated approximately \$1.1 million in annual cost and cost avoidance savings for Eglin AFB.

### Strategies & Solutions

This firm-fixed price contract had a defined scope of work for three energy conservation measures (ECMs):

- ECM 1: Controls Retro-Commissioning of Existing Network Systems in Six Buildings. Work included point-to-point checks on wiring, control function, calibration of analog points, and sequence of operation testing. Controllers were reprogrammed as necessary to incorporate several control strategies: zone temperature set point adjustments; outside air damper control; scheduling and night setback/setup controls; heating/cooling system control optimization; and proportional integral derivative tuning.
- ECM 2: Energy Management Control System (EMCS) Upgrades. ESG installed new zone temperature sensors, modified EMCS server screens in three buildings, and removed and replaced any sensors that were either malfunctioning or no longer operable.
- ECM 3: Chiller Replacements. After existing chillers were removed in three buildings, ESG evaluated each building's cooling needs in order to properly size and install new chillers to meet the necessary load requirements. Air-cooled chillers were installed utilizing the latest technology. The oil-free centrifugal compressors use magnetic bearings and variable-speed drives to deliver unparalleled efficiencies compared with conventional models. Chilled water pumps, piping, valves, and strainers were installed, and each chilled water system was tested, adjusted, and balanced.

### Key Installed Technologies

- Retro-commissioned existing controls systems in six buildings
- Installed new, state-of-the-art chillers in three buildings
- Reprogrammed DDC controllers
- Installed zone temperature sensors and modified EMCS server screens



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# Energy Management System Upgrade

## Eglin Air Force Base, Florida



### Savings Information

- Annual Energy and Operational Savings over \$2.3 Million

### Project Size

- \$6.7 Million

### Environmental Benefits

This project supports the 2008 Air Force Infrastructure Energy Strategic Plan, which was developed to help meet energy conservation goals specified in Executive Orders 13423, 13514, and EPACK 2005. It also reduces the Base's annual energy use by approximately 99,000 MMBtu.

Other major benefits included simplified and automated generation of utility billing and energy reporting as well as streamlined certification and accreditation requirements for existing HVAC controls and utility metering networks.

Gulf Power Company of Pensacola, Florida, competitively selected ESG to develop, design, and implement an energy management system (EMS) upgrade at Eglin Air Force Base (AFB). The solution consisted of building a new secure network dedicated for communication with existing facility automation systems, including both the HVAC Direct Digital Controls (DDC) and advanced utility metering systems. The new EMS utilizes energy management software capable of accessing real-time and archived data from disparate automation systems for use in dashboard displays, reporting, and diagnostic analysis. In addition, the EMS network solution complies with all government information assurance requirements. Based on its savings-to-investment ratio and priorities emphasized in the Energy Policy Act of (EPACT) 2005, Executive Order 13423, and the Energy Independence and Security Act of 2007, this project received FY 2011 Energy Conservation Investment Program (ECIP) funding.

### Strategies & Solutions

ESG surveyed 151 buildings totaling over five million square feet and, along with Eglin AFB, determined the best value for utilizing the ECIP funding at the Base. Work included installation of network IT infrastructure; upgrades to the HVAC controls system by installing Enterprise network controllers and components for implementing energy conservation strategies; an energy management software platform and associated programming that provides useful, integrated data from the HVAC controls and utility metering systems for energy analysis and reporting; development of a utility billing software tool; and development of a Strategic Energy Master Plan, which serves as a model for other facilities/agencies.

### Key Installed Technologies

- A stand-alone network for communication with HVAC controls and utility metering systems at 144 locations utilizing fiber-optic, wireless, and hard-wire infrastructure
- Override timers and space humidity sensors to facilitate runtime control strategy in 72 buildings (206 zones)
- An Energy Management System (EMS) system capable of displaying real-time and archived energy as well as operational data for each building
- Assistance with energy management report generation
- A large screen monitoring station at the Energy Management Center and 10 additional network-connected computer stations
- A programming interface with the existing Sensus™ utility metering system and Niagara™ HVAC controls network to import historical and real-time data into the new EMS



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