Energy Reduction at West Point: A Systems Approach to a Cultural Problem

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Abstract: The West Point Energy Council (WPEC) sponsors a Cadet Capstone seeking solutions to the overconsumption of electrical energy at the United States Military Academy (USMA). USMA routinely exceeds the electrical quota as set in its contract with Orange and Rockland Utilities, the local power company. As a result, the Academy is at risk to losing access to all electricity from its power provider. WPEC asks the Cadet Capstone to focus on the base-load usage of the Academy rather than specifically targeting reduction of peak usage. Comprehensive literature review suggests a building’s heating, ventilation, and air conditioning (HVAC) systems as well as lighting are the biggest contributors to energy base-loads. The Capstone focuses on affecting those systems, which in turn lowers the base-load, through policy change. Our research reveals cadets are unaware of USMA’s dire energy situation. This lack of awareness is the main driver of energy inefficiency at the Academy at the cadet level.

Keywords: Energy Usage, United States Military Academy, Net Zero

1. Introduction

The United States Military Academy (USMA) at West Point, New York is a four-year undergraduate degree granting institution. USMA is headed by a Superintendent and the study body consists of cadets. Cadet are simultaneously earning a bachelor’s degree and commission into the United States Army upon graduation. Within USMA are many organization supporting and accomplishing USMA’s mission. One of these organizations, the West Point Energy Counsel (WPEC), advises the USMA Superintendent on all energy matters. Of particular interest to WPEC and the Superintendent are opportunities reduce the energy usage of the Academy. USMA currently uses more than one mega-watt more than the negotiated contract allows for. This is significant for two reasons. First, Orange and Rockland Utilizes charges significantly higher prices each time the Academy exceeds the contracted upper-limit. Second, in the event of high demand, USMA is at risk for brown-outs. The cadet capstone, consisting of four systems engineers, focuses on generating cadet level solutions favorably impacting USMA’s energy bill and reducing the risk for brown-out. This capstone specifically focuses on areas of USMA directly and easily accessible by cadets.

Underneath the USMA umbrella is the United States Corps of Cadets (USCC). USCC is USMA’s student body. USCC is organized into one brigade consisting of four regiments. A regiment consists of three battalion each with three companies. At every level, cadets are assigned duties and positions. The company, regiment, and brigade all have Environment/Energy Officers (E2O). Currently, these positions are focused on annual recycling drives. This presents an opportunity to develop these position into something slightly more robust. More specifically, our project team seeks to expand the duties of the E2O to include monitoring energy consumption in cadet barracks, educating cadets on energy usage, and ensuring compliance with current energy policy.

2. Background

We utilize a systems approach to model our problem, specifically, the Systems Decision Process (SDP). The SDP a set of procedures for solution design in a multidisciplinary environment, ensures the needs of the stakeholder and decision makers are met, evaluates candidate solutions for adherence to project requirements, and emphasizes effect of environmental factors on project solutions. The SDP turns a problem into a solution through its four phases.