

## Executive Summary

The Grunenwald Science and Technology Building is the new laboratory and classroom building for Clarion University. The mechanical system does use sustainable ideas and energy consumption reduction as a basis for the initial design approach. The building implements 5 VAV AHU's, 3 of which are 100 percent outdoor air for the laboratory spaces which make up 50 percent of the building. The other 2 AHU's are standard VAV systems that use an economizer with CO2 measurement controlling the damper for outside air and serve the classrooms and offices in the Science and Technology Building. The Building uses (2) 250 ton centrifugal chillers which are water cooled by 2 cooling towers. Hot water is produced by passing the campus generated steam through a plate and frame heat exchanger with water, and the water is used in the pre-heating and heating coils of the AHU's. The sustainable design approach can be seen in the energy efficient equipment selected for the building.

The intention of this proposal is to further minimize the energy consumption of the building while not adding a substantial first cost. In order to achieve the energy reduction for the building lowering the effective carbon footprint, several alternative designs have been proposed. These alternative designs are: lab exhaust fan redesign, Dedicated Outdoor Air System with a parallel system, and Geothermal Heat Pumps. The implementation of each of these alternatives will need to be integrated into the Science and Technology Building Systems. The systems will be researched to determine the best possible solution for the building. The best alternative will be determined by which best met the goals of the building project for sustainable and energy efficient.

To analyze the alternative systems energy modeling programs will need to be used along with Labs21 when analyzing the exhaust fan redesign. The other tools that will be used are: energy modeling programs, Trace 700, HAP, or eQuest, ASHRAE Standards, and local building codes.

The breadths that will be studied are architectural, and construction aspects of the project. For the architectural breadth the addition of solar shades to the building facade will be analyzed, while for the construction breadth will study the implementation of the geothermal system.