

Executive Summary

The following report explains the energy analysis of the Clemson University Advanced Material Research Laboratory. Many different approaches were used to evaluate the energy of the building.

A checklist from the U.S. Green Building Council's LEED for New Construction was used to evaluate the building in all aspects. Clemson University ARML proposed 38 out of 62 credits. The certification goal for this project is Silver. The project proposed credits in the following categories: Sustainable Sites – 9, Water Efficiency – 4, Energy and Atmosphere – 4, Materials and Resources – 4, Indoor Environmental Quality – 12, and Innovation and Design – 5. These will be expanded later in the LEED-NC Certification section.

ASHRAE Standard 90.1 is a tool which evaluates the building envelope and lighting systems used in the building, not the mechanical energy performance. This standard requires no more than 50% of the building envelope to be glass. Clemson ARML meets this requirement with having only 15.9% fenestration. ASHRAE also requires a lighting density less than 1.1 W/sq ft in order to save energy. After running the calculations using the Space-by-Space method, most of the spaces comply with this requirement.

The total amount of lost rentable space was calculated to be 30.4%. Since Clemson University ARML is mostly research laboratories, there is a gross amount of equipment for this type of building. After this, the mechanical first cost was calculated to be \$3,024,000, with a cost of \$25.85/sq ft.

Carrier's Hourly Analysis Program (HAP) was used to calculate the loads on the building and also to perform an energy analysis on the building. With this program, the annual energy consumption and operating costs were found, along with the yearly energy utilization data.