



Executive Summary:

The Tahoe Center for Environmental Sciences provided many opportunities for developing an integrated, eco-friendly set of building systems. Some of the many design challenges included creating a LEED platinum building, ensuring all the systems fit with the architecture, integrating all building systems to make sense as a whole functioning unit and providing the client with the best possible building. The following report contains design information pertaining to a new lighting system for four rooms, new electrical systems, an in-depth LEED analysis, and a mechanical systems investigation.

The lighting depth covers four spaces: the exterior entryway, the main lobby, the case study classroom, and a chemistry lab. An in-depth analysis of the design criteria for each space lead me to appropriate designs for each room. Each room focuses on integration of fixtures, controls and architecture. Also of top importance is energy consumption. I chose efficient sources to achieve a high degree of energy savings. Additionally, I performed a daylight analysis on the lobby floor to determine light levels in that portion of the lobby.

The electrical depth focuses on the design of a cogeneration system, a photovoltaic system, and an overall electrical system. Prior to the analysis an eQuest energy simulation was performed to determine electrical Loads on the building. I installed two 30kW cogeneration units, along with transformers to step down from 480V to 208V. In addition, 60kW of photovoltaics were installed to attempt to generate power for the building and gain an additional LEED credit. The electrical system in the building was adjusted to accommodate the new systems, including the new lighting loads installed.

The LEED analysis breadth performed involved a detailed look into the points attained, those not attained, and those that were questionable as to whether they would be attained or not. I attempted to more accurately determine exactly how many points would be gained by finding points that were not obtained and seeing whether they could be achieved or not. Of particular interest was the credit for producing 20% of the building's energy with renewable resources.

The mechanical breadth involves using the output from the eQuest energy model to determine the feasibility of installing six solar hot water heating panels. The heat output from the cogeneration units was also considered when designing the panels.

The new lighting design, electrical system, and the hot water analysis and LEED analysis provide the Tahoe Center for Environmental Sciences with a fully functioning, efficient, and well integrated set of building systems. These systems will not only provide the functions they were designed for, but also will serve as learning tools for the students and faculty using the building.