

EXECUTIVE SUMMARY

Energy Efficiency

Maintaining energy efficiency in academic buildings is critical for conserving future electricity and natural gas consumption on the main campus. It is important for the university to evaluate methods of optimizing energy demands in the summer and winter months, such that the university can maintain building use efficiency with future building construction and reduce energy bills for each fiscal year. Recommendations include:

- Increase indoor cooling temperatures to 76 °F during the summer months and decrease indoor heating temperatures to 66 °F during the winter months to save on energy costs from space heating and air conditioning.
- Install the Stem Solutions Battery Storage and solar panels on the main campus to reduce electricity consumption during peak hours of the day.

LEED EBOM

Argyros Forum is the center of Chapman's main campus culture. This chapter looked at the building's potential to become a LEED EBOM certified building. By taking a step forward and pursuing green building certification for Argyros Forum, Chapman would demonstrate its commitment to the sustainability policy. Through analysis of Argyros Forum, several changes can be made to create a more environmentally sustainable building.

- One major effort that can be made is to conduct a through lighting retrofit. Findings suggest that many lighting fixtures are very inefficient and do not meet the needs of building occupants.
- Another major recommendation is that Argyros Forum and Chapman University as a whole should implement a sustainable purchasing policy.

Main Campus Retrofits

Chapter 3 focuses on Main Campus Retrofits, specifically lighting retrofits in three main campus buildings: Demille Hall, Smith Hall and Roosevelt Hall. In 2014, the cost for lighting in these three buildings account for 27% of the cost of electricity in these three buildings. Recommendations include:

- Decrease time that hallway lights are on. Turning off hallways lights for 12 hours a day would result in a savings of over 37,000kWh per year, or a 22% energy reduction in lighting in the three buildings.
- Replacing existing 28W fluorescent T8 fixtures with 18W LED T8 fixtures would result in 35.7% energy reduction, which is a savings of 61,000kWh per year and a savings of over \$8,380 from the 3 buildings.

On Campus Behavior Change

Inducing behavior change over a large body of people has proven to be a difficult task. Nonetheless, it is an important approach to reducing energy consumption and cutting costs. Recommendations within this chapter include:

- Implementing mandatory sustainability training sessions every year for new Chapman employees that are also open to all existing staff and faculty.
- Starting a “Casual Friday” where staff and faculty can dress for slightly warmer temperatures within the office spaces and classrooms.

Retro Commissioning in the Residence Halls

Residence halls constantly demand energy, gas, and water demand and even more so as Chapman University's student population continues to grow. It is essential to target areas of high-energy consumption in order to initiate retro-commissioning projects to combat rising utility costs. Recommendations include:

- Installing Telkonet system throughout Pralle, Henley and Glass hall to centralize and manage HVAC controls, which account for 17-49% of total energy use in residential buildings.
- Install a separate meter for South Morlan and North Morlan to track energy savings after South Morlan is remodeled and to aid in behavior change and Ecolympics.

Retrofits in Residence Halls

Resident Halls are one of the most occupied buildings at Chapman University and it comes as no surprise that the electricity consumption of these buildings are high. In 2014, the university paid \$176,000 for lighting alone. To address the inefficient and wasteful use of

electricity, it is important to take a look at lighting fixtures, daylight harvesting methods and installation of occupancy sensors in the halls. The following recommendations will cut the electricity bill to \$112,000. Recommendations include:

- Retrofit of outmoded T12 and T8 light fixtures to T8 LED 18 watt light fixtures
- Installation of occupancy sensors will lower the total on-time of hallway light fixtures, cutting electricity consumption down.

Residential Behavior Change

On-campus student population is on the rise again. Retrofits and retro-commissioning projects can buy time but they alone will not have a large enough impact to keep up with student energy demand. Now is the time to foster an on-campus community that is conscious of conservation and willing to save energy.

- Re-invest in Eco-Olympics for the upcoming Fall 2015 semester. Collaborate with the Office of Housing and Residence Life's Fenestra Residential Program and focus campaigns within the incoming freshman student demographic.
- Invest in a utility dashboard to accurately measure the on-campus student energy demand in real-time. Subsequently allowing for predictive analytics and research into the emerging field of energy behavior change.

Policies, Standards and Scheduling

Policies and standard regulations are highly beneficial. They enhance productivity, increase innovation, and provide a resource of guidelines and procedures. This chapter of the 2015 Building Construction and Energy Use Audit recommends the establishment of permanent subsections within Chapman University's sustainability policy, consisting of:

- An Energy-Use policy
- A Building-Use policy
- A New construction policy