# Project #1: Design of an Energy Visualization Tool

## Background

Buildings are responsible for 40% of CO<sub>2</sub> emissions in US. Most of these emissions come from the combustion of fossil fuels to provide heating, cooling and lighting, and to power appliances and electrical equipment. Most buildings waste a significant amount of energy on inefficient operation and UC Davis is no exception. However, UC Davis is committed to improving its operational energy efficiency and eliminating waste and has commissioned a team in Facilities Management to identify and eliminate energy waste in its campus buildings. The Energy Conservation Office (ECO) is leading this effort and is looking for students interested in joining their team.

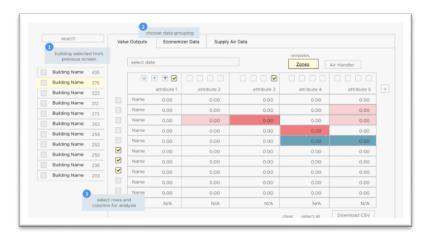
The ECO has developed the Campus Energy Education Dashboard, or CEED (<a href="http://ceed.ucdavis.edu">http://ceed.ucdavis.edu</a>, to help the campus community better understand energy use in buildings. They have also developed the TherMOOstat (<a href="http://thermoostat.ucdavis.edu/#/map">http://thermoostat.ucdavis.edu/#/map</a>) a thermal feedback app for students, faculty and staff to send feedback on room comfort issues and take part in our energy investigations across campus. The ECO is now interested in developing additional online tools for displaying, reporting, and interacting with UC Davis' energy data.

## **Project Description**

Students working on this project will assist in the design and implementation of an Energy Visualization Tool that will enable ECO staff to pull, analyze and visualize Heating, Ventilation and Air Conditioning (HVAC) datasets. The Energy Visualization Tool will be used by ECO engineers and other technical users in the optimization of HVAC systems and identify operational issues and opportunities for energy efficiency upgrades.

The project team will design and build an Energy Visualization Tool:

- Help the ECO make building HVAC data accessible via the development of a web application
- Full stack development: MERN stack (MongoDB, Express.js, React and Node.js)
- Query the data using the given RESTful API
- Pre-process queried data to the stakeholders needs
- Visualize the data in a flexible and interactive format
- Test and improve the software with stakeholders feedback
- The Tool will be expected to integrate into the standards of UC Davis AdminIT group



Above Image: One option for tool user interface

### Outcome

- A working prototype of the Energy Visualization Tool, and demo for ECO engineers
- The students will be expected to deliver the Tool's source code in Github
- Comprehensive documentation of the code is required

#### Skillset

- The ideal team will have experience with database APIs (retrieving data), pre-processing data, and data visualization tools
- HTML, CSS, and Javascript (web development)
- · Knowledge of React, Node.js, and MongoDB are definitely a plus