

Societal Problem:

A growing issue in modern societies is the ability to supply electrical power to all. With the recent black outs seen by California, our team took to finding a new solution to prevent strain on the grid.

One of the aspects of energy use we decided to focus on was electrical lighting. The U.S Energy Information Administration found that lighting uses “219 billion kilowatthours (kWh) of electricity”. By designing a system that can reduce this energy we can produce a more stable grid.

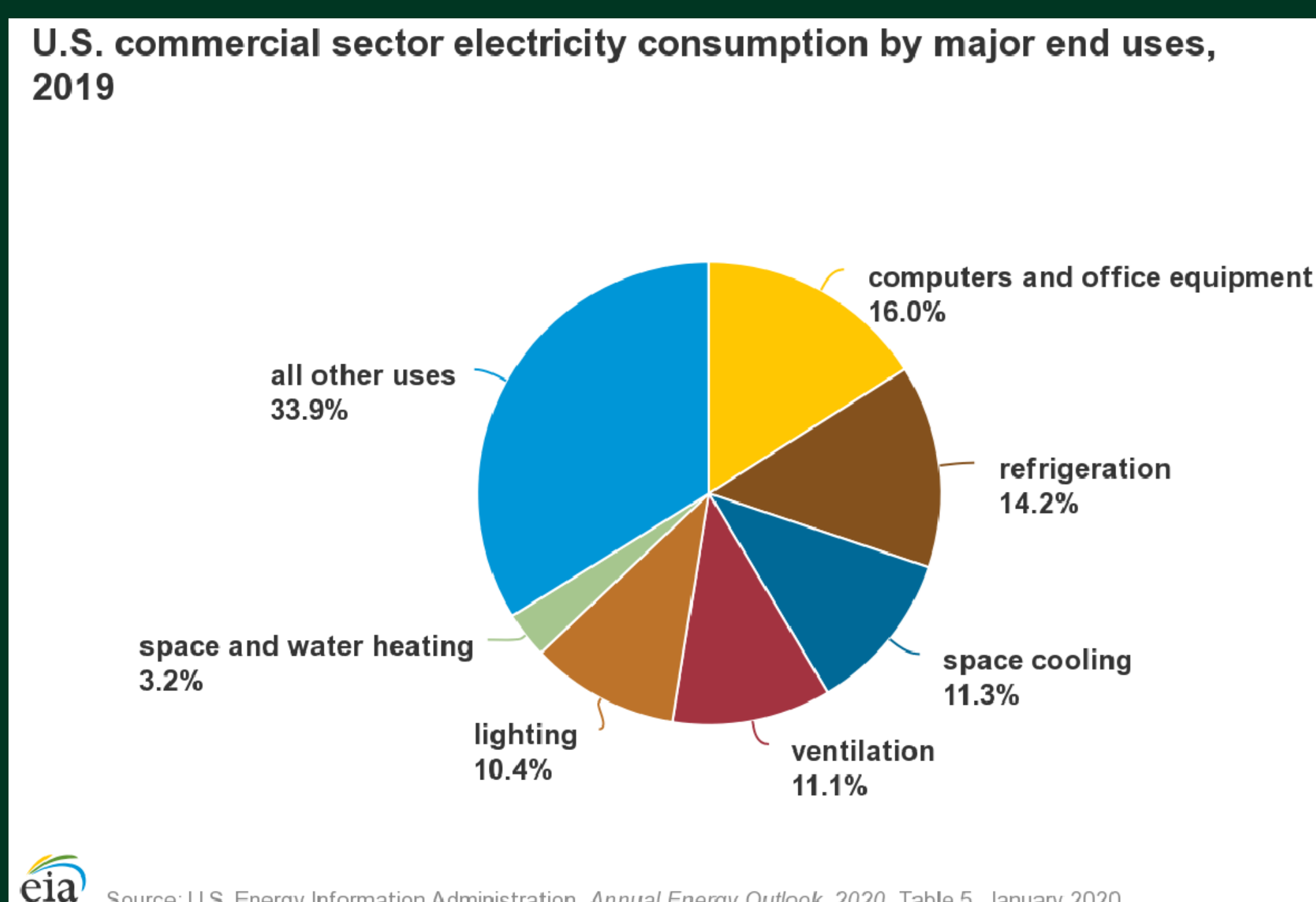


Figure 1: Commercial sector energy usage

Design Idea:

The Solar Lighting system integrates a solar tube with reactive lighting, allowing a room to be illuminated by natural light. The unit will maintain constant luminosity using sensory data and microcontrollers while recording and reporting the amount of energy saved. The system will be combined with a solar panel and charge controller to enable off grid use.

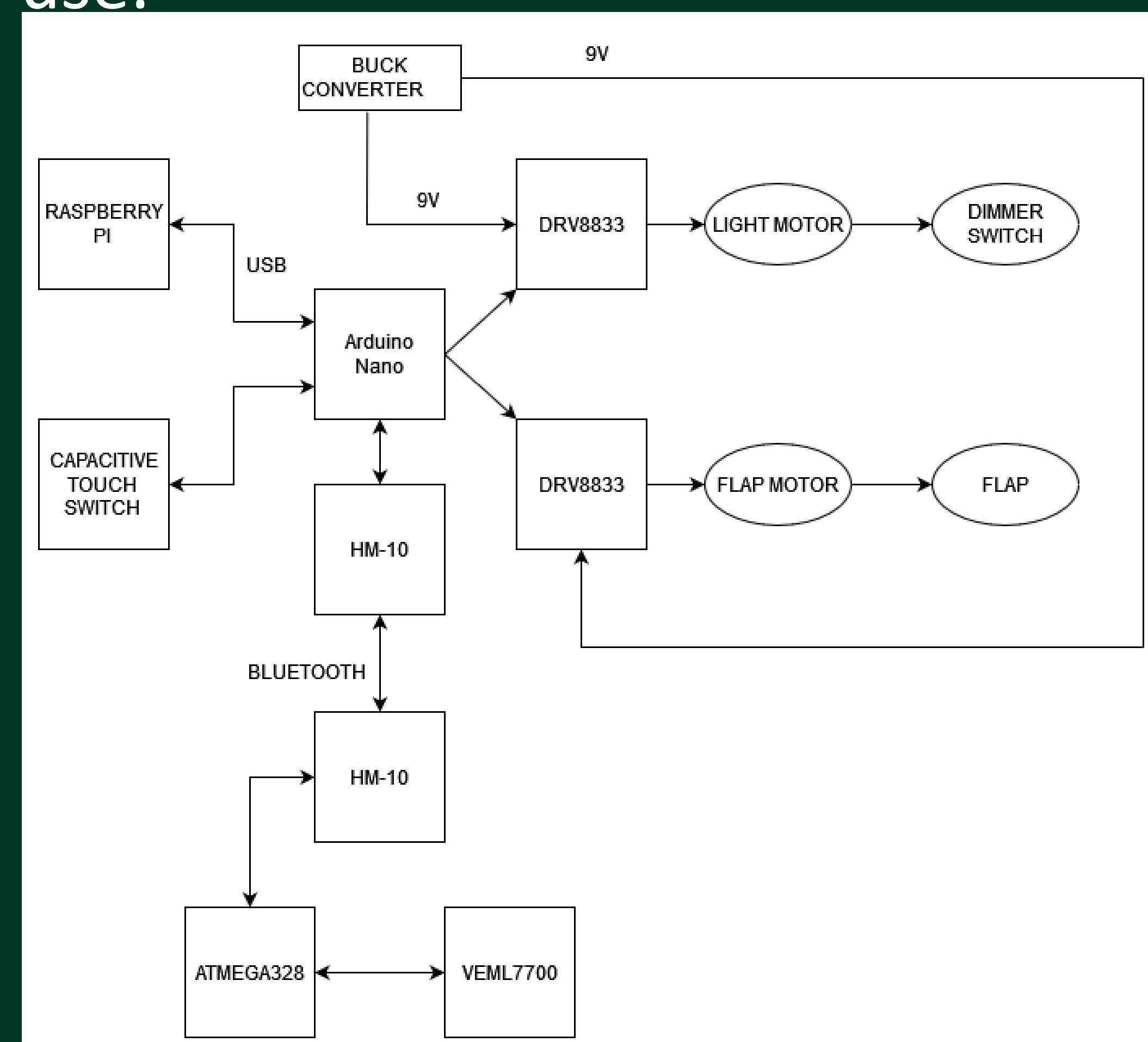


Figure 2: Block diagram of completed system

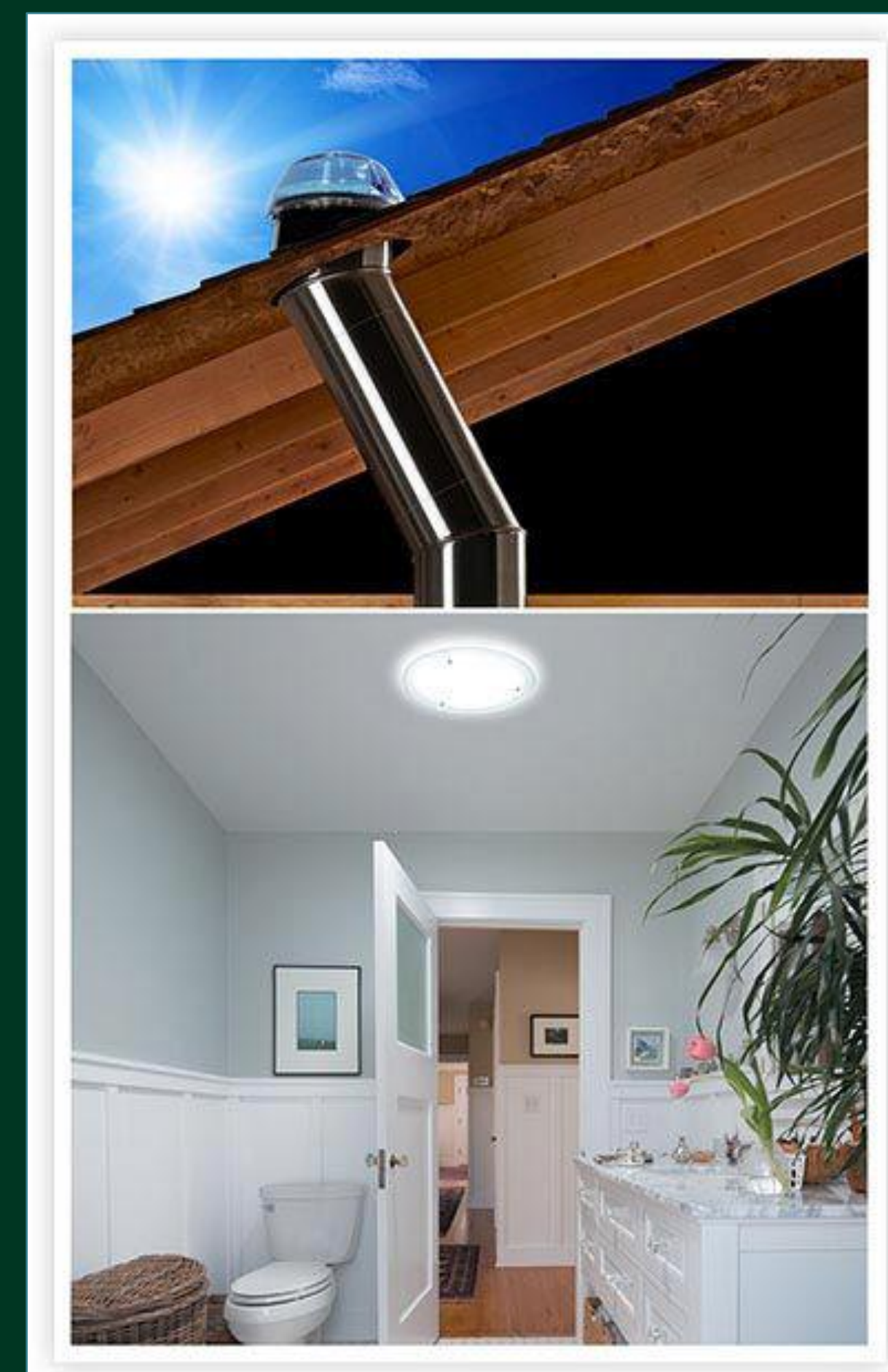


Figure 3: Solar tube illustration

Features:

- Control box that will maintain a lighting set point received from the User App
- User application will allow the user to see and change the system's values like light level and set point.
- Physical switch is used to control the system's ON/OFF state without support of the User App.
- A solar tube covering to block sunlight when system is not in use
- Solar panel and charge controller for capturing and storing electrical energy from the sun

Impact on Community:



Figure 4: Electrical lighting vs. Solar Tube

A major benefit of the Solar Lighting system is that it can reduce a communities overall expenditure of electrical power. This can help reduce strain on the grid and prevent future blackouts.

Also, most people much prefer natural light to artificial light, and the introduction of sunlight into the workspace can greatly improve moods as well as increase the uptake of vitamin D in the body.