Reducing Electricity Consumption With Remote Controlled Power Strips

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Goal

The purpose of this project is to determine whether or not remote controlled power strips would be effective in reducing CSU's residential electricity consumption. The primary contributor to the university's carbon footprint is electricity consumption. The idea was to implement these power strips on two floors as a pilot to see if they reduced the electricity consumption, and by extension, our carbon foot print, by enough to warrant using the power strips on a wide scale.

Hypothesis

By using the power strips on a floor-wide scale, the electricity consumption per floor will drop by a factor great enough to warrant further research and implementation of these power strips. Properly educating the residents on the pilot floors will lead these residents to use the power strips regularly, and will reduce individual electricity consumption.

Project Overview

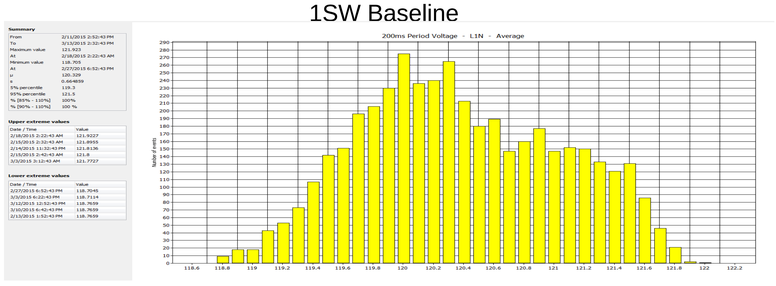
- Order the power strips, Belkin Conserve Switch Surge Protector With Remote, for the two pilot floors.
- Sub-meter the 2 floors for pilot testing of this project.
- Record 4 weeks of data without power strips to establish a base line, or "control", for the experiment
- Personally set up and hand out the power strips to each resident on the pilot floors.
- Educate students on the purpose of these power strips while explaining how to easily implement their usage during their daily lives
- Record 4 weeks of data with power strips
- During the 4 weeks of using the power strips, regularly meet with the residents on the pilot floors to answer questions, deal with issues regarding the power strips, and facilitate the education of the students regarding the project.
- Analyze the data.

Variables / Research

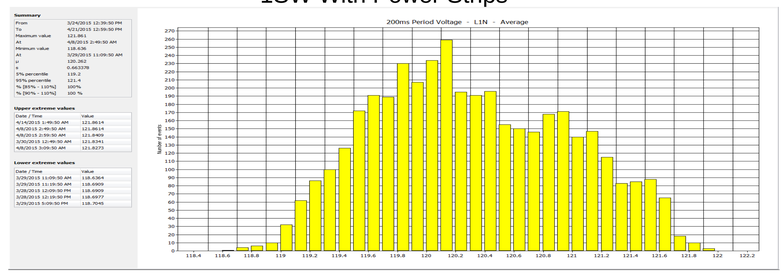
Controlled variables	Independent variable	Dependent variable
• Number of rooms on the floors being sub metered for the experiment. • Number of people involved in project	• The presence of remote controlled power strips	• Electricity usage per hall. • Will be measured in average period voltage over number of events

Results

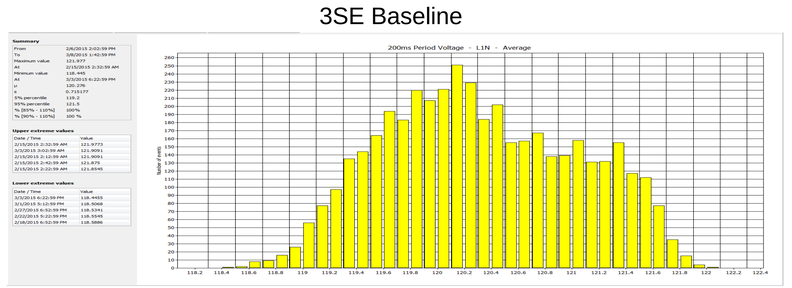
1SW Baseline



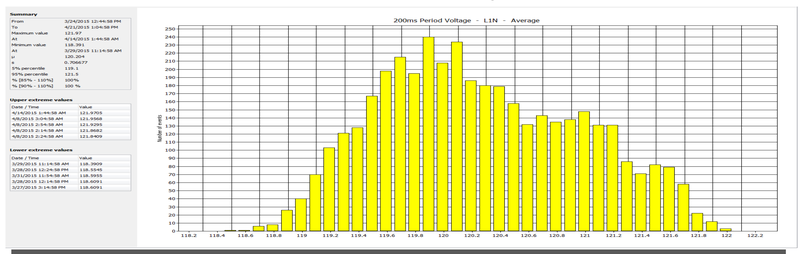
1SW With Power Strips



3SE Baseline



3SE With Power Strips



Statistical Analysis

Null Hypothesis: The power strips did not lower the amount of electricity used.

Alternate Hypothesis: The power strips lowered the amount of electricity used.

Creating a hypothesis test with the data results in a Z-score of 4.0822 and a p-value of .000046689. The P value is incredibly small because of the clear difference between the two data sets and the scale of the data. It is incredibly unlikely to the point of impossibility that this difference was caused by sampling error, so we reject the null hypothesis in favor of the alternate hypothesis.

Conclusion

The purpose of this project was to determine whether or not these power strips would reduce the amount of electricity used in residence halls. Our hypothesis was that these power strips would reduce the electricity consumed by a significant enough margin that further research could be done to implement these power strips on a building or campus-wide scale.

Simply observing the data shows that the power strips did reduce the amount of the electricity consumed by the residents on these two floors. The hypothesis test proves that this was not the result of a sampling error or a combination of random coincidences, and that it was, in fact, a direct result of the use of these remote controlled power strips. However, this change was not significant enough to warrant the wide-spread use of these power strips in residence halls.

Furthermore, while these power strips did reduce electricity usage on these floors, the power strips themselves had many limiting factors, primarily the range on the remotes. With a 60-foot range on the remotes and a maximum of 8 frequencies, installing the remotes in a way that they did not interfere with each other was incredibly difficult in a hall with less than 20 rooms. This would not work with two power strips in each room, and would be impossible to implement on a building-wide scale without constant interference between floors.

Final Thoughts

While it is clear that these power strips did in fact reduce electricity consumption beyond a shadow of a doubt, the reduction was not significant. The power strips would reduce CSU's carbon footprint, but the cost would far outweigh the gain for this method. We believe these remote controlled power strips are a solid investment both for people that wish to reduce their carbon footprint caused by electricity and for people who want to save some money on electricity bills. These power strips would pay for themselves in a domestic setting within a year if used properly. However, given the 60 foot range of the power strip remotes and the density of occupants in a residence hall, using these on a wide scale in a campus setting is not realistic with current technology.

This project was successful in proving that students would be willing to reduce their electricity consumption if given the opportunity and the resources to do so. Remote controlled power strips are just not the method to do this. A more comprehensive method would be occupancy sensing power strips. Unfortunately, the initial cost for these power strips is far too high for pilot testing currently. Should the technology improve and occupancy sensing power strips become cheaper, we would like to see CSU implement a similar pilot test to implement them in residence halls.

Acknowledgements and References

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