Lights Out

Nicholas Liebmann

Table of Contents

1. Business Requirements

Climate Change is beginning to make a bigger and bigger impact in our world whether we notice it or not. Fossil Fuel burning is a small percentage of the greenhouse gases in our atmosphere but has shown an exponential growth in the last 40 years. Power plants are the main cause of this unfortunate outcome. In the last 20 years we have begun our process to remove these plants from our society by building wind and solar farms but we still need more funding which ultimately means more time as well. Our idea is to limit down the fossil fuel burning during this time by switching out the students light bulbs involved in the climate change club on campus for free. In doing this we will see a significant drop in the energy consumption day in and day out and also the light bulbs life span. A website or app would be the perfect place for students to request light bulbs and also allow us to record their usage data.

1.1. Background

Climate Change is a matter the we as a civilization need to face now rather than later. Last year the equivalent coal burnt from light bulbs alone could have been equated to at least 966 billion kilowatt hours (What's wrong with Power Plants?, n.d.). Our estimates show that if that the city of San Jose were to convert completely to LED bulbs that we could be taking away about 40 billion kilowatt hours (Electricity in the United States, n.d.) from the original which is a significant drop.

1.2. Business Opportunity

In Northern California their isn't any other organization helping with this cause which is why we found this to be an incredible opportunity for me and my team. The Greenbelt Alliance located in Louisiana use to be solely based off this very idea but have since transformed into helping less fortunate communities in the fight against climate change. Their success allowed them to expand into helping the communities with sustainable living opportunities at a little to no cost. Our app seeks to allow all SJSU students to request our lights right from their phones at no cost.

1.3. Business Objectives and Success Criteria

Success will be measured completely off the data that we receive. Our algorithm is adaptable for any living situation a student might be in. First the student's electricity bill is a factor that we are able to work with as long as we have an estimate of how long the lights are on during any given day. If students have access to the power meter in their home then ask that they use this as a measurement to get a more exact estimate. Our partial differential equation should be able to get an estimate on the power consumption before and after the LED change. We will receive a percentage between a fluorescent light being used and an LED at which point we can truly see the difference.

1.4. Customer or Market Needs

As seen below our customers had a fairly straight forward experience using our app which is our top priority. In our original design customers said that the apps wording was a bit confusing which as well made the app tough to navigate. Since then we decided to completely restart and re-design it completely. An absolute must for this application is user privacy. We decided to not create user login for this very reason although because we allow for delivery people's address need to be secured. We will not release the application until we can 100% guarantee this for our users. The app itself is very tiny and want it to be available for any kind of phone there is.

1.5. Business Risks

The risks that we see in our future is actual user acceptance. We have tried to make this application as small as possible to avoid any inconvenience any student might have. Another risk is whether students are ok with our delivery methods because at this particular moment we still have yet to implement any form of security. COVID-19 has also made us look beyond this and think of mail as another form of delivery to allow for social distancing. A huge problem we foresee in the future is user's reselling our lights or even setting up deliveries to students not in need. My team and I plan on communicating about any possible red flags we see during the delivery process to avoid this very situation. The chart below should cover some other risks but the above are our main concerns and are still looking at ways to improve.

Blank Templatel- No.69 **(List additional hazards, risks and controls particular to your school using this blank template)**

Hazards	Is the hazard present? Y/N	What is the risk?	Risk rating H = High M = Medium L = Low	Controls (When all controls are in place risk will be reduced).	Is this control in place?	Action/to do list/outstanding controls *Risk rating applies to outstanding controls outlined in this column	Person responsible	Signature and date completed
Funding	Y	If we aren't able to get our lights out we may be seen as unreliable	H	When my group does not have the funds but students need the lighting we would use our own personal funds to ensure the lights are LED's	Y	We will have to make it known that funding is not in our favor at this time but also that our motto is to fight CC so if the lights are needed then we'll have them	Mia (funding)	nick liebmann 4/10/20
Falling behind due to the virus	Y	Not available to focus on my project because of my family	H	Dedicate times of the day to the project and making my family members aware of the circumstances	N	I live in a tiny apartment with a family of 5 who loves to be annoying so going into another room and locking the door is problematic same so maybe find a quiet park or something	Nick(app)	nick liebmann 4/10/20
No help from group mates on the app	Y	This means I'm on my own and have to do it by myself	L	Outsourcing to find someone that will make problem solving faster to expedite the this process	N	Use a subreddit and maybe and tell them the situation or even github to solve problems faster and remain on time	Nick(app)	nick liebmann 4/10/20
Redoing the essentials for the app	Y	We have been collecting the wrong data and have to redo the app	M	Make the 1st draft easily adjustable in case of a situation as such and then after narrow down the code	Y	Possibly start before with a few test runs and see if what we're looking for is on task and see if they're comfortable even giving us their info	Prasan(Data)	nick liebmann 4/10/20

If there is one or more **High Risk (H)** actions needed, then the risk of injury could be high and immediate action should be taken.
Medium Risk (M) actions should be dealt with as soon as possible. **Low Risk (L)** actions should be dealt with as soon as practicable.

Risk Assessment carried out by: nick liebmann **Date:** 04 / 10 / 2020

219

Figure 1. *Examples of some various other risks that were planned for in advance.*

2. Vision of the Solution

Our end goal would be to allow this service for the entire city of San Jose. As of now with our students in 168B things have moved smoothly before the release of the application. Students were willing to give us the required information as long as they didn't need to give any personal information away. With the release of the application we suspect that with a bigger audience that we will see an even greater success rate.

2.1. Vision Statement

The future with the release of the app seems to be bright. We have worked with students in the 168A class to get an outsider's perspective on what it should look like. We are working to make the user

experience as easy and straight forward as possible. SJSU also has the Sammy app that we thought would be another fantastic way to advertise. We are still waiting upon a response but thought they should add a tab in the student section for freebies and deals for current students. Until we really start to expand and start to see some possible implications then we will really start to be able to see what work really needs to be done.

2.2. Major Features

1. *First and foremost is user privacy. If the user wishes to give a home address for delivery, then we wouldn't want any of that private information to get out. We want the user to be completely safe when using our service.*
2. *Be able for the user to easily understand and navigate the application easily. Wording was an issue we saw in the Alpha testing which is something that needs to be redone and possibly even entirely. We want to keep this application as small as possible to avoid any user inconvenience.*
3. *We need user data. Without the user's data there is no way we can measure anything. We have written a pretty powerful algorithm that will eliminate absurd numbers and also tiny ones. False data might also be a problem from our data collection but wont disrupt the true consumption.*
4. *Our last feature that will be added is to make the application less plain. We got some feedback that told us just because the app is straight forward does not mean in can look good and fun. We intend to add more design and characteristic into the visuals for our users.*

2.3. Assumptions and Dependencies

The way we get success is solely based off our users given data. We made the algorithm to allow the students to just give general averages in hopes that they fulfill our request. Our hope is too get more in contact with the Greenbelt Alliance and work with them to see the problems they faced and possibly even see some things they found beneficial that we maybe haven't even thought about.

3. Scope and Limitations

Our vision seeks to expand but only to a certain extent. As of now we want to stay with a controlled group to find any issues that may arise and figure out solutions to them before moving to a larger scale. The application is a great example of this because we did not have professionals design and implement everything so in terms of collecting the right data, we want to get things perfect before moving forward. Our budget was showing promising increases before COVID-19 struck which has since set us back. We would love to offer this service from here on out for SJSU students. A city-wide design would become a real financial burden and is not guaranteed to work. From experience my team and I have learned that bringing something like this to fruition is not an easy task and requires maintenance. We would love this project to continue through the years and allow fellow students to come and help but also allow them the opportunity to expand or maintain in any way that they see fit.

3.1. Scope of Initial Release

The application will start with a message from us and our mission. Following that will be a light switch that will be turned off but once turned on, prompt the user to choose how they would like to obtain their lights. In this the user can request the lights to be delivered or picked up from any location of their choosing. As of now, we only offer to 168A students to avoid any security breaches that may occur. We want every user to feel completely safe while using our application and won't release it until this problem is solved. Upon our initial release we have asked that students provide us data before receiving their lights. The purpose of this is that our partial differential equation is designed to show us our results compared between fluorescent and LED bulbs. The results will then add up over time giving us a comparison between the power consumption of both bulbs. This will be one of the three tabs at the top of our application.

3.2. Scope of Subsequent Releases

Our priority is security and user's feedback. For our own data/statistic collection the user's feedback is essential. We started very small to try various techniques that might encourage this and hopefully get it right from the beginning. As of now we are at a controlled population and wish to expand next to a department wide group. By this point we wish to have got the two essentials down well at which point we will expand our app as well. For now we want to defer the overall look and design of the app to focus on our priorities. With our expansion we will then start to work more with advertising, user feedback and requests, and any misuses of the lights from our users; such as stealing.

3.3. Limitations and Exclusions

I would not want this to go beyond a school project for the very reason of keeping it maintainable for future students. I would love to see this whole project turn into a room in the Student Union and offer students jobs and opportunity's for on campus-work. We have a ton of CS students and very little on campus opportunities for them to get real work experience. Environmental Students are the same way and I believe that students could use us a way to maybe explore and hopefully expand on their creative new ideas.

4. Business Context

This started off as a school project and for my team and we wish to continue to expand this as much as we can. We don't want to be paid in any other way than a simple "Thank you". The donations we receive are solely used to be made for the purchase of LED light bulbs at the cheapest wholesale price that we can find and afford. We have a vision for the future that would require a greater budget but will not encounter this road for quite sometime.

4.1. Stakeholder Profiles

<Stakeholders are individuals, groups, or organizations that are actively involved in a project, are affected by its outcome, or can influence its outcome. The stakeholder profiles identify the customers for this prototype and other stakeholders, and states their major interests in the prototype. Characterize business-level customers, target market segments, and different user classes, to reduce the likelihood of unexpected requirements surfacing later that cannot be accommodated because of schedule or scope constraints. For each stakeholder category, the profile includes the major value or benefits they will receive from the prototype, their likely attitudes toward the prototype, major features and characteristics of interest, and any known constraints that must be accommodated. Examples of stakeholder values include:
My team has formed, what we believe, is a great and easy way to fight climate change outside of the university boarders. We ask for donations to allow students a possible financial burden that my team can then use as an opportunity to help educate fellow students on their decision-making impact. We look for lights that fit our standards at the cheapest possible price we can find. We ensure that our money is not gone to waste so we are able to provide as much as we possibly can for those who need it. That being said if a person wishes to donate but would want to control what lights are being bought then we would be hesitant. Our mission is to fight climate change and educate SJSU on their impacts. That goes without saying that the money we receive isn't being wasted but you as someone who donates can ensure the below:

- *We intend to work as hard as we can*
- *With your donations you too will be fighting Climate Change*
- *Giving to those in need*
- *Your money is only being used towards LED bulbs*
- *You might be investing in a project that could lead to greater on-campus opportunities*

4.2. Project Priorities

My team and I are all graduating seniors who are extremely driven by this project. Most of us already work in companies that we plan on staying with past graduation. This means that once the semester is over we will have all the prior school time to utilize towards building our vision. We currently have a fantastic starting point with the students of 168A and need to do a lot before expanding to a greater audience. We are not CS majors and wish to do this project our way to avoid greediness which ultimately means that we need time to learn. We all work at different paces and are all working on various aspects of the app from the design, to the security, to the advertisements, and the negotiating. As of now we are just working and keeping in contact every other day to track each other's progression. We've been working hard and have so far given away about 70 bulbs that only cost us about one-hundred dollars which is incredible.

4.3. Operating Environment

To avoid any student being left out of this opportunity we want to make this app as small and easy as possible. We want every student on campus with any smart phone to somehow get our app on their phone. Obviously, non-smart phone users cannot do this but they could always reach us by phone. The only problem we want our users to have is their own internet issues which means all the problems should only be on our end. The downloaded app should basically be sent info to us and nothing else.

- *Our current control group are only students of 168A but when we do decide to move forward, we want to bike ride to houses/apartments to offer emission free delivery as well. If the student lives more than 5 miles we would hope that they choose the on-campus pick-up method for our convenience.*
- *They should be able to access the system at any time and when they should request a pickup one of my 5 team members will be prompted to deliver the light during their designated time.*
- *The data comes from user feedback and runs through a partial differential equation that gives a result of the comparison of all the lights that we have switched to LED versus Fluorescent. The results should be combined and also stored individually. Our goal was to track the varying difference just like the books rented in the MLK library.*
- *No the user can submit his feedback when ever they would like because we already prepared for this very situation. If a user doesn't give a response a notification will be alarmed on their phone to do so.*
- *The user can access us at any time for their convenience. In the future, since lights are mainly used at night, we may intend to add hours of operation for our convenience but as of now a team member has allowed for late night services.*
- *As instructed above we are still beginners in this whole process so we aren't quite sure how to exactly implement the security but that doesn't mean that we don't know what needs to be protected. We decided to avoid individual users to keep away certain information for the users benefit. Meet-up locations with times and addresses are a huge piece of information that needs to be kept secured then wiped. These are just some of the security aspects we intend to take care of.*

<Tables are labeled at the top of the table and figures are labeled at the bottom of the figure.
Each title uses a hanging indent.

***Table 1**. This is an example of a very long title that you would place at the top of your table using a hanging indent style.*

***Figure 1**. This is an example of a very long title that you would place on/at the bottom of your figure using a hanging indent style.*

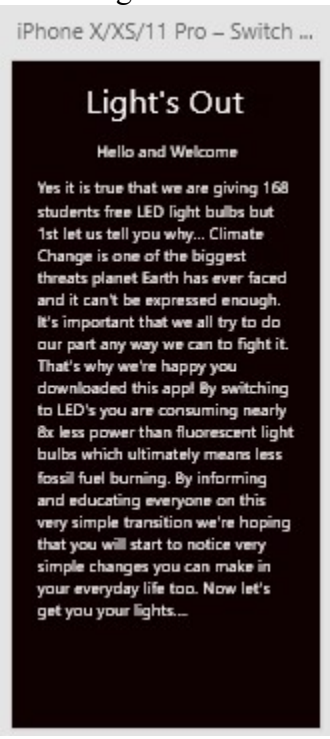
All tables and figures are sourced on the bottom.
***Source:** www.sjsu.edu/cs100w*

(We will cover creating tables and figures in lecture)>

Appendix A: Prototype Layout
Appendix B: Works Cited
Appendix C: Gantt Chart
Appendix D: Raw Data
Appendix E: Project Backlog

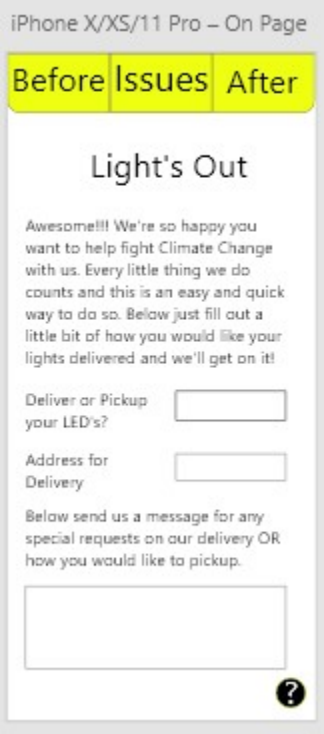
Appendix A: Prototype Layout

Initial Page – Who we are and our mission



2nd Page – Turn the switch on to request lights

Main Page – This consists of the user's requests, issues, and feedback data



Appendix B: Works Cited

Energy Technology Perspectives 2008: Scenarios and Strategies to 2050. (2008). *Energy Technology Perspectives*. doi: 10.1787/9789264041431-en Bergesen, J. D., Tähkämö, L., Gibon, T., & Suh, S. (2015). Potential Long-Term Global Environmental Implications of Efficient Light-Source Technologies. *Journal of Industrial Ecology*, *20*(2), 263–275. doi: 10.1111/jiec.12342

Jones, R., J. Du, Z. Gentry, I. Gur, and E. Mills. 2005. Alternatives to fuel-based lighting in rural China.Proceedings of the Fourth International Conference on Energy-Efficient Lighting, 9–11 May, Shanghai.

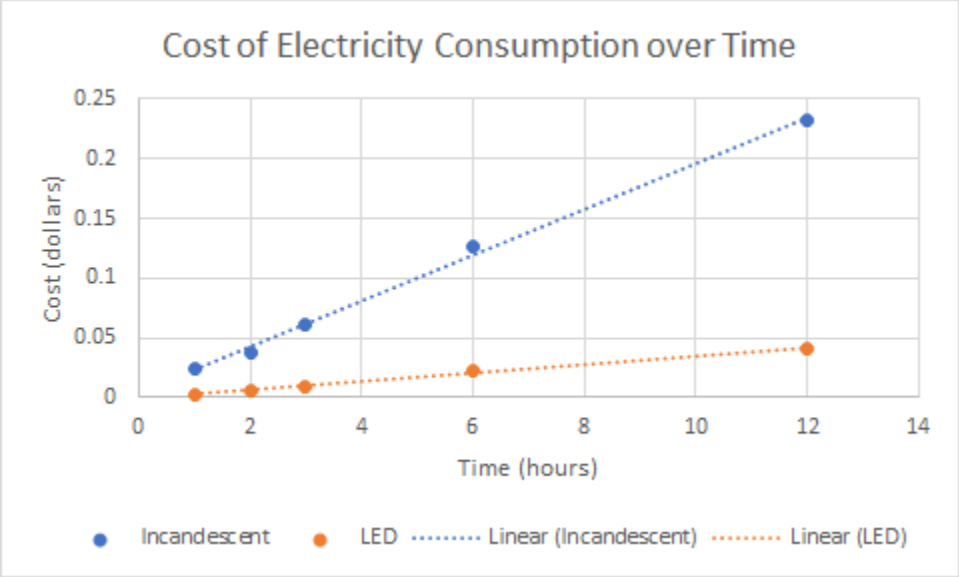
Murphy, T. W. (2012). Maximum spectral luminous efficacy of white light. *Journal of Applied Physics*, *111*(10), 104909. doi: 10.1063/1.4721897 Liddell, C. (2012). Fuel poverty comes of age: Commemorating 21 years of research and policy. *Energy Policy*, *49*, 2–5. doi: 10.1016/j.enpol.2012.02.036

What's wrong with Power Plants. (n.d.). Retrieved April 12, 2020, from https://www.clearwater.org/news/powerplants.html

Elisabeth, L. 2018: Why you should switch to LED lightbulbs right now, before the law requires it. Retrieved April 13, 2020, from https://www.washingtonpost.com/lifestyle/home/why-you-should-switch-to-led-lightbulbs-right-now-before-the-law-requires-it/2018/01/16/c2d915f4-f0a2-11e7-b3bf-ab90a706e175_story.html

Appendix C: Gantt Chart

Appendix D: Raw Data



This linear fit chart I made shows the difference between an incandescent bulb and a LED bulb. The goal was to get a basis on the percentage difference between the two with a set amount of measurements. I had both bulbs burn for 12 hours straight and used my home power meter to get the kilowatt/hr measurement. The incandescent bulb consumed .774 kilowattt hours while the LED only burned .054 kilowatt hours. As you can see from the graph the LED showed to be nearly 64% energy efficient.

Appendix E: Project Backlog