

# Center for Building Performance and Diagnostics

## Executive Summary

### Community Partners

Azizan Aziz

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### Student Development Team

Swathi Anand

Clara SeoHyun Shim

Ankur Toshniwal

Leo Ying

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## Background

The Center for Building Performance and Diagnostics (CBPD) is an extension of the School of Architecture at Carnegie Mellon University. The mission of the CBPD is to conduct research, development, and demonstrations to increase the quality of and user satisfaction with commercial buildings and integrated building systems, while improving cost, time, and energy-efficiency. The Robert L. Preger Intelligent Workplace, outfitted with advanced computer and diagnostic equipment, is a "living" and "lived-in" laboratory that houses the CBPD faculty, including Azizan Aziz (Senior Research Architect) and his team of approximately 10 PhD and master students with various technological skillsets.

## Project Description

### Project Opportunity

The primary problem that CBPD and Azizan's team were facing was the lack of engagement within the campus community (student, faculty and staff) to conserve energy at CMU. After analyzing submetering data on approximately 35+ campus buildings this past fall semester, they have identified many ways that people's behavior can improve the performance of such buildings without interrupting their activity inside the building. If these strategies can be properly implemented, thousands or even millions of dollars can be saved from the university's energy bill. As students ourselves, Azizan believes our team has a better understanding of how we can engage our peers to conserve energy at CMU better than himself & his team and thinks we can take advantage of that to address this issue.

### Project Vision

In an effort to fulfill CBPD's goals, our initial project vision was to conduct surveys and interviews on our key stakeholders: students, faculty and staff, Facilities Management Services (FMS) to get their opinions on issues related to campus energy consumption and future efforts to conserve energy on-campus. After the research phase, we would analyze our results and brainstorm the best technological solution to resolve CBPD's problem. We would hope to come up with a sufficient number of use cases for our technological solution and explore ways in which the student body can interact with it to see campus energy consumption and file complaints to FMS.

## Project Outcomes

After interviewing our stakeholders, surveying over 240+ students and 50+ staff/faculty, and presenting our results to CBPD and two FMS representatives, we concluded that there is a substantial disconnect between the student/faculty body and FMS, where information regarding campus energy usage or efforts to make the campus 'more green' are not made aware to the general CMU community. To solve this problem we decided to create a web application to break the communication barrier between Carnegie Mellon students & faculty, and the staff at FMS with regards to campus energy usage.

## Project Deliverables

Our deliverable is a web application through which students, faculty and staff can make posts on energy conservation issues they see around campus by taking a photo and writing a short description. Students, faculty and staff can consequently upvote/downvote and comment on others' posts. Registered FMS staff will be able to view and address issues made through these posts and make statuses on campus initiatives to go green. This application is deployed on Heroku, and utilizes Django as the framework and PostgreSQL as the database.

## Recommendations

Since our team had to focus all our efforts on building a solid minimum viable product by the end of the semester, we were unable to incorporate all the B/C-level functionalities and features that Azizan and our team would have hoped to see implemented in ConnectFMS. We advise future development teams to improve the user experience and develop a dashboard for users to view statistics on trending posts, popular topics discussed among users, areas on campus complained of the most and more. This would allow FMS administrators to address users' campus energy issues faster and potentially observe rising issues even before more users post about them.

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## Student Development Team

**Swathi Anand** led the team as the project manager and backend developer. She is a junior Information Systems major with a minor in Human-Computer Interaction. She will be interning at JP Morgan Chase this summer and is looking toward a career in application development and user experience design.

**Clara SeoHyun Shim** led the team as the designer. She is a senior Information Systems major with minors in Human Computer Interaction and Global Systems Management. She will be taking a gap year to pursue a career in technology in the fashion industry before attending graduate school.

**Ankur Toshniwal** led the team as the full stack developer. He is currently a junior in Information Systems and also pursuing a Computer Science minor. He will be interning as a Software Developer at Y Media Labs and hopes to be an entrepreneur following a career in software development.

**Leo Ying** was the database and deployment lead, and assisted with front-end development. He is a Junior Information Systems and Human-Computer Interaction double major. He will be interning at McKinsey as a technology consultant this summer and is looking toward a career in technical consulting.