Project Proposal

02-5: Energy Supply

Problem statement

TCNJ is committed to providing a reliable but cost-efficient energy supply to the TCNJ campus. There is currently no application that lets users access and visualize the use and costs of locally produced versus grid energy with environmental considerations for the entire TCNJ campus. Users would benefit from a single module that provides visualizations, displays, and comparisons of the costs and environmental impacts of the various energy supply methods. This would allow for the campus to create a well-informed decision for a future plan to reduce emissions at a fair price.

Objective of the Module

Our objective is to develop a module that allows for a user to simultaneously minimize both energy consumption costs and environmental impact.

Project Plan

We would like to create a webpage application that provides visualizations of the costs associated with power supply for the TCNJ campus, which specifically will allow a user to come to an informed conclusion about how economical and environmentally friendly different energy sources would be. The end product would compare the cost of creating energy on campus in comparison to taking energy from the grid. Additionally, the module will weigh the environmental impacts thereof. We hope to create a comprehensive database using PostgreSQL to store the existing energy supply data, provide projections on future energy usage and costs, all within an efficient, secure, and informative user interface.

By aggregating and displaying data, this module will allow a user to come to an informed decision regarding the most cost-effective and environmentally friendly way to supply the TCNJ campus with power. We plan to provide visual representations in the form of graphs and charts to help the user understand trends in their data. We believe that an intuitive user interface is crucial to achieving our goal of informing our users.

To complete our task, we will need information from many sources. Namely, data on the unit cost of power when produced locally vs. taken from the grid. Other important sets of data include the emissions and environmental impact for each energy supply method, seasonal fluctuations in price, and potential costs associated with generating power on the TCNJ campus. Some research on our part would include obtaining available data on energy supply from similar institutions that have taken a “greener energy” initiative.

A similar system to our proposed project is that of Energy star. Their portfolio manager application displays data on energy consumption and efficiency per building. Our module will display campus-wide data on the costs of energy supply. We plan to include both locally produced power and energy from the grid, as well as the environmental consequences of producing versus outsourcing energy supply.

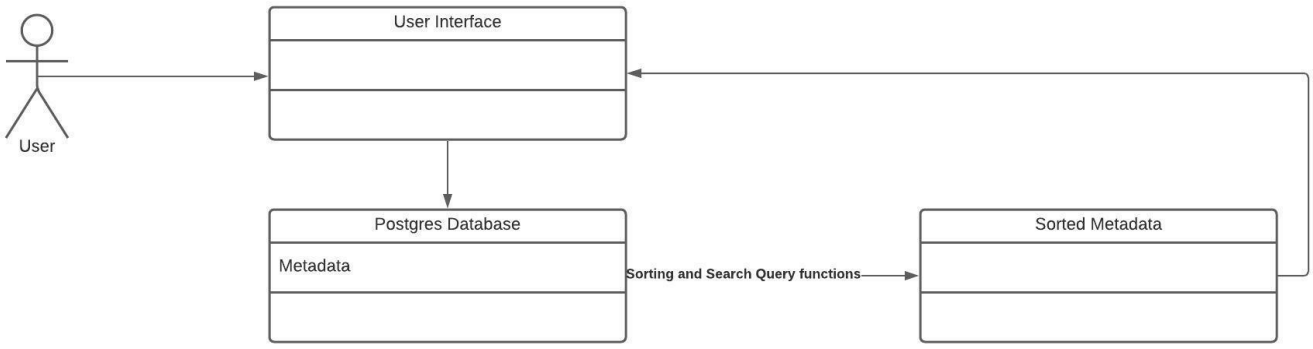
This module will be useful in visualizing data from the past and current day, as well as providing projections into the future. A possible modification can be to create multiple projection plans and compare them using live data. This means that a user could view historical trends in power supply in former years. It can also be used to build various plans for years in the future.

Technical Aspects

We hope to create an efficient application and database that can manage all the data gathered by TCNJ for energy expenditures and create visualizations based on the data. By using Python and PostgreSQL we believe that it would be possible to create a module of this size. For security purposes, we will implement access control to allow only authorized users to access the database and sensitive information. Before creating the full-scale database, we hope to learn more about database security in class and implement these practices in our project. We will use GitHub and its repositories to store the data and source code. If needed, GitHub offers easy recovery and version control solutions.

We will need to learn how to use Python to create a secure connection to PostgreSQL, as well as learn how to use PostgreSQL in order to efficiently store our data. As students, we will learn the basics of how to use these tools in class and then will look for reference material on the execution of specific tasks that we may not be familiar with doing.

Diagrammatic Representation



Quad Chart

Need: TCNJ, as well as other customers in the market, are looking for a cost-effective, yet environmentally conscious way to balance energy supply costs.	**Approach**: Create a web-based module that allows for easy visualization of the costs of various supplies of power for TCNJ's campus.
Balance:	**Competition:**

Balance in energy cost and environmental sustainability Benefits for future use of buildings and energy sources	No direct competition; energy star provides a somewhat similar service on a per building basis.

Answers to Questions Given in the ACC 311 Rubric:

- **What research questions are identified? Who are the stakeholders in the issues identified?**

On most college campuses, energy supply is an important component that should be addressed to optimize efficiency and remain cost-effective. To address energy supply concerns, several questions should be answered. The stakeholders who are affected by this issue are The College of New Jersey and outsourced electrical grids from other power plants. First, it must be decided whether or not it is economical for The College of New Jersey to produce its own power for various buildings on campus or use an electrical grid. After addressing the economic factor, it must be decided when would The College of New Jersey have the least pollution when producing its own power, in comparison to using an electric grid. This would have to take into consideration a site and source basis.

- **What financial and nonfinancial data would you incorporate in your model/database design for the identified issues?**

In addressing energy supply, both financial and nonfinancial data should be included to form a strategy to address the issues stated above. On the financial end, we would incorporate the cost of delivering power to all the buildings on campus and operating the tri-gen, boilers and chillers. In regards to the nonfinancial data, we would look at the emissions being produced on campus, at a site and/or source, and through the tri-gen, boilers and chillers.

- **What is the cost object in the problem identified?**

The cost object is energy.

- **Can direct costs, indirect costs, fixed costs or variable costs related to the issue be identified based on the data available/provided? If yes, describe them.**

Given the dataset, the information provided gives a total cost for each meter entry, yet does not divide the cost into separate divisions of costs such as Direct, Indirect, variable and fixed costs. The dataset would need to include separate entries that fulfill the direct, and indirect costing methods, as well as those costs shown as what is fixed and variable. This information is important to the separation of costs that are needed and not needed. This information would help provide an outline of costs directly associated with the production of energy

- **What are the cost drivers for the issues identified?**

The volume of energy that is used, or rather the demand for energy throughout the campus would be our cost drivers for this issue. TCNJ students, residents, professors, and employees use energy from the supply source which affects the cost of energy over a given time span. There is a cause-and-effect relationship between the level of activity and the cost. Activities such as doing laundry, heating buildings, and turning lights increase the desired supply of energy on campus.

- What is your plan to solve the issues identified? What do you expect to see from your end product that address the issues identified?
  Addressed above.