

Analyzing Middlebury's Energy Goals

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Abstract

Middlebury is currently working towards an initiative, Energy2028, which is a ten-year challenge with the goal of using 100 percent renewable energy by the year 2028. Updates relating to this initiative are infrequent and irregular, and we believe it would help both the school and students to have a more common, more accessible progress update. This may come in the form of a web application that allows users to see Middlebury's progress, as well as projections of where the school will be by the year 2028.

1 Problem statement and deliverables

Problem statement

Our idea is to acquire data from the Middlebury Energy2028 project, and using machine learning, make predictions about Middlebury's progress towards its goals.

Prototype deliverable

Multiple graphs presenting Middlebury's progress towards Energy2028 based on data collected about solar panels and other green energy producers.

Final deliverable

An application that allows users to look at Middlebury's progress towards Energy2028, and potentially to interact with the data shown.

Note

Jack Byrne responded to our email, and we are meeting with him on Monday (September 27th) to discuss mutually beneficial ideas for our project. We may steer our project in a different direction after this meeting.

2 Background and related work

Over 600 colleges and universities have signed the American College and University Presidents' Climate Commitment [colby]. Since Middlebury is not the only school working to lighten its carbon footprint, it may be beneficial to observe the documented ways other schools are working, so that we can more effectively find Middlebury's green data. Colby College, Maine, has extensive descriptions about the different aspects of their school that are devoted to a more green tomorrow. From sustainable dining hall food plans to electric public transportation across campus, Colby hosts different, yet influential, plans to help mitigate the school's affect on the environment [colby].

One goal of our project would be to potentially use machine learning and previous data to predict Middlebury's progress towards its Energy2028 goal of 100 percent renewable energy in the coming years. This would be a time series forecasting problem, where data collected continually by a constant interval is used to make predictions about the future. Solar and wind power data do not normally

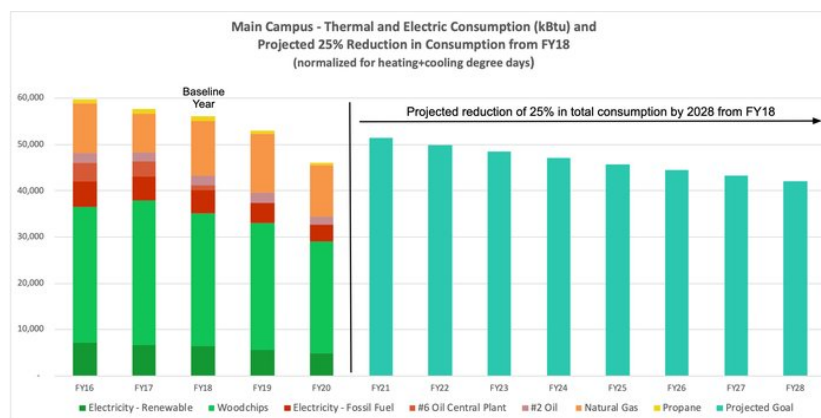


Figure 1: Middlebury's Future Plans to Progress through Energy2028.

increase linearly, and so it would be beneficial to use a more variable time series method [other].

The city of Los Angeles also has a goal of its own; they are hoping to, as a city, be using 100 percent renewable energy by the year 2045 (or as early as 2035). They create different projections of the city's progress based on factors such as customer electricity demand and differing supply-related scenarios [LA]. While LA's simulations are being used to plan where their resources will go to in order to increase their renewable energy source production, the concepts are very relatable to our project. When forecasting about Middlebury's progress, it may be beneficial to offer different models based on a list of goals and possible changes in the future.

3 Proposed methods

We Plan to do most of our coding in Python, using various packages, the two primary ones being NumPy and SkLearn. We also plan on using JavaScript and React for our website development. In terms of data sets, we plan on primarily using whatever the Middlebury Environmental Office can provide for us – we are meeting with Jack Byrne on Monday, September 27th to discuss the data being collected that we could get access to. We have also discussed potentially supplementing this data with other data from other sources on the same topics (for example, using solar panel data collected from solar panels not at Middlebury).

4 Alternatives

We feel that our project will need more ways to increase our project scope than decrease. There are various ways we could do this, such as:

- Using other data sources from outside of Middlebury to augment the Machine Learning model
- Using more information supplied by Middlebury to present a bigger picture
- Developing the website more

References

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