MICHIGAN STATE UNIVERSITY

Project Plan Presentation

Electricity Grid Planning Tool

The Capstone Experience

Team Anthropocene Institute 2

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Fall 2021

From Students…

…to Professionals

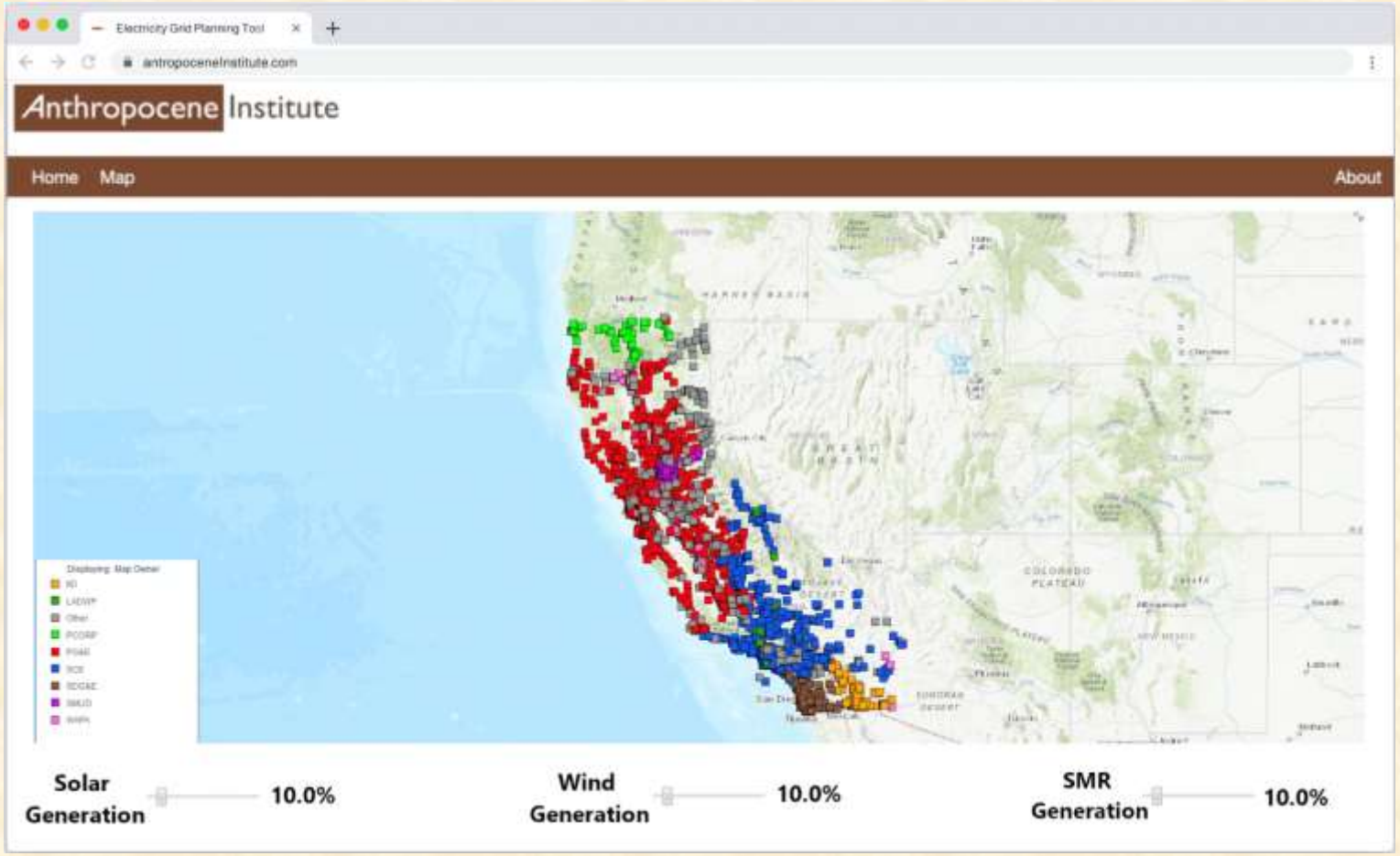
Functional Specifications

- Help grid planners understand the costs and benefits of deploying Small Modular Reactors at substations within California's power grid.
- This solution must work for both todays and future power grids.
- This application must be able to measure Small Modular Reactors (SMRs) effect on the stability of California's power grid.

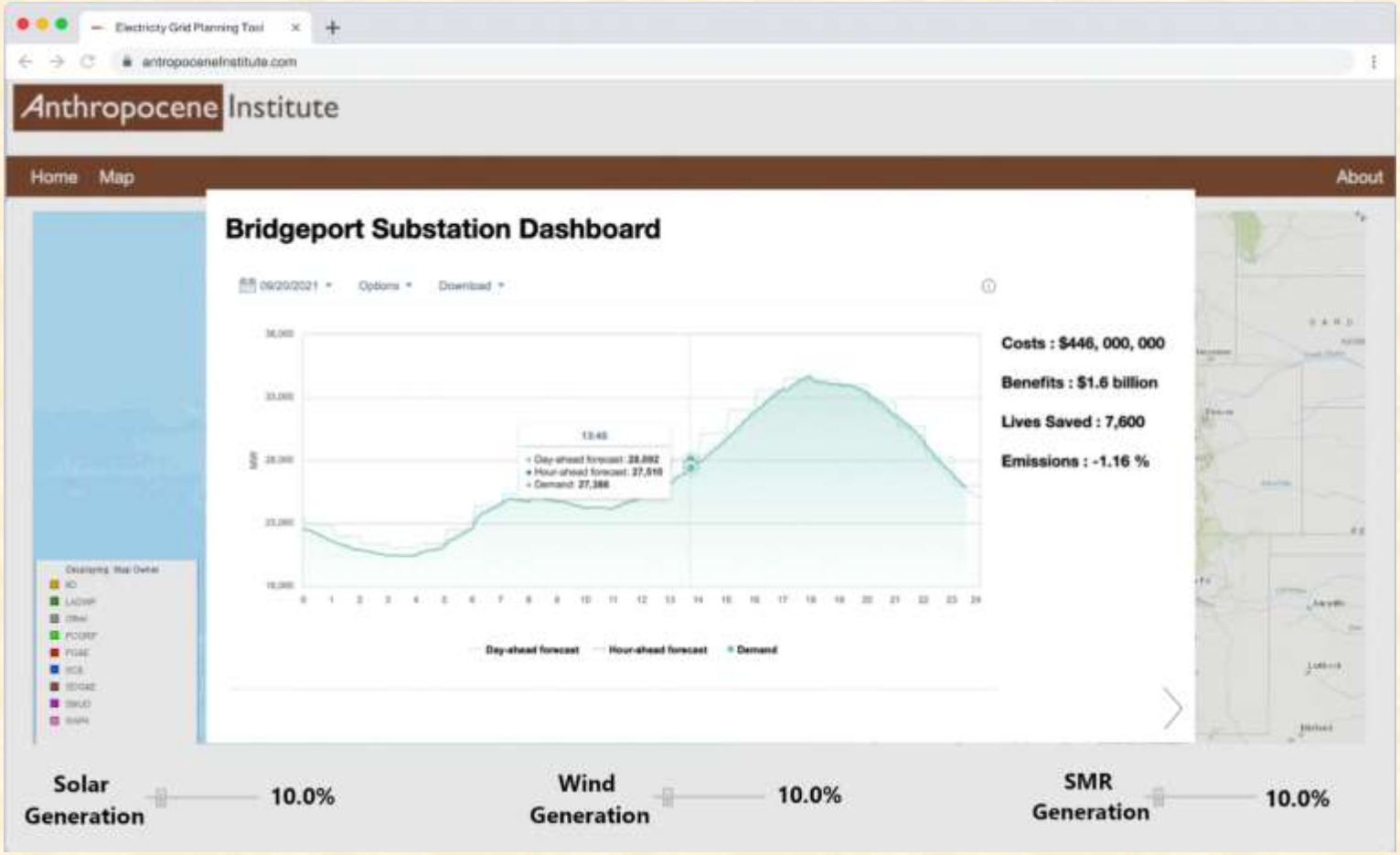
Design Specifications

- Interactive map along with a dashboard for each substation.
  - Display locations for both substations and powerplants with the option to select individual substations.
- Custom dashboard will display data to help users understand cost/benefits of SMR deployment.
- The web application will also contain links and information to various sources to help inform users.

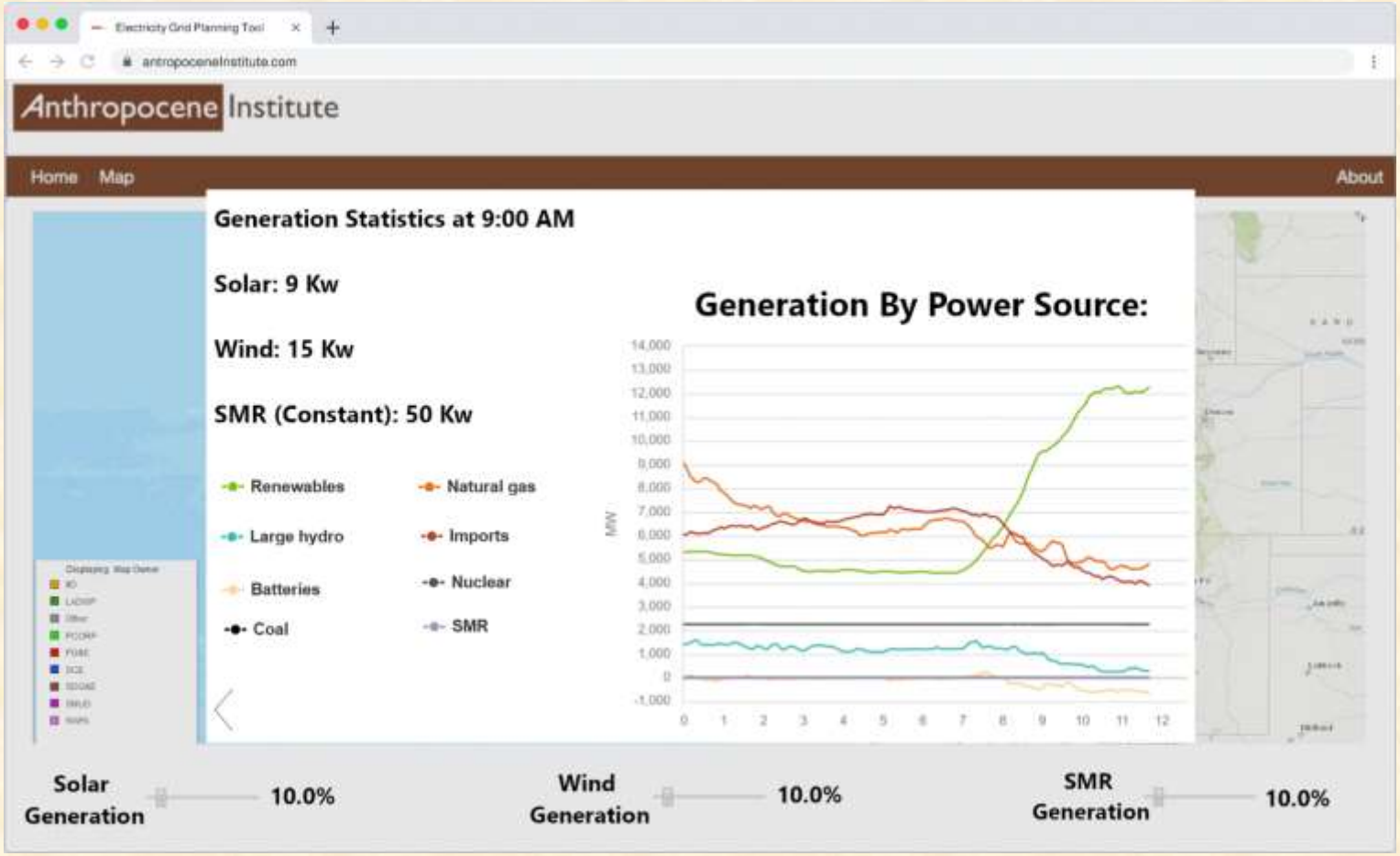
Screen Mockup: Home Page



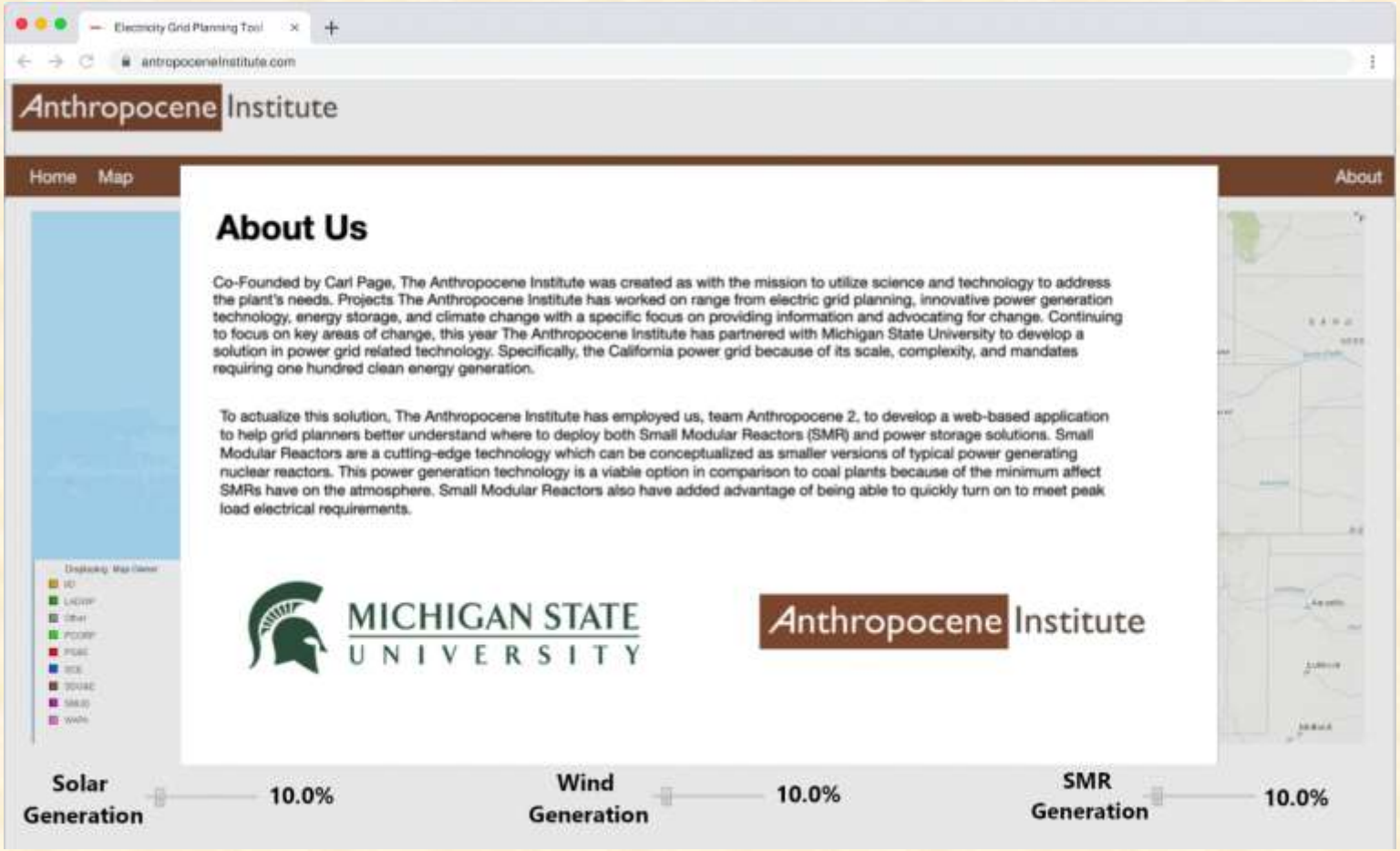
Screen Mockup: Substation Dashboard



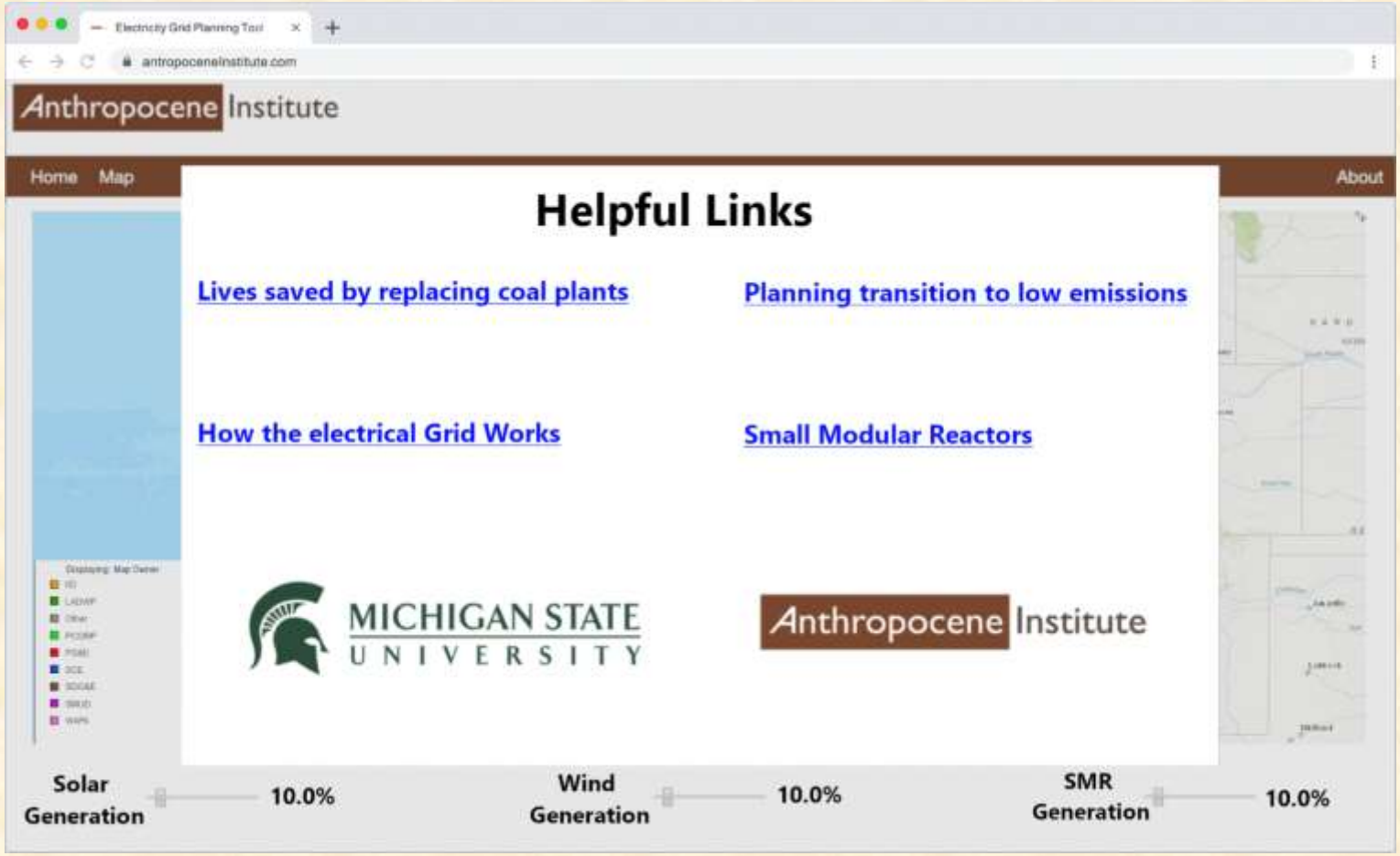
Screen Mockup: Generation Statistics



Screen Mockup: About Us Page



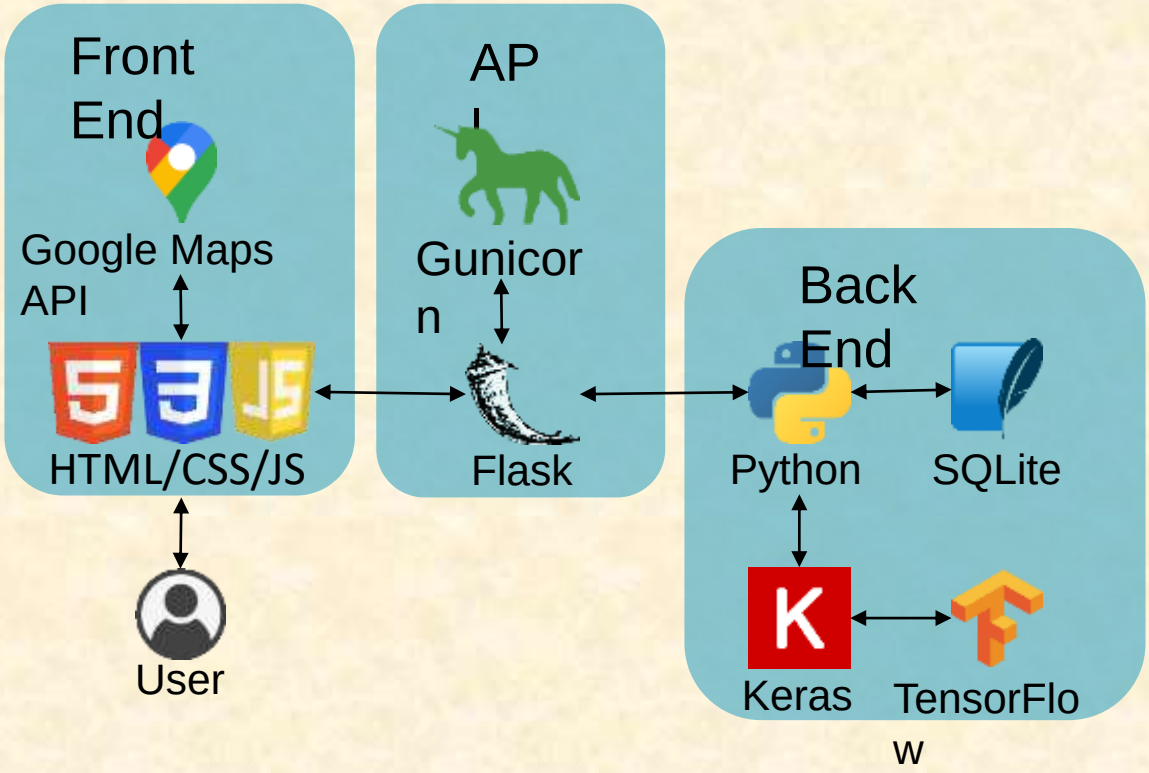
Screen Mockup: Helpful Links Page



Technical Specifications

- Dell Mounted server rack running Ubuntu Linux
  - Functions as a webserver utilizing Apache2
- Flask API developed in python to connect database and artificial intelligence to front-end.
  - GUnicorn will be used to deploy workers to handle API workloads.
- Keras and TensorFlow will be used to generate and train a machine learning model and then make predictions with that model.
- Front-end features an interactive map built with Google Maps API and dashboards developed with HTML, CSS, and JavaScript.

System Architecture



System Components

- Hardware Platforms
  - Dell Rack Mounted Server running Ubuntu Linux
- Software Platforms / Technologies
  - Apache2
  - Flask and GUnicorn
  - HTML, CSS, JavaScript, and Google Maps API
  - Keras and TensorFlow
  - Pandas and Numpy

Risks

- Dataset that will be needed for the Machine Learning Model
  - **Description**: Machine Learning Models require an extensive dataset. One of the challenges to mitigate will be identifying enough data and gathering that data set.
  - **Mitigation**: Our team will contact electricity providers, non-profits, and any government agencies to collect the necessary information to produce a viable Machine Learning Model.
- Identifying a Model with a high degree of accuracy
  - **Description**: The model will need to accurately predict consumers' demand along with the supply of electricity that will be met with the current collection of electricity generators connected to the grid.
  - **Mitigation**: The team will need to identify efficient inputs to get a high degree of accuracy in our Machine Learning Model.
- Relaying Information from the Model to an Interactive Map
  - **Description**: Our team will need to collect information about the interaction between the Google Maps API and the corresponding user input
  - **Mitigation**: Our team will be utilizing the Google Maps API and constructing an API for the project.

Questions?