1) **Project Title: Agri**
2) **Project Summary:**

This project focuses on showing the environmental impact involved in producing and transporting the food on your plate, based on where you are located. The web application will let users enter a product and their location, then return statistics on the environmental and economic costs of getting that product to them. These stats include carbon emissions, energy use, and transportation costs. The goal is to help people understand the hidden costs of their food choices and encourage them to choose options with a lower environmental impact. The app will pull data from different sources to provide accurate and useful insights. By making this information easily available, it can help consumers make more sustainable decisions.

3) **Description of an application of your choice. State as clearly as possible what you want to do. What problem do you want to solve, etc.?**

This app is meant to give users a better idea of how their food choices impact the environment by looking at the energy and cost of transporting produce. A lot of people don't realize how much energy goes into moving food from one place to another, especially when it's imported.

Users can choose a product, a potential importer, and their location. The app finds the overall impact of getting the food to you based on each crop/food's individual growing and export conditions. The main problem this app addresses is the lack of easy-to-understand information on food sustainability. By making this data accessible, the app can help people make more eco-friendly decisions. This could be useful for individuals, businesses, and policymakers who want to reduce their environmental footprint.

4) **What would be a good creative component that can improve the functionality of your application? To get a better sense of what a creative component is, these are technically challenging features that improve the user experience of your application.**

We plan to create a graphic visualization of the data that shows an icon moving from its starting location to the user's location. This dynamic visualization could allow a real-time breakdown of the carbon emissions, water and energy consumption, and transportation costs, which would require APIs that let us view real-time data.

Another complex feature we thought of would be to allow a barcode scanner that could find the exact item rather than just a general item. For example, it would be able to find a scan of the barcode of a banana and know that it was sold by Chiquita. It could utilize this information to trace back Chiquita's manufacturing location, thereby giving the user environmental impact statistics for their purchase. We would use the OpenFoodFacts API to implement this feature.

5) **Usefulness Explain as clearly as possible why your chosen application is useful. What are the basic functions of your web application? (What can users of this website do? Which simple and complex features are there?). Make sure to answer the following questions: Are there any similar websites/applications out there? If so, what are they, and how is yours different?**

This application would be useful in helping consumers make environmentally conscious purchasing decisions based on energy consumption. Users can enter their general location, a product item, and choose from a list of potential importers to receive a detailed breakdown of the land use, water, and carbon footprint involved in bringing that item from its source to their grocery store. A more advanced feature could allow users to input their entire grocery list and compare different combinations based on their energy consumption. This would enable users to mix and match purchases to minimize overall energy use while still obtaining the products they need.

For a simple search of a single product and location, we could incorporate a visual representation, such as an icon moving from the product's sources to the user's location. Users could hover over each source to view the energy consumption associated with each step. While a similar website, Food Miles, calculates the distance food travels, our application would provide a more comprehensive view by analyzing total energy consumption rather than just mileage.

6) **Describe your data sources (Where is the data from? In what format [csv, xls, txt,...], data size [cardinality and degree], what information does the data source capture?). It would be hard to satisfy stage 2 requirements with one dataset⤳ strongly recommend identifying at least two different data sources for your project.**

We are pulling our data largely from the USDA's list of agricultural trade data, alongside some other open source repositories and government databases. Our data is in the format of csvs and excel files, with the sizes of data files being in the range of ~50MB. The *U.S. Export Share of Production, Import Share of Consumption (2008-2022)* dataset contains data regarding where we rely on other countries agriculturally and what crops are grown domestically. Furthermore, the *State Agricultural Trade Data* dataset gives more specific breakdowns state by state on the value of imports and exports. We are also using the *Our World in Data* database to get specifics onthe environmental impact of different food items.
https://www.ers.usda.gov/topics/international-markets-us-trade/us-agricultural-trade/data
https://www.ers.usda.gov/data-products/state-agricultural-trade-data
https://catalog.data.gov/dataset/farm-income-and-wealth-statistics

7) **A detailed description of the functionality that your website offers. This is where you talk about what the website delivers. Talk about how a user would interact with the application (i.e., things that one could create, delete, update, or search for). Read the requirements for stage 4 to see what other functionalities you want to provide to the users.**

SEARCH: The website will allow user to search for produce items based on their location and will provide them with a breakdown of the energy consumption used to bring that item to their grocery store.
The other search operation we plan to implement is allowing users to input a grocery list to compare the energy consumption across different suppliers so that they can pick the option that is most environmentally friendly
- We will do this specifically by querying our location database to find the latitude/longitude of their location, finding the distance to the importer location, and using this to find CO_2 emissions. Furthermore, we will query the *Our World in Data* database for the specific food item to find the relevant impact statistics.

CREATE: Users can login to our website and save previous searches to go back to them, or input a grocery list which we will save.
- In the database we will keep track of user records, holding general information like name, email, and password, and last known location, and holding tables for their relevant search information.
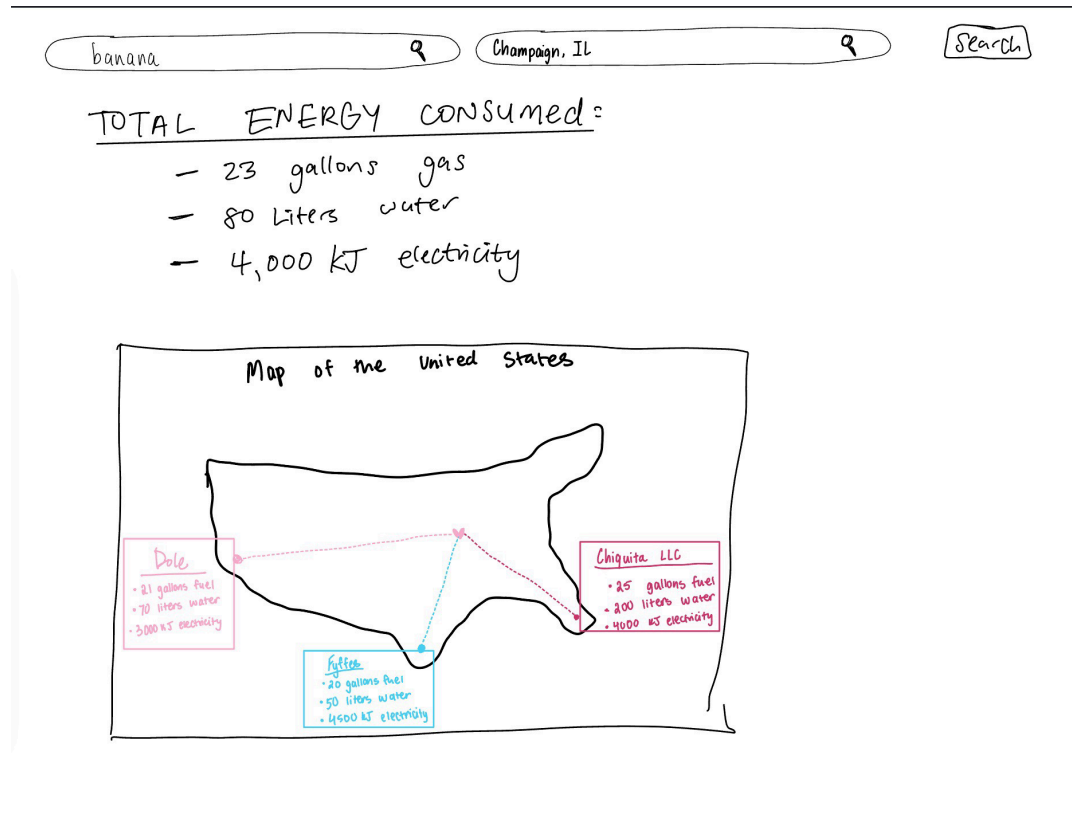
UPDATE: Users can update their grocery lists, their location, and their account information.
DELETE: Users can delete their previous grocery lists and search history.
READ: We are reading data after each user query in order to provide the relevant statistics.
To create a dynamic visualization that shows the user where their produce is coming from, we use the user's input information and read from the relevant databases.

a) **A low-fidelity UI mockup: What do you imagine your final application's interface might look like? A PowerPoint slide or a pencil sketch on a piece of paper works!**

The search interface shows "banana" and "Champaign, IL" search fields with a Search button.

TOTAL ENERGY CONSUMED:
- 23 gallons gas
- 80 Liters water
- 4,000 KJ electricity

Map of the United States

Dole
• 21 gallons fuel
• 70 liters water
• 3,000 kJ electricity

Chiquita LLC
• 25 gallons fuel
• 200 liters water
• 4000 kJ electricity

Fyffes
• 20 gallons fuel
• 50 liters water
• 4500 kJ electricity

b) **Project work distribution: Who will be responsible for each of the tasks or subtasks? Explain how backend systems will be distributed across members. Be as specific as possible as this could be part of the final peer evaluation metrics.**

- Front end search, interactive visualization – Medha, Vani
- Front-end user onboarding and general energy consumption display – Kevin, Kathy
- Database creation, integrating user login tables with our import data – Vani, Medha
- API integration, creating database queries - Kathy, Kevin

In terms of database creation, this will include bringing in our export data from various different sources, creating a user table and other tables to house user data, and ensuring that our database structure is optimized.

Our other backend workflow will include integrating APIs and other libraries for our more specialized use cases, like barcode scanning and user location tracking.

APIS WE PLAN ON USING:
https://world.openfoodfacts.org/files/api-documentation.html