Week 3 Notes:

Website/App with

- Interactive Map of University Buildings in DC
- Analysis of GW and Howard University Buildings
- Research on standards for universities

Total Measurements of Energy and Water Columns:

WATERUSE_ALLWATERSOURCES_KGA- Total annual water consumption in kilogallons (1,000 gallons).

ELECTRICITYUSE_RENEWABLE_KWH- The total annual electricity consumed by the property generated and used onsite from any onsite renewable energy generation systems (if applicable), in kilowatt-hours (kWh).

ELECTRICITYUSE_GRID_KWH- The total annual electricity consumed by the property generated and used onsite from any onsite renewable energy generation systems (if applicable), in kilowatt-hours (kWh).

NATURALGASUSE_THERMS- The total annual natural gas consumed by the property, in therms (1 therm equals 100,000 British Thermal Units (Btus), and is approximately equal to the energy content of 100 cubic feet (CCF) of natural gas.

FUELOILANDDIESELFUELUSEKBTU-Total annual energy consumption from liquid fuel use on the property, inclusive of fuel oil no. 1, fuel oil no. 2, fuel oil no. 4,fuel oil no. 5 and no. 6, diesel, kerosene, and propane, measured in kBtu (1,000 British Thermal Units).

TOTGHGEMISSIONS_METRICTONSCO2E- Greenhouse Gas (GHG) Emissions are the carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) gases released into the atmosphere as a result of energy consumption at the property. GHG emissions are expressed in Metric Tons of carbon dioxide equivalent (CO2e), a universal unit of measure that combines the quantity and global warming potential of each greenhouse gas. Total Emissions is the sum of Direct Emissions (emissions associated with onsite fuel combustion) and Indirect Emissions (emissions associated with purchases of electricity, district steam, district hot water, or district chilled water. These emissions occur at the utility plant, but they are a result of the property's energy consumption and therefore contribute to the overall GHG footprint).

Columns with Measures that are Normalized:

SOURCEEUI_KBTU_FT- Source Energy Use divided by property square footage, normalized for weather. Weather-normalization is based on National Oceanic and Atmospheric Administration (NOAA) weather data for the zip code. Source Energy Use is the total amount of

raw fuel that is required to operate the property. In addition to what the property consumes on-site, source energy includes losses that take place during generation, transmission, and distribution of the energy, thereby enabling a complete assessment of energy consumption resulting from building operations. For this reason, Source EUI is the best way to quantify the energy performance of commercial buildings.

ENERGYSTARSCORE-The 1-100 score calculated by ENERGY STAR Portfolio Manager® that measures how well the property is performing relative to similar properties, when normalized for climate and operational characteristics. The 1-100 scale is set so that 1 represents the worst performing buildings and 100 represents the best performing buildings. A score of 50 indicates that a building is performing at the national median, taking into account its size, location, and operating parameters. A score of 75 indicates that at a property is performing in the 75th percentile and may be eligible to earn ENERGY STAR Certification.

Week 4 Goals:

- Individual analysis of building data at say GW and Howard. Also other universities (but there's less data). Comparison of buildings over time for each variable. Scatterplots of buildings versus two numeric variables.
- Mapping for all university buildings and setting up streamlit app for the project.
- Use dash/plotly for graphs.
- Research on standards that should be met by universities.

Week 2 Notes:

Research Topic: Analysis of energy and water usage university buildings in DC. Which universities are up to standards? Which are not? How can we measure standards with the data? What recommendations do we have for each university?

Building Energy and Water Data Set:

Building Energy and Water Performance Benchmarking Meta Data

Benchmarking App

Information About Clean Energy in DC:

Progress | Clean Energy DC Info

Energy Benchmarking | doee

Possibly Useful Data Set to Identify Buildings: Certificate of Occupancy Data

Building Identifiers and Info Columns:

PID
TAXRECORDFLOORAREA
REPORTEDBUILDINGGROSSFLOORAREA
PRIMARYPROPERTYTYPE_SELFSELECT
OWNEROFRECORD
ADDRESSOFRECORD
REPORTSTATUS
REPORTINGYEAR

Variables of Interest:

ENERGYSTARSCORE
SOURCEEUI_KBTU_FT
TOTGHGEMISSIONS_METRICTONSCO2E
TOTGHGEMISSINTENSITY_KGCO2EFT
WATERSCORE_MFPROPERTIES
WATERUSE_ALLWATERSOURCES_KGAL
NATURALGASUSE_THERMS
FUELOILANDDIESELFUELUSEKBTU

ELECTRICITYUSE_RENEWABLE_KWH
ELECTRICITYUSE_GRID_KWH

Week 3 Goals:

- Review Meta Data to get an understanding of columns!
- Subset building data by universities and clean data if needed. Make sure buildings are unique, and we can identify each building in a time series. Group by universities.

PRIMARYPROPERTYTYPE_SELFSELECT - This column is helpful to subset by universities and dorms

OWNEROFRECORD - This column can be used to identify which university owns the building

- Conduct exploratory data analysis on water and energy data by university.
- **Next steps:** Identify university standards and compare with initial results.

Week 1 notes:

Potential Research Project: DECENTRALIZING ECO-LABEL REGIMES

Project Overview :::(Suggestion: As we dive deep into this project we will continue to add more content in this document)

- Community-based sustainability can be much more powerful than top-down federal government sustainability
- Most eco-labels are nationalized, meaning they are managed by the federal government
- We should propose local-level ecolabels that can only apply to the confines of a U.S. city

Project Objectives/Purpose

- Why is this important? Our entire idea for this project was about how not considering the specific location of a manufacturing plant reduces the accuracy of a sustainability assessment. This project still argues that. We're arguing that sustainability should be determined from the bottom-up, not the top-down. Local people understand the environmental conditions of their home far better than the federal government does. Thus, ecolabels should be coming from the local government for only the specific confines of a city

Project Design

- For the technical side of this project, I want us to design an eco-label for the city of Washington DC. It could be a label that DC business owners could put in their storefronts or restaurant windows to indicate that they've applied for the eco-label and passed a sustainability assessment.

Project/Research Questions:

Questions:

1. Which environmental indicators are important in this city? Water usage? Clean energy usage? Where products were sourced?

2. How can we demonstrate a data-driven approach to eco-labeling?

3. We don't need to do a project that decides whether every storefront in DC deserves an eco-label or not, but we do need to demonstrate an example of a business that would receive one and a business that would not receive one, at the very least. Where could we find data to do this type of comparative analysis? What type of data are we looking for?

4. What applications should we employ as we create our eco-labeling software/application.

Data Sources

Open Data DC-

https://opendata.dc.gov/

Building Data- https://opendata.dc.gov/dStudent Awards | The GW Open Source Program Office | The George Washington Universityatasets/DCGIS::building-energy-benchmarking/explore?location=38.898060%2C-77.007563%2C11.41

Potential Contest-

https://ospo.gwu.edu/student-awards

Week 2 Goals:

- **Explore the building and energy data**
- **Explore Open data DC for any interesting environmental Data Sets**
- **Form a Research Question and form an idea for what our "showcase" will look like (an app, or a report or something else visual that we can create).**
- **Any ideas you have for a potential research project.**