

[INFO 4310] HW 2

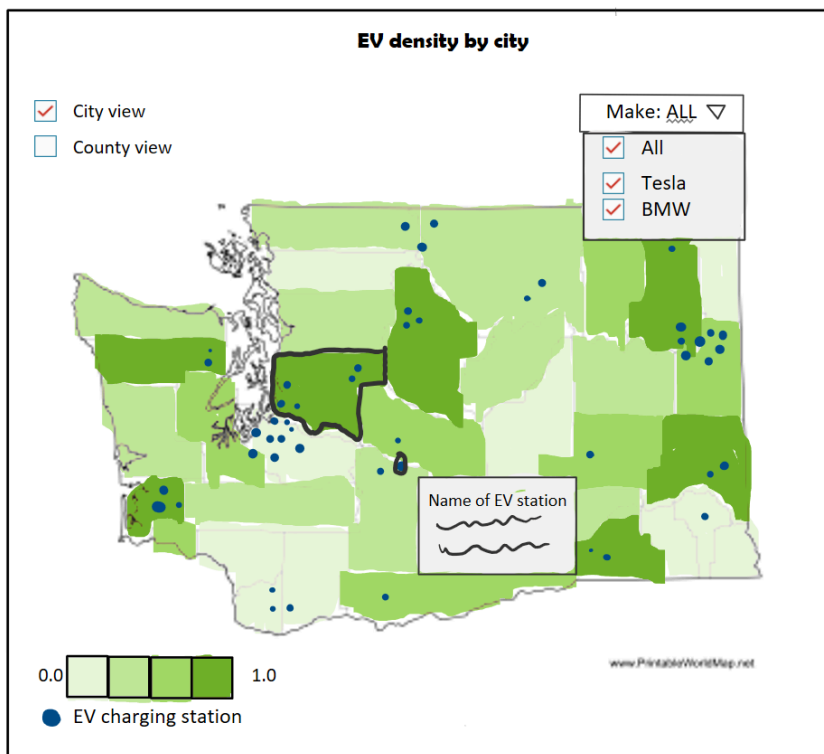
Ahmed Sultan (aks264) & Sydney Wan (ssw73)

Introduction

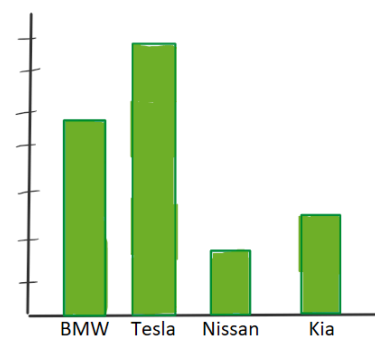
In our project, we chose to analyze the distribution of [Electric Vehicles across Washington State](#). As the data description on the website describes, “This dataset shows the Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs) that are currently registered through Washington State Department of Licensing (DOL).” Each row in the dataset is a different car, and includes a variety of information including County, City, Postal Code, Model, Year, Make, and Electric Range. We also introduced another dataset that includes the locations of [alternative vehicle charging stations](#) across Washington, from the U.S. Department of Energy website. By using these two datasets, our main goal is to identify which counties and zip codes “are most ready” for Washington’s transition to a fully-electric vehicle population. Based on this information, we plot the charging stations to see if the state’s infrastructure is in alignment with the distribution of electric vehicles. Alternative insights we planned to implement included a breakdown of which car brands are most popular and which geographic locations have higher average electric range. In our initial brainstorming, we planned to create an interactive map that would display most of the important data, with additional bar charts and plots to display the remaining information.

Storyboard

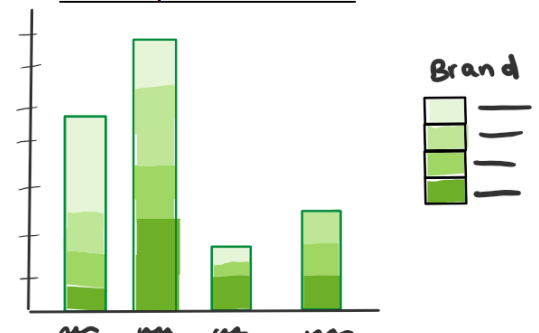
Electrical Vehicle Makeup in Washington State



Number of cars in Seattle

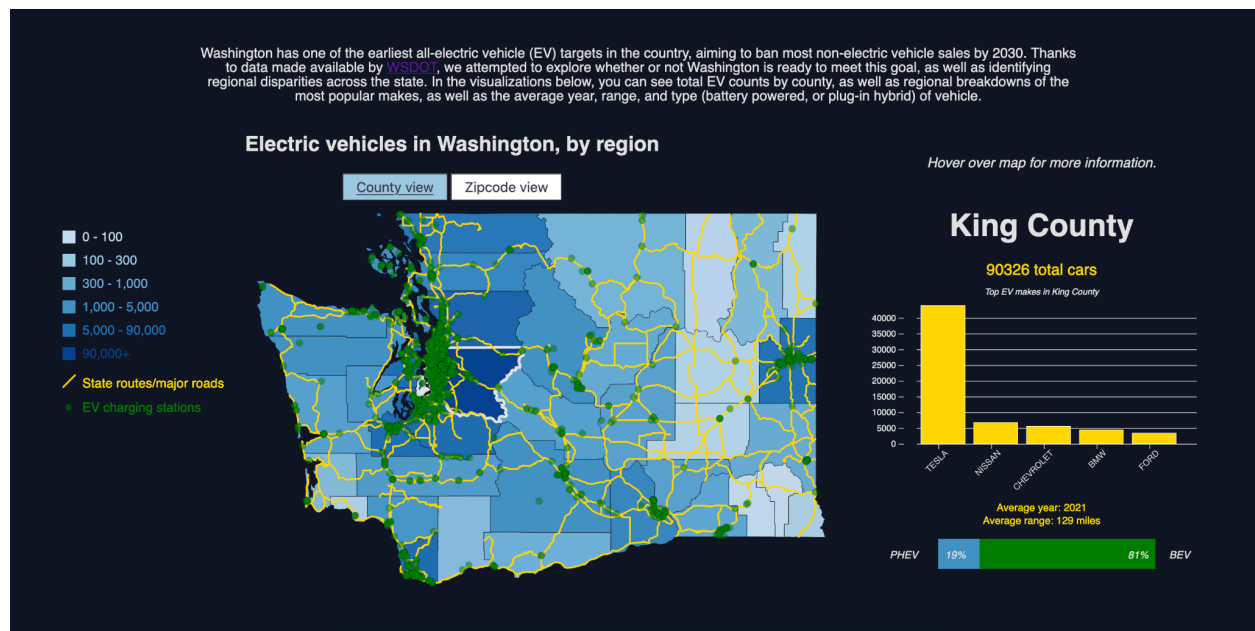


Car Makeup of the Densest cities



While designing the storyboard, we wanted the map to be the largest component as we are mainly analyzing geographic distribution. We chose to include two filters, a toggle between city and county view as well as a filter to limit the car make in the density calculation. Because there is a wealth of data in the map, we hoped that introducing filters would allow the user to explore the information even without a specific query in mind. The city/county toggle filter was immediately chosen in our decision making process to allow for greater exploration of the EV density. As the focus of our project is geographic disparities, we knew it was necessary to have some kind of interaction that allowed for exploration in EV distribution. We included a filter to limit the data by car brand as users may have interests in certain brands, and the density may vary greatly if the user chooses to focus on a single brand. We also included clickable circles on the map to display information on the EV stations, as the dots may not provide the user much insight on their own. Lastly, we incorporated the ability to click on the city/county which would in turn update the top bar chart. The idea here was that if a user clicks on a city/county, they can see the car brand distribution in greater detail.

Final Visualization



In our final visualization, we included most of the features from our storyboard. We have a choropleth map of the EV distribution, which can toggle between county or zip code view. The map plots the EV charging stations with dots and roadways with yellow lines, and the map also has the ability to zoom and pan. All of the different aspects on the map are distinguished by the legend on the left hand side. The user can hover over each county/zip code to see the name of the zone and the total number of EVs in that zone. Additionally, there is a bar chart on the side that displays the top 5 car makes for the selected region. Below that, there is a bar that displays the percent of PHEV vs. BEV cars, which are partial hybrid electric vehicles and battery electric vehicles.

Trade Offs

We chose to switch from city view to zip code view because it is less intuitive for users to look at a state map with city outlines as it is to see by zip code. We omitted the map filter to display by make because we felt that it distracted from the main purpose of our project, which was to analyze the overall distribution of electric vehicles. However, we still kept the bar chart of the car make by county/zip code so users could compare between car brands in a single glance, rather than toggling a filter on and off to draw those comparisons. Instead of making the EV charging stations clickable, we achieved the same goal through a zoom feature so that users could distinguish between the multitude of points centered in the Greater Seattle Area. We also implemented an overlay of the roadways so that there could be more information on infrastructure so that the EV stations could be better contextualized. We chose to remove the click on EV station feature because it would conflict with the hovering/clicking on each county/zip code. The last change we made was omitting the second bar chart. We did this because we felt the visualizations were becoming redundant and the user could see the relevant data by interacting with the map and looking at the first bar chart. Instead, we created a single percentage bar that displays the percent of hybrid (PHEV) vs. full-electric vehicles (BEV) in the selected state, to portray a greater variety of information. We wanted to allow for more choropleth views for the user to choose between, but found it would be hard for a user to wrap their head around all the different data views without getting confused or frustrated without prior knowledge.

Work Breakdown

Ahmed did the research to find the EV dataset, as well as the geojson data for the WA state counties. He created the initial map and color scale that laid the groundwork for the rest of the project. Additionally, he cleaned all of the data so that we could display the total count of cars by zone as well as retrieve the specific car make data for that zone. He also coded in the road overlay, organized the layout of the page, refined the bar chart to accommodate zips/counties with a lack of data, added the PHEV vs. BEV dynamic bar, adjusted the legend to include the stations/roads, and fixed the hover feature.

Sydney found the EV charging station dataset, as well as the geojson data for the WA state zip codes. She also created the storyboard and wrote the final report. For the code, she made changes to the map to address scaling and the readability of the color scale. She also implemented the zoom feature, county/zip code toggle, initial zone hover feature, initial dynamic bar chart, and the legend.

Each group member spent about 15-20 hours each working on the project. The longest part for Ahmed included the data wrangling, which took most of the time. The longest part of the project for Sydney was the dynamic bar chart to update and adjust spacing.