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February 11th, 2025

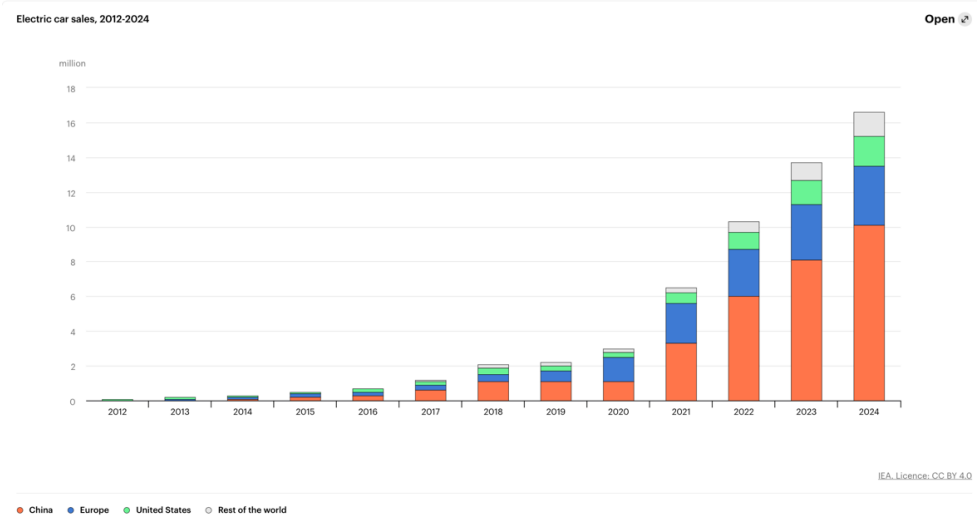
DS 4200

Project Proposal

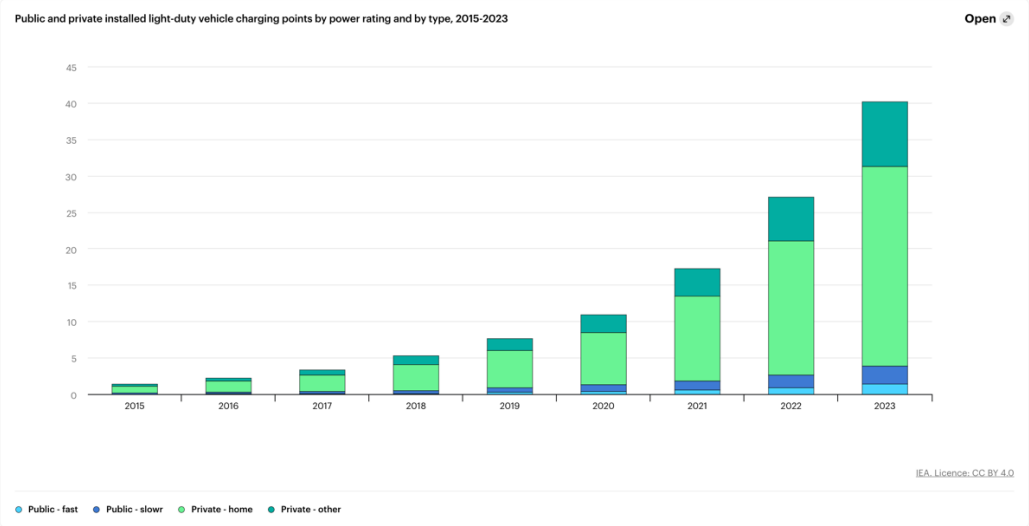
Distribution of Electric Vehicle Charging Stations: A regional analysis

Climate change and the growing awareness of environmental externalities generated from fossil fuels, catalyzed a global movement in transitioning to green energy, specifically the adoption of Electric Vehicles (EVs). Transportation is the main source of US climate pollution and global pollution, and the Environmental Defense Fund predicts that a shift to electric vehicles could reduce 800 million tons of carbon dioxide emissions per year by 2040 ("Accelerating to 100% Clean: Zero Emitting Vehicles"). As of 2023, the International Energy Association reported for more than 40 million EVs on road globally, of which 95% of sales generated were contributed by China, Europe, and the United States (IEA). However, since EVs do not rely on gasoline, charging infrastructures are crucial to encourage adoption among individuals. Thus, our research project aims to explore the global distribution of electric vehicle charging stations, and examine the regional discrepancies in accessibility, price, and usage patterns.

The figure below is published by the International Energy Association shows a stacked bar chart of the global adoption rate for Electric Vehicles by region. Overall, between 2012 to 2024, the world has seen an exponential increase in EV sales. China has the largest share of EV sales, followed by Europe, the United States, and the rest of the world.



The figure below is published by the International Energy Association shows a stacked bar chart of the global adoption rate for public and private charging stations by region. Overall, between 2012 to 2024, the world has seen an exponential increase in charging stations. While public fast and slow chargers are increasing, through the years, the growth rates of private chargers are much quicker.



Several existing literatures investigate the relationship between public EV charging stations and the adoption of these clean vehicles. White et al. argues that the density of charging stations positively correlates with adoption through the effects of visibility and social acceptance (White et al.). However, the study was limited to only three major US metropolitan areas, Los Angeles,

Dallas, and Atlanta. An international level study conducted by Anwar et al. suggests that across North America, Western Europe, and emerging markets, environmental factors only have minimal effect on EV adoption, instead, encourages policies to focus on charging infrastructures and subsidies (Anwar et al.). The study emphasizes the widespread demand of charging infrastructures and its ability to drive adoption rates across nations. We aim to contribute to the discipline by diving deeper into the current regional distribution and availability of charging stations.

The data we plan to use in our study is published on Kaggle in January 2025 which contains information on worldwide charging stations (Attri, V). The data contains more than 5000 entries and includes information on station location, charger type, availability, maintenance frequency, price, number of users per day, distance to city, and station company. To perform accurate analysis, we plan on cleaning the data, imputing or deleting any missing values through exploring the data. The purpose of the study is to explore the global distribution of electric vehicle charging stations, and examine the regional discrepancies in accessibility, price, and usage patterns. We plan on creating a tree map showing the hierarchy of global distribution of electric vehicle charging stations, creating a histogram to understand the distribution of prices, and creating a bar chart to show the average price of charging by region.

As a group, we plan on collaborating through all sections by communicating effectively in our weekly check-ins on progress. We will delegate responsibilities fairly throughout the assignment and ensure each person’s workload is manageable.

Works Cited

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