Executive Summary
Electric Vehicle Support Infrastructure

Case study 2

Basic Analysis

The dataset provided by the UK government shows traffic of different vehicle types across different regions from 2000 till 2020. [1] After observing the data, the minor roads data was missing and was entirely dropped. Moreover, after summarizing the data the total mileage was shown to be mostly consumed by cars and taxis 77.3% and followed by lgvs at 13.1%. For the Annual millage for all motor vehicles there was a 19% increase in overall UK millage through years 2000 to 2019. However, in the year 2020, UK experiences a sharp decrease of 24% between the that could be largely attributed to lockdown during COVID-19. Most regions follow similar trend and a **sharp drop** in mileage in 2019 is experienced among the UK. Cars and LGVs most responsible for trend changes while other vehicle type display constant millage with slightly notable decrease around 2019. The dips and rises can be due to changes in fuel prices and economic downturns.

Regression

I have decided to choose the Prophet model as it is one of most widely used approaches to time series forecasting and has proven to be robust to missing data and shifts in the trend, and typically handles outliers well [3]. Using the Prophet model, I was able to forecast UK vehicle mileage for the next 30 years. However, I decided to exclude the data point 2020 from my analysis as it effects the model's prediction. Therefore, one can reflect on the limitations from this regression analysis as it does not consider external factors and unexpected events such as the COVID-19 drop in 2020.

Research

After looking at historical data of EV percentage growth in the UK, I used the prophet model to predict percentage of EV's in the next 30 years and it has shown to grow towards a 100% percentage. This is due to the UK's shift towards Zero emission vehicles [4]. Using these percentage estimates, I have

forecasted the mileage of EVs in the UK over the next 30 years. Using the calculated mileage and Electric car efficiency estimates of 340 wh/mi, I estimated the electricity demands of EVs in TWh/year [5]. Then by observing supply and demand of UK's electricity I calculated an energy margin and obtained the additional required energy showing that the UK would need to produce over 60 TWhs/year by 2050.

Recommendations

Finally, using the levelized energy costs for 2040 calculated by government reports I was able to explore different recommendations [6]. As the Large-Scale solar option was the cheapest, I calculated the Large-Scale solar costs per region to cover by 2040. However, The UK cannot solely rely on solar energy because of its weather and its regional capacities. Different regions have potential for different renewable energies. For example, London can use wind and solar energies, but seaside regions could more take advantage of offshore wind. Therefore, as the experts have advised the UK must integrate different renewable energies and existing sources such as photovoltaic panels, wind, biogas and battery power which has proven to result in cost savings of up to 25 per cent [7].

References

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