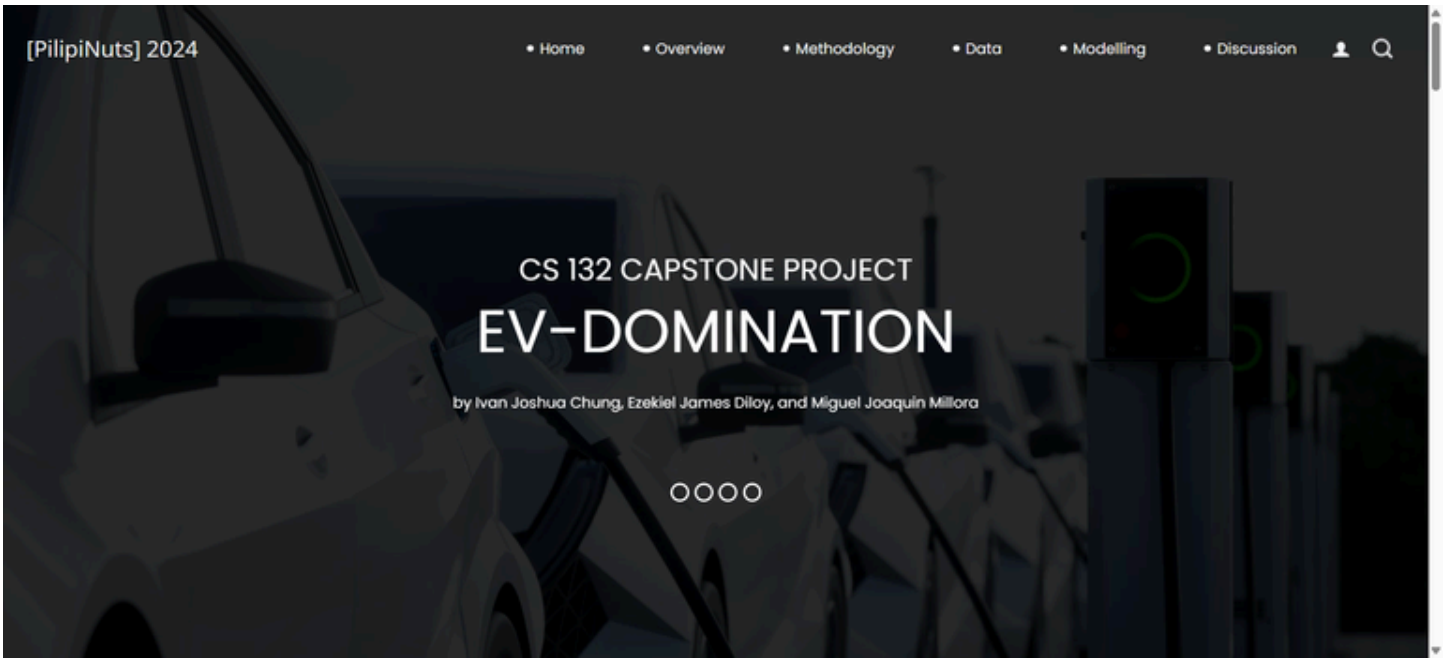
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CS 132 CAPSTONE PROJECT
EV-DOMINATION
by Ivan Joshua Chung, Ezekiel James Diloy, and Miguel Joaquin Millora


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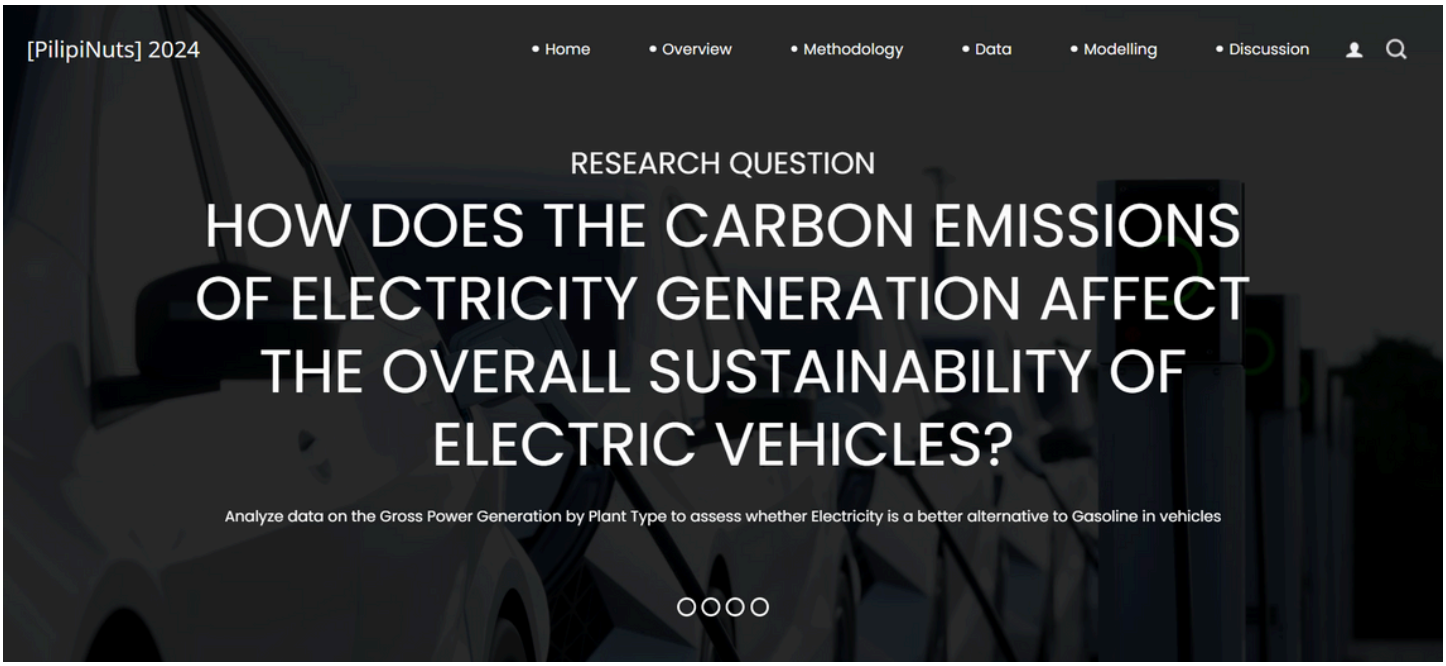
HYPOTHESIS
AS THE ADOPTION OF ELECTRIC VEHICLES CONTINUES TO RISE IN THE COUNTRY, CARBON EMISSIONS ARE EXPECTED TO DECREASE.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RESEARCH QUESTION
HOW DOES THE CARBON EMISSIONS OF ELECTRICITY GENERATION AFFECT THE OVERALL SUSTAINABILITY OF ELECTRIC VEHICLES?
Analyze data on the Gross Power Generation by Plant Type to assess whether Electricity is a better alternative to Gasoline in vehicles

RESEARCH QUESTION

HOW DOES THE TRANSITION FROM GASOLINE TO ELECTRICITY IN AUTOMOTIVE VEHICLES AFFECT THE CARBON FOOTPRINT IN THE PHILIPPINES?

Carbon emissions from the years before the rise of electric vehicles will be compared to current carbon emissions to assess the impact of their adoption

OVERVIEW

With the rise of Electric Vehicles in the country, our project EV-Domination, focuses on the actual impact that Electric Road Vehicles have on the country's overall carbon emission. The group aims to enlighten the public on the effectivity of Electric Vehicles, and if it really is an alternative to Internal Combustion Engines.

A few years back, scientists brought news of the disastrous effects of global warming. Although a bit slow, people have begun working on recovering the state of the world back to the acceptable range. However, scientists have also said that in regards to the state of the world due to global warming, "there is no recovery/fixing, there is only preventing more damage".

So, this study is aimed to assist in the movement of transitioning from fossil fuels to electricity-powered transportation.

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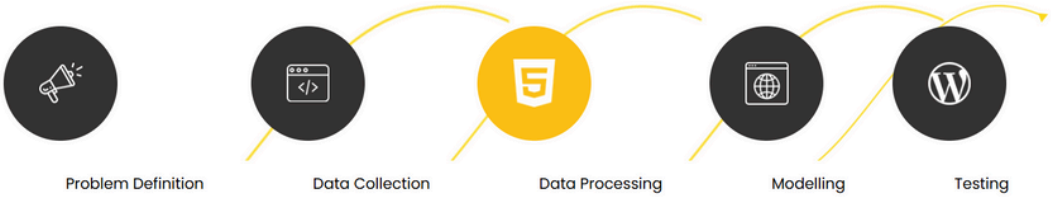
METHODOLOGY



DATA

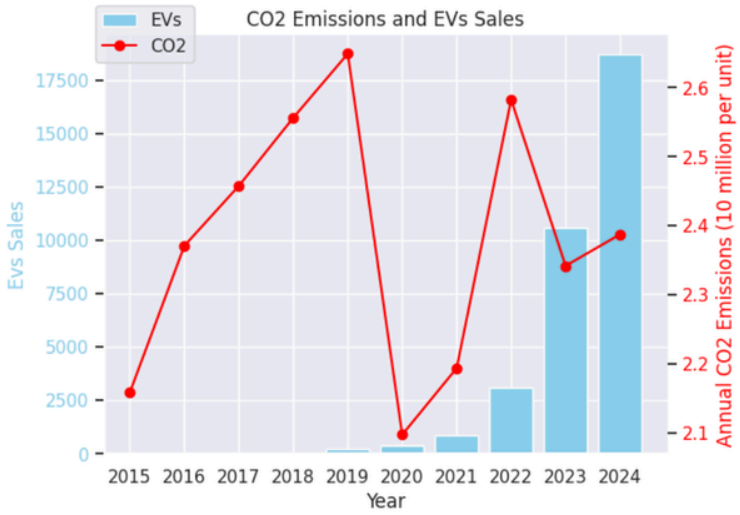
We have collected raw data from "Climate TRACE" regarding the CO2 Emissions of Road Transport Vehicles across the Philippines

Our Dataset

MODELLING

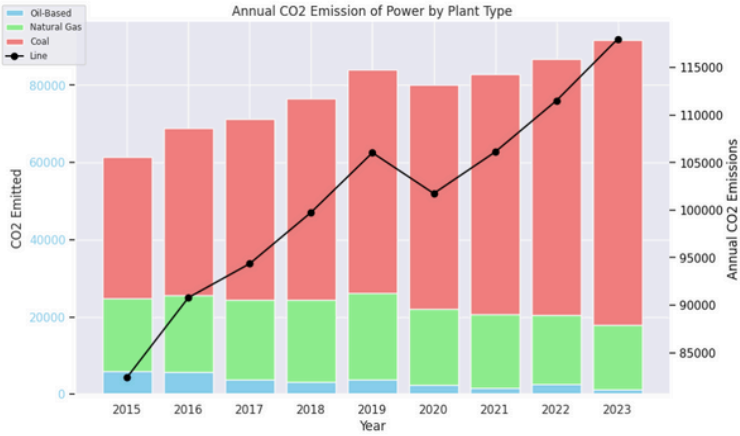
Relation of EV Sales to the Carbon Emissions of the Road Transportation Sector

The first graph below displays the relation of EV sales with the amount of Carbon Emitted per year. In the graph below, it can be seen that with the increase of Electric Vehicles sold, there is a little decrease in the Carbon Emissions throughout the years. With the popularity of Electric Vehicles, the trend of increasing carbon emissions per year was interrupted.



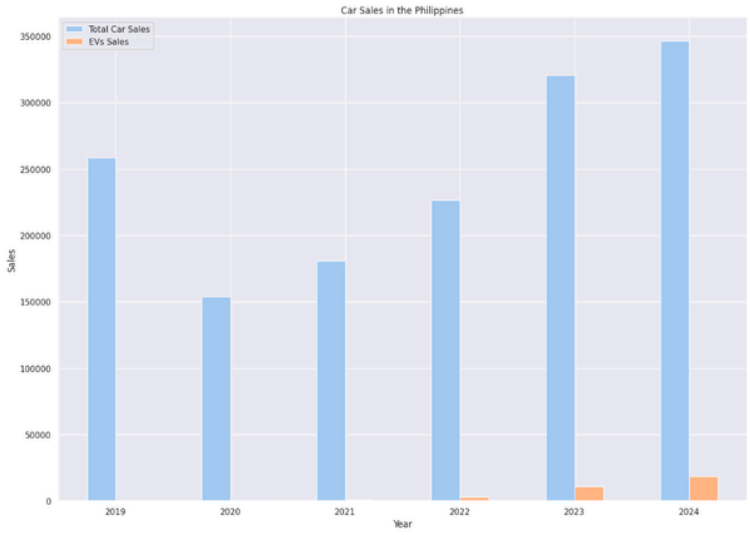
Relation of Power Generated and Annual CO2 Emissions of Fossil of Power Generation

The Graph below shows the increase in the need for Power and the side effects of Fossil Fuel Power Generation. It can be seen that the generation of more power leads to the emission of more CO2. The more Electric Vehicles sold would require more Power, and if there is no transition made to Renewable Energy Generation, the positives gained from the reduction of Carbon Emissions in the Transportation Sector would be reversed by the Carbon Emissions caused by the Production of Energy.



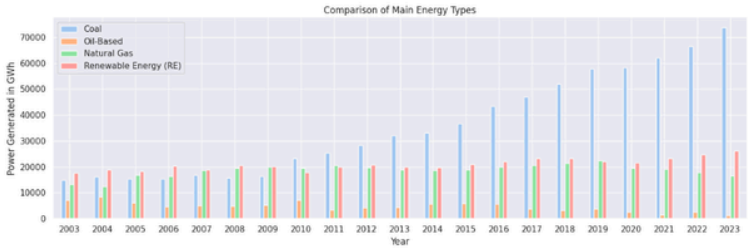
Total Car Sales and EVs Sales in the Philippines

The graph below shows the annual total amount of cars sold in the Philippines for the past few years. The graph also shows the number of EVs sold in the year. Upon checking the graph, EVs are still not the bulk of cars sold in the Philippines, this is understandable as Electric Vehicles have only started to be promoted in the country in the year 2022.



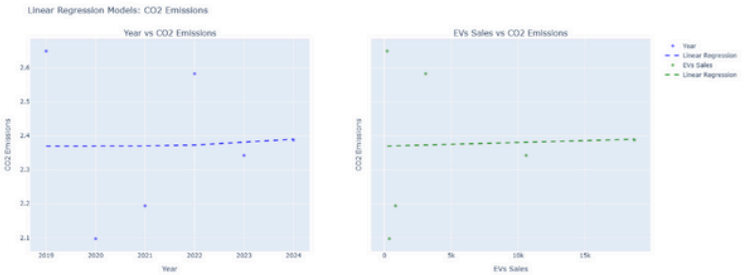
Power Generation of the Major Types of Energy Plants

The graph below compares the 4 major types of energy production in the country. As seen in the graph, Coal-based production has been exponentially increasing as compared to the other 3. Natural Gas based production was initially increasing but recently has been decreasing, with the annual amount being stable. As well as Renewable Energy, it has been steadily and stably increasing. Lastly, Oil-based has been the lowest in production and is continuing to decrease. With this graph, it can easily be seen that Fossil Fuel based Energy is still the majority. This simply shows that the Philippines needs to transition more renewable forms of energy when the country wishes to transition to Electric Vehicles.



TESTING

Based on the results of the linear regression models, there appears to be no significant relationship between the year and CO2 emissions from transportation, nor between EV sales and CO2 emissions. The R^2 values for both models are 0.00, indicating that neither variable explains any discrepancy in CO2 emissions. Additionally, the p-values for the independent variables are the following: 0.93 for Year and 0.94 for EV Sales. This suggests that the observed trends could be caused by other factors such as the pandemic which associates a reduction in carbon emissions due to the lack of vehicles in the road.



Several possible explanations may account for these findings. First, the adoption of EVs may still be too recent or too limited in scale to produce a noticeable effect on nationwide emissions. Second, the pandemic likely introduced a major confounding factor: during 2020 and parts of 2021, transportation patterns shifted dramatically due to lockdowns, reduced commuting, and travel restrictions. These changes could have temporarily reduced CO2 emissions regardless of EV sales, thus distorting the longer-term trends and weakening any correlation. Furthermore, post-pandemic recovery may have led to a rebound in emissions as travel resumed, again complicating any potential link between EV growth and emissions decline.

DISCUSSION

If despite the rising population of EVs in the country still has no effect on decreasing the carbon emission, find other causes that are making the number rise. Else if it does affect the carbon footprint of the country, then suggest advertising EVs.

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THE TEAM

EZEKIEL JAMES DILOY

"Hello! I am a Bachelor of Science in Computer Science student at the University of the Philippines. As a car enthusiast, I've been closely following the rise of electric vehicles (EVs) in the Philippines. Inspired by the lessons from our Data Science class, my group and I aim to study the actual environmental impact of EV adoption in the country."

IVAN JOSHUA CHUNG

"I have an interest in cars. I also have an interest in improving the quality of life for Mother Nature. With that in mind, this project is a good opportunity to satisfy those interests."

MIGUEL JOAQUIN MILLORA

"As somewhat of a car enthusiast, I've always been fascinated by how vehicles evolve especially with the rise of electric vehicles (EVs). I'm particularly curious about how EV adoption will unfold in a developing country like the Philippines, and what that means for climate action and sustainable transportation. This project gives me the opportunity to explore that intersection of technology, environment, and real-world challenges."

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