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Are Greenhouse Gas Emissions lowered with electric vehicle use?

Our group has collected data relevant to the questions we are attempting to answer using our database. We have gathered Electric Vehicle Ownership Data, Vehicle Miles Traveled Data, Community Profile Data, Community-Scale GHG Emissions Data, Walk Scores for NJ Cities Data, and Data on EV Charging Stations in NJ for incorporation into our database. The previously listed datasets will provide our team insight into the population densities, median household income, and GHG emissions from passenger vehicles from each municipality, as well as the percentage of EV ownership and locations of EV charging stations across NJ.

With the data that was collected, these are the following questions that we are trying to answer. The most important question is: “Do electric vehicles lower greenhouse gas emissions in each municipality?” Considering the economic background of each municipality, analyzing the electric vehicle usage can give a team an idea of how different a municipality with heavy use of gas vehicles looks compared to one that relies on electric vehicles. In congruence with the previous question, is there a correlation between walk scores and greenhouse gas emissions based on population density?

“Are there municipalities eligible for certain sustainability programs or rewards based on their current practices?” Determining this can benefit a municipality because it can give a municipality an incentive to go green by earning these certain rewards.”Are there areas where certain municipalities can improve their sustainability practices?” With this question being solved, municipalities can get an idea of where they can improve environmentally; therefore, giving that said municipality a slight incentive.

The data we found on the Sustainable Jersey page helps us explore these questions. The data we collected can help municipalities identify certain sustainable jersey actions that could be beneficial to them. We wanted to focus mainly on the transportation aspect and the data we obtained showcases that. The GreenHouse Gas emissions by Vehicle data found on the NJ sustainability site showcases the impact of GHG emissions by different vehicle types in different municipalities in New Jersey. Correlating this data with the Electric Vehicle ownership data, we can identify how many people own Electric vehicles in specific municipalities and we can identify if electric vehicles have an impact on greenhouse gas emissions. We can also identify whether or not  Electric Vehicles are viable alternatives to passenger vehicles for a given municipality. Looking at the Community Profile data, focusing mainly on the transportation factor, we also want to compare If municipalities with lower walkability scores result in higher GHG emissions, and if that's true then it's better to promote EVs and more charging stations in those certain areas with higher GHG emissions.

The greenhouse effect describes how "greenhouse gasses" trap heat at the Earth's surface. These heat-trapping gasses act like a blanket wrapped around Earth, keeping it warmer than it would be without them. Carbon dioxide, methane, nitrous oxides, and water vapor are examples of greenhouse gases. Scientists have discovered that the warming effect of carbon dioxide aids in the stabilization of the Earth's atmosphere. The terrestrial greenhouse effect would collapse if carbon dioxide were removed. Without CO2, the Earth's surface would be 33°C (59°F) colder. However, for the last century or two, people have been meddling with the planet's energy balance, primarily through the use of fossil fuels, which emit carbon dioxide into the atmosphere. Carbon dioxide levels in the atmosphere have been steadily growing for decades, trapping extra heat at the Earth's surface, and driving temperatures to climb (Chandler, 2023). Global warming has many negative impacts on our environment including stronger hurricanes, desertification, decreases in snow covers and ice, and rising sea levels. (“Infographic - the Effects of Global Warming,” n.d.). Our personal vehicles are a major contributor to GHG. Collectively, cars and trucks account for nearly one-fifth of all US emissions, emitting around 24 pounds of carbon dioxide and other global-warming glasses for every gallon of gas. The use of electric vehicles eliminates these extra emissions and helps slow the cycle of climate change (“Car Emissions and Global Warming, 2014”).

There are many key ethical and environmental issues that are attached to global warming and climate change. The ethical principles of climate change revolve around the moral obligation to protect the environment for future generations, to fairly distribute the costs and benefits of climate change, to take action to prevent harm even when the science is uncertain, and to recognize the common but differentiated responsibilities of all countries to act, with developed countries having a greater responsibility to act as a result of their large amount of emissions. These principles underline the significance of taking action to reduce climate change and ensure that its repercussions are fairly distributed (The Ethical Principles of Climate Change, 2022). Global warming has a profound impact on human health, generating temperature increases and extreme weather events that increase the incidence and spread of many diseases. Some of the direct effects of global warming on health include heat-related sickness and death, with vulnerable people being especially vulnerable. Furthermore, changes in temperature and precipitation patterns cause changes in the prevalence of infectious diseases. Climate change exacerbates air pollution, leading to respiratory and cardiovascular disorders. Natural catastrophes are becoming more common and severe as a result of global warming, causing injury, displacement, and mental health issues. These health effects of global warming can be reduced by limiting climate change and implementing adaptation measures (Climate Effects on Health, 2022).

Use Case: View Electric Vehicle Information

Primary Actor: User

Description: The user views the specified information about Electric vehicles

Scenario:

1. System will prompt user to select county in NJ
2. User makes selection
3. User will select information about Electric vehicles
4. User will refine selection of electric vehicle information
5. User will make selection of electric vehicle information they wish to view
6. Information will be displayed to user

Use Case: View Database Municipalities

Primary actor: User

Description: The User will view a table of the database

Scenario:

1. User is prompted to select a county in NJ
2. User makes the selection
3. User is prompted to select a municipality within selected county
4. User makes the selection
5. User is prompted to select the data they would like to view
6. User makes the selection and is directed to the data

Works Cited

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Vehicle Miles Traveled Data (Also has the greenhouse gas emissions): [Vehicle\_Miles\_Traveled-On-Road\_Vehicle\_GHG\_Emissions\_Data\_08.11.22.xlsx (live.com)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.sustainablejersey.com%2Ffileadmin%2Fdata%2FVehicle_Miles_Traveled-On-Road_Vehicle_GHG_Emissions_Data_08.11.22.xlsx&wdOrigin=BROWSELINK)

Community Profile Data (Median household income): [Community\_Profile\_Data\_08.21.22.xlsx (live.com)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.sustainablejersey.com%2Ffileadmin%2Fdata%2FCommunity_Profile_Data_08.21.22.xlsx&wdOrigin=BROWSELINK)

Community Scale GHG Emissions: [Community-Scale\_GHG\_Emissions\_08.22.22.xlsx (live.com)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.sustainablejersey.com%2Ffileadmin%2Fdata%2FCommunity-Scale_GHG_Emissions_08.22.22.xlsx&wdOrigin=BROWSELINK)

Walk Scores for each city in NJ: <https://www.walkscore.com/NJ/>

Sustainability Actions: [Actions - Sustainable Jersey](https://www.sustainablejersey.com/actions/#close)

EV Charging Stations in NJ: [NJ Public Electric Vehicle (EV) Charging Locator (arcgis.com)](https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=e41aa50dd8cd45faba8641b6be6097b1)