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Positive Benefits of Electric Vehicles on the Average Consumer

For the past decade, we've been hearing more and more about "global warming" or "climate change" as environment issues become a bigger concern. Even though the global CO_2 levels have remained steady in the past two years, temperatures continue to rise. We are making progress, but what we need now is not just to maintain our CO_2 emissions levels, but to reduce them. Renewable energy and energy conservation is a major area of research and there has been a huge amount of innovation and new inventions over the years. However, it's ultimately up to the main population to adapt to new policies and make use of these new technologies if we want to actually reduce our carbon footprint. One of the most important innovations in regards to CO_2 have been the research in electric vehicles (EVs). There are clear advantages to using electric vehicles over internal combustion engine vehicles (ICEVs), but what we need now is a way for these advantages to be conveyed to the average consumer; consumers need an incentive to make the change from ICEVs to EVs. With our research, we aim to study exactly how much better EVs are compared to ICEVs for not only the environment, but also for the consumer.

A lot of research has been done on the advantages of EVs over ICEVs by studying the differences and the types of emissions between the two. Kaushik Ranjan, an associate professor at TERI University states that electric vehicles do not have an internal combustion engine, and as a result, have zero CO_2 emissions. Ranjan does not look at the whole picture when considering

the total emissions, since the source of the energy to power the EV can add as much to our carbon footprint as ICEVs can. However, the vehicle itself does not emit anything from exhaustive sources and the energy that it uses can come from renewable resources, which is a major advantage of using electricity. Furthermore, in a study done by Victor Timmers and Peter Achten from the University of Edinburgh as well as in a study done by Lester Lave, Chris Hendrickson, and Francis McMichael, it was discovered that the weight of the vehicle plays a large role in non-exhaustive emissions. On average, with cars that have an electric counterpart, the electric counterpart weight about 24% more. Timmers and Achten discovered that this increased weight actually caused more brake, tire wear, and road surface wear, resulting in even more non-exhaustive emissions that ICEVs. However, even though these non-exhaustive emissions are harmful to the environment, they do not contribute to our carbon footprint, since they are non-exhaustive emissions. Furthermore, the difference in the amount of non-exhaustive emissions is not enough to say that that ICEVs emit less than EVs overall, since EVs emit nothing from exhaustive sources.

While most of the research in this area has been done to study the effect of cars on the environment, there are no major studies that study the effect of EVs on the average consumer. Many of these studies are outdated, referencing technology from 1995, and since then, many advancements in rechargeable batteries and electric vehicles in general have been made. Since this is still a relatively new field, new technology is constantly being introduced and we need to make all these into account, since these are the things that could potentially cause the average consumer to make the switch to electric vehicles. Even though environment-friendliness is one of the biggest selling points of EVs, for the consumer, that is only one of the factors that play in

role in the decision. What this study will do differently is analyze not how EVs benefit the environment, but how EVs will the benefit the consumer's money and spendings.

Since the goal of this study is to study how much EVs benefit the average consumer, we need average consumers to be the subject of the study. According to the Federal Highway Administration, the most frequent drivers fall in the age ranges 20-34 and 35-54, with about 15,000 average miles driven per year. Furthermore, the age range of 20-54 make up 63.4% of all drivers, as of 2011. If we want to make the biggest positive impact on our environment, we need to target the largest group of drivers by studying drivers ages 20-54. The study will take a sample of drivers within that age group in the state of California, since about 25 million of the 214 million drivers in the US reside in California (Federal Highway Administration). If the whole state of California were to switch to EVs, we can eliminate potentially 12% of all emissions from exhaustive sources. However, since we are still in the early stages of this new technology, it's unreasonable to expect everyone to suddenly make the change and buy a new car, especially since EVs are generally more expensive.

In Lave, Hendrickson and McMichael's analysis of electric vehicles, they claimed that the initial and maintenance costs of EVs is not worth buying an EV over an ICEV for the consumer. In their comparison of ICEVs and their electric counterparts, they discovered that the EV counterpart was almost 50% more expensive. The 2017 Ford Focus was $16000 MSRP while the Ford Focus Electric was $30000. However, in this study, we want to show that EVs are a big benefit for the environment and also that these costs are worth it for the customer. We will study the average driver in the state of California, monitoring not only the initial cost of buying the vehicle, but also the amount of money spent on maintenance and battery recharging. We will compare this to a control group by studying the amount of money spent on maintenance costs

and gas refills of an ICEV. Since electricity is cheaper and more stable, compared to gas, we want to show that the average consumer will eventually make back the initial costs of buying the vehicle.

It's certain that electric vehicles are the future and that making the change from a gas-powered vehicle to an electric-powered vehicle is necessary if we want to protect the environment and alleviate our concerns about climate change. However, the real challenge now is convincing people to choose EVs over ICEVs when buying new cars. In 2014, there were 214 million licensed drivers and that number increases every year. Furthermore, even though our carbon emissions have leveled out, temperatures are still rising and the past 15 years have been the hottest years this century. If we don't watch our own carbon footprint, we will be the ones experiencing the effects of climate change, even more than we are right now. We need to provide an incentive for the ones that are directly adding to our carbon footprint, vehicle drivers themselves, to make the change if we want a better future for not only future generations or our country, but for the whole planet.

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