Definition of Topic and Rationale:

Electric Vehicles (whether fully electric or hybrid) have garnered much attention over the past decade. Not just from the general population, but also from the government sector. This attention has brought to light some interesting questions about the efficacy of the promises made by these EV developers and if they'll be able to compete in the market long term. Many argue yes but with caveats. One of the main questions is whether or not the environmental impact that comes as a result of production, distribution, and infrastructure requirements is better or worse than that of gasoline vehicles. There are a lot of factors involved when answering this question. In this research proposal, I hope to answer that question and examine the many factors involved when transitioning from gasoline-powered vehicles to electric vehicles. I've always had a love of technology, and that love has permeated into my adulthood. That love has turned into passion as I've become acutely aware of the negative effects humans often have on the environment. The importance of this discussion can not be understated. It's important to recognize that there is no full elimination of greenhouse gases. Mining materials, producing synthetic parts, transportation, and distribution, down to the charging and pumping of gas stations, all have a carbon footprint that affects not just us, but future generations. Exploring the impact of EVs is not just a problem for us; it is a future problem that warrants discussion and evaluation now.

Review of Preliminary Research:

Lawmakers are already pushing to integrate full EVs into everyday use. The phasing out of gasoline-powered vehicles has resulted in some frustration and contention in the automotive industry as cutbacks are made and jobs are lost. Henry Payne, an automobile enthusiast,

discusses the industry change, “The move is causing massive disruption to the industry. Despite the Biden administration's claims that carbon prohibition will create a jobs boom, Ford announced on August 22 that it is cutting 3,000 jobs as it transitions to EVs” (Payne). This has created a ticking clock, as it were, for manufacturers to push EVs on the population as lawmakers continue to push prohibition-like laws on gasoline vehicle production. One question raised is whether or not our current infrastructure can keep up with the increasing demand for electric vehicles and what impact that will have on the environment.

An interview with Jeremy Michalek discusses the advantages and disadvantages that will result in a full switch to electric vehicles. “The advantage of pure electric vehicles is no gasoline consumption and no tailpipe emissions. But there are still emissions involved in producing electricity and batteries” (Michalek). One main disadvantage is the lack of range EVs have when compared to gasoline vehicles. This results in more charging times and more electrical requirements. It seems as though there’s a gasoline filling station on every corner. But charging stations are few and far between. There’s also a discussion about the efficiency of EV batteries and their longevity. In addition, Michalek discusses the effects that increased carbon restrictions will have on the production of electricity and manufacturing parts for EVs: “Electricity cost is a small portion of the overall cost of vehicle ownership, but an economy-wide carbon price will affect the cost of all goods that release carbon in their production (and use). This means they increase the price of raw battery materials at mines, the price of shipping those materials, and running the factories that produce the batteries” (Michalek).

These are issues lawmakers seem to have neglected in forcing automobile companies to reduce their overall production of gasoline vehicles. Initial data may suggest that EV emissions are lower, but there are limitations to that claim. We can’t begin to analyze data until EVs have

more widespread adoption. This requires infrastructure. Hongzhi Lin discusses the limitations we're experiencing when analyzing exactly how much infrastructure is required to sustain EV use and minimize emissions output. It requires network study, or the study of cars in use currently. Theoretical data can only take you so far. "...the vehicular emission rates are highly dependent on network traffic conditions in reality, which is few explored" (Lin).

Regardless of the results, something must be done to reduce carbon emissions and greenhouse gases that result in irreversible climate change. A study conducted by "Energies" magazine emphasizes the urgency of emissions reduction: "Climate change is already affecting the entire world, with extreme weather conditions like droughts, heatwaves, heavy rain, floods, and landslides becoming more frequent" (Oliveri et al.). They go on to list many of the limitations of sources of electricity. Even charging stations at home and within the network still use carbon-powered sources through the use of coal plants. They found that, though there was a difference in emissions, it was heavily dependent on where that electricity was being generated from. "...the environmental impact of EVs versus gasoline vehicles is highly contingent on the source of electricity" (Oliveri et al.).

My research concluded that there are many factors involved when discussing the emissions issue. EVs and gasoline-powered vehicles both require sources of energy for production, distribution, and usage. Gasoline-powered vehicles dominate the market, thus there is more data and study into their network energy consumption. Only time will tell with EVs as we find more sustainable energy sources, improved means of production, and higher range and longevity. As it stands, it appears that EVs have a high possibility of being a sustainable alternative to gasoline-powered vehicles, but more research must be done to decide for sure.

Guiding Research Question:

My guiding research question remains much the same but with a slight modification: Are Electric Vehicles a viable alternative to gasoline-powered vehicles regarding emissions output?

Intended Target Audience:

The question of emissions does not have a limited scope. Everyone stands to benefit from lower emissions. Lowering greenhouse gas emissions will result in a better quality of life, not just for us, but for future generations as well. But we have to be the catalyst for change. I hope this research will inspire more people to take an interest in sustainable alternatives to greenhouse energy emissions. More sustainable alternatives affect everyone.

Research Plan:

In my research, I noticed many variables regarding EV energy sources. Many individuals who own EVs use solar power and greener energy options to fuel their vehicles at home. Network usage of these options was rarely discussed. In addition, hybrid vehicles were brought up as a more sustainable alternative to fully electric vehicles and a more gradual climb towards fully electric vehicles. My research was pulled mostly from journals or magazines. While credible, I would like to do research into more scholarly articles from people knowledgeable about green energy and renewable energy sources. I used the Opposing Viewpoints database which I found to be very helpful. I will most likely return to this database for more well-rounded research.

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