*Naomi Ugwuoke*

*CIS 485 | Kevin Renso*

*Are Electric Vehicles Ethical?*

Final Project

Table of Contents

[Introduction 2](#_Toc101988470)

[What are Electric Vehicles? 2](#_Toc101988471)

[Top Manufacturers 2](#_Toc101988472)

[How Do Electric Vehicles Work? 3](#_Toc101988473)

[Lithium-Ion Batteries 3](#_Toc101988474)

[How Are They Sourced? 4](#_Toc101988475)

[How is Lithium Mined? 5](#_Toc101988476)

[The Problem with Electric Vehicles 6](#_Toc101988477)

[Ethical Theories 8](#_Toc101988478)

[Subjective Relativism 9](#_Toc101988479)

[Cultural Relativism 10](#_Toc101988480)

[Divine Command 11](#_Toc101988481)

[Ethical Egoism 11](#_Toc101988482)

[Kantianism 12](#_Toc101988483)

[Act Utilitarianism 12](#_Toc101988484)

[Rule Utilitarianism 13](#_Toc101988485)

[Social Contract 13](#_Toc101988486)

[Rawl’s theory of Justice 14](#_Toc101988487)

[Virtue Ethics 15](#_Toc101988488)

[Charging Stations 15](#_Toc101988489)

[Summary 16](#_Toc101988490)

[Works Cited 17](#_Toc101988491)

**Are Electric Vehicles Ethical?**

# Introduction

## What are Electric Vehicles?

Electric Vehicles (or EVs for short) as the name implies, are vehicles that make use of an electric motor for propulsion. They have batteries that are rechargeable. These vehicles have an electronic motor that provides motive power to them. (Bandyopadhyay, 2022).

The topic of non-electric engine vehicles comes up when talking about electric vehicles. Non-electric vehicles make use of combustion engines to power the vehicles. They require some type of fuel that burns to create energy that is converted to provide motive power to the vehicle. Nowadays, electric vehicles can be more commonly found on roads.

## Top Manufacturers

There has been an increase in companies entering into the electric vehicle market due to the increase in demand for and interest in these vehicles. More and more manufacturers have started producing and selling electric vehicles. The company that is currently leading this section of the market is Tesla Motors.

Tesla is an American car manufacturer. It is one of the largest EV car manufacturers in the world. It is owned by Elon Musk, and it is far ahead in the electric vehicle game. It is currently the most popular electric vehicle that can be found on the road today.

## How Do Electric Vehicles Work?

EVs have an electric battery that powers the vehicle. The battery provides the motor of the vehicle with an electric current which allows the vehicle to run. The duration at which the charge in the battery lasts depends on the capacity and ability of the battery. Most vehicles that are in commercial production today make use of rechargeable Lithium-ion batteries. These are similar to the batteries that can be found in common electronic devices such as laptops, cellphones, wireless headphones, etc.

## Lithium-Ion Batteries

Lithium-ion (Li-ion) batteries make use of the ionization process of lithium atoms to produce power. The batteries are made up of a lithium cobalt oxide cathode (positive electrode), and a graphite anode (negative electrode). How a lithium-ion battery works is that when a device or vehicle with this type of battery is plugged in, electrons enter the battery in turn, causing the lithium ions to flow towards the anode. The lithium atoms entangle with graphite layers of the anode. When the device or vehicle is unplugged, this process is reversed. Lithium atoms at the anode start to return to the cathode. As this happens, energy is discharged. This cycle is repeated as many times as the battery is charged.

## How Are They Sourced?

According to bp’s Statistical Review of World Energy 2021, which tracks the number of the world’s energy production and reserves, there are five major countries that are responsible for about 92% of the world’s production of lithium in 2019. They include:

“

1. Australia – 52.9% of the world’s production
2. Chile – 21.5%
3. China – 9.7%
4. Argentina – 8.3%
5. Zimbabwe – 2.1%

”

(Robert Rapier, 2020)

## How is Lithium Mined?

Lithium is extracted from two main sources: ore mining and salt deserts. Australia is currently the biggest source of pre-mined lithium. Lithium produced in Chile and Argentina is gotten from salt deserts. Salt deserts (also known as cellars) are expanses of land which are covered in salt and other minerals. The minerals are extracted from naturally occurring brines (concentrated salt water) found deep under the brew lengths of high-altitude salt deserts and made up of a mixture of potassium, borax, manganese, and lithium salts. The extraction of these minerals requires drilling and then pumping the brine liquid into evaporative pods. It is then left to evaporate over a period of a few months. After this, they are moved to an open-air evaporation pool for about 12 to 18 months. After this time, the moisture is distilled to extract lithium carbonate which is used in the creation of lithium-ion batteries. (Koop, 2020).

This method of mining lithium is cost-effective in extracting lithium carbonates. However, this process requires a huge amount of water. The production of 1 ton of lithium requires about 500,000 gallons of water. The mining activities in those areas have greatly depleted the water resources in regions like Chile, which has an already scarce supply of water. (Koop, 2020).

The other method of mining lithium requires extraction from rocks (ore mining) using more traditional methods. However, this method makes use of chemicals to extract lithium that can be used. These chemicals used in this process are washed down into oceans and water bodies. This creates a cycle of pollution because the water bodies are used for various activities such as livestock farming, fishing, and even domestic purposes.

There are many opinions on these vehicles that have already been formed by individuals. Some of these opinions can be true, and some can be proven wrong. Regardless, these are the opinions that people use to answer the question of whether electrical vehicles are ethical or not.

## The Problem with Electric Vehicles

There are many reasons people opt to purchase internal combustion vehicles instead of electric vehicles. One of these reasons is money. Currently, the upfront cost of electric vehicles is greater than that of petrol or diesel vehicles of similar capabilities. This makes it more difficult for people, especially those of lower-income status to make the decision to buy an electric vehicle. (Broom, 2021).

Another reason why people choose to purchase non-electric vehicles rather than electric ones is the performance of the vehicle. For petrol- or diesel-powered vehicles, they run for a much longer period of time, depending on the fuel tank size, before needing to be refueled. However, electric vehicles need to be charged frequently.

Also, as previously explained, the production of batteries that run most electric vehicles that are in commercial circulation today, are made from lithium. The sourcing of this raw material has a huge impact on the environment.

## Ethical Theories

Given all the disadvantages of electric vehicles, the question for everyone to ask is: ‘Can something that results in so bad for the environment during its production be ethical’? This question can be argued using ethical theories. The ethical theories that will be discussed in this document to answer this question include:

* Subjective Relativism
* Cultural Relativism
* Divine Command
* Ethical egoism
* Kantianism
* Act Utilitarianism
* Rule Utilitarianism
* Social Contract
* Rawl’s theory of Justice
* Virtue Ethics

(Quinn, 2014).

## Subjective Relativism

This is an ethical theory that states that morality is subject to an individual’s opinion. This means that everyone gets to choose or decide for themselves whether something is moral or not. (Quinn, 2014).

Different people have different opinions on different subjects. The case is the same for electric vehicles. There are many factors that help to mold the opinions of people in relation to electric vehicles. Some of these opinions can be facts and some can be myths. Some popular myths about electric vehicles include:

1. Internal combustion engine vehicles are better for the environment than electric cars.
2. Electrical vehicles do not carry enough power to adequately handle the requirement of a day.
3. It is difficult to find charging locations for electric vehicles.
4. Electric vehicles are not safe compared to gasoline vehicles.

(Electric Vehicle Myths, 2021)

These myths should be cleared up throughout this document.

To answer the question of whether electric vehicles are moral, there is no definite answer that can be determined by the subjective relativism theory, because everyone must decide for themselves if it is moral or not to use electric vehicles.

## Cultural Relativism

This theory describes the view that all beliefs, customs, and ethics are relative to an individual within a society. This means that right and wrong are specific to a culture or a society. Something that is considered right in one culture might be considered wrong in another. (Quinn, 2014).

In some countries, there are incentives that are being offered for people who decide to buy electric vehicles. For example, in Canada, there are some monetary enticements that are offered to people who purchase zero-emission vehicles. The amount of money a Canadian can receive depends on various factors such as what car is being gotten if the vehicle is leased or purchased, etc. (Incentives for purchasing zero-emission vehicles, 2022). In various other countries, there are similar incentives that are provided to encourage the shift to electric vehicles.

Through incentives such as the one just mentioned, it can be inferred that electric vehicles are accepted in the country that is providing the incentive. Therefore, we can say that according to people in these societies, electrical vehicles are ethical.

## Divine Command

This is a theory that follows the belief that morality is determined by the divine command. In essence, this theory explains that something is right or moral because God has commanded it. (Quinn, 2014).

Whether or not electric vehicles are moral according to this theory can be inferred by considering the impact of all types of vehicles on the planet. Various studies have proven that the long-term impact of electric vehicles on the environment is much less than that of petrol- and diesel-powered vehicles.

Using the religion of Christianity, the bible says in Revelations 11:18, that God will return to destroy those who destroyed the earth (Revised Standard Version). Electrical vehicles are zero-emission vehicles. This means that they do not release poisonous gases that are dangerous to the environment. According to this passage in the bible, it can be argued that electric vehicles are ethical because they do not directly pollute the earth (Waterworth, 2021).

## Ethical Egoism

This is an ethical theory that states that morality is determined based on self-interest. This theory explains that moral decisions should be based on the individual feels is best for themselves (Quinn, 2014). Electric vehicles are not perfect solutions, but they are a good start for improving humans’ impact on the environment. Electric vehicle companies such as Tesla Motors and people who decide to purchase electric vehicles are ethical according to the theory of ethical egoism no matter their reason, as far as the reason is in their own interest.

On the other hand, electric vehicles pose competition to non-electric vehicle companies. People running these companies can argue that electrical vehicles are unethical according to ethical egoism because it doesn’t work in their best interest.

## Kantianism

Kantianism is an ethical theory developed by Immanuel Kant. This theory states that morality is determined based on whether a subject conforms to duty or not. This theory says that one should always act in accordance with rules (Quinn, 2014). In many countries, there are rules being put in place to make all new vehicles being produced have zero-emission. For example, in Canada, the Canadian government has set a mandatory goal for “all new light-duty cars and passenger trucks to be zero-emission by 2035” (Zero Emission Vehicle Infrastructure Program, 2022). Electric vehicles are zero-emission vehicles. Therefore, according to the ethical theory of Kantianism, electrical vehicles are ethical.

## Act Utilitarianism

This is an ethical theory that states that an action is moral if it produces the most happiness for an individual. This theory explains that the morality of an individual’s action is specific to each action (Quinn, 2014). Everyone has the choice of whether to purchase an electrical vehicle or not. There is no law against purchasing a non-electrical vehicle. There have been more positive than negative responses to electric vehicles over the years. Due to this, electric vehicles are ethical according to act utilitarianism because, overall, they cause more happiness than sadness.

## Rule Utilitarianism

This theory explains that states that morality depends on the correctness of the rules followed by an action to achieve the greatest good for the greatest number of people. This theory attributes morality to the action that results in the most units of happiness (Quinn, 2014). In the world, lots of people worry about the impact of vehicles on the climate and on the environment. Although Electric vehicles are not the perfect solution to this global problem, they are the better option when looking at electrical vehicles and non-electric vehicles that are in circulation on the roads. Therefore, according to this rule utilitarianism ethical theory, electrical vehicles are ethical.

## Social Contract

This theory describes the view that morality is determined by the rules of a government (Quinn, 2014). Electric vehicles have been proven to be better than internal combustion vehicles. Over years of use, electric vehicles have less impact on the environment due to lower emissions through various methods, the government of some countries has shown encouragement to switch to vehicles that produce fewer emissions such as electric vehicles. As mentioned earlier, some countries have created laws that restrict the new vehicles being produced to have zero emissions by 2035 (Zero Emission Vehicle Infrastructure Program, 2022). It can be translated to mean that electric vehicles comply with the rules of some countries. This means that according to the social contract theory, electric vehicles are ethical.

## Rawl’s theory of Justice

This is a theory by John Rawls that focuses on providing everyone has the resources that they will need to achieve a common goal (Quinn, 2014). One of the problems with electrical vehicles is that it is less affordable than its alternative. Not everyone is able to buy an electric vehicle due to the cost. According to Rawl’s theory, then electrical vehicles are not ethical.

However, companies that produce electric vehicles predict that the prices of these vehicles are likely to reduce due to increased demand, and they could even become cheaper than gas-powered vehicles (Rufiange, 2020). If this happens, then Rawl’s theory can allow for electric vehicles to be considered ethical.

## Virtue Ethics

This theory states that morality is determined by a person’s morals and virtues (Quinn, 2014). This theory allows morality to be dependent on an individual’s beliefs on right and wrong. There is research to back up the claim that electric vehicles are better for the environment than internal combustion vehicles. However, you cannot force a belief on a person. Not all beliefs are true, but not all beliefs are false either. So according to virtual ethics relating to the environment, if a person thinks that electric vehicles are better for the environment, then electric vehicles are ethical. On the other hand, if it thinks that electrical vehicles are not ethical, then electric vehicles are not ethical.

## Charging Stations

There is the topic of the number of charging stations not being enough for people. Currently, due to the price of electric vehicles, these vehicles are mostly only purchased by people with substantial incomes. As such, electric vehicle charging stations are usually located in ‘rich’ neighborhoods where these electric vehicles are more likely to be found (Brown, 2019). However, this is not a hindrance because most electric vehicles that we see come with chargers that can be connected to regular electrical outputs. Also, most electric vehicles can hold enough charge to allow a person to go about their daily duties.

# Summary

The major selling point for electrical vehicles is that it is better for the environment than vehicles with internal combustion engines. In general, the production of any vehicle requires a lot of resources and has an impact on various components of the environment. At the end of the day, electric vehicles are still vehicles. They are man-made machines; hence they are bound to have an impact on the environment.

Following the ethical theories discussed above, the answer as to whether electric vehicles are ethical or not can vary depending on the theory being discussed. Ultimately, electrical vehicles have a better impact on the planet, but there are still some ways to go in discovering completely a zero impact or less impactful solution for vehicle production and use.

# Works Cited

Bandyopadhyay, K. R. (2022). Electric Vehicles. *Salem Press Encyclopedia*.

Broom, D. (2021, July 8). *4 reasons why electric cars haven’t taken off yet*. Retrieved from World Economic Forum: https://www.weforum.org/agenda/2021/07/electric-cars-batteries-fossil-fuel/

Brown, B. (2019, April 22). *Where to go when your EV is low: Rich neighborhoods have most charging stations.* Retrieved from Digital Trends: https://www.digitaltrends.com/cars/realtorcom-ev-charging-stations-zip-code-home-prices/

*Electric Vehicle Myths*. (2021, December 2). Retrieved from United States Environmental Protection Agency: https://www.epa.gov/greenvehicles/electric-vehicle-myths

*Incentives for purchasing zero-emission vehicles*. (2022, April 25). Retrieved from Government of Canada: https://tc.canada.ca/en/road-transportation/innovative-technologies/zero-emission-vehicles/incentives-purchasing-zero-emission-vehicles

Koop, F. (2020, January 9). *What’s behind lithium mining? Here’s all you need to know*. Retrieved from Lithium Latin America: https://www.zmescience.com/science/lithium-mining-098534/

Penn, I., & Lipton, E. (2021, May 6). *The Lithium Gold Rush: Inside the Race to Power Electric Vehicles*. Retrieved from The New York Times: https://www.nytimes.com/2021/05/06/business/lithium-mining-race.html

Quinn, M. (2014). *Ethics for the Information Age.* Pearson.

*Revised Standard Version.* (n.d.). Retrieved from Holy Bible: https://www.bible.com/bible/2020/REV.11.RSV

Robert Rapier. (2020, December 13). *The World’s Top Lithium Producers*. Retrieved from Forbes: https://www.forbes.com/sites/rrapier/2020/12/13/the-worlds-top-lithium-producers/?sh=37e332f85bc6

Rufiange, D. (2020, December 17). *ELECTRIC CARS COULD COST LESS THAN GAS-POWERED VEHICLES BY 2023.* Retrieved from auto123.com: https://www.auto123.com/en/news/price-electric-vehicles-bloombergnef-batteries/67694/

*Statistical Review of World Energy.* (2021). Retrieved from bp: https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

Waterworth, D. (2021, July 20). *Why Evangelical Christians Should Be Supporting EVs*. Retrieved from Clean Technica: https://cleantechnica.com/2021/07/20/why-evangelical-christians-should-be-supporting-evs/

*Zero Emission Vehicle Infrastructure Program.* (2022, February 4). Retrieved from Government of Canada: https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/zero-emission-vehicle-infrastructure-program/21876