



## Introduction

This poster will compare and contrast three different types of vehicles: Electric vehicles and Combustion Engine vehicles and their impact on the environment. Its obvious that the carbon dioxide, or CO<sub>2</sub>, that is created by engines are a large detriment to society.

## Comparisons

- On average, the combustion engine vehicle uses about 3 times more energy than the electric vehicle. As the claim can be made that the energy is used in different ways in both types of vehicle, the electric vehicle is a lot more efficient when compared to the combustion engine vehicle. (Cerovsky)
- Even though the electric vehicle's lithium battery creates around 10 to 15 percent of its environmental burden and the combustion engine does not include a lithium battery, the environmental burden of a combustion engine vehicle is far more (around 120 to 160 percent more) than an electric vehicle. (Nickischer)

## Combustion Engine

### Vehicles

- Largest amount of CO<sub>2</sub> emissions from the tail pipe.
- Combustion engines can use either gasoline (highest CO<sub>2</sub> emission), diesel (slightly less CO<sub>2</sub> emission), or some combustion engines even use biofuel (very rare but creates very little CO<sub>2</sub> emissions). (Cerovsky)
- A midsize vehicle with about 100,000 miles on it would have produced about 24 million grams of CO<sub>2</sub> (Nickischer)

## Electric Vehicles

- Zero tail pipe emissions
- Still create a large carbon footprint which harms the environment. (Cerovsky)
- A larger carbon footprint is created for electric vehicles in opposition to combustion and hybrid vehicles because of the lithium battery. The lithium battery takes a longer time to decompose and even emits CO<sub>2</sub> from itself
- Where the electricity comes from to charge the electric motor makes a difference too. It could come from a coal-burning facility which also creates a lot of CO<sub>2</sub> emissions.
- An electric battery in a midsize car with about 100,000 miles will have produced between 12-21 million grams of CO<sub>2</sub> (Nickischer)

## Conclusion

As you can see in the information present in the poster, the electric vehicle is the overall best vehicle for producing the smallest environmental burden. Even though the electric vehicle needs to have a lithium battery and the combustion engine vehicle has no need to use one, the combustion engine creates a far larger carbon footprint simply because of how much CO<sub>2</sub> emissions that the engine gives off

		CO <sub>2</sub> Per kilometer driven (g)	CO <sub>2</sub> Produced from 100k miles (Mg)	CO <sub>2</sub> produced from the mechanical production / decomposition (Mg)	CO <sub>2</sub> Produced from Lithium Ion battery (Mg)
	SUV class Electric Vehicle	119.3 - 196.45	19 - 32 AVG = 25.5	11.475	3.4
	SUV class Combustion Vehicle	269.2	43	7.74	

Nickischer, A. (2019). Environmental Impacts of Internal Combustion Engines and Electric Battery Vehicles. D.U. Quark, Contest Submissions.

Cerovsky, Z., and P. Mindl. "Hybrid electric cars, Combustion Engine driven cars and their impact on Environment." 2008 International Symposium on Power Electronics, Electrical Drives, Automation and Motion. IEEE, 2008.