Electric cars

Consideration, Methodology, Challenges

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Abstract: All the electric cars market their product claiming it is close to 0 per cent of the carbon footprint. This is a big myth and no scientific research papers backing this theory. This research paper studies the scientific truth about this claim. The study of the whole carbon emission cycle is being presented and checked in detail by concluding which methodologies can be adapted to have the greenest way to transit and reduce the total carbon emission-reducing the overall climate change.

IndexTerms **- Carbon emission, electric car, carbon footprint.**

INTRODUCTION

Climate change is happening faster than ever, and humans can't do much about it now. At the same time, Car companies have been advertising a lot about how eco-friendly transportation mode is an Electric car and how we can save our planet. The birth of the electric vehicle gave great peace of mind to eco-conscious drivers. And significant developments surging oil prices and the need to cut back on greenhouse gas emissions have made these vehicles even more desirable. But these cars just might be worsening air quality and global Warming. It all depends on these sources used for generating electricity. Even a battery-powered car recharged with electricity generated by coal-fired power stations is likely to cause more than three times as many deaths from pollution as a conventional gasoline-fueled vehicle.

PROBLEM STATEMENT

Climate change is the most severe issue humanity is facing. Society found vast deposits of Fuel under the Earth. Since then, we are extracting and burning it for energy and releasing the emissions in the air. In the past 150 years, we rebuild our entire civilization around that energy source for our electrical demand. 2015 was the hottest year ever recorded from the time we started keeping records, and that's from 1880. Now, the question isn't will the Warming happen; it's how bad it will be?
Electric cars are more energy-efficient than conventional vehicles. Still, the electric cars run on electricity which is brought from the energy grids that make the electric power by burning coal. So, switching to electric vehicles is just changing your fuel source from a petrol pump to a power plant, thus causes more emission than a hybrid car.
Also, the problem is the trend. Just shifting your regular car to an electric vehicle won't be helpful as the electric vehicle is also made of steel, copper, and aluminium. To make it worse electric car's batteries are made up of rare metals that need intensive mining. Just constructing a car also releases loads of greenhouse gases. So, only manufacturing adds about 50 per cent total to the total carbon footprint. Electric cars almost cut no Co2 and generate more air pollution than gasoline cars

Stats supporting problem statement

More than 1/3rd of the lifetime Co2 emissions from an electric car comes from the energy used to make the car itself. Vehicle exhaust in only responsible for 1/3rd of traffic pollution. Just in India, over 4 Million + cars were sold in 2017. So, The problem is not buying green products. Like Electric cars; the problem is buying itself. Just manufacturing adds about 50 per cent total to the total carbon footprint. Making an electric car releases 25000 pounds of Carbon dioxide than the 16000 pounds emission of carbon dioxide for a conventional car. A Nissan Leaf (Most popular electric car emits about 31 metric tonnes of carbon dioxide during its production, electricity consumption and scrapping over its 1.5 Lakh Km Lifetime while a regular Mercedes CDI A160 will emit 34 metric tonnes for similar characteristics. While a Tesla emits 44 Metric Tonnes and an Audi A7 Quattro emits 49 metric tonnes. Despite producing a rate of CO2 per mile 50% lower than gas-powered cars, electric cars begin their road life with a significantly larger CO2 footprint due to their production. The only way to make up the difference is to drive them for more extended periods. The manufacturing of electric cars results in higher carbon emissions than fuel-based vehicles. Electric vehicles use electricity which also has its carbon footprint.

CHALLENGES

- Tesla's conveyances withal use lithium-ion batteries, and studies by the Environmental Protection Agency and the U.S. Department of Energy have shown that storms such as these that use cathodes with nickel and cobalt, as well as solvent-predicated electrode processing, can have an earnest environmental impact -- including ecological toxicity and contribution to Global Warming, among other factors.

- The co2 produced while producing an electric car is more than conventional cars' production because of the mining of lithium.

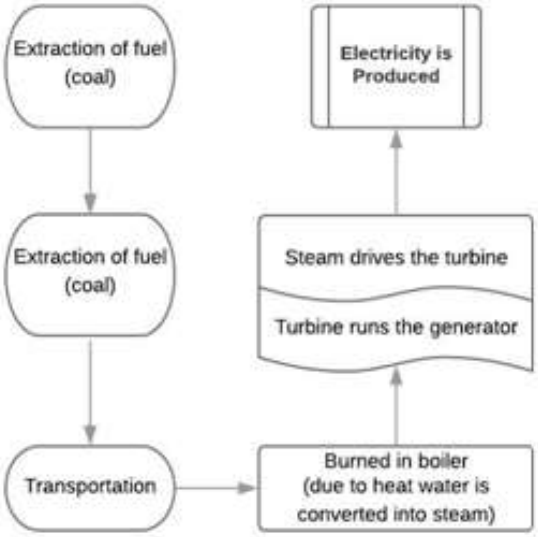
- The time taken to refuel an electric vehicle is hugely more than the time taken to refuel gasoline-powered automobile.

PREPARE YOUR PAPER BEFORE STYLING

The power used to drive the automobile can be in different forms, but the primary resources are electricity and gasoline. The following are the power generation process: -

Electricity generation

The electricity that is a prerequisite for electric cars is mostly generated using coal. The process starts with coal mining then the extracted coal is refined and then transported to electricity generation power plants where it is burned in a boiler (to produce steam). This steam is applied on sets of turbines connected to the motor or generator via a shaft. Thus, this electricity is made and then again sent to electricity refuelling stations.



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flow chart of power generation

Pulverized coal-fired power generation is currently the primary method of coal-fired power generation. Coal is ground to a fine powder and is burned in the boiler. Heat in the boiler boils the water into steam. The steam pressure turns the steam turbine, and the generator generates electricity.

There are also various methods of electricity generation dependent on types of energy. Among resource energies, coal and natural gas are used to create electricity by combustion (thermal power), Uranium by nuclear fission (nuclear power), to utilize their heat for boiling water and rotating steam turbinesBut, of course, power from sources such as solar and wind provides CO2-free energy for electric vehicles. The U.S. receives 14% of its energy from renewables today. Obama's U.S. Energy Information Administration predicts that 25 years the figure would have risen to 17 percent by just three percentage points. Meanwhile, in 2040, those fossil fuels that produce 65% of U.S. energy today will only generate roughly 64% of it.

Generation of gasoline or petroleum

Coal petroleum is also a fossil fuel that means it is formed from the remains of dead organisms, but it is liquid as its formation was much different from coal construction. Petroleum is an exhaustible natural resource which means only a limited supply is available. Oil is formed from sea creatures' remains as they die their body settled at the bottom of the sea or ocean and gradually got covered by sand clay. Over millions of years, the absence of high air temperature and high pressure transformed the dead organisms into petroleum.

Petroleum needs to be refined in the refineries to get these fuels, raw fat or crude oil is a dark oily liquid within an unpleasant smell, it is extracted from Earth's crust through a deep oil well and a massive pump that extracts the petroleum through this deep oil well. Petroleum is a complex mixture; petroleum refining means separating its components. It is carried out at petroleum refineries this separation process is known as fractional distillation this process is actually for separating chemical components by their boiling point mixture is heated to a temperature at which one or more fractions of the compound will vaporize (different components vaporize at different temperature) and thus get separated. Hence, we get lots of things from petroleum. We get fuels like petrol, kerosene, diesel, LPG etc. We also get lubricating oil, paraffin wax which we get from the residue of the refining process. Every component of petroleum has some use. Hence, it is often called black gold.

CARBON EMISSION FROM DIFFERENT CARS

CO_2 emissions from electric cars

Over the entire life cycle, the use of a fully electric car results in approximately 35% lower CO_2 emissions than a petrol car. The relatively higher emissions in the electric car production and the battery are fully compensated during the vehicle's use phase. The CO_2-profit will increase in the future as the share of renewable sources in electricity generation continues to grow.

CO_2 emissions from semi-electric cars

For semi-electric cars the proportion of electric kilometres has a significant influence on CO_2- emissions. This share depends, among other things, on the size of the battery, the mileage and the charging behaviour. Charging behaviour, in particular, is an

uncertain factor that differs enormously between drivers. Therefore, three 'loading scenarios' were used in this study, varying from almost no charging to charging twice a day.

Comparison of cars on petrol, diesel, plug-in hybrid (petrol) and complete car

	Gasoline	**Diesel**	**Plug-in-hybrid**	**Electric**
Example brand/ type (2014) in this class	*V.W. Golf*	*V.W. Golf*	*Opel Ampera*	*Nissan Leaf*
Total weight	1225kg	1365kg	1715kg	1474kg
Battery weight	n/a	n/a	180kg	274kg
Range on electricity according to information manufacturer**	n/a	n/a	Approx. 60 km	Approx. 175 km
Lifespan (assumption)	160,000 km	160,000 km	160,000 km	160,000 km
Percentage km Electric	n/a	n/a	10-95% (65%)**	100%
CO_2 emission according to the European type approval (a combination of on the fuel engine and electric)	118 g/km	106 g/km	27 g/km	0 g/km
CO_2 emissions in practice at driving on the fuel engine	173 g/km	161 g/km	166 g/km	n/a
Electricity consumption in the practice when driving on the electric motor	n/a	n/a	0.18 kWh/ km	0.18 kWh/ km

To be able to make a fair comparison between conventional and (semi-) electric cars, the mileage (the lifespan) and the share of different road types (highway, city, rural) has been set equal for all car types. In the CO_2 emissions in the production of all-electric vehicles, the battery takes up almost half. Much has been published about this. Yet there is little consensus: there is a wide variation in figures. This variation is mainly due to differences in the electrodes' composition in batteries used in vehicles and differences in the energy demand of production. This energy demand partly depends on the scale of production. With large batteries, the CO_2 scales emissions with capacity and mass. For plug-in hybrids with relatively small batteries, the CO_2 emission is relatively high, because cooling technology and electronics take up a relatively large share. A fully electric car per kilometre driven has up to approx. 35% lower CO_2 emissions than an average petrol car over its entire service life. This is the result of significantly lower emissions in the energy chain. While this energy chain is responsible for about 80% of the total emissions in a conventional car, in a fully electric car, this is roughly half (about 50%). The CO_2-profit that fully electric cars achieve in the energy chain more than compensates for the relatively more considerable amount of emissions released in the vehicle chain. Emissions in the vehicle chain (production, maintenance and end-of-life) are higher than with a comparable conventional car. This is partly due to the additional emissions that are released

Comparison of well-to-wheels CO2 emissions for E.V.s, hypothetical E.V. and existing fleets by country, and a selection of current ICEVs and HEVs

Model	The U.S.	The U.K.	
	gCO2/km		
REVAi	102	93	EV
T.H.! N.K. City	123	118	
EV Fleetd	123	114	
Tesla Roadster	143	131	
Honda Civic Hybrid	140	140	Hybrid
Toyota Prius T3d	118	118	
Seat Ibiza	126	126	Gasoline
Volkswagen Polo	127	127	
Toyota iQf	128	128	
Smart fortwo	133	133	
Mini Cooper Clubman	166	166	
Lotus Elise	208	208	
Porsche Boxster	284	284	

CONCLUSION

It is said that electric cars do not generate any carbon footprint and are more energy-efficient than gas. But the truth is we are just shifting from fuel source from the gas pump to a power plant, and if those power plants use coal to produce electricity, it emits more CO2 than a hybrid. According to one study even if 1/3 of all drivers switch to electric cars, the carbon savings would be tiny, but that's just right now soon all electricity will come from the sun, water, wind and heat. But that dream is a long way off new electric cars will probably break down before that happens and in the meantime, it will pump out a ton of CO2 from everything that goes into just making the car. Building an electric vehicle not only requires steel, copper and aluminium like a regular car. Still, worst, their batteries are made of rare metals that take intensive mining and even the mere act of putting the car together produces greenhouse gases. All this is typically adding 50% to the total carbon footprint. The most eco-friendly way is to use your present car till it's a maximum healthy life and when you wish to shift. Then shift to a new hybrid or electric car

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