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ARE ELECTRIC CARS GOOD FOR THE ENVIRONMENT?

There are several types of electric cars including hybrid, plug in hybrids, and battery electric cars (fully electric). For this investigation I will only consider the battery electric cars. These cars emit zero CO_2 while they are running, hence they are called (ZEC) Zero emitting cars. There are many types of electric cars on the market ranging from a budget friendly Toyota to a high end BMW.

Electric cars have some drawbacks compared to diesel and petrol cars. These cars have very complicated batteries which take more energy to make than normal diesel or petrol cars. Also these cars hazardous batteries can create a toxic atmosphere when disposed as the lead, alkaline, mercury and more could leak out and pollute the environment. While there is no CO_2 emitted when actually driving, the power plants and battery take enormous energy to produce. For example in Germany it works out worse to drive an electric car than a gasoline driven car unless you drive over 100,000 kilometres. This is because of the additional energy used in the manufacturing of the car.

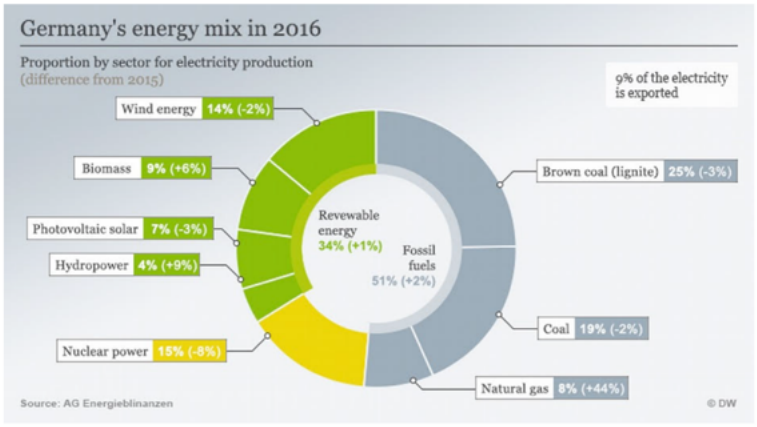

Figure 1 source: https://www.dw.com/en/how-eco-friendly-are-electric-cars/a-19441437

These figure would be reduced to 30,000 kilometres if the car only used the green energy such as wind, biomass, photovoltaic solar or hydropower.

1. An interesting topic chosen with a clear research question.

2. Positions the topic as science in society

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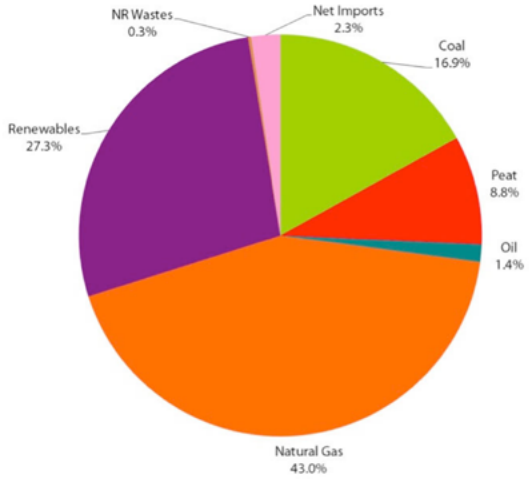


Figure 2 source: http://www.engineersjournal.ie/2016/10/04/irelands-renewable-electricity-increased-to-25-in-2015-seai-2/

This is Ireland's energy mix, as you can see it has less renewable resources the German figures. This leads me to believe that it is even worse to use an electric car in Ireland as of now.

It can take more than twice the amount of energy to produce an electric car than a petrol or diesel car. For example, the production of the 33.6 kilowatt hour for the BMW i3 produces emissions of approximately 5 metric tonnes of CO_2. The average car emits 4.6 tonnes of CO_2 a year

A study done by TNO in 2015 shows the carbon footprint of electric and petrol cars from manufacturing onwards. Making the body for an electric and petrol car typically produces 7-10 metric tons. But the battery in an electric car could emit 9 metric tons in the making. This is if it has a 60 kilowatt hour battery. Batteries are usually made of lithium, copper and cobalt, which can be found from mining which could be in China or The Democratic Republic of Congo. This can lead to deforestation and human right breaches this is another negative of electric cars

It is well known that electric cars have zero emissions while driving. This sounds great but that is because the emissions are hidden as they come from the manufacturing of the car and its battery and from charging the car. It really depends on the country you are in if electric cars are good for the environment. In Norway their energy mix is 95 % hydro electric power. This means if you were to charge an electric car 95% of the energy would be created by renewable energy. This makes electric cars in Norway very beneficial to the environment. If we take United Arab Emirates, its renewable energy is at 0.1% and the rest of the chart is filled with

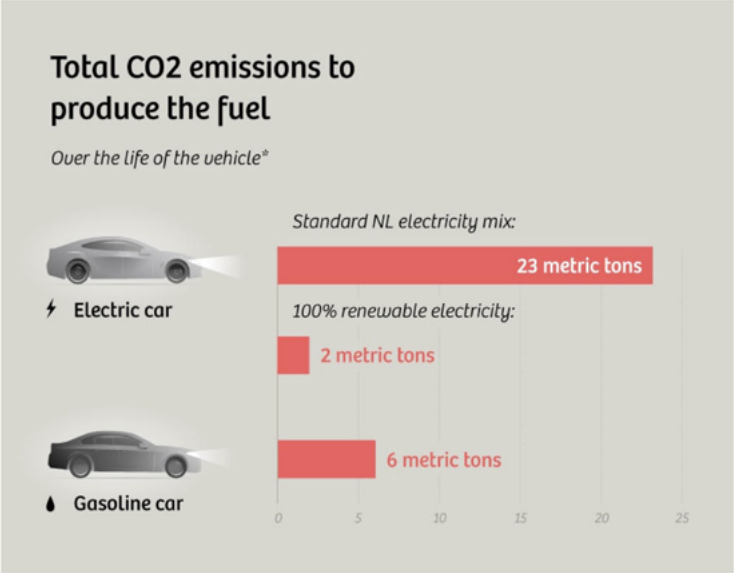
3. Presents the information in a well-structured way using informative representations and relevant scientific terminology

4. Explains the relevant science and the impact of the topic on the environment.

5. Explains different sides of the argument.

natural gas, oil and coal. In this country it would be worse to drive a electric car then a normal car.

Electric cars are better for people's health as they have no exhaust that can pollute the air. If you are driving a petrol car you could be putting your health at risk. You can get respiratory sicknesses such as bronchitis and asthma. It can also increase the chance of getting cancer. This alone has caused deaths of 30,000 people. A statement by the World Health Organization says that 92% of the worlds population breathes in air that is polluted. This number could be reduced if people were to use electric cars. If people were to use electric cars in cities where there is a condensed area of petrol cars it would make the air in cities much healthier for humans. Also another reason to use electric cars is oil spillage. This can destroy plants animals and any wildlife in the area. It can also leak into rivers and lakes killing fish and making the water not viable for use.



This is a chart done by Thalia Verkade for De Correspondent . It shows how much CO_2 is emitted in the lifetime of a petrol car and an electric car (220,000km). This is based on the Netherlands. The Netherlands has approximately 80 % fossil fuels in its electricity mix. If you were to use your electric car in the Netherlands and to use the electricity mix you would emit an enormous 23 metric tons. Say if you found an electricity supplier with 100% renewable electricity. You would produce

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approximately 2 metric tons of CO_2 compared to 23 metric tons. A gasoline car produces 6 metric tons of CO_2.

My conclusion from the above is that it is only viable to use an electric car if you're in a country with almost 100% renewable electricity or you can find a supplier with 100% renewable energy. As of now I believe that electric cars are doing more harm than good, but I think there is a good future for them as more countries become green, and turn to renewable energy. It is critical that we pursue better technologies, as peak oil can occur in the next few years, with studies suggesting we may already be there.

References for my work:

https://www.dw.com/en/how-eco-friendly-are-electric-cars/a-19441437

- I believe this link is a credible source as it is written by Deutschland Welle a German news company. It is non-biased as it has two sides on the argument, also they quote their sources

https://www.sierraclub.org/sierra/green-life/2013/10/ask-mr-green-how-much-energy-make-new-car

- I believe this is reliable because this is the website of the Sierra Club an environmental organisation founded in 1892. The information should be reliable as they have access to a lot of research

https://www.theguardian.com/sustainable-business/2017/aug/10/electric-cars-big-battery-waste-problem-lithium-recycling

- I believe that the information from this site is reliable as they are a reputable British news source. It is written by a journalist freelancer called Joey Gardiner, he is a specialist in housing, planning and regeneration. I read some of his other articles and they all seem to be outstanding. This is why I believe this is reliable.https://www.building.co.uk/joey-gardiner/17844.bio This is a link to some of Joey's work.

https://www.energy.gov/eere/electricvehicles/electric-vehicle-benefits

- While this is by the US government, I believe that it could be biased as it is one sided.

https://www.ssb.no/en/elektrisitet

- This is a reliable source as they are a company founded in 1897 and make 1000 new statistics for Norway each year. They are used for collecting data across Norway. I believe that this is non-biased as it is just statistics.

6. Gives a personal opinion informed by research, linking the information to the argument and using science explanations

7. Finds information from a number of balanced sources and gives a complete reference list

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https://www.crystolenergy.com/uae-balances-oil-riches-green-energy-drive/

- While this is a private website, the contributors are of international renown.

https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle

- It is credible, as it is another US government website and only gives statistics and not opinions.

https://www.ucsusa.org/clean-vehicles/vehicles-air-pollution-and-human-health#.W50W17Remf0

- This is a reliable source as this organisation was founded by scientists from Massachusetts Institute of Technology.

https://www.npr.org/sections/thetwo-way/2016/09/27/495654086/who-says-92-percent-of-the-worlds-population-breathes-sub-standard-air?t=1537022155980

- It is a very credible source as it is a radio station company founded in 1970 and has over 1000 stations across America. They got there information off The World Health Organisation for this report. The WHO is very reliable as it internationally supported body

https://thecorrespondent.com/7056/why-electric-cars-are-always-green-and-how-they-could-get-greener/741917761200-afaa6e5d

- This company is relatively new as it was founded in 2013. It stays away from the daily news cycle and focuses on in depth coverage on a certain topic. They have individual correspondents that work separately to each other on specific topics. It is quite reliable in my opinion.

Analysis:

Most of these websites are secondary sources but use studies done by reputable websites and organisations. I believe that these websites weren't biased.

8. Considers the reliability and quality of the sources.

OVERALL JUDGEMENT **ABOVE EXPECTATIONS**