How Much CO2 Does a Car Emit per Mile: List by Type, Size, Energy Source

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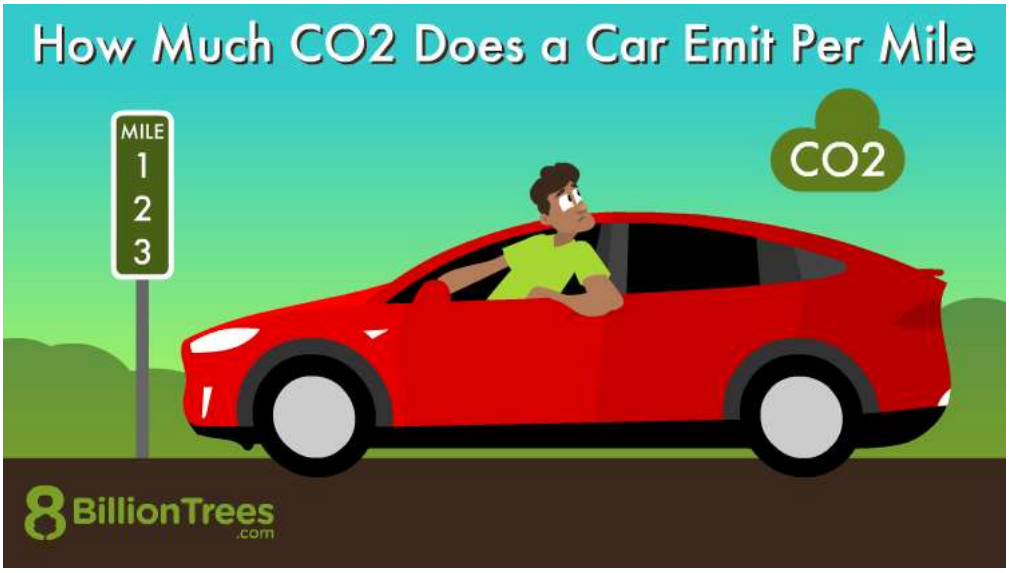


When calculating the impact that cars have on the environment, many people wonder, how much CO_2 does a car emit per mile?

And while those numbers are good to know, the fact is that all vehicles have a carbon footprint… not connected to how many miles or kilometers they travel.

Vehicle manufacturing, operation, and eventual disposal play huge role in the total car footprint, especially the materials used.

But you can find out right now how much CO2 does a car emit per mile, using this calculator.

Car Carbon Footprint Calculator

What make and model?

Make

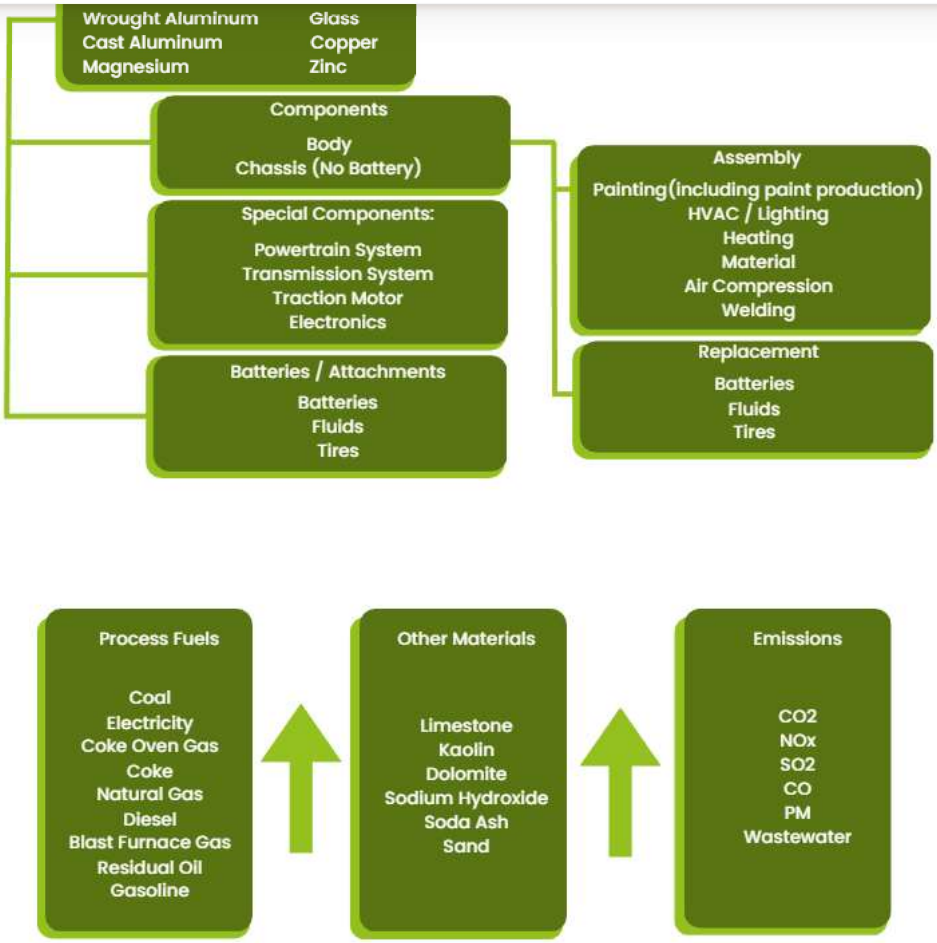
Read More About: **Car Carbon Footprint Calculator**

Construction of Cars and Their Maintenance Footprint

The construction of cars and their maintenance footprint are integral to any calculation of a **passenger car's impact on the environment** and its contribution to global warming. This is true, even if a traditional passenger car's CO_2 footprint mainly comes from fuel consumption and tailpipe emissions.

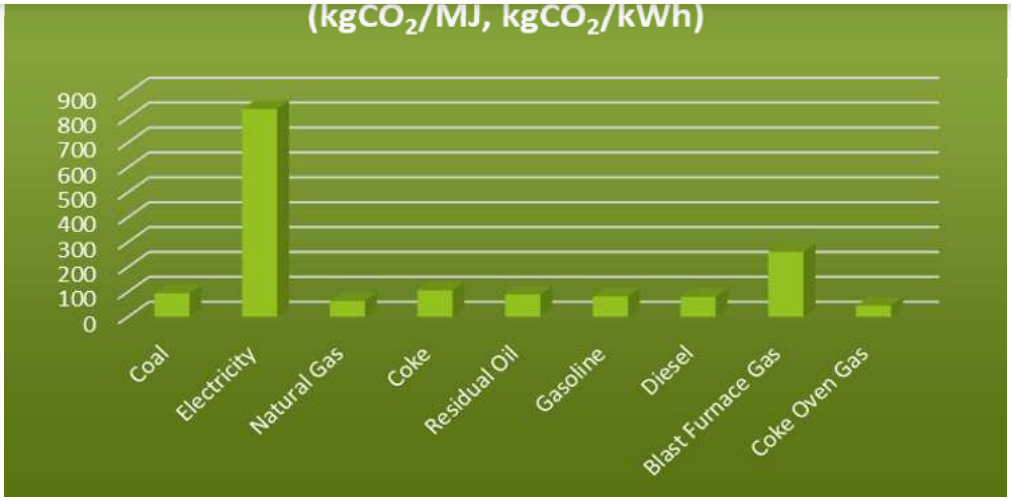
The construction of cars requires large amounts of plastic, steel, rubber, glass, paint, and more, which all produce CO_2 emissions.

- Before Manufacturing Process
- Manufacturing Process
- After Manufacturing Process



The below table states the CO_2 emissions factor of several process fuels (during car manufacturing in China):

Type of Process Fuel	**CO_2 Emissions Factor ($kgCO_2/MJ$, $kgCO_2/kWh$)**
Coal	94.8
Electricity	834.5
Natural Gas	63.5
Coke	105.9
Residual Oil	89.3
Gasoline	82.0
Diesel	79.9
Blast Furnace Gas	260.0
Coke Oven Gas	44.4



Energy used in oil extraction and energy used in oil refining also plays a part in the burning of fossil fuels. Extraction and refining of oil are necessary for conversion into usable fuel.

- It takes around 1,700 kWh of energy to extract one barrel of oil (159 liters).
- Petroleum refineries are responsible for the consumption of 3x ~015 Btu of energy every year. This is equivalent to 4% of annual energy consumption in America.

The below table indicates the **CO_2 emissions** produced during the car production process (China):[1]

Component		**CO_2 Emissions (kg per vehicle)**		
		Internal combustion engine vehicle	EV-NCM	EV-LFP
Basic Components	Body	CO_2 emissions: 2,767.9	CO_2 emissions: 4,393.5	CO_2 emissions: 4,393.5
	Chassis (no battery	CO_2 emissions: 1,684.7	CO_2 emissions: 2,665.5	CO_2 emissions: 1,665.5
	Powertrain system	CO_2 emissions: 2,092.5	CO_2 emissions: 145.6	CO_2 emissions: 145.6
Special Components	Transmission	CO_2 emissions: 617.4	CO_2 emissions: 455.2	CO_2 emissions: 455.2
	Traction	–	CO_2 emissions: 1,179.1	CO_2 emissions: 1,179.1
	Electronics	–	CO_2 emissions: 1,010.2	CO_2 emissions: 1,010.2
	Lead-acid batteries	CO_2 emissions: 24.5	CO_2 emissions: 15.1	CO_2 emissions: 15.1
Batteries / Attachments	Li-ion batteries	–	CO_2 emissions: 2,788.8	CO_2 emissions: 2,892.4
	Fluids	CO_2 emissions: 230.2	CO_2 emissions: 98.3	CO_2 emissions: 98.3
	Tires	CO_2 emissions: 677.1	CO_2 emissions: 677.1	CO_2 emissions: 677.1

Assembly	Li-ion batteries (assembly)	–	CO_2 emissions: 141.5	CO_2 emissions: 141.5
	Vehicle assembly	CO_2 emissions: 1,064.1	CO_2 emissions: 1,064.1	CO_2 emissions: 1,064.1
Total		9,172.5	14,642.5	14,746.1

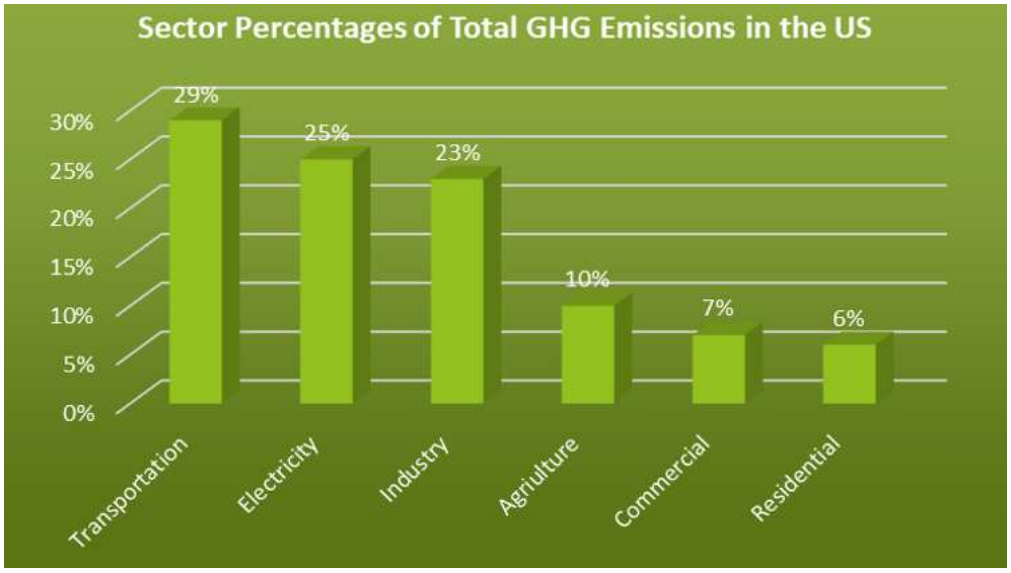
How Much Do Cars Contribute to Global Warming?

Burning fossil fuels for energy, heat, and transportation is the largest source of carbon emissions in the US.

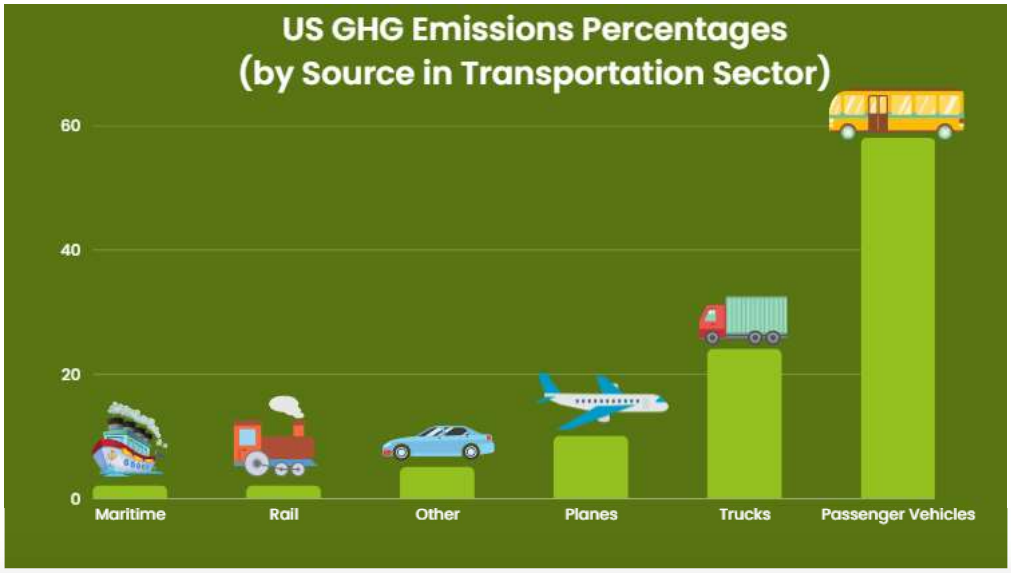
So, how much do cars contribute to **global warming**?

In America, transportation leaped to the top of the list of carbon emitters in 2017. These emissions are mainly produced by cars.

The below chart indicates the US transportation CO_2 emissions compared to other sectors:



The following chart indicates the percentage of carbon emissions emitted by passenger vehicles in the US, compared to other modes of transport:[2]



Passenger vehicles account for 10% of human-caused GHG emissions around the world. In large cities, this figure escalates to 50%.[3]

How Much CO2 Does a Car Emit?

The next question is, how much CO_2 does a car emit (single vehicle)?

It is estimated that a light passenger vehicle burning 1 liter of fuel, releases 3 kg of CO_2.

The following calculations also apply to light passenger vehicles:

- A single car emits 4.6 metric tons of CO_2 every year.
- This is based on the assumption that the car's fuel economy is 22 miles per gallon and that the car drives 11,500 miles every year.
- A single gallon of gasoline burned creates 8.887g of carbon emissions.

How Much CO2 Does a Car Produce?

It is estimated that the average passenger car produces around 4.6 metric tons of CO_2 every year. This is based on the assumption that the average passenger car's fuel economy is 22 miles per gallon, and that the car racks up an average mileage of 11,500 miles per year.

Furthermore, every gallon of gasoline burned produces around 8.887g of carbon emissions.

How Much CO2 Does a Car Emit per Mile?

The question then follows: how much CO_2 does a car emit per mile?

The answer is based on how **emissions** are determined for internal combustion engines. Conventional internal combustion engine emissions are calculated according to the tailpipe emissions produced by burning a gallon of fuel (gasoline).

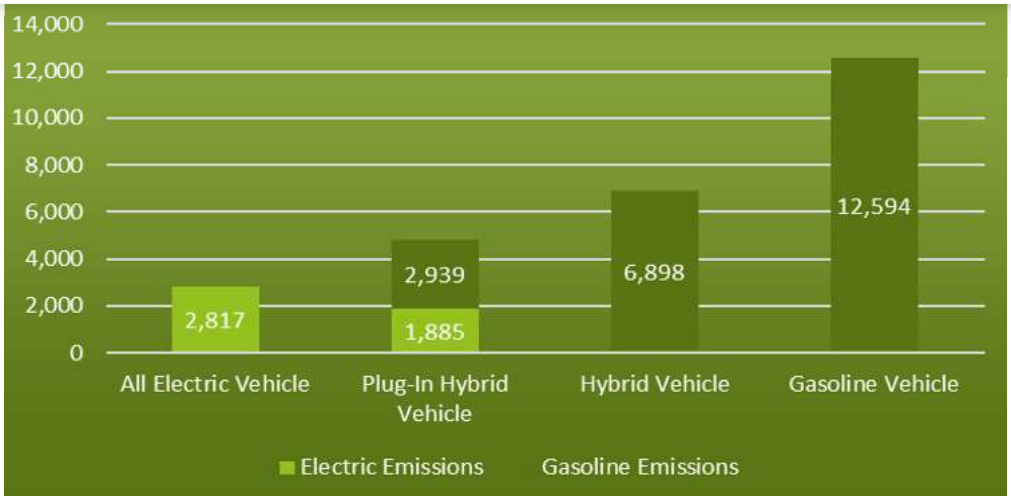
- 8,887g of CO_2 emissions per gallon of gasoline
- 10,180g of CO_2 emissions per gallon of diesel

This (assuming fuel economy is 22 miles per gallon), equates to 404g of CO_2 for every mile driven.[4]

Following this discussion, the next question would then relate to how emissions are determined for electric vehicles.

While driving an electric car, no emissions are produced. Therefore the emissions produced by electric vehicles are referred to as upstream emissions – relating to the electricity production required to power an electric vehicle.

The below chart indicates the annual emissions per vehicle.[5]



It is often asked how emissions relate to fuel economy. From the above information, it is clear that the CO_2 from fuel use is directly related to the amount of fuel burned.

- A diesel-powered passenger vehicle emitting 95g of carbon emissions per km burns around 3.7 liters of fuel every 100 kilometers.
- A petrol-powered passenger vehicle emitting 95g of carbon emissions per km burns around 4 liters of fuel every 100 kilometers.

Read More About: **Car Carbon Offsets**: Eliminate Vehicular Carbon Emissions With Ease

How Much CO2 Does a Car Emit per Km?

CO_2 emissions can also be determined per kilometer.

How much CO_2 does a car emit per km?

It is estimated that a medium gasoline-powered car emits 192 g of CO_2 per km.

In comparison, a medium car powered by diesel fuel emits 171g of CO_2 per km.

The below table highlights the CO_2 emissions of a passenger car per kilometer compared to the CO_2 emissions of other vehicles per kilometer:[6]

Mode of Transport	**CO_2 emissions (equivalent per km)**
Domestic Flight	255 CO_2e per km
Medium Petrol-Powered Car	192 CO_2e per km
Medium Diesel-Powered Car	171 CO_2e per km
(Short-Haul Flight – Economy Class)	156 CO_2e per km
(Long-Haul Flight – Economy Class)	150 CO_2e per km
Bus	105 CO_2e per km
Medium Motorcycle	103 CO_2e per km
2-Passenger Petrol Car	96 CO_2e per km
Electric Vehicle (Medium – UK)	53 CO_2e per km
National Rail	41 CO_2e per km
Ferry	19 CO_2e per km
Eurostar (International Rail)	6 CO_2e per km

Answering the question, how much CO_2 does a car emit per mile, can further be broken down into emissions per minute, hour, day, and year.

It is estimated that if every car in America idles for 6 minutes a day, 3 billion gallons of fuel would be wasted yearly.

The below table compares emissions produced by idling, cold starting, and restarting:

Emissions Produced	Tier 2-Bin 5a	Cold Start	Restart	Idle 30 Seconds	Cold Start divided by Restart
THC (mg)	878	191	44	8.0	4.3
NOx (mg)	552	228	6	0.3	38
CO (mg)	31,290	2,970	1,253	3.2	2.4

The average diesel vehicle emits around 10g of carbon emissions per minute, while most other vehicle types emit 0.1g of NOx per minute.[7]

How Much CO2 Does a Car Emit per Hour?

If a traditional gasoline-powered car is idled for one hour, it burns ⅓ of a gallon of gas and emits almost 4 pounds of carbon into the air. Some types of cars will waste up to a gallon of gas if the car is left idling for an hour.

How Much CO2 Does a Car Emit per Day?

When considering the question, how much carbon does a car emit per mile, the calculation can also be done per day.

How Much CO2 Does a Car Emit per Year?

The logical question then becomes, how much CO_2 does a car produce per year? Both petrol-powered, and diesel-powered cars contribute to this calculation. It is estimated that a **single-passenger car** emits around 4 tons of CO_2 per year.

Furthermore, both diesel and petrol cars produce methane and nitrous oxide emissions from their tailpipes, as well as hydrofluorocarbon emissions from faulty air conditions. These emissions also contribute to global warming.

How Much CO2 Do Cars Emit Worldwide Percentage?

The below table indicates the percentage of CO_2 emissions produced by cars, compared to other modes of transport:[8]

Mode of Transport	CO_2 Emissions Percentage
Mode of transport: passenger cars	41%
Mode of transport: trucks (heavy and medium)	22%
Shipping	11%
Aviation	8%
Buses / Minibuses	7%
Commercial vehicles (light)	5%
Two or three-wheelers	3%
Rail	3%

1 ton of CO_2 can be compared to the following:

- The amount of emissions produced by traveling 6,000 km in a diesel-powered car.

The below table indicates the amount of CO_2 pollution by country, related to road transportation (per capita).[9]

USA	4,486 CO_2kg per capita
Canada	4,120 CO_2kg per capita
Saudi Arabia	3,961 CO_2kg per capita
Australia	3,339 CO_2kg per capita
Malaysia	1,879 CO_2kg per capita
Germany	1,848 CO_2kg per capita
France	1,758 CO_2kg per capita
Spain	1,755 CO_2kg per capita
EU-28	1,712 CO_2kg per capita
UK	1,705 CO_2kg per capita
Iran	1,655 CO_2kg per capita
Italy	1,569 CO_2kg per capita
Japan	1,451 CO_2kg per capita
Mexico	1,225 CO_2kg per capita
Russia	1,070 CO_2kg per capita
Turkey	947 CO_2kg per capita
South Africa	894 CO_2kg per capita
Brazil	817 CO_2kg per capita
China	537 CO_2kg per capita
Indonesia	503 CO_2kg per capita
Vietnam	352 CO_2kg per capita
Ghana	251 CO_2kg per capita
India	205 CO_2kg per capita
Zambia	117 CO_2kg per capita
Cameroon	113 CO_2kg per capita
Tanzania	96 CO_2kg per capita
Gabon	94 CO_2kg per capita
Ethiopia	63 CO_2kg per capita
Eritrea	48 CO_2kg per capita
DR Congo	21 CO_2kg per capita

The below **car emissions** table further breaks down the data related to transportation C_2 emissions, by comparing the global CO_2 emissions of passenger cars between 2000 and 2020.[10]

Year	**CO_2 Emissions in Billion Metric Tons**
2020	3 billion metric tons of CO_2
2019	3.2 billion metric tons of CO_2
2018	3.1 billion metric tons of CO_2
2017	3.1 billion metric tons of CO_2

2015	3 billion metric tons of CO_2
2014	2.9 billion metric tons of CO_2
2013	2.8 billion metric tons of CO_2
2012	2.8 billion metric tons of CO_2
2011	2.7 billion metric tons of CO_2
2010	2.6 billion metric tons of CO_2
2009	2.6 billion metric tons of CO_2
2008	2.6 billion metric tons of CO_2
2007	2.5 billion metric tons of CO_2
2006	2.5 billion metric tons of CO_2
2005	2.4 billion metric tons of CO_2
2004	2.4 billion metric tons of CO_2
2003	2.4 billion metric tons of CO_2
2002	2.3 billion metric tons of CO_2
2001	2.3 billion metric tons of CO_2
2000	2.2 billion metric tons of CO_2

Car CO2 Emissions per Km Calculator

A car CO_2 emissions per km calculator can be employed to produce accurate figures.

An average CO_2 **emissions calculator** requires the following inputs:

- Distance traveled in kilometers
- Fuel type
- Fuel consumption[11]

How Much CO2 Does a Car Emit per Mile?

The question, of how much CO_2 does a car emit per mile, can also be answered by comparing different cars.

The below table indicates the average global emissions per type of car per year:[12]

Type of Vehicles	**CO_2 Emissions (CO_2kg/year)**
Pickup trucks	3,510 CO_2kg/year
Large SUVs	2,550 CO_2kg/year
Sports cars	2,460 CO_2kg/year
Luxury cars	2,385 CO_2kg/year
Large cars	1,815 CO_2kg/year
Medium cars	1,515 CO_2kg/year
Small cars	1.470 CO_2kg/year

Are Electric Vehicles Greener?

So, are electric vehicles greener when compared to the above information?

While electric cars don't produce tailpipe emissions, their manufacturing process does (especially the battery). And when electric cars are not powered by renewable sources, their emissions escalate further.

The process of manufacturing a traditional gasoline-powered car and an electric car is much the same, except that electric car production produces more carbon emissions.

This fact comes down to battery production.

Batteries Are the Biggest Emitter

Batteries are the biggest emitter of carbon emissions during electric car production because they consist of lithium, cobalt, graphite, and nickel. These elements require extraction through mining activities, which in itself include highly polluting processes.

For example, to produce a single ton of one of these elements, 75 tons of acid waste is produced, as well as 1 ton of radioactive residues.

In addition to this, the energy consumption during the production of these batteries accounts for almost half of their entire carbon footprint, because the energy usually comes from high-impact carbon sources. Fortunately, the processes involved in manufacturing electric cars and their batteries are constantly being improved, which has a positive effect on the environment.[13]

Audi CO2 Emissions Calculator

Audi has launched a personal CO_2 emissions calculator on their website, to enable Audi drivers to calculate their CO_2 emissions per Audi model. The calculations in the **Audi CO_2 emissions calculator** are based on mileage and the amount of fuel purchased.

In addition to the calculator, Audi owners residing in Mexico are able to offset the emissions produced by their Audi vehicles, by purchasing carbon credits that come from the Oaxaca forests. The exchange is 250 pesos for every ton of CO_2.

The limit of carbon offset purchases is 2,500 pesos or 10,000 tons of CO_2. When the limit is reached, Audi owners can consider a **daily driver carbon offset**.

Carbon Footprint of Electric Cars vs Gasoline

The **carbon footprint of electric cars vs gasoline** cars is explained as follows:

- In 2022, a study showed that the production of an **electric vehicle** does produce more CO_2 than a traditional gasoline-powered vehicle, but the difference in emissions is erased when the EV is driven because it does not produce tailpipe emissions.
- It takes around 1.5 years for electric sedans to even out the pollution equation.
- It takes around 1.9 years for SUVs to even out the pollution equation.
- It takes around 1.6 years for pickup trucks to even out the pollution equation.

The study further reiterates the following:

- Emissions from battery electric vehicles (sedans) are at 35% compared to that of an internal combustion vehicle (sedan)
- Emissions from **electric** SUVs are at 37% compared to that of a gas-powered SUV.
- Emissions from battery electric pickup trucks are at 34% compared to that of an internal combustion pickup truck.

Furthermore, another study has shown that while a regular internal combustion vehicle produces 66 tons of GHG emissions in the US during 200,000 miles of driving, a BEV emits 39 tons over the very same distance.[14]

Reviewing the above information, it is clear that finding the correct answer to the question, how much CO_2 does a car emit per mile, is more intricate than just estimating the CO_2 emissions of a gasoline-powered vehicle.

Frequently Asked Questions About How Much CO2 Does a Car Emit per Mile

- What Are the Cars With Lowest CO2 Emissions?
- How Many Electric Cars in the World?
- How Many Electric Cars in the US?
- How Many Miles Can Electric Cars Go?
- What Is California Electric Car Rebate?
- What Is Recycling and Decarbonizing the Grid?

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References

[1]Science Direct. (2019, January 17). Comparative Study on Life Cycle CO2 Emissions From The Production Of Electric And Conventional Vehicles In China. Science Direct. Retrieved December 08, 2022, from <https://www.sciencedirect.com/science/article/pii/S1876610217309049/pdf?md5=4efd1d693e93804caf117e45af99e852&pid=1-s2.0-S1876610217309049-main.pdf>

[2]Chrobak, U. (2021, October 19). How America is tackling its greatest source of emissions. BBC. Retrieved December 08, 2022, from <https://www.bbc.com/future/article/20211019-climate-change-how-the-us-can-drive-less>

[3]Sgcarmart. (2022). My car's contribution to global warming. Sgcarmart. Retrieved December 08, 2022, from <https://www.sgcarmart.com/news/writeup.php?AID=78>

[4]Larsen, D. (2020, June 9). Electric Vehicles, Emissions and Fuel Economy – SACE. Southern Alliance for Clean Energy. Retrieved December 08, 2022, from <https://cleanenergy.org/blog/electric-vehicles-emissions-and-fuel-economy/>

[5]Alternative Fuels Data Center. (2022). Alternative Fuels Data Center: Emissions from Electric Vehicles. Alternative Fuels Data Center. Retrieved December 08, 2022, from <https://afdc.energy.gov/vehicles/electric_emissions.html>

[6]Tiseo, I. (2021, October 4). Travel carbon footprint by transport mode. Statista. Retrieved December 08, 2022, from <https://www.statista.com/statistics/1185559/carbon-footprint-of-travel-per-kilometer-by-mode-of-transport/>

[7]Alternative Fuels Data Center. (2022). Which Is Greener: Idle, or Stop and Restart? Which Is Greener: Idle, or Stop and Restart? Alternative Fuels Data Center. Retrieved December 08, 2022, from <https://afdc.energy.gov/files/u/publication/which_is_greener.pdf>

[8]Tiseo, I. (2021, December 14). Global transport CO2 emissions breakdown 2020. Statista. Retrieved December 08, 2022, from <https://www.statista.com/statistics/1185535/transport-carbon-dioxide-emissions-breakdown/>

[9]Tiseo, I. (2022, March 21). Road transport CO2 emissions per capita by country. Statista. Retrieved December 08, 2022, from <https://www.statista.com/statistics/1201243/road-transport-sector-per-capita-co2-emissions-worldwide-by-country/>

[10]Tiseo, I. (2021, December 14). Global CO2 emissions from passenger cars 2020. Statista. Retrieved December 08, 2022, from <https://www.statista.com/statistics/1107970/carbon-d emissions-passenger-transport/>

[12]The World Economic Forum. (2022, April 22). Which type of passenger car produces the most CO2 emissions? The World Economic Forum. Retrieved December 08, 2022, from <https://www.weforum.org/agenda/2022/04/most-polluting-passenger-cars/>

[13]Gonçalves, A. (2022). Are Electric Cars Really Greener? What About Their Batteries? Youmatter. Retrieved December 08, 2022, from <https://youmatter.world/en/are-electric-cars-eco-friendly-and-zero-emission-vehicles-26440/>

[14]Taub, E. A. (2022, October 19). E.V.s Start With a Bigger Carbon Footprint. But That Doesn't Last. The New York Times. Retrieved December 08, 2022, from <https://www.nytimes.com/2022/10/19/business/electric-vehicles-carbon-footprint-batteries.html>

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