

# EVs - To buy or not to buy

An Electric Vehicle, or EV, is being hyped as THE solution to personal transportation GHG emissions.

Here is a table to help work out the various factors involved in considering whether to purchase an EV:

To buy or not to buy an electric vehicle				
The time to buy an EV may be getting closer but there's still a lot to consider				
Considerations that influence your decision				
What is important is whether the purchase means that 'net' carbon will be saved				
In other words, will the carbon footprint of the complete life cycle - production, use, disposal - of the vehicle end up with the lowest actual total amount				
AND				
Does the purchase put some money in your pocket at the same time by an overall savings in energy use				
Life situation	Cost to produce the car	How much you drive	Cost to maintain	Trade in or disposal
	This is a cost that most people don't factor in			How long can the car last?
What impact will the EV have on your costs, relatively speaking	EVs are more expensive to manufacture and generate more CO2 to make them	It probably doesn't make sense below a certain driving amount	Evs are probably cheaper to maintain but replacing the battery at about 8 - 10 years is very expensive	The life of the car - Will the EV last long enough to justify the extra cost and CO2 from production?
Access to charging station other than at home	Will probable remain so	If your daily commute is more than the distance the electric car gets on a charge	For many people this might mean the car is not economical beyond 8 - 10 years life.	The life of the battery - How much will it really cost to replace the main battery?
Access to a service station near to you				A depleted battery might mean the car has no trade in value
Does the car fit your lifestyle needs, cargo capacity, holiday needs and so on?	How long, based on your normal driving habits, will it take to pay for the cost difference?	Hybrid might be better	Cost of parts and access to parts	It is still easier to maintain an ICE powered car even if it might be more expensive in the longer term

Without factoring in price, the benefit of driving an EV is not true for every driver and it also takes quite some time before the EV takes over as being more environmentally friendly. Why? The battery. While many aspects of EVs do reduce their overall impact such as lower emissions and maintenance cost, longer life span and the like, the battery is still a BIG problem. So, you can't blame Doug Ford for being a little confused.

"Around half of the emissions from battery production come from the electricity used in manufacturing and assembling the batteries. Producing batteries in regions with relatively low-carbon electricity or in factories powered by renewable energy, as will be the case for the batteries used in the best-selling Tesla Model 3, can substantially reduce battery emissions". [Factcheck: How electric vehicles help to tackle climate change](#)

The batteries in electric vehicles are expensive to produce and this production also generates quite a lot of CO2. A gasoline powered car does not have this production overhead. But there seems to be quite a lot of controversy about just when in the electric vehicle's lifespan this overhead starts to benefit the environment. Also, a great deal of the benefit depends on how the electricity that powers the car is

produced. An area that uses a lot of fossil fuels to generate electricity will have a higher carbon footprint than one that uses hydro or nuclear power.

But, just how far do you have to drive an EV before it takes over as more environmentally friendly? A recent DW documentary states:

"... the switch to electric cars could end our dependence on oil but do electric cars help save the climate and the environment?  
the production of these vehicles consumes an enormous amount of energy. ... only after 80 000 kilometers does an electric car have a better climate impact than a car with a combustion engine until then the e-auto has to compensate for the energy guzzling production and the cars are only more climate friendly if they are powered by Green electricity". [The future of mobility in Europe](#) | DW YouTube Documentary @ 32:49

In a comment by Tom Cockcroft: "After 15,000 miles (24,000 km) electric cars are better for the environment not 80,000 — please check your facts". So, I did. Here are some data for comparison.

"you'll have to drive another 13,500 miles (21,725 km) before you're doing less harm to the environment than a gas-guzzling saloon". [Analysis: When do electric vehicles become cleaner than gasoline cars?](#) By Paul Lienert

Data from other studies show:

"Electric cars have to travel as far as 50,000 miles to match the carbon footprint of a petrol model because of the massive amount of energy consumed during the production process, according to research". (80,000 km) [Electric cars only greener than petrol after 50,000 miles](#) by Graeme Paton, Transport Correspondent, The Times, November 26 2020

"According to Volvo, its battery electric cars may need to drive 100,000 kilometers or more to offset the emissions associated with building its battery!

First, the calculus used by Volvo says the results depend in large measure on the source of electricity its customers use to charge their vehicles. If they drive in Poland, where 90% of the electricity comes from burning coal, then yes, it will take 100,000 kilometers or more to reach parity with a conventional gasoline-powered car. On the other hand, if the electricity comes from renewable sources such as wind or solar, the crossover point is closer to 50,000 kilometers. The middle scenario, based on the current EU energy mix, is 77,000 kilometers". [Unpacking The "Electric Cars Aren't As Green As You Think" Claims](#) by Steve Hanley, CleanTechnica, January 21, 2022

"Producing lithium-ion batteries is highly energy-intensive: from mining to processing, shipping, and manufacturing, the journey from raw material to finished product is long and arduous. Because of this, EVs use twice the energy and emit more CO<sub>2</sub> during their manufacturing than ICE cars.

However, the picture changes once we look at the total lifecycle. Once an EV is manufactured, it produces very low emissions, requiring no diesel or gasoline to power its engine. According to a Wall Street Journal estimation that compared a Tesla Model 3 with a Toyota RAV4, the Tesla becomes more sustainable after about 33,000 km and emits 77 percent less CO<sub>2</sub> after 160,000 km". [Are electric cars better for the environment?](#) by Joseph D. Simpson and Kristof Tüzes, EVBox, May 13, 2022

"In one example, the Argonne model compared a Tesla Model 3 and a Toyota Corolla,

purchased and driven in the United States, where coal power makes up nearly a quarter of all electricity generation. In this comparison, the Tesla had to travel 13,500 miles before it surpassed the Corolla. That's a year or more of driving for most people.

The benefits arrive sooner for drivers in a country with a greener electrical grid. In Norway, where hydropower is king, Tesla's Model 3 overtakes the Corolla after 8,400 miles". [EVs Are Not Cleaner Than Gas Vehicles by Default: Study](#) by Chris Teague, JD Power, Jun 29, 2021

And, finally:

"With our new set of assumptions, an electric vehicle with a battery of 80 kWh would begin to have a lower carbon footprint than a petrol-driven vehicle somewhere between 67226 km and 151259 km traveled". [Electric car: 697,612 km to become green! True or false?](#) by Damien Ernst

So, the benefits of driving an EV do not begin to accrue on day one after driving it off the lot. Benefits will only start after anywhere from about 21,000 km to more than 150,000 according to these studies. That's quite a range, so to sum up, the benefits of an EV are highly dependant on which data is being used to compare, where the car is being driven and the driving habits of the user. [Turns out, the biggest factor is the capacity of the battery itself.](#) The more the capacity, the longer it takes before the vehicle becomes beneficial. The 80 kWh battery in certain Tesla models is going to take about 3X longer than the 24 kWh batteries found in models from other manufacturers. Other models with larger capacity batteries will take even longer, such as the Volvo mentioned or some models made by Audi. In terms of a simple calculation, it averages about 1,000 km per kWh of battery capacity to overtake a gasoline powered car in relation to its environmental benefits.

Obviously, electric vehicles DO reduce oil demand. ([Global EV Outlook, 2020](#), IEA) In turn, this generates fewer GHGs and results in cleaner air. Electric cars are improving efficiency as time goes on while gas powered vehicles risk becoming more expensive. However keeping an old car longer also reduces the lifecycle impact.

"Old cars have a poor reputation for being "gas guzzlers" which just make global warming worse. However, a surprising new study reveals trading in your old car for a brand new electric vehicle may actually be doing more harm than good. Researchers in Japan say choosing to keep and drive your older gasoline-powered car longer leads to fewer emissions entering the environment". [Keeping old cars longer can help the environment MORE than buying new electric cars](#) by Chris Melore, September 30, 2021

Another factor is the life of the battery itself. How long will the battery last before needing to be replaced? It looks like the typical battery is good for between 8 - 10 years. So, for most models, this is considerably less than the lifespan of the EV and this cost must also be factored into the mix. See, for example: ['How Long Should An Electric Car's Battery Last?'](#) by Ceyhan Cagatay, Editor

And how far can you drive an electric vehicle when it is -20C? "EVs often lose 12% of their range in cold weather, but the loss leaps to 41% with the heater on full blast". [Is a Cold Climate a Deterrent to EV Ownership?](#) To be fair, gasoline powered cars also lose range and efficiency in cold weather.

It is difficult to assess all this data because there a lot of variables that can't be pinned precisely. Comparing the 'lifetime emissions' for each type of vehicle for your driving habits will reveal the truth about the relative efficiency of each vehicle type. So, making the case that an EV is the best choice is not going to be the same for every driver. There may be no benefit for some drivers.

The best way to improve the efficient use of automobiles is in a shared context where the automobile is in use more. A car that sits for 90% of its life has a lower efficiency than one that is in use more than 10% of the time.

Whatever data is used to assess the relative efficiency of an automobile, it is clear that ANY use is going to have an energy impact. So, to improve the overall efficiency of personal transportation requires moving more to public transportation or other choices such as eBikes.

"Only one motorised means of transportation could beat electric cars: the electric bus".

[Lifecycle assessment: Electric cars vs ICEs](#)

Don't buy that EV without some careful calculations of your needs vs the actual costs.

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