

Summary of CO2 emissions per 100km (kg)				
Tesla Model 3 Ontario electricity mix	0.9			
Tesla Model 3 Natural Gas	8.8			
Tesla Model 3 Coal	21.5			
Corolla highway driving	18.7			
Corolla city driving	26.1			
	Tesla Model 3 (city/hwy)			
https://www.fueleconomy.gov/feg/findacar.shtml	26			kWh/100 miles for reference
	1.609			km/mile
https://fcr-ccc.nrcan-rncan.gc.ca/en#VehicleReport/26703	0.162			kWh/km for reference (not used)
Use more conservative actual reported efficiency	0.170			kWh/km (Efficiency - 0.170kWh/km in first 12 months. Use this.)
Reference distance	100			km
Energy for reference distance	17.0			kWh
	Ontario mix	Gas	Coal	
https://www.ieso.ca/en/Learn/Ontario-Electricity-Grid/Supply-Mix-and-Generation	10.4%			% gas in the Ontario mix. Balance is nuclear, hydro, wind and solar.
https://www.eia.gov/tools/faqs/faq.php?id=74&t=11	0.095	0.91	2.23	lbs CO2 to produce 1kWh of electricity
	2.20462			lbs/kg
	0.043	0.413	1.012	kg CO2 to produce 1kWh of electricity
Charging efficiency	80%			Car usage energy / Tesla app energy
Total CO2 for reference distance	0.9	8.8	21.5	kg

	Toyota	Toyota		
	Corolla	Corolla		
	City	Hwy		
https://www.fueleconomy.gov/feg/findacar.shtml	28	39		mpg
Reference distance	100			km
	3.78541			litres/gallon
Fuel for reference distance	8.4	6.0		litres
https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/oe/pdf/transportation/fuel-efficient-technologies/autosmart_factsheet_6_e.pdf	2.3			kg CO2 produced by burning 1 litre of gasoline
Tailpipe emissions for reference distance	19.3	13.9		kg
https://www.ucsusa.org/sites/default/files/attach/2017/02/Fueling-Clean-Transportation-Future-Oil.pdf	35%			"The emissions produced through extracting and refining the oil add on average an additional 35% CO2e. Moreover, this is an average that includes a very wide range of types of oil, some of which produce far more global warming emissions than the average."
Production CO2 emissions for reference distance	6.8	4.9		kg
Total CO2 for reference distance	26.1	18.7		kg
Notes:				
Distribution of electricity has CO2 losses/emissions. Not included?				
Production of battery has CO2 emissions. See below.				
Transportation of fuel has CO2 emissions. Not included.				
Assume non battery manufacturing CO2 the same for Model 3 and Corolla.				
CO2 to manufacturer the car not included. Model 3 battery is included.				

		Tesla Model 3 Ont. Energy mix	Toyota Corolla, 50% hwy, 50% city	
Model 3 US battery (assume somewhere between 61 and 106 biased to 61)		76		kg CO2e/kWh
Model 3 US battery		75		kWh
Model 3 US battery		5700		kg CO2e
distance per year		18,000		km/year
CO2 per reference distance		0.9	22.4	kg/100km
	0	5,700	-	kg CO2e (accumulative totals by year)
	1	5,864	4,034	
<p>The 75kg CO2e is the assumption battery manufacturing emissions.</p> <p>"The IVL researchers now estimate that battery manufacturing emissions are actually between 61 and 106 kg CO2-equivalent per kWh, with an upper bound of 146 kg. The low end estimate of 61 kg is for cases when the energy used from battery manufacturing comes from zero-carbon sources."</p> <p>"Taking manufacturing conditions into account, a Model 3 with a 75kWh battery from the Nevada Gigafactory results in notably smaller emissions..."</p>	2	6,028	8,068	https://www.carbonbrief.org/factcheck-how-electric-vehicles-help-to-tackle-climate-change/
	3	6,193	12,101	
	4	6,357	16,135	
	5	6,521	20,169	
	6	6,685	24,203	
	7	6,849	28,237	
	8	7,014	32,270	
Breakeven point			1.47	years
			26,514	km

