

Comparison Passenger Car Drives

LEGEND

	Emissions Euro VI (Sept. 2017)	CO ₂ (from 2020)	CO	HC+ NO _x	HC	NO _x	PM	PN	Wastage of resources		Range (vehicle)	Investment Running costs		Remarks
									Vehicle L/100km	Well-to- Wheel		Buy	Oper- ation	
Gasoline (Petrol)	Engine	+	o	+		o	o	o	+	+				
	Vehicle	+	o	+		o	--	o	+	+	++	++	++	see 1
	Well-to-Wheel	+	o	+		o	--	o	+					
Diesel	Engine	++	++		++	o	o	o	++	++				
	Vehicle	++	++		++	o	--	o	++	++	+++	+	+++	see 2
	Well-to-Wheel	++	o		o	o	--	o	++					
Vegetable Oil (no Biodiesel)	Engine	+++	++		++	o	o	o	++++	++++				
	Vehicle	+++	++		++	o	--	o	++++	++++	+++	+	+++	see 3
	Well-to-Wheel	+++	o		o	o	--	o	+++					
Hybrid-Drive Range-Extender (Gasoline)	2 Engines	+	+	+		+	+	+	+	++				
	Vehicle	+	+	+		+	--	o	+	++	++	o	++	see 4
	Well-to-Wheel	o	+	+		+	--	o	+					
Hydrogen and Fuel Cell	Engine	+++	+++	+++	+++	+	++	++	-	-				
	Vehicle	++	++	++	++	+	--	--	-	-	o	---	+	see 5
	Well-to-Wheel	--	--	--	--	-	--	-	-					
Elektricity Battery	E-Motor	++++	+++	+++	+++	+++	+++	+++	-	-				
	Vehicle	+++	+++	+++	+++	+++	---	---	-	-	---	---	+	see 6
	Well-to-Wheel	-	-	-	-	-	---	---	---					
Gas (CNG, LNG)	Engine	+	o	++	++	+	+	+	o	+				
	Vehicle	+	o	++	++	+	--	+	o	+	+	o	+	see 7
	Well-to-Wheel	+	o	o	o	o	--	o	o					

Remarks:

1) Gasoline Drive is the cheapest way buying a car, however, the operating costs are higher than Diesel because of the higher fuel consumption and higher fuel price. With the CO content in the exhaust gas, the limit value is twice as high as for the Diesel. Although CO is a very harmful gas, no one takes care about it. As with all other drive types, the particle limits apply only to the engine's exhaust, not to the vehicle. During driving, however, about 50 to 100 times more PM (than permitted in the exhaust gas) is generated by wear of road, tires, brake and clutch; a substantial part of this is respirable fine dust! This fact is not being addressed at the moment by environmental associations, the media and politics, since electric vehicles produce the most of these unregulated emissions due to their higher weight. Unfortunately the present focus is put only on Diesel.

2) Diesel drive is currently the better technology compared to the gasoline drive in terms of CO₂ emissions, CO emissions, HC emissions, fuel consumption and range. Compliance with all limits currently set by law (especially for NO_x and PM) in real driving operation is possible with proven and available software and hardware, as well as at a reasonable cost without non-legal manipulations. With regard to the non-limited particulate emissions of the whole vehicle, refer to description as under 1).

3) Like Diesel, but nearly CO₂-neutral. This is the most effective solution to limit the greenhouse effect and conserve resources, as long as all other drives (including electric motors) are fully or partially depending at least on fossil fuels.

4) Hybrid vehicles (which have an electric drive in parallel or in series with a conventional internal combustion engine) also derive their energy from the fuel tank only. Their advantage is that they can recover energy during deceleration or downhill. The most advantageous variant here is the so-called range extender, since the internal combustion engine does not have to be larger than is necessary for the average driving requirement. This results in significant fuel savings and lower emissions.

5) Hydrogen / Fuel Cell as a vehicle propulsion has no CO or HC emissions and only little NO_x emissions. The chain of conversion from primary energy (today H₂ is mainly produced from fossil fuels) is long and the efficiency of the environmental balance "well-to-wheel" is worse than with Diesel. The trend in H₂ production is on-board for the fuel cell, instead of direct drive from a gas tank.

6) In today's German energy mix of coal, gas, oil, nuclear and renewables, the direct use of electricity from the economic and ecological point of view is the worst choice. The fact that e-cars run with the same current, with which one would never heat his apartment, obviously does not appear to anyone. The alleged emission-free operation of an electric vehicle is really based on the fact that it has shifted its exhaust into the power plant, from where unfortunately only a very small part of the energy reaches the wall plug at home. Only when a significant share of the electricity comes from renewable sources, an electric vehicle is truly environmental and climate friendly. But we are still far away. In the case of the well-to-wheel view, the balance of all emissions compared to other drives is rather detrimental, especially for PM, as the higher vehicle weight will rub off more particles from tires and road. The consumption of fossil resources is greater in comparison and the range is significantly lower than that of other drives. In addition, there are high costs for the car purchase, limited battery life, energy loss by electric heating in winter (while also greatly reducing battery capacity), as well as problems due to long and frequent charging periods. And anyone who is afraid of electrosmog should primarily avoid an e-vehicle, in which strong currents flow and pulsate. The only (and currently only discussed) advantage is the local alleged emission-free mobility, because the valid laws limit only emissions from combustion engines.

7) The development of gas engines is towards natural gas (CNG, LNG, methane) instead of liquefied propane or butane). There are similar advantages and disadvantages as with the drive by petrol engine, usually still in combination with a petrol tank. The combustion of this gas is cleaner than the gasoline and diesel engine and causes lower emissions. The gastank requires a lot of space for relatively little energy content; therefore a smaller range should be accepted. On the transport route from fossil gas source via pipeline to petrol station, about 50% of this extremely climate-damaging gas is lost.