

What will we be driving in

Patrik Soltic, head of the Drive Technologies group at the Internal Combustion Engine Laboratory, provides some answers.

Spark-ignition engines

Even in the future most cars will be equipped with a spark-ignition engine. That's because many people are looking for a multi-use automobile with a large boot and a driving range suited for vacations. The market share of smaller turbo-charged engines, called "downsized engines", will increase because they consume considerably less fuel in the "partial load range" (in which a car engine is primarily operating). Besides petrol, other fuels made of alternative or biogenic sources (natural gas, biogas, bioethanol, etc.) are gaining importance due to geopolitical considerations and depending on the price of crude oil. That also improves the CO₂ balance.

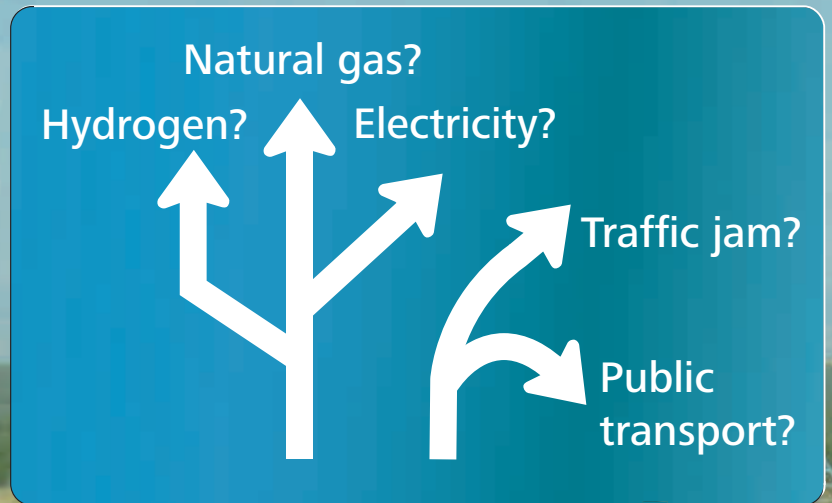
Diesels

Currently, spark-ignition engines must meet tougher limits than diesel engines. This difference will likely disappear with the Euro 6 emission standard. Thus, Euro 6 diesel engines need an expensive "chemistry factory" in the exhaust system, which will make them even more expensive compared to spark-ignition engines. Predictions thus assume a decrease in the future market share of diesels – also because modern spark-ignition engines consume only marginally more than diesel engines. It's unlikely that in future large amounts of bio-diesel can replace mineral-based diesel fuel because the two are vastly different both chemically and physically. Biodiesels cause considerable problems in modern injection systems and exhaust-treatment systems.

Hybrids

Hybrids are automobiles with internal combustion engines that are supported by an electric motor, e.g. at acceleration from standstill. When the driver applies the brake, the hybrid-system feeds energy back into a battery. Using only electricity, normal hybrids can only travel some hundreds of metres. Even without the need to plug into an electric socket, these cars can achieve a significantly lower fuel consumption, especially in city traffic. Due to the upcoming requirements for the reduction of CO₂ in vehicles, this technology will become more and more important.

20 years?



Electric cars

These make sense for certain applications, such as municipal vehicles and regional delivery services (such as parcel services) as well as commuter cars that only drive short distances and regularly return to their base station. Electric cars, though, are not always more eco-friendly. In the EU, on average approximately 570 grams of CO₂ are generated per kilowatt-hour of electricity, and global predictions tend towards an increase rather than a decrease of CO₂ emissions for electricity production. Thus, in the foreseeable future, mass motorization using electric vehicles would not lead to a reduction in CO₂ compared to modern vehicles with internal combustion engines.

Plug-in hybrids

Plug-in hybrids can draw energy from an electric socket and typically have an electric driving range of a few tens of kilometres. At this time, however, they are favoured in the calculation of CO₂ emissions because of a legal loophole: electricity from a socket is considered CO₂-free – even if it is produced by a coal-fired power plant. As soon as the actual CO₂ emissions are taken into account, plug-in hybrids lose much of their CO₂ advantage, except when they are operated purely in an urban environment.

Fuel cell cars

Drivetrains based on fuel cells are also a sort of hybrid because in addition to the fuel-cell itself a battery is needed for intermediate storage and the distribution of the load. Fuel cells are currently only useful for municipal vehicles and regional delivery services because a public network of hydrogen stations does not yet exist. In addition, hydrogen is nowadays not generated in a sustainable way (i.e., from solar or wind power). Almost all hydrogen produced today is synthesised chemically, mainly from natural gas, heavy oil and coal. When considering CO₂ emissions, this has no advantage unless the fuel cell is replacing a very inefficient conventional drivetrain.