

CombiFuel Swiss AG



Information brochure about alternative powertrain types

CAR/SUV/LCV

CombiFuel®

Up to 95% fewer emissions



All other powertrain types

Today's «standard»



Petrol



Diesel



Fullhybrid



Plug-in-Hybrid



Electric






CNG






Hydrogen propulsion








 CombiFuel®	 Petrol	 Diesel
<p>CombiFuel® is an innovative and green liquefied gas injection-System. CombiFuel® is a newly developed powertrain system that runs on LPG, with the potential to leave a unique ecological and economic footprint. The plug-in technology has been designed to be universally applicable to most combustion engines. CombiFuel® can be applied universally for all gasoline engines as well as for all diesel engines. Universally applicable, from the smallest vehicle to a truck (40 Tons). Thanks to an emission reduction of up to 95% and a reduction in fuel costs of up to 50%, CombiFuel® will be the ideal investment for future for fleets and commercial vehicles (trucks).</p>	<p>The combustion of the petrol engine «Otto engine» is based on a compressed air-petrol mixture which is brought to combustion in the cylinder chamber. When the mixture is compressed, pressure (8-18 bar) and heat (400-600°C) are generated. The resulting exhaust gases are cleaned by a 3-way catalytic converter in modern vehicles and the particles are cleaned by a particle filter.</p>	<p>The diesel engine works with a self-ignition of the injected fuel in the compressed combustion air.</p>
Advantages		
<ul style="list-style-type: none"> • Emission reduction of up to 95% & almost 100% less particles and NO_x • significant reduction of CO₂ • reduction of fuel costs up to 50% • A condensing module recognises the liquid gas mixing ratio e.g. (propane / butane) • The CFS control unit works adaptively and is OBD-capable. • Innovative plug & play system • Approx. 1.3 billion existing vehicles (petrol/diesel) • Many more... 	<ul style="list-style-type: none"> • The lower pressure and temperatures enable cheaper engine production, which has a positive effect on the acquisition costs • Sporty driving feel as well as smoother running • The emission values of nitrogen oxide are below those of diesel engines 	<ul style="list-style-type: none"> • Lower consumption per 100 km compared to petrol engines. • Maximum torque available at low engine speeds. • Acceptable consumption even in city traffic • More pleasant behaviour and smoother pace than petrol. • Less CO₂ is emitted into the atmosphere
Disadvantages		
<ul style="list-style-type: none"> • Purchase price • Fill up the tank with two different fuels 	<ul style="list-style-type: none"> • Consumption is significantly higher with petrol than with diesel engines • CO₂ emissions are higher than with diesel engines • Direct-injected petrol engines have higher particle emissions • Low power delivery in the lower speed range 	<ul style="list-style-type: none"> • Higher nitrogen oxide and particle emissions than with petrol engines. • Complex exhaust gas purification (AdBlue) • Turbocharging (turbo, compressor) mandatory
Prospects		
<p>CombiFuel® is a bridging technology (e.g. Europe 5 years, developing countries up to 30 years) that offers users of petrol and diesel vehicles the opportunity to make their vehicle more environmentally friendly. This also circumvents future driving bans.</p>	<p>Despite 150 years of development, there is still potential for optimisation.</p>	<p>Despite negative perceptions among the population and politicians, the compression-ignition engine is not a model that will be discontinued soon.</p>



 <p>Fullhybrid</p>	 <p>Plug-in-Hybrid</p>	 <p>Electric</p>
<p>Hybrid cars have both an internal combustion engine and a fuel tank as well as an electric motor and a battery. A control system regulates when which drive is used.</p>	<p>Plug-in hybrids are based on the same system as full hybrids. However, they have a larger battery, which allows more range, but must be charged externally.</p>	<p>The lithium-based batteries, which are environmentally unfriendly to produce, emit electrical energy that drives the electric motor. The mechanical kinetic energy converted by the electric motor drives the wheels.</p>
Advantages		
<ul style="list-style-type: none"> • Reduction of pollutant and noise emissions. • The recovery of braking energy charges the batteries of the electric motor • Simultaneous use of both forms of energy enables powerful acceleration • No concerns about range 	<ul style="list-style-type: none"> • Reduction of pollutant and noise emissions • No concerns about range • No driving bans in cities because of the switch to E-Drive 	<ul style="list-style-type: none"> • Maximum torque is already reached at the start • No pollutant and noise emissions during operation • High driving comfort • No driving bans in cities
Disadvantages		
<ul style="list-style-type: none"> • Purchase price and weight somewhat higher than for combustion engines 	<ul style="list-style-type: none"> • The acquisition costs are significantly higher than those of combustion engines. • Fuel savings are hardly feasible on long journeys • Regular charging of the battery is necessary • The vehicle is heavier and more prone to problems due to two systems • Maintenance costs for plug-in hybrids are higher than for conventional combustion engines 	<ul style="list-style-type: none"> • High acquisition cost • Less range than a combustion vehicle • Longer charging times • Battery production requires elements such as cobalt and manganese, some of which are mined under questionable conditions • According to studies (see link below), the production of a battery alone generates 61–106 kg of CO₂ per kWh. • A luxury electric vehicle compared to a diesel car will only become CO₂-neutral after approximately 70'000 kilometres or after about 5 years • Higher fine dust formation during production & driving (for heavy vehicles with long range)
Prospects		
<p>Hybrid engines embody an environmentally friendly bridging technology until even more efficient technologies become established on the market.</p>	<p>Plug-in hybrids are also a bridging technology suitable for short-distance drivers.</p>	<p>Europe's manufacturers have invested billions in e-vehicles and politicians are also pro e-mobility. The expansion of the public charging infrastructure is inevitable. In certain European areas, the charging infrastructure is operated by high-emission diesel generators and/or during power outages. Moreover, the structure is sparse in some areas.</p> <p><small>Source: www.combifuel.ch/en/powertrains</small></p>

 CombiFuel®	 CNG	 Hydrogen propulsion
<p>CombiFuel® is an innovative and green liquefied gas injection-System. CombiFuel® is a newly developed powertrain system that runs on LPG, with the potential to leave a unique ecological and economic footprint. The plug-in technology has been designed to be universally applicable to most combustion engines. CombiFuel® can be applied universally for all gasoline engines as well as for all diesel engines. Universally applicable, from the smallest vehicle to a truck (40Tons). Thanks to an emission reduction of up to 95% and a reduction in fuel costs of up to 50%, CombiFuel® will be the ideal investment for future for fleets and commercial vehicles (trucks).</p>	<p>Gas engines are divided into CNG (Compressed Natural Gas) and LPG (Liquefied Petroleum Gas). Gas engines are a subgroup of the classic combustion engines.</p>	<p>To generate energy from hydrogen and oxygen stored in gaseous form, the hydrogen engine contains a fuel cell that drives an electric motor.</p>
Advantages		
<ul style="list-style-type: none"> • Emission reduction of up to 95 % & almost 100 % less particles and NO_x • significant reduction of CO₂ • reduction of fuel costs up to 50 % • A condensing module recognises the liquid gas mixing ratio e.g. (propane / butane) • The CFS control unit works adaptively and is OBD capable. • Innovative plug & play system • Approx. 1.3 billion existing vehicles (petrol/diesel) • Many more... 	<ul style="list-style-type: none"> • Fewer pollutants than petrol and diesel engines • Better CO₂ balance compared with petrol/ diesel • Cleaner combustion 	<ul style="list-style-type: none"> • No local pollutant emissions • Short refuelling time • Compared to electric cars, the range is higher with less weight • No driving bans in cities
Disadvantages		
<ul style="list-style-type: none"> • Purchase price • Fill up the tank with two different fuels 	<ul style="list-style-type: none"> • Low range in gas-only mode. • Needs a conventional fuel as a reserve/ supplement • Gas is carried in pressurised tanks of up to 300 bar in the vehicle 	<ul style="list-style-type: none"> • Only two models available • Few filling stations • High acquisition costs • Liquefied and compressed hydrogen (700 bar, -250°C) is flammable even at low temperatures. That's why high-pressure hydrogen tanks are usually made of several layers of plastic, reinforced with carbon fibres
Prospects		
<p>CombiFuel® is a bridging technology (e.g. Europe 5 years, developing countries up to 30 years) that offers users of petrol and diesel vehicles the opportunity to make their vehicle more environmentally friendly. This also circumvents future driving bans.</p>	<p>Until now, gas cars have never been able to establish themselves due to various myths.</p>	<p>The hydrogen vehicle is still a niche product and models and refuelling options are rare. But that is about to change. The H₂ promotion association wants to create a nationwide network. In addition, numerous manufacturers have plans for hydrogen vehicles up their sleeves. Nevertheless, in the medium term, hydrogen will mainly be found in the commercial vehicle sector.</p>