Fact sheet

Free the automotive industry from the electricity trap!

- European emissions legislation
- "Tank-to-Wheel"
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- CNG is 100 % renewable: Straw in the fuel tank

European emissions legislation

The European Union has committed itself to a 20 percent reduction in greenhouse gas emissions by 2020 (compared to 1990 levels). The transport sector is a significant contributor to CO_2 emissions in the EU, with a share of approximately 26 percent. Of this, the passenger vehicle sector is responsible for 12 percent, approximately half of the total. Pollutant emissions and climate-damaging CO_2 emissions from passenger vehicles and light-commercial vehicles are governed by Europe-wide directives and regulations which set limits and testing procedures for emissions and evaporation. The emission limits in grams per kilometre (g/km) have been successively tightened since 1992 – with the implementation of the European directive 91/441/EWG (Euro 1).

Diesel passenger vehicles classified as Euro 4 are still permitted to emit approximately three times as much nitrogen oxides as vehicles powered by petrol-based fuels. In order to achieve further significant reductions in emissions of diesel particles, the emission limits for these pollutants will be sharply reduced further in future Euro classifications for diesel passenger vehicles. Particle emissions are reduced with a reduction of 25 mg/km particulate mass for Euro 4 passenger vehicles and 5 mg/km for Euro 5 and 6 (for vehicles powered by petrol-based fuels and diesel vehicles as well as for goods vehicles in all weight categories). For vehicles powered by petrol-based fuels classified as Euro 6, the nitrogen oxide limit is 60 mg/km, only a quarter below the limit for Euro 6 diesel vehicles. Euro 6 has been obligatory for all new passenger vehicles since September 2015. The emission limits for light-commercial vehicles are staggered based on vehicle (reference) weight.

European CO_2 legislation

CO_2 emissions for new passenger vehicles are successively limited to 120 g/km up to the year 2015 and to 95 g/km from the year 2020. The CO_2 target values for light-commercial vehicles are 175 g/km from the year 2017 and 147 g/km from the year 2020.

"Tank-to-Wheel"

"Tank-to-Wheel" refers to a calculation limit used in determining transport emissions (in particular for CO_2). This calculation method, specifically "From the fuel tank to the wheel" - takes account of the chain of events from the intake of energy consumption (fuel or electric energy) through to its conversion into kinetic energy in motor vehicles. It measures the emissions of a vehicle that result from bringing a vehicle into motion, starting from the fuel tank of the vehicle. These emissions are also described as direct emissions or operational emissions. This only takes account of that element of the process directly resulting from the technology used in the vehicle. Manufacturers and vehicle engineers generally work on a Tank-to-Wheel perspective as they are not able to influence other factors aside from the vehicle itself (for example the emissions generated in manufacturing

VERBIO Vereinigte BioEnergie AG
Ulrike Kurze
Marketing/PR
Ritterstraße 23 (Oelßner's Hof), 04109 Leipzig
Tel.: +49 176 13085404
Fax: +49 341 308530-999
E-Mail: ulrike.kurze@verbio.de

Katja Springer
c/o zebra|public
Werner-Hartmann-Straße 5, 01099 Dresden
Tel.: +49 351 212800-27
Fax: +49 351 212800-39
E-Mail: katja.springer@zebra.de

the fuels). The Tank-to-Wheel methodology is the basis used by manufacturers to make declarations of fuel consumption and fuel costs as well as for emissions (used for vehicle taxes).

"Well-to-Wheel"

Specifically "From the borehole/well to the wheel" is a calculation method which investigates the entire value-added chain from obtaining and refining the fuel energy through to conversion to kinetic energy. Under this method the partial "Well-to-Tank" (obtaining, preparation and production of fuel) and the "Tank-to-Wheel" approach (vehicle efficiency) are considered in a holistic approach. The "Well-to-Wheel" calculation is obligatory for use in emissions certificates for fuels under the Renewable Energy Directive. This provides a transparent picture of how ecological a fuel really is.

The significance of the difference can be shown particularly well using the example of an electric vehicle: From "Tank-to-Wheel" an electric vehicle is emission free, it has 0 g/km CO_2 emissions while the vehicle is in operation. The more ecologically accurate picture given by the "Well-to-Wheel" calculation also includes CO_2 emissions which result from creating the electricity used to power the electric vehicle. Based on the current German electricity mix, this is in the range of between approximately 65 - 75 g/km. On the other hand, a CNG vehicle powered by biomethane manufactured from waste materials or straw generates emissions of only around 5 g/km.

CNG is 100 % renewable: Straw in the fuel tank

Biomethane from 100 percent straw is an advanced biofuel which impresses with its 90 percent CO_2 savings, the highest efficiency and its competitive production cost. Further, a CNG vehicle powered by biomethane produced using straw is more environmentally friendly than an electric car powered using the current German electricity mix which is, for the most part, based on lignite and anthracite coal. This globally unique technology to manufacture biomethane from 100 percent straw on an industrial scale was developed internally by VERBIO AG. The first production plant has been in operation at Schwedt/Oder since 2014. A second will be on line in Pinnow in the German State of Brandenburg from 2018.

Only four big bales of straw (two tonnes in total) are needed to produce the annual amount of fuel required to power a medium sized natural gas passenger vehicle for a year. According to a study published by the German Biofuels Research Centre (Deutschen Biomasseforschungszentrums Leipzig – DBFZ) between eight and twelve million tonnes of straw remain unused in Germany every year, meaning that these are available for the generation of biofuels. Using the VERBIO technology this could be used to create enough fuel for more than five million vehicles.

In contrast to electro mobility, CNG motors using biomethane from straw also provide a fuel alternative for small vehicles which is technically available and affordable.

VERBIO Vereinigte BioEnergie AG
Ulrike Kurze
Marketing/PR
Ritterstraße 23 (Oelßner's Hof), 04109 Leipzig
Tel.: +49 176 13085404
Fax: +49 341 308530-999
E-Mail: ulrike.kurze@verbio.de

Katja Springer
c/o zebra|public
Werner-Hartmann-Straße 5, 01099 Dresden
Tel.: +49 351 212800-27
Fax: +49 351 212800-39
E-Mail: katja.springer@zebra.de