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## Media communiqué

### Results of Empa Investigation Comparing Emissions from Various Power-Train Types

**Empa scientists have carried out a study comparing emission levels from petrol, diesel and natural gas fuelled vehicles. All these types of drives have become “cleaner” over the past few years thanks to advances in technology, with natural gas engines being the cleanest. They produce 21 per cent less CO<sub>2</sub> emissions than petrol vehicles and 11 per cent less than diesels, as well as contributing the least to ozone creation. The poorest results were produced by diesels without particle filters, a fact which supports those calling for the introduction of these filters.**

Empa has performed an emissions-comparison study on different power train systems used in 32 automobiles. The study was conducted as part of the investigation to determine emission factors for vehicles used on Swiss roads on behalf of the Swiss Federal Office for the Environment (FOEN). The results, which have just been released, provide valuable, up-to-date comparisons between vehicles which are being marketed today and which meet the current Euro-4 exhaust gas regulations.

The aim of the investigation was to investigate the most important emissions of motor vehicles from the air-pollution point of view. These include fine particulates, ozone-producing gases such as nitrogen oxides and hydrocarbons, and greenhouse gases such as carbon dioxide and methane. The measurements show that all the types of power plants studied – petrol, diesel and natural gas fuelled engines – have become cleaner thanks to the continuous technological developments which have occurred over recent years. An environmentally relevant assessment of these ever-improving vehicles must therefore place more and more emphasis on the greenhouse gas emissions which are responsible for climate change effects. From this point of view natural gas fuelled vehicles, which emit about 21 per cent less greenhouse gases than petrol engines and about 11 per cent less than diesels, still take pride of place.

Despite the technical progress in a general sense, human respiratory problems caused by fine particulates and ozone still remain unsolved, in particular in urban areas. The study shows that diesel vehicles without fine particulate filters produce emission levels about 250 times higher than the other power train systems. The use of diesel particle filters, as called for by FOEN among other bodies, is therefore an important measure in efforts to improve air quality.

In the case of NO<sub>x</sub>, which is responsible for ozone production, emissions from petrol and natural gas fuelled engines are at a comparable, low level. Diesel vehicles, on the other hand, give out about ten times more NO<sub>x</sub> in comparison. When the proportion of NO<sub>2</sub> in the NO<sub>x</sub> is taken into account, even greater differences become apparent. This is particularly important because NO<sub>2</sub> is both an ozone creating agent and a health hazard. While petrol

and natural gas engines emit practically no NO<sub>2</sub>, with diesel engines the NO<sub>x</sub> emissions consist of 30 to 50 per cent of this gas. Diesel vehicles therefore contribute significantly more to local ozone creation than do petrol or natural gas fuelled vehicles.

As for total hydrocarbons (THC) the average values for petrol, diesel and natural gas fuelled vehicles are comparable. In the case of non-methane hydrocarbons (which are also important for ozone creation and their effects on human health) natural gas engines produce the lowest emission levels, followed by diesels. Petrol engines show the highest NMHC emission levels.

A relative comparison shows that natural gases emerge as the best option in terms of greenhouse gas and ozone-producing emissions. Petrol fuelled vehicles demonstrate equally good emission of NO<sub>x</sub> levels, but with the highest greenhouse gas levels. Diesel vehicles fitted with particle filters show good results in terms of particle emissions (as do petrol and natural gas types), but are at a distinct disadvantage in terms of NO<sub>x</sub> emissions. Diesel vehicles not equipped particle filters can only be categorized as “giving cause for concern” due to their high levels of both particulate and NO<sub>x</sub> emissions .

The complete study can be downloaded at: [www.novatlantis.ch](http://www.novatlantis.ch)  
(click on the first entry under Highlights on the homepage)

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