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REAL WORLD EMISSION MEASUREMENT OF DIESEL AND HYBRID SUV WITH INCREASED BIO FUEL BLENDS

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ABSTRACT

Bio fuels are already used as additive to conventional fuels due to their nearly closed CO_2 cycle. However nowadays a share of about 5% of the fuel is substituted by bio fuels. In order to reach national CO_2 emissions targets as formulated in the Kyoto agreement increased bio fuel shares are considered. Thus a fuel blend with a share of 10% bio fuel was investigated in high efficient propulsions systems.

The measurements were conducted with reference fuels and reference fuel blended with a bio fuel share of 10%. For the test drives representative routes of 77 km total length in the area of Vienna were defined, which includes sections with significantly different driving conditions. Furthermore test drives at different constant speeds on freeway sections were carried out. The so gained measurement results were therefore based on thousands of detailed measurements sets, which were averagely weighed.

The chosen test vehicles were equipped with the new ultra compact On-Board Measurement System (OBM) to determine the exhaust mass emissions in real time. The measurement method is based on modal analysis of the emission concentrations in the tailpipe of the vehicle, as previously published [1]. For the investigations in real world traffic two premium class SUVs, one with a Diesel engine and automatic transmission and one with a gasoline hybrid system were chosen. It is to state in general that the CO_2 and pollutant emissions were dependant on the propulsion system of the vehicle. For the hybrid SUV in comparison to the SUV with Diesel engine and automatic gearbox, 30% lower CO_2 emissions on city routes were measured. The nitrous oxide emissions of the different propulsion systems were determined in detail as well.

The application of the fuel blend in the different vehicles and propulsion systems with 10% bio fuel share, lead to diversified results. On city routes a reduction in CO_2 emissions in the conventional propulsion system was observed, whereas for the hybrid vehicle an increase was measured. On freeway routes the results were the other way round, the fuel consumption of the Diesel SUV increased. The fuel consumption of the hybrid SUV was slightly decreased. In full load tests, the gasoline hybrid vehicles showed lowered acceleration performance and the Diesel powered SUV increased CO_2 emissions.

PREVIOUS PUBLICATIONS

[1] Pucher E., Müller J.: "Real-life Emission Measurement of Light Duty Trucks with CNG, Diesel and Gasoline Engines"; SAE Future Transportation Technology Conference, Chicago, USA; 07.09.2005 - 09.09.2005; in: "2005 SAE Future Transportation Technology Conference Proceedings", SAE International, (2005), Paper-Nr. 2005-01-3445.