AUGUST 2017

NEWSLETTER

International Regulatory Developments

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EUROPE

RDE and WLTP enter into Force – A New Era for Vehicle Emissions Control

On 1 September 2017, two new European emissions Regulations that will deliver cleaner cars and more reliable CO_2 emissions and fuel consumption data entered into force: Real Driving Emissions (RDE), which provides effective emissions control under more realistic driving conditions, and WLTP, which leads to more robust CO_2 emissions and fuel consumption information.

From 1 September 2017, certification of cars introduced to the European market for the first time includes Real Driving Emission (RDE) measurement with new Not-To-Exceed emissions limits which must be met while driving on the road. This means that all new car types, including diesel vehicles, have to comply with stringent regulation for nitrogen oxide (NOx) emissions during real driving.

On road NOx emissions are now capped at 2.1 times the Euro 6 limit and this will be lowered to 1.5 by January 2020. RDE requirements make sure deNOx aftertreatment technologies, including Selective Catalytic Reduction (SCR) systems and NOx traps, are used correctly. Also, as that day, car manufacturers have to declare maximum Conformity Factors (CF) for each new car type providing for an incentive to manufacturers to market even cleaner vehicles. Air Quality modelling has shown that the new RDE requirements are expected to deliver air quality benefits for citizens, EU Member States, and local authorities.

The Euro 6 limit for Particle Number (PN) emissions now has to be met not only in the laboratory, when the car is tested on a roller chassis-dynamometer, but also on the road with a cap of 1.5 times the Euro 6 limit. This will ensure emissions of ultrafine particles from diesel and Gasoline Direct Injection (GDI) vehicles are reduced to close to zero level in real-world. The PN limit for GDI vehicles also becomes the same as for diesel for the first time. To meet that challenge, a new technology – the Gasoline Particulate Filter (GPF) – has been developed for GDI cars and is introduced to the market with the entry into force of RDE requirements for PN. AECC has demonstrated that for vehicles tested with either DPF or GPF, the Euro 6c PN limit ($6x10^{11}$ particles/km) is met during on-road driving, even under severe driving conditions and low ambient temperatures.

In addition, from 1 September 2017 onwards, new car types will be certified in the laboratory using the "Worldwide-harmonized Light vehicle Test Procedure" (WLTP) for the measurement of CO_2 emissions, fuel consumption and tailpipe pollutant emissions. WLTP replaces the now outdated NEDC (New European Driving Cycle) procedure developed in the 1980s.

The WLTP drive cycle has been designed with a more realistic dynamic driving pattern and reaches higher speed than the NEDC. Nevertheless, the core of the improvement with the WLTP lies in the procedure itself. The road load determination procedure is improved with reduced margins ensuring vehicles are certified under conditions closer to those found in-use on the road. The vehicle test mass in WLTP reflects the actual mass of the individual vehicle rather than the mass of a basic vehicle as the NEDC. Preconditioning of the vehicle is also improved with e.g. prohibition of external recharging of the battery before the test and a test at 14°C is also included to account for EU-average temperature conditions.

The AECC press release is at www.aecc.eu/wp-content/uploads/2017/09/170901-AECC-PR-WLTP-RDE-introduction.pdf.

It was posted on AECC social media: Twitter (@AECC_eu), LinkedIn, and a brand new AECC Facebook page.

Commission's Tender for Study on Motorcycles' Roadworthiness Test

On 18 August 2017, the EU Commission launched call for interest for a study assessing the possibility of including light trailers and two- or three-wheel vehicles in the scope of the EU rules on periodic roadworthiness tests for motor vehicles.

Economic operators have to express their interest to the EU Commission. The Commission will then invite interested parties to participate in this tendering process. The Commission is expected to award the contract by the end of 2017, with the study expected to be completed over the course of 2018.

A Commission Report would be expected by the end of April 2019 on the effectiveness of the inclusion of light trailers and two- or three-wheel vehicles in the scope of Directive 2014/45/EU on periodic roadworthiness test.

In particular, the Report would need to assess whether the standards and costs of periodic roadworthiness testing of each category of vehicle is proportionate to the road safety objectives set. The Report would be accompanied by a detailed impact assessment analysing the costs and benefits throughout the European Union, including the specificities of Member States.

The call for interest is open until 15 September 2017 and is at https://ec.europa.eu/transport/content/study-inclusion-light-trailers-and-two-or-three-wheel-vehicles-scope-periodic-roadworthiness_en.

Commission Consultation on Heavy-Duty Vehicle Emissions closed

The short public consultation for the proposal on the monitoring and reporting of CO_2 emissions and fuel consumption of heavy-duty vehicles (HDV) closed on 2 August 2017.

The consultation had been launched under the Commission's Better Regulation Agenda and aimed to gather the views of stakeholders on the recently published proposal (*see AECC Newsletter of May 2017*).

Three comments were submitted, two from private individuals, and one from the European Automobile Manufacturers' Association (ACEA).

ACEA declared its support for the Commission's objective of using the CO_2 data from VECTO to enhance transparency on the market, and underlined that the scheme is crucial for increasing the amount of data available regarding CO_2 emissions from trucks in Europe, as well as in order to help vehicle operators to be better informed when purchasing a vehicle.

However, the association found several issues regarding the proposal. Firstly, ACEA suggested the alignment of the scope of the proposal with the draft Commission Regulation concerning the certification of fuel consumption and CO_2 emissions from new HDVs, so that manufacturers only have to collect and submit data on those vehicles subject to CO_2 certification.

Secondly, the association proposes a more specific definition of a vehicle's "production date": either (i) the date when the vehicle leaves the first manufacturer's production or (ii) the date of the CO_2 consumer file as date of production.

Lastly, ACEA expressed concerns about the negative consequences of the disclosure of competitive input data for the EU automotive industry.

The proposal was sent at the end of May 2017 to the Council and to the European Parliament for co-decision.

ICCT Summary of EU Heavy-duty Certification Requirements on CO_2

On 1 August 2017, the International Council on Clean transportation (ICCT) published a summary of the implementing act adopted by the EU for type-approval of CO_2 emissions and fuel consumption of on-road heavy-duty vehicles.

The Technical Committee on Motor Vehicles (TCMV) unanimously adopted on 11 May 2017 a draft implementing act put forward by the European Commission on the certification of the CO_2 emissions and fuel consumption of heavy-duty vehicles, which will go into effect in 2019 and 2020 (*see AECC Newsletter of May 2017*).

Starting 1 January 2019, heavy-duty vehicles belonging to one of the four vehicle groups with the highest contribution to on-road freight CO_2 emissions will be certified for their CO_2 emissions and fuel consumption. Six additional heavy-duty vehicle groups will be required to be certified for CO_2 emissions and fuel consumption by 1 January 2020. The certification procedure is based on VECTO, a vehicle simulation tool that uses as inputs the measured performance of the different vehicle components.

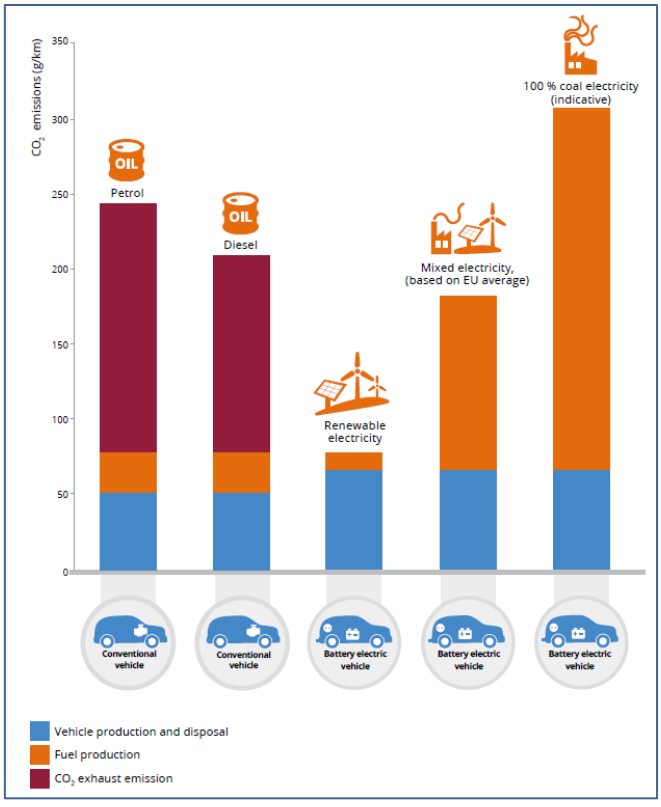
The ICCT report is at www.theicct.org/sites/default/files/publications/ICCT_update_HDV-EU-CO2-cert_20170731.pdf.

EEA Signals 2017 Report on the Future of Energy in Europe

On 31 August 2017 the European Environment Agency (EEA) released its Signals 2017 report which looks into Europe's energy system and its transition towards clean, smart and renewable energy.

European countries consume less energy compared with 10 years ago, mainly due to energy efficiency gains. Europe also relies less on fossil fuels due to energy savings and the faster-than-expected uptake of renewable energy.

The Signals 2017 report includes articles looking at how Europe is making the shift to renewables and the benefits of improving energy efficiency. It also profiles the impact of climate change on our energy system, the future of the electric cars and its impact on the grid and an interview on biofuel production. Securing an affordable energy supply locally amid the ever changing global energy markets is also explored.



The EEA Signals 2017 report is at www.eea.europa.eu/publications/signals-2017.

German National Diesel Forum

On 2 August 2017, the German Federal Ministers for Transport (Mr Dobrindt), Environment (Ms Hendricks), (Finance) Mr Schäuble, Economic Affairs and Energy (Ms Zypries) and Research (Ms Wanka), as well as the Prime Ministers of Baden-Wuerttemberg, Bavaria, Hesse, Lower Saxony, and Saarland, and the Mayors of Berlin and Hamburg, met representatives of the automobile industry, namely Audi, Volkswagen, Porsche, Daimler, BMW, Ford, and Opel, in the first 'National Diesel Forum'.

The summit was called to find agreement on ways to cut NOx emissions from diesel cars already on the market and help local authorities improve air quality as well as to consider the loss of confidence in the automotive industry.

A joint declaration issued after the summit indicated that optimized combustion engines must not be ignored in the process of achieving emission-free vehicles. The signing parts stated that modern and clean diesel technology can contribute to climate change mitigation and combustion engines will be necessary in the foreseeable future for individual mobility and freight transport. The contribution of synthetic fuels to the reduction of pollutants and greenhouse gases will be examined in the future.

For immediate measures, car manufacturers were requested to optimize 5.3 million Euro 5 and 6 diesel cars currently registered in Germany to reduce NOx emissions of these vehicles by 30% by the end of 2018.

Binding rules for these 'retrofit' actions are:

- Cost is to be borne by car manufacturers,
- Car manufacturers need to prove that changes do not impact negatively other relevant type-approval characteristics such as CO_2 emissions, fuel consumption, noise, and engine power, and
- Car manufacturers must take over the warranty on components involved in the measures.

Car manufacturers made a binding commitment to create self-financed incentives (e.g. "switchover premiums") to accelerate fleet renewal of cars older than Euro 5. For newly registered Euro 6 vehicles, manufacturers must explicitly state that the SCR system operates in optimal conditions (i.e. with appropriate urea injection to ensure highest NOx reduction efficiency) in all real-world driving conditions.

In the declaration, other car manufacturers were also invited to contribute to reducing pollution with similar measures.

The Federal Motor Transport Authority (KBA) compromised to conduct market surveillance and will test emissions of in-service cars type-approved by themselves or by other type-approval authorities across the EU, including on-road NOx emissions. Also, the effectiveness of the retrofitting or upgrades will be reviewed by the KBA or the responsible type-approval authority.

This is an important first step but further actions will need to follow. OEMs were requested to come forward with RDE-compliant vehicles earlier than mandatory dates. A concept is to be expected from car manufacturers in October 2017.

The German Federal Government will launch a €500 million fund called 'Sustainable mobility for the city', funded by the three German automotive manufacturer according to their market shares. The aim is to develop and implement an individual green-city plan for each of the 28 regions affected by high NO_2 concentrations. Plans will include digitization, intelligent transport systems, intermodal mobility solutions and increasing automation and networking in individual and public transport.

The Federal Government will also expand support platforms for pollution-reducing measures in urban transport. In addition to the existing promotion of electro-mobility, focus will be on electric, hybrid, and CNG busses; support vehicles with low urban emissions for green public procurement, additional funding for recharging infrastructure, a uniform digital e-ticketing system throughout Germany, expansion of subsidies for hybrid trains or hydrogen fuel-cell locomotives and further promote cycling and walking.

Finally, four expert groups were established to address:

- Emissions reduction of vehicles in circulation
- Traffic control, digitization, and networking
- Changeover of public vehicle fleets to low-emission mobility
- Optimization of drive technologies and alternative fuels

The National Diesel Forum declaration (in German) is at www.bmvi.de/SharedDocs/DE/Anlage/K/170802-erklaerung-nationales-diesel-forum.pdf?__blob=publicationFile.

Proposed Diesel Software Updates not enough for German Environment Ministry

On 23 August 2017, the German Ministry for Environment urged the car industry to help boost the uptake of clean vehicles after findings of a study published on 18 August 2017 showed that software updates and other measures implemented so far would only have a minor effect on diesel pollution.

The study, commissioned by Federal Environment Minister Barbara Hendricks, calculates estimated change in NOx concentration resulting from software updates to

Euro 5 and Euro 6 cars, as well as repurchases of Euro 4 or older diesel cars in two scenarios: a highly polluted city (Munich) and a less polluted city (Mainz). Even making optimistic assumptions, such as ruling out the possibility of consumers buying larger cars with higher consumption, the study concludes that the proposed software updates and the repurchase of older vehicles will lead to a reduction of NOx pollution in the German cities of up to 6%. This reduction is not sufficient in most affected cities to meet the annual average of 40 µg/m³, the EU limit for the protection of human health.

Ms Hendricks urged carmakers to deal with technical upgrades quickly. She stated that, as with the software updates, the manufacturers should also responsible for hardware retrofits, and the costs for this must be fully borne by them.

The Ministers suggested premiums for the for really clean vehicles, such as electric cars, hybrid- and gas propulsion, economical petrol engines or the most modern diesel engines, which have low real-driving emissions on the road, as stipulated by the latest emission regulations, which should be confirmed by the manufacturer.

Over the next few weeks, the expert groups agreed upon at the Diesel Forum will develop further measures for a second diesel summit to be held in the autumn.

The study is at www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Luft/dieselgipfel_wirkungen_bf.pdf.

UK Heavy-Duty Vehicle's Retrofit Scheme

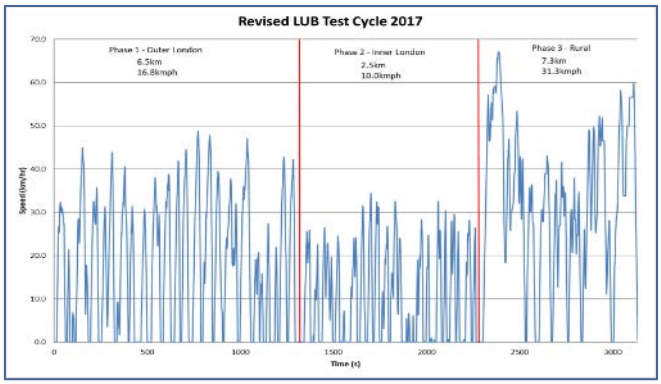
On 3 August 2017, the Clean Vehicle Retrofit Accreditation Scheme (CVRAS) for busses, coaches, and heavy-goods vehicles was launched in the UK.

The scheme was developed jointly by the Low Carbon Vehicle Partnership (LowCVP) and the Energy Saving Trust (EST) together with industry stakeholders through funding and support from the Joint Air Quality Unit of the Transport (DfT) and Environment (Defra) UK Departments.

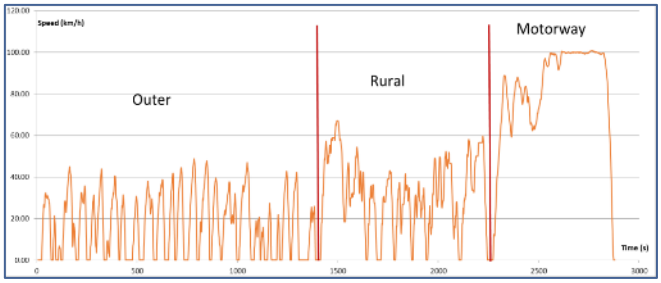
The CVRAS will provide independent evidence that a vehicle retrofit technology will deliver the expected emissions reductions (including >80% NOx reduction) in real world operation. It will enable drivers, technology manufacturers, businesses and local authorities to be confident that properly verified and accredited technologies meet the standards in the government's Clean Air Zone Framework for England.

The objective of the scheme is to accredit retrofit technologies which will deliver on road emissions levels equivalent to Euro VI/6, based on the best available data and representative operating cycles.

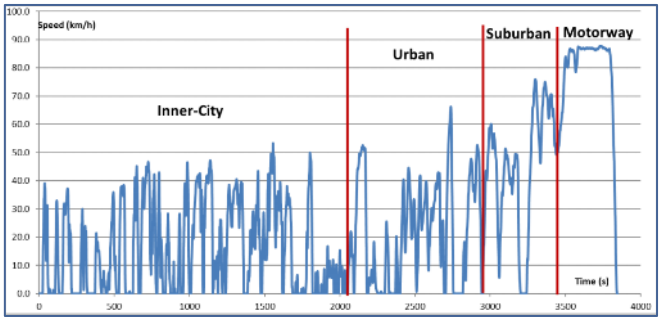
The accreditation request form refers to the UN Regulation No 132 on Retrofit Emissions Control (REC). Several modifications are included in the test protocol though. Buses are to be tested using the 2017 revised LowCVP UK Bus cycle, consisting of an outer-London phase followed by an inner-London phase and ending with a rural phase.



Coaches are to be tested using the 2017 LowCVP UK Coach cycle, consisting of an outer-city phase followed by a rural phase and ending with a motorway phase.



Heavy-goods vehicles shall be tested using the 2017 LowCVP UK HGV cycle (a combination of the Transport for London's AM Peak cycle and the World Harmonized Vehicle Cycle), consisting of an inner-city phase followed by urban, suburban and ending with a motorway phase.



Emission limits permitted from the vehicle fitted with the retrofit device are as follows:

Exhaust emission parameter		Maximum permitted limit	Reduction performance
Primary emissions			
Mixed oxides of nitrogen	NOx	500mg/km	>80%
Nitrogen dioxide	NO_2	100mg/km	
Particulate matter (PM)	PM	10mg/km	
Number of particles (PN)	PM	6 x 10^{11}/km	
Secondary emissions			
Nitrous oxide/methane	N_2O/CH_4 (as CO_2e)	< 5% of CO_2	
Carbon dioxide	CO_2	< 1% increase	
Ammonia	NH_3	10ppm average 25ppm peak	
In service			
Mixed oxides of nitrogen	NOx		> 80% daily average

N_2O and CH_4 emissions CO_2-equivalent levels must not constitute more than 5% of the total CO_2 emissions recorded during the tests with the retrofitted vehicle.

Technologies already potentially identified and in common use include: Selective Catalytic Reduction (SCR), hybrid powertrain systems and engine repowers with gas (LPG or CNG). New technologies will need to provide robust, independent relevant test data of the performance, prior to being considered for CVRAS accreditation.

More information, including test protocol and accreditation request forms, is at www.energysavingtrust.org.uk/business/transport/clean-vehicle-retrofit-accreditation-scheme-cvras.

Highways England's Air Quality Strategy

On 2 August 2017, Highways England published its Air Quality Strategy, setting out the agency's contribution to support the Department for Environment, Food and Rural Affairs (Defra) and the Department for Transport (DfT) as they work to improve air quality in the UK and deliver NOx compliance at the roadside.

The agency has been given £100 million by the UK Government to improve air quality through to 2021, and the strategy released sets out how they plan to spend that money, which includes a target to put a charging point for electric cars every 20 miles on 95% of the road network.

Highways England is also considering covering motorways with barriers incorporating new polymer materials with the potential to absorb NO_2. Several trials have been realized since 2015, including the testing of a NOx-eating paint alongside the network. Nowadays, the Highways agency is studying the viability and effectivity of constructing canopies - tunnel-like structures, already in place in some Dutch roads - over the most polluted sections of the roads to prevent vehicle emissions reaching the neighbours.

The strategy is at www.gov.uk/government/uploads/system/uploads/attachment_data/file/634933/N160081_Air_Quality_Strategy_Final_V18.pdf.

Consultation on Draft London Environment Strategy

On 11 August 2017, London Mayor Sadiq Khan published his draft London Environment Strategy and launched a public consultation on the strategy.

The strategy brings together every aspect of London's environment and is divided into air quality, green infrastructure, climate change mitigation and energy, waste, adapting to climate change, and ambient noise.

The Mayor will clean up London's air, water and energy in a way that is fair, protects the health of Londoners, and contributes to the fight against climate change. Action will be taken now to introduce less polluting buses, deter the most polluting vehicles from being driven in London, and clean up the air around schools and new developments. London entire transport system will become zero emission, and London will be a zero carbon city by 2050.

The consultation is open until 17 November 2017 and is at www.london.gov.uk/what-we-do/environment/draft-london-environment-strategy-have-your-say.

Switzerland prohibits New Porsche Cayenne Registrations

On 18 August 2017, the Swiss Federal Roads Office (FEDRO) banned registrations of new *Porsche Cayenne* 3L Diesel, as a consequence of the manipulation of emissions control devices recently discovered.

Cayenne models are equipped with V6 3L engines manufactured by Audi. These engines were found to have a cheating software incorporated that deactivate emissions control systems, causing vehicles to emit pollutants well over the Euro 6 limits.

Only not yet registered vehicles are subject to this prohibition, vehicles already circulating in Switzerland can continue doing so.

More information can be found at https://www.astra.admin.ch/astra/fr/home/documentation/communiques-de-presse/anzeige-meldungen.msg-id-67781.html.

ASIA PACIFIC

ICCT Paper on Early Implementation of China 6

On 9 August 2017, the ICCT published a work paper titled 'Cost–benefit analysis of early implementation of the China 6 light-duty vehicle (LDV) emissions standard in Guangdong Province'.

The paper reviews the costs and public health benefits that would result from implementing the China 6 light-duty vehicle emission standard in Guangdong Province and adds a recommended timeline earlier than the national plan (2023).

Building on a previous paper, the ICCT generated four implementation scenarios in order to capture and compare the emission impacts: continuing business as usual, following the national timeline, early adoption of China 6 and an aggressive adoption.

In addition to the emission and health impacts, a calculation of air quality impact from LDVs is included.

	China 6 adoption		Scrappage	Modeling			
				Emission	Air quality	Health	CBA
BAU	N/A	N/A	YLVs	√	√	√	√
National Timeline	China 6a China 6b	2020.1.1 2023.1.1	YLVs	√			
Early Adoption	China 6b	2018.9.1	YLVs	√	√	√	√
Aggressive	China 6b	2018.9.1	YLVs and Old vehicles	√			

The ICCT claims that air quality impacts of introducing the China 6b LDV emissions standard ahead of the national schedule (Early Adoption scenario) will help Guangdong

improve the concentration of annual average $PM_{2.5}$ and average daily 1-hour peak O_3 by 0.4 µg/m^3 and 2.0 ppb, respectively.

In 2030 alone, the early implementation of the China 6b standard will avoid 880 premature deaths and more than 626 hospitalizations in the province.

According to the authors, the economic value of total $PM_{2.5}$- and O_3-related health benefits from implementing China 6 are more than three times the cost of implementation. Therefore, early adoption of the China 6 standard yields tremendous benefits over the midterm (in 2030).

The ICCT concludes that early adoption (in mid-2018) of the China 6b standard would help Guangdong address its most prominent air quality and human health concerns cost-effectively, in both the short and long term.

The ICCT report is at www.theicct.org/sites/default/files/publications/CBA-LDV-China-6-GP_ICCT-Working-Paper_09082017_vF.pdf.

Indian Supreme Court orders Pollution Control Certificate for Vehicle Insurance

On 10 August 2017, the Supreme Court of India issued a directive that insurance of a vehicle will not be renewed unless the owner provides a pollution under control (PUC) certificate.

Among the other slew of directions, the Court also asked the India Ministry of Road Transport and Highways to ensure that all fuel refilling centres in the National Capital Region (NCR) have PUC centres. The Supreme Court granted four weeks' time to ensure that there are functional PUC centres in the NCR and to ensure that operating vehicles have PUC certificates.

Jakarta proposes Emissions Test as Part of Public Vehicle Registration Renewal

Indonesian media *Berita Jakarta* reported on 2 August 2017 that Jakarta's Environment Department has proposed emission tests as a mandatory requirement for owners of public vehicles to renew their vehicle registration documents (STNK).

An emissions test application that is still being developed will connect the Environmental Department with the 218 certified Workshops on Emissions Testing (BPUA) in Jakarta. Each vehicle tested will be connected to a database through this application. Vehicle owners will be required to attach the resulting emissions test certificate in order to renew their vehicles' registration.

More information can be found at www.beritajakarta.id/en/read/22516/emission-test-proposed-to-become-stnk-renewal-requirement.

Amendments to New Zealand Engine Fuel Specifications

On 22 August 2017, New Zealand Energy and Resources Minister Judith Collins announced changes to New Zealand's gasoline and diesel specifications.

The amendments to Engine Fuel Specifications Regulations 2011, which sets out minimum standards for fuel performance and minimizing harmful components, are designed to "support the growth of lower-emission fuels that are better for people, the environment and cars," said Ms Collins.

Updates to New Zealand's fuel standards encompass four significant components: raising New Zealand's limit for methanol in gasoline from 1% to 3% volume; increasing the biodiesel blend limit in diesel from 5% to 7%; introducing a total oxygen limit; and reducing the sulfur level allowed in gasoline from 50 to 10 ppm (diesel fuel already has a 10 ppm sulfur limit in New Zealand).

Several minor technical changes accompany these amendments, to reflect technology enhancements and improve the clarity of the specifications. The introduction of a total oxygen limit, increasing the biodiesel blend limit and raising the methanol blend limit is expected to increase demand for biofuels, and potentially allow more flexibility in fuel mixes and enhance the security of local supply.

Reducing the sulfur level in gasoline is "specifically targeted to reduce harmful emissions, which will have health and environmental benefits," said Ms Collins, and will align New Zealand with increasingly stringent fuel standards throughout Europe, Japan and the US. Three of the four amendments are scheduled to take effect on 2 October 2017, with lower gasoline sulfur limits beginning 1 July 2018.

More information is at www.mbie.govt.nz/info-services/sectors-industries/energy/liquid-fuel-market/engine-fuel-quality/2016-17%20updates.

GENERAL

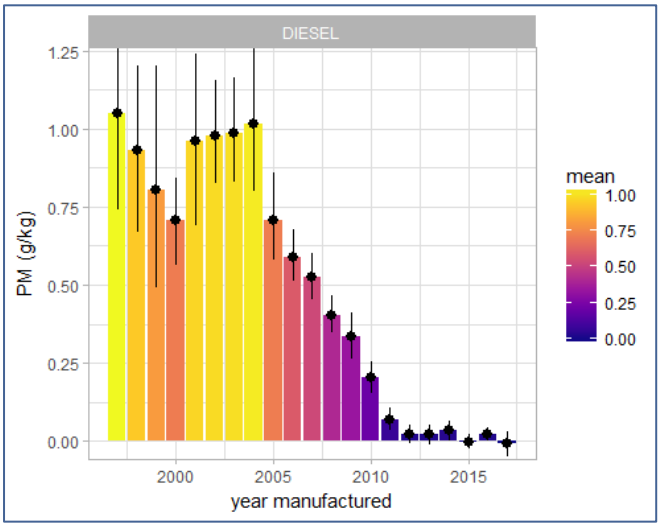
UK Remote Sensing confirms DPF Effectiveness for reducing PM

On 17 August 2017, Ricardo published an article reflecting on the efficacy of Diesel Particulate Filters (DPF) in reducing PM emissions.

The company is currently piloting remote sensing measurements around the UK. It has created a vehicle emissions database currently holding 50 000 real-world driving emission measurements from road vehicles and anticipates 100 000 measurements by the end of 2017.

The database offers great insight into the behaviour of vehicle emissions under real-world driving conditions including a window into the performance of DPF technologies.

Analysis of the data show that emissions of PM have clearly fallen since 2005, when Euro 4 standard vehicles were introduced. Indeed, cars produced in the last 5 years or so have PM emissions that are below the detection limit of the instrument. Such a trend is in fact a major success story for controlling PM emissions from vehicles.



Ricardo's remote sensing data for Euro 5 and Euro 6 vehicles can also be used to ascertain whether substantial DPFs removals could be detected through corresponding increases in PM. Simulations have been run to estimate the effect of potential DPF removals, and results show that it might be possible to detect DPF removal at a 1% rate. However, for DPF removal rates from 5% and above it becomes much clearer that the removal can be detected.

The Ricardo publication is at https://ee.ricardo.com/news/remote-sensing-demonstrating-diesel-particulate-f.

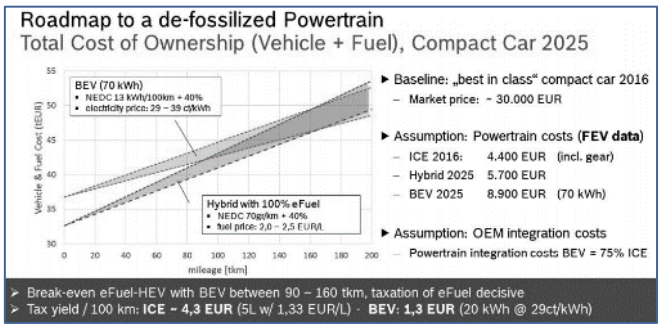
Bosch Study on CO_2 Reduction Potential of Synthetic Liquid Fuels

On 22 August 2017, Bosch released a study on the potential of synthetic fuels for reducing CO_2 emissions titled 'Carbon-neutral cars: synthetic fuels turn CO_2 into a raw material'.

The study proposes to add synthetic fuels to conventional fuels in order to reduce CO_2 emissions from an existing vehicle fleet. Synthetic fuels can be produced with the help of electricity from renewable sources: hydrogen produced from water is added to carbon, which can be recycled from industrial processes or the air, to produce liquid synthetic fuel. Thus, greenhouse gases become raw material from which gasoline, diesel, gas or even kerosene can be produced.

"Synthetic fuels can make gasoline and diesel-powered cars carbon-neutral, and thus make a significant contribution to limiting global warming," said Dr Volkmar Denner, chairman of the board of management of Robert Bosch GmbH. In addition, he stated that synthetic fuels can be designed to burn practically soot-free.

One further crucial advantage is that the existing filling station network can continue to be used. The same applies to the existing combustion engine expertise. Moreover, even though electric cars will become significantly less expensive in the years ahead, the development of these fuels, now very expensive, may be worthwhile. Bosch has calculated that, up to a lifetime mileage of 160 000 km, the total cost of ownership of a hybrid running on synthetic fuel could be less than that of a long-range electric car, depending on the type of renewable energy used.



The study concludes that by 2050, the use of synthetic fuels as a supplement to electrification could save up to 2.8 gigatons of CO_2, three times Germany's CO_2 emissions in 2016.

The Bosch study is at www.bosch-presse.de/pressportal/de/media/dam_images/pi9773/efuels_studie_bosch.pdf.

ICCT Report on Real-World Emissions of Euro 6 Cars

On 29 August 2017, the International Council on Clean Transportation (ICCT) published a report on real-world emissions of four Euro 6 passenger cars.

Investigations were conducted by the Laboratory of Applied Thermodynamics (LAT) of the Aristotle University of Thessaloniki, and its spin-off company, Emisia. Vehicles tested included three diesel cars – a BMW 520d 2.0 (with DOC+DPF+LNT), a Nissan Pulsar 1.5 dCi (with DOC+DPF+LNT), an Opel Insignia 2.0 CDTI (with DOC+DPF+SCR) – and a Gasoline Direct Injection VW Polo 1.2TSI (with TWC and no GPF).

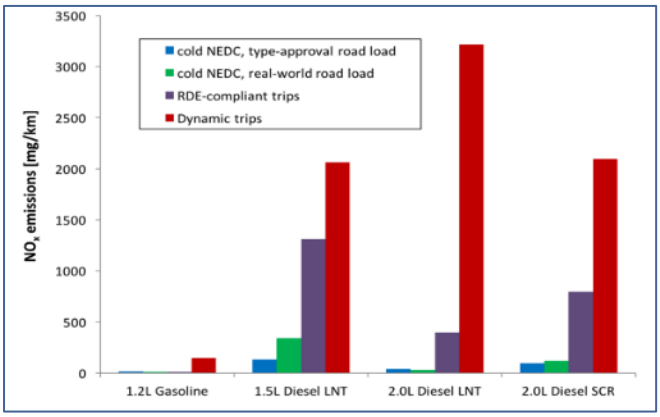
Vehicles were tested under various conditions. First, the laboratory reiterated the NEDC type-approval test using two different estimation of road-load settings. The first used the car manufacturer's original parameters, and the second their own independent measurements. Another series of tests measured emissions on different vehicle speed profile (i.e. ARTEMIS, WLTC) at ambient conditions varying from 18°C to 25°C.

Second, the four vehicles were tested on the road following the RDE regulation protocol, which includes defined limits for dynamic driving conditions (e.g. exclusion based on vehicle's speed and acceleration, and cumulative positive altitude).

For the last series of on-road tests, the four vehicles were driven more dynamically on a hilly road to investigate emissions levels outside RDE boundary conditions.

The findings reveal that:

- Every tested vehicle exceeded their CO_2 certification levels in a range varying from 21% to 37% under the laboratory type-approval test using real-word road-load settings.
- Two of the three diesel vehicles exceeded the NOx limit by 19% and 66% while tested under the laboratory type-approval test.
- Under RDE-compliant on-road trips, NOx emissions from diesel vehicles showed average levels varying from 5 to 16 times the Euro 6 limit.
- NOx emissions of diesel vehicles driven in more dynamic driving conditions increased further to reach a range from 26 to 40 times the Euro 6 limit.
- NOx and CO emissions from the gasoline vehicle remained below the Euro 6 limit under any of the laboratory tests and RDE-compliant trips. While tested in more dynamic on-road conditions, emissions exceeded the laboratory type-approval limit by a factor of 2.5 for NOx and by a factor of 2.4 for CO.



The ICCT report is at http://theicct.org/sites/default/files/publications/EU-RDE-Vehicle-Testing_ICCT-EMISIA-Consultant-Report_29082017_vF.pdf.

ICCT Report on Plug-in Hybrids' CO_2 and Fuel Consumption Measurement

On 28 July 2017, the International Council on Clean Transportation (ICCT) published a report on fuel consumption and CO_2 measurement of Plug-in Hybrid Electric Vehicles (PHEV).

The report is titled 'Too low to be true? How to measure fuel consumption and CO_2 emissions of plug-in hybrid vehicles, today and in the future'. It first outlines the current procedure for the determination of fuel consumption, CO_2 emissions, electric energy consumption, and electric range, specifically for PHEVs in Europe; this current procedure is described in the UN Regulation No 101. It then highlights the most relevant changes expected with the introduction of the new Worldwide harmonized Light vehicles Test Procedure (WLTP), which comes into effect in the EU in September 2017. Finally, key differences between the EU and US test procedures for PHEVs are briefly discussed.

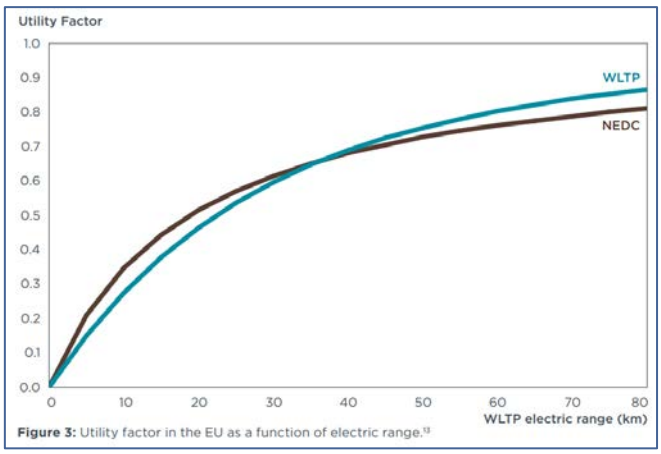


Figure 3: Utility factor in the EU as a function of electric range.[13]

The report concludes that the electric driving range of a PHEV strongly influences the fuel consumption and CO_2 emission values that are used for the official reporting as well as for communication to consumers. In the current NEDC-based vehicle testing procedure, the electric range of PHEV tends to be estimated in a rather optimistic way. In the real world, CO_2 emissions of a PHEV strongly depend on factors such as the driving distance, consumer behaviour, ambient temperature, and recharging behaviour. In the new WLTP test procedure a utility factor is introduced that is expected to better reflect the real-world energy consumption and electric range of PHEVs. Nevertheless, even under the WLTP, official and real-world values for PHEV will continue to strongly deviate for some customers.

In the future, the specific driving behaviour of individual customers could be taken into account for estimating fuel consumption and CO_2 emission values that more accurately reflect the everyday driving experience and that allow for a fairer comparison between individual vehicle types.

The ICCT report is at http://theicct.org/sites/default/files/publications/EU-PHEV_ICCT-Briefing-Paper_280717_vF.pdf.

RESEARCH SUMMARY

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Wells to wheels: Environmental implications of natural gas as a transportation fuel, Hao Cai, et al.; *Energy Policy* (October 2017), Vol. 109, pp. 565-578, doi: 10.1016/j.enpol.2017.07.041.

FORTHCOMING CONFERENCES

2nd Annual Emission Control Forum for Non-Road Mobile Machinery

7-8 September 2017, Frankfurt, Germany
www.tbmevolution.com/index.php/conferences/ucoming-events/2nd-annual-emission-control-forum-for-non-road-mobile-machinery-detail
This Forum will discuss best practices on how to meet Stage V regulations requirements at the lowest cost possible, how to conduct In-Service Monitoring data analysis, learn about future state-of-the-art aftertreatment and SCR technologies; about electro-hybrid mobile machines; discuss harmonisation strategies of emission regulations and how to prepare best for future emissions regulations.

13th International Conference on Engines & Vehicles (ICE2017)

10-14 September 2017, Capri, Italy
www.sae-na.it/index.php/en/2016-03-19-14-13-16/2016-03-19-14-14-16/welcome
Topics to be addressed include engine modelling and diagnostics; engine combustion; new engines, components, actuators & sensors; hybrid and electric powertrains; fuels and lubricants; and exhaust aftertreatment and emissions.

Emissions 2017

12-13 September 2017, Frankfurt, Germany

https://gamcinc.com/conferences/emissions/?id=1
The forum will address advances in emission technology and management systems related to OEMs, suppliers (all tiers), component manufacturers, governmental and non-governmental agencies.

10th Integer DEF Forum USA 2017

26-28 September 2017, San Antonio, USA
www.integer-research.com/conferences/def-forum-usa-2017

2017 Aachen Colloquium Automobile and Engine Technology

9-11 October 2017, Aachen, Germany
www.aachener-kolloquium.de
The congress provides a wide range of technical presentations addressing current challenges of the vehicle and engine industry.

7th Integer Emissions Summit & AdBlue® Forum India 2017

11-12 October 2017, New Delhi, India
www.integer-research.com/conferences/ies-india-2017
The conference will examine the progress made towards Bharat VI a year on from the government's announcement regarding plans to implement the stringent emissions standards by 2020.

GreenPort Congress 2017

11-13 October 2017, Amsterdam, Netherlands
www.greenport.com/congress
The Congress aims to highlight innovations in equipment and technology to allow port users to adhere to policy, whilst illustrating practical solutions through case studies from the global logistics chain.

5th International Conference Real-Driving Emissions

16-18 October 2017, Berlin, Germany
https://real-driving-emissions.iqpc.de
The IQPC RDE conference will discuss the latest state of affairs around the implementation of RDE procedures in Europe, with a special focus on its consequences for engine and exhaust technology and further developments on local and global markets.
AECC will give a presentation on latest results from a Real-Driving Emission testing campaign

SAE 2017 International Powertrains, Fuels and Lubricants Meeting

16-19 October 2017, Beijing, China
www.sae.org/events/pfl

G.STIC 2017 – Global Science, Technology & Innovation Conference

23-25 October 2017, Brussels, Belgium
www.gstic.org
The objective of this conference is to underpin the technological discussions in the UN and other international forums as they relate to the Sustainable Development Goals, the climate goals and Means of Implementation.

3rd Annual Automotive Exhaust Systems Summit

26-27 October 2017, Munich, Germany
http://vonlanthengroup.com/en/events/3rd-annual-automotive-exhaust-systems-summit.html
Key practical learning points of the summit include insights on the best-practices and latest innovative technologies for exhaust systems; new challenges relating to selective catalytic reduction; control concepts and systems for exhaust gas aftertreatment; the exhaust sensors market's effect on automotive industry trends; the role of tomorrow's exhaust systems, future power trains, and future energy carriers for clean mobility; and emissions legislation and the future requirements.

10th Integer Emissions Summit USA 2017

7-8 November 2017, Pittsburgh, USA
www.integer-research.com/conferences/ies-usa-2017

15th FAD-Conference

8-9 November 2017, Dresden, Germany
www.fad-diesel.de/conference-2017

The FAD conference will focus on drive technologies and environmental impact; Real-Driving Emissions – milestones of implementation; exhaust aftertreatment for on-road applications; contributions of science and research; emission concepts for non-road diesel engines; exhaust aftertreatment for gas engines; special requirement of exhaust aftertreatment for hybrid drives; emission strategies and solutions for large engines; new exhaust aftertreatment concepts; service time and aging of exhaust aftertreatment systems; and future fuels and exhaust aftertreatment.

1st International FEV Conference Zero CO_2 Mobility

9-10 November 2017, Aachen, Germany
www.fev.com/index.php?id=805
The conference on Zero CO_2 Mobility will discuss the potential and performance of various forms of energy storage – from battery technologies to eco- and e-fuels.

22nd International Transport and Air Pollution Conference (TAP 2017)

15-16 November 2017, Zurich, Switzerland
http://tapconference.org
The conference topics include exhaust and non-exhaust emissions from transport modes (measurements and modelling); urban and suburban air quality; energy demand and greenhouse gas emissions from transport modes; and transport policies and mobility challenges of the future.

Clean Air Forum

16-17 November 2017, Paris, France
www.euconf.eu/clean-air/index.html
The European Clean Air Forum, organized by the European Commission, will provide a basis for structured dialogues, exchange of knowledge and good practices, and to enhance capacity of relevant stakeholders to improve air quality. It aims to reflect on the development of policies, projects and programmes in the context of air pollution and air quality, and facilitate the implementation of European, national and local air policies. It will focus on three themes: air quality in cities; agriculture and air quality and clean air business opportunities.

Heavy-Duty, On- and Off-Highway Engines 2017

28-29 November 2017, Augsburg, Germany
www.atzlive.de/en/events/heavy-duty-on-and-off-highway-engines
Main subject areas of the conference include new diesel, gas, and dual-fuel engines, electrification, and reducing pollution.

Future of Transport 2017. Towards clean, connected and competitive Transport in Europe

6 December 2017, Brussels, Belgium
www.future-transport.eu
The conference will develop the debate around transportation in Europe by focusing on the innovation emerging as a result of technical and digital progress.

10th International AVL Exhaust Gas and Particulate Emissions Forum

20-21 February 2018, Ludwigsburg, Germany
www.avl.com/web/de/-/10th-international-avl-exhaust-gas-and-particulate-emissions-forum
AECC will give a presentation on Real-Driving Emissions from a Gasoline Plug-in Hybrid vehicle with and without a Gasoline Particulate Filter.

11th International Conference on Air Quality – Science and Application

12-16 March 2018, Barcelona, Spain
www.airqualityconference.org
Deadline for abstract: 13 October 2017
The conference brings together participants from the air quality, climate and health research and other stakeholder communities to discuss the latest research advances, new applications and highlight important implications for policy and users.

WCX18: SAE World Congress Experience

10-12 April 2018, Detroit, USA
www.wcx18.org

8th AVL Large Engines TechDays

11-12 April 2018, Graz, Austria
www.avl.com/-/8th-avl-large-engines-techdays

Electrification, New Fuels and Power Sources: Boom or Doom for Large Engines?

39th International Vienna Motor Symposium

27-28 April 2018, Vienna, Austria
https://wiener-motorensymposium.at
Deadline for abstract: 30 September 2017
Outstanding lecturers from all over the world will present the latest findings in engine development and, amongst other topics, will report on new engines, fuel cells, hybrid technology, exhaust gas treatment and real driving emissions (RDE).

SIA Powertrain 2018: the New Compression Engine for Passenger Cars & Commercial Vehicles

16-17 May 2018, Rouen, France
www.sia.fr/evenements/93-sia-powertrain-rouen-2018
The conference will support the automotive community in providing an overall picture of state-of-the-art technologies and by anticipating future development challenges. Reflecting the ongoing focus shift in transportation decarbonisation to a well-to-wheel basis, new topics will be introduced on alternative powertrain energy types (sustainable liquid and gaseous fuels) and fuel cells.
Deadline for abstract: 2 October 2017

37th FISITA World Automotive Congress: Disruptive Technologies for Affordable and Sustainable Mobility

2-5 October 2018, Chennai, India
https://www.fisita-congress.com
Deadline for Abstracts: 30 September 2017

The congress topics include powertrain & emissions, fuels & lubricants, noise & vibration, vehicle dynamics, active and passive safety, electric & hybrid vehicles, autonomous & connected vehicles, manufacturing & materials, vehicle concepts, and sustainability.

2018 Aachen Colloquium Automobile and Engine Technology

8-10 October 2018, Aachen, Germany
www.aachener-kolloquium.de
The congress provides a wide range of technical presentations addressing current challenges of the vehicle and engine industry.

40th International Vienna Motor Symposium

16-17 May 2019, Vienna, Austria
https://wiener-motorensymposium.at