MAY 2019

NEWSLETTER

International Regulatory Developments

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AECC demonstrates Diesel is Future-Proof

On 16 May 2019, AECC's Joachim Demuynck presented results of "Integrated Diesel System Achieving Ultra-Low Urban and Motorway NOx Emissions on the Road" at the 40th Vienna Motor Symposium.

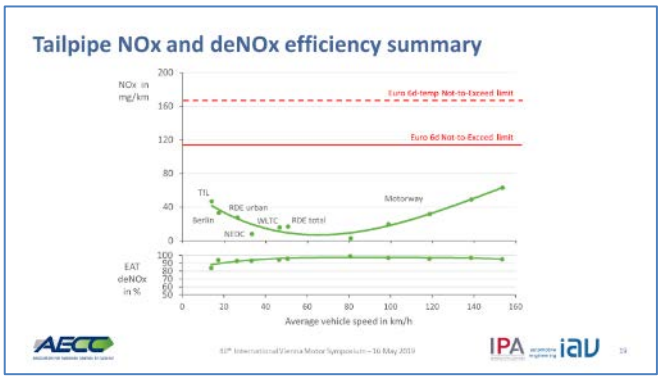
This project demonstrates that it is possible to achieve consistent ultra-low diesel NOx emissions across a wide range of driving conditions using existing technologies. This achievement is a result of a rigorous technical programme co-funded by the International Platinum Group Metals Association (IPA), and undertaken at engineering company IAV in Germany.

Using a Euro 6b 1.5 litre C-segment mild-hybrid diesel car as the base, the organisations adapted the emissions control system by adding catalysts suited for different parts of the duty cycle and different driving conditions. Engine and aftertreatment control was also upgraded to provide improved functionality.

In slow urban driving and at high speeds on the motorway, the smart combination of technologies was shown to consistently bring down NOx to less than half of the Euro 6 limit. In real-driving conditions in cities, an average value of less than 30 mg/km was achieved, demonstrating that diesel car emissions can be low everywhere.

NOx reduction above 95% from engine-out levels was measured, including at speeds up to 160 km/h on German motorways.

In these conditions, all of the catalyst elements – Lean NOx Trap (LNT), close-coupled and underfloor Selective Catalytic Reduction (SCR), and SCR on DPF (Diesel Particulate Filter) – all commercially available, were brought into action. The 48V mild-hybrid system was also used for thermal management, enabling low urban emissions.



At a time when the future of diesel vehicles is being discussed, these results clearly show that it is possible to continue to reduce their emissions to levels also achieved by petrol cars, and that diesels can carry on evolving for many years to come while maintaining their inherent CO_2 advantage.

The paper is at www.aecc.eu/wp-content/uploads/2019/04/190516-AECC-IAV-IPA-Integrated-Diesel-System-achieving-Ultra-Low-NOx-on-the-road-Vienna-Symposium.pdf.

Slides presented in Vienna are at www.aecc.eu/wp-content/uploads/2019/05/190516-AECC-IAV-IPA-presentation-Vienna-final.pdf.

And a fact-sheet is available at www.aecc.eu/wp-content/uploads/2019/05/190516-AECC-Ultra-Clean-Diesel_LEAFLET.pdf.

Diesel Information Hub now available in Italian and Spanish

With the aim to reach out to a broader public across Europe, the AECC-powered Diesel Information Hub is now available also in Italian and in Spanish.

These two additional languages come on top of the English and French versions.

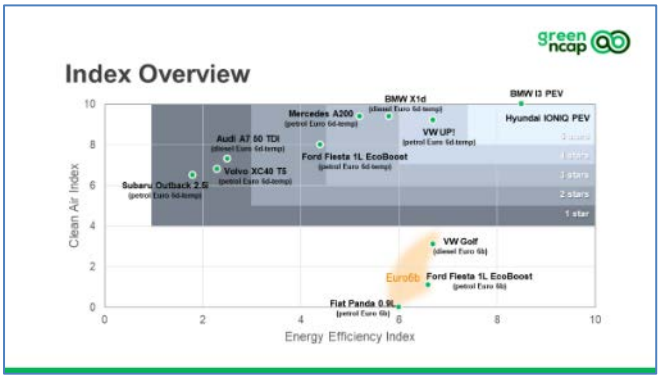
The AECC Diesel Information Hub is aimed at contributing to the public discourse on the future of mobility and urban air quality by providing clear and concise information on the modern diesel engine.

Where do you find Emissions Data for the Car you want to buy?

The AECC's Diesel Information Hub has been complemented with a new article on new sources of information for consumers which tell them how clean new cars are, both for air pollutants and for carbon dioxide (CO_2).

Car buyers are now able to make a more informed decision about their purchases, thanks not only to the greater availability and transparency of official emissions test results but also to independent sources releasing real-world performance and rankings to supplement the official data.

For instance, the Green NCAP, launched in February 2019, is run by the same independent organisation that has provided Euro NCAP vehicle safety information for over 20 years. Its database will become more populated over time, although initially it only contained data for 12 cars. The Green NCAP highlights that modern diesels, complying with the latest Euro 6d-temp standard, have a better Clean Air index than older models and therefore benefit from a higher star ranking overall. In fact, the only non-hybrid or non-electric vehicles that have achieved any stars are those with Euro 6d-temp certification.



The AIR (Allow Independent Road-testing) Index is another ranking scheme produced by an independent organisation, the AIR Alliance, whose members have been testing cars in real-world conditions for several years. The AIR Index rates cars from A (dark green), the best, down to E (red), the worst, based on their on-road urban NOx emissions.

Several other organisations also carry out emissions tests to determine how different vehicles perform in real world conditions. For instance, Emissions Analytics (a founder member of the AIR Alliance) feeds the data into its EQUA Index; ADAC, the German mobility organisation, carries out its own testing which confirms that cars of the most recent Euro 6d-temp standard emit very low levels of pollutants in the real world. ADAC also provides a useful list of cars that are already certified to the latest emission standards.

EUROPE

Commission tables Legislative Proposal for Heavy-Duty Euro VI-E Standard

On 17 May 2019, the European Commission published a draft legislative proposal on a Heavy-duty Euro VI-E standard.

The new Euro VI-E step will be introduced on 1 January 2021 for new types and 1 January 2022 for all new heavy-duty vehicles. There is a two-year delay for Positive Ignition engines, type 1A and 1B dual fuel engines (2023 and 2024 respectively).

A Particle Number (PN) Conformity Factor (CF) is set at 1.63 for type-approval as well as for In-Service Conformity. The CF is to be reviewed on an annual basis.

Also, for all pollutants cold-start emissions are included in the PEMS In-Service Conformity assessment.

The final conformity factor for the test is calculated as: $CF_{final} = 0.14 \times CF_{cold} + 0.86 \times CF_{warm}$, where:

- CF_{cold} is the highest CF according to the moving average window calculation starting from the engine start
- CF_{warm} is the 90th percentile of the CFs according to the moving average window calculation starting from a coolant temperature of 70°C

The EC proposal also aligns requirements for Auxiliary Emissions Strategy with recent light-duty provisions.

The Heavy-duty Euro VI-E proposal is open for public comments until 14 June 2019.

The HD Euro VI-E proposal and public consultation are at https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2019-3257202_en.

New European Parliament elected

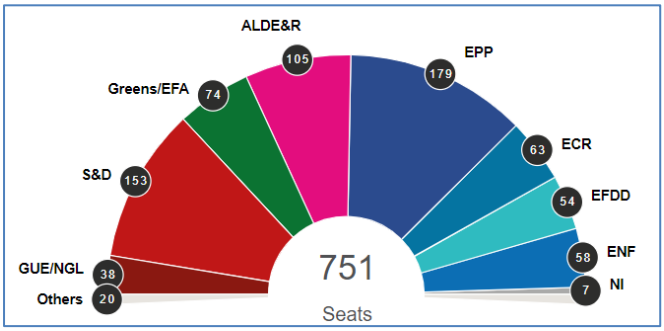
Between 23 and 26 May 2019, European citizens voted in the 28 EU Member States to elect their new representatives in the European Parliament.

This time nearly 51% of EU citizens eligible to vote took part in the elections, the highest turnout in 20 years and

the first time since the first direct elections in 1979 that turnout has increased. Numbers increased in 21 countries, going up more than 10 percentage points in seven of them.

Newly elected MEPs must consider which political group to join or form in the Parliament. The groups include members from various countries who share political affinities. Political groups enjoy certain advantages such as more influence and speaking time, but must meet certain requirements, including consisting of at least 25 MEPs from at least seven Member States.

At the time of printing, final results were available from 22 Member States. There were provisional results for 6 Member States and national estimates for one Member State. This means the provisional results shown below are still subject to change.



The results website (https://election-results.eu) is regularly updated as new data becomes available.

EU heads of state and government met for a summit in Brussels on 28 May 2019 to discuss the election results and start the nomination process for Commission president, as well as the heads of other EU institutions. The Council aims to nominate the new leaders in June 2019.

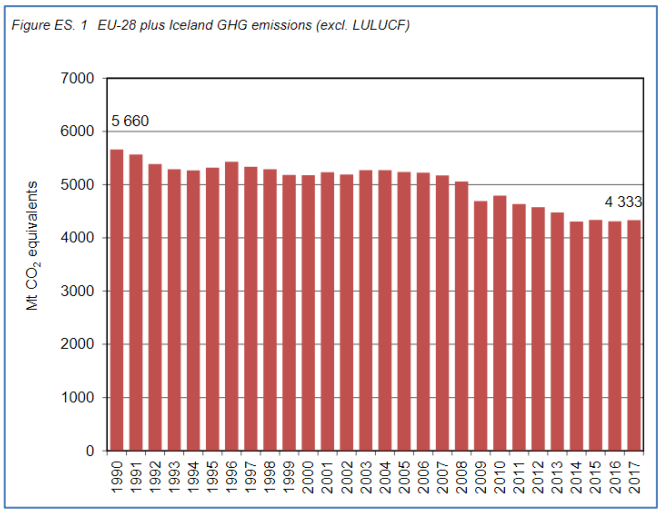
1990-2017 EEA Greenhouse Gas Inventory Report for the EU

On 29 May 2019, the European Environment Agency (EEA) published its "annual EU greenhouse gas (GHG) inventory 1990-2017 and inventory report 2019".

Total GHG emissions (including international aviation) rose by 0.7% in 2017 compared with 2016. These official data confirm the preliminary estimates published by the EEA in October 2018. From 1990 to 2017, the EU reduced its net GHG emissions by 21.7%. The EU is therefore still exceeding its 20% reduction target set for 2020.

The 0.7% increase in EU GHG emissions observed in 2017 resulted from the main following factors:

- Transport emissions continued to grow: for the fourth consecutive year since 2013, CO_2 emissions from road transportation increased, both for freight and passenger vehicles. Most of the increase was accounted for by higher diesel consumption by trucks and vans, but consumption and emissions also increased for passenger cars. Emissions from international aviation increased substantially as a result of higher demand and consumption of jet kerosene.
- Across the EU, several industrial sectors recorded higher emissions in 2017 as a result of higher economic and industrial activity compared to 2016.



These increases were partly offset by improvements in the energy and carbon intensity of the economy, due to:

- Lower fossil-fuel consumption and emissions in the production of heat and electricity in power stations, with lower use of coal and higher use of natural gas and renewables.
- Lower transformation losses and better energy efficiency.

Poland and Spain accounted for the largest increases in GHG emissions in absolute terms in 2017. In Poland, the increase was mainly due to higher emissions from road transportation. In Spain, the bulk of the net increase in emissions was accounted for by higher use of coal for power generation. The largest increases in relative terms in 2017 occurred in Malta, Portugal and Estonia.

The EEA 1990-2017 GHG inventory report is at www.eea.europa.eu/publications/european-union-greenhouse-gas-inventory-2019.

CO_2 Emissions from Energy Use in the EU

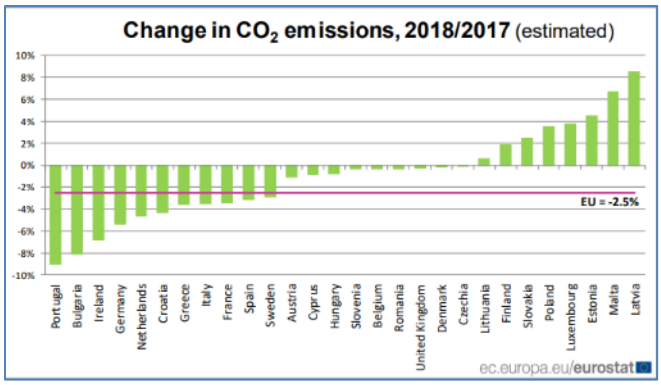
On 8 May 2019, Eurostat published early estimates of carbon dioxide (CO_2) emissions from energy use for 2018.

Eurostat estimates that in 2018 CO_2 emissions from fossil fuel combustion significantly decreased by 2.5% in the EU, compared with the previous year.

CO_2 emissions fell in 2018 in a majority of EU Member States, with the highest decrease being recorded in Portugal (-9.0%), followed by Bulgaria (-8.1%), Ireland (-

6.8%), Germany (-5.4%), the Netherlands (-4.6%) and Croatia (-4.3%).

Increases were registered in eight Member States: Latvia (+8.5%), ahead of Malta (+6.7%), Estonia (+4.5%), Luxembourg (+3.7%), Poland (+3.5%), Slovakia (+2.4%), Finland (+1.9%) and Lithuania (+0.6%).



More info is at https://ec.europa.eu/eurostat/documents/2995521/9779945/8-08052019-AP-EN.pdf/9594d125-9163-446c-b650-b2b00c531d2b.

EEA launches Citizens Science Initiative on Air Quality at School

On 27 May 2019, the European Environment Agency (EEA) and the European Network of the Heads of Environmental Protection Agencies (EPAs) launched a citizen science initiative to monitor air quality around European schools.

The participating schools measure nitrogen dioxide (NO_2) concentrations with reliable, simple, low-cost devices, placing one sampler beside the road in front of the school and one in a less polluted area, such as the school backyard.

Children at participating schools learn about air pollution and its health effects during the project. Parents also get to see how road transport affects air quality, and the project explores whether this knowledge leads parents to shift away from bringing their children to school by car. A short questionnaire will track any changes in awareness and behaviour.

Besides raising awareness on air quality, the initiative explores how data collected by citizens might complement official air quality data.

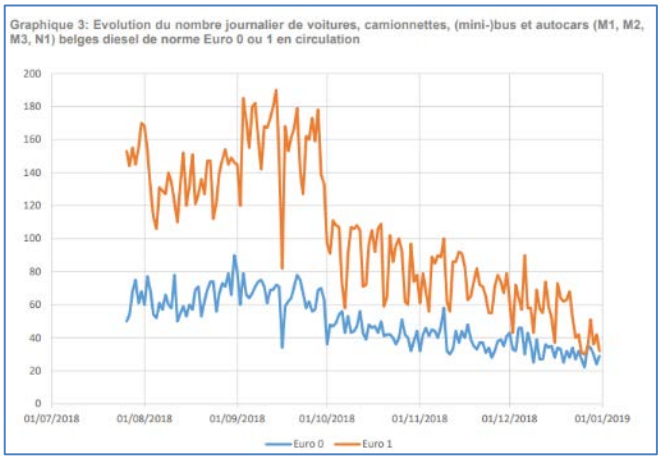
More info is at www.eea.europa.eu/highlights/new-initiative-to-measure-outdoor.

First Assessment of Brussels Low Emission Zone

On 17 May 2019, the Environment Ministry of the Brussels region in Belgium issued its first assessment of the Low Emission Zone (LEZ).

One year after its implementation, the Brussels LEZ is now operational. The interfaces for motorists, the control and sanctioning devices for vehicles in breach have been set up in accordance with the legislation. Equally important are the first communication campaigns and accompanying measures for citizens and businesses that were launched in 2018. However, the issue of foreign vehicle inspection will have to be given special attention in the coming months. New means will have to be deployed for these vehicles to be controlled and sanctioned effectively.

After a year of existence, the LEZ also has the expected effects. The number of older Euro 0 and Euro 1 diesel vehicles in circulation has actually decreased, as evidenced by figures on the composition of the fleet of vehicles in circulation. This reduction is very clear from 1 October 2018, which corresponds to the beginning of the effective application of the sanctions.



This improvement in the composition of the fleet was accompanied by a reduction in emissions of nitrogen oxides (-4.7% NOx) and fine particles (-6.4% $PM_{2.5}$) from Belgian cars in use between June and December 2018, although it is difficult to distinguish the part of the reductions actually attributable to the LEZ, the report admits.

In addition, in 2018, about 140 Euro II diesel buses were still in use by public transport authorities. These buses were replaced by Euro VI diesel hybrid buses at the beginning of 2019 to meet the LEZ access criteria. In addition, 30 electric buses have been progressively introduced. This improvement of the bus fleet also contributes to the improvement of the air quality.

The Brussels LEZ assessment (in French) is at www.lez.brussels/sites/default/files/rapp_2018_lez_fr_final.pdf.

German Prosecutors fine Bosch over Emissions Defeat Software

On 23 May 2019, *Reuters* reported that German prosecutors in Stuttgart had said that Robert Bosch agreed

to pay a €90 million fine for lapses in supervisory duties that enabled automakers to engage in emissions cheating.

Prosecutors imposed a €2 million fine for a "regulatory offence" and a further €88 million to penalise "economic benefits". Bosch has accepted the fine and will not appeal the decision, the prosecutors added.

More info at www.reuters.com/article/us-bosch-emissions-fine/prosecutors-fine-bosch-90-million-euros-for-emissions-cheating-role-idUSKCN1ST10C.

German Prosecutors fine Porsche in Dieselgate

On 7 May 2019, prosecutors in the German city of Stuttgart fined carmaker Porsche €535 million in relation to emissions cheating in diesel vehicles.

The case involves 99 000 Porsche models equipped with Audi engines, built from 2009 and sold worldwide. The fine is broken into two parts, with €4 million levied in punishment for the offence and €531 million calculated as the economic gains the company made while falsely advertising vehicle emissions.

The carmaker confirmed the fine, stating the prosecutor had said management supervision lapses were to blame for the emission cheating, and that the fine was an "important step towards ending the diesel issue."

The prosecutor said Porsche has waived the right to appeal in the case, and that payment directly to the state of Baden-Württemberg is due within six weeks.

More info (in German) at www.staatsanwaltschaft-stuttgart.de/pb/,Lde/Startseite/Presse/Porsche/?LISTPAGE=1235504

UK Committee on Climate Change Report

On 2 May 2019, the UK's Committee on Climate Change published a report, Net Zero: the UK's contribution to stopping global warming.

Amongst other conclusions, it states that 2040 (the date proposed by the government) is too late for the phase-out of petrol and diesel cars and vans, and current plans for delivering this are too vague. It suggests 2035 as the latest date to allow sales of conventional ICE-powered light duty vehicles, but preferably 2030 'if feasible'.

The report states that driving electric vehicles becomes cheaper than driving petrol or diesel equivalents by the mid-2020s in its net-zero scenarios, due to continued reductions in battery costs and lower fuel costs. Analysis suggests annual savings of up to £6 billion (€7 billion) per year in switching away from diesel and petrol cars towards low-carbon transport between 2030 and 2050. This conclusion stands even without existing subsidies when purchasing electric vehicles or the higher tax rates levied on petrol and diesel sales.

To reach net-zero emissions by 2050 it will be necessary for heavy-goods vehicles (HGVs) to move away from combustion of fossil fuels and biofuels to a zero-emissions solution (e.g. hydrogen, battery vehicles). Given the current evidence on lead-times for infrastructure and the time taken to turn over vehicle stocks, the government will need to make decisions regarding how HGVs will be decarbonised in the second half of the 2020s. This will necessitate small-scale trial deployments of hydrogen HGVs in a variety of fleets prior to this, in the UK or elsewhere. As HGVs need to travel internationally, the eventual choice is likely to need to be consistent with equivalent decisions made elsewhere in Europe.

The UK report is available at www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf.

NORTH AMERICA

US EPA Vehicle Engine Compliance Report 2014-2017

On 30 April 2019, the US Environmental Protection Agency (EPA) published a progress report on vehicle and engine compliance activities covering the 2014-2017 model years as well as compliance actions taken in calendar years 2014-2017.

The report data relate to testing, defects, and recalls in calendar years 2014 through 2017, for a variety of sectors encompassing highway and non-road engines and vehicles. These include, for example, light-duty vehicles (i.e., passenger cars and passenger trucks), highway motorcycles, highway heavy-duty engines and trucks such as tractor-trailers and buses, non-road engines such as construction and agricultural equipment, marine craft of all sizes, and locomotives.

The US EPA reminds that air quality has improved overall and decreases in pollutant concentrations measured at air quality monitors indicate that EPA's air pollution control programmes are contributing to improved air quality. There are however remaining hotspots.

During the period covered by the report, the US EPA learned that Volkswagen equipped its model year 2009-2016 diesel passenger vehicles with software that enabled cars to pass emissions tests but exceed pollution standards during normal vehicle operation. The VW defeat device case highlights the need for EPA's active and visible presence in monitoring compliance with emissions standards.

Over calendar years 2014 – 2017, the defect and recall programmes have affected millions of vehicles and engines currently in use. A vehicle or engine may be subject to multiple recalls, and therefore the same vehicle or engine may be included more than once in the "Affected Vehicles" count.

Table ES-1: Recall Reports and Affected Vehicles/Engines by Regulated Sector, 2014 - 2017

Regulated Sector	2014		2015		2016		2017	
	Recalls	Affected Vehicles	Recalls	Affected Vehicles	Recalls	Affected Vehicles	Recalls	Affected Vehicles
Light-Duty Vehicles	44	9,006,273	64	4,191,581	65	5,969,283	86	4,937,955
Highway Motorcycles	0	0	2	1,050	3	23,931	2	8,179
Heavy-Duty Highway Engines	12	149,392	6	338,453	9	755,553	6	41,752
Nonroad Spark Ignition Engines	2	21,502	0	0	3	9,362	3	4,171
Recreational Vehicles	2	20,016	1	244	1	800	5	90,551

The number of defects and recalls reported light-duty vehicles is greater than any other industry sector. Because of the factors that make the light-duty sector unique, defect and recall reporting are critical components of compliance for this sector. Light-duty emission standards are the most stringent of any sector and light-duty vehicles have the most sophisticated and complex emission control systems, including on-board diagnostic (OBD) systems, that are integrated with other computer-controlled systems within a vehicle. Given this greater complexity, there is a greater opportunity for defects to occur. In addition, the light-duty vehicle sector has existing infrastructure, in the form of dealerships, that facilitates conveying information about defects and recalls to consumers, as well as implementing recalls and servicing vehicles. For these reasons, defect and recall reporting are critical light-duty compliance tools.

For other sectors, such as heavy-duty highway engines, non-road spark ignition engines, recreational vehicles, and highway motorcycles, compliance audits conducted in the field play a greater role in how EPA assesses compliance. Between 2014 and 2017, the EPA conducted 91 compliance audits across a variety of regulated sectors in North America, Europe, and Asia. In its audits, EPA found issues such as problematic emissions measurement software, non-compliant calibration and testing practices, missing records, use of test fuel that did not meet specifications, and others.

Of these compliance audits, 16 were Selective Enforcement Audits (SEAs). For SEAs, a pass/fail determination is made at the end of audit, based on the emission test results of the sampled products. In the period from 2014-2017, EPA suspended one SEA that began in 2013 and the manufacturer agreed to recall its products voluntarily. There were no failed audits among the 16 SEAs conducted from 2014-2017; however, there were testing and laboratory issues that manufacturers were required to correct.

The US EPA compliance report is at www.epa.gov/sites/production/files/2019-04/documents/420r19003.pdf.

US EPA's Spring 2019 Regulatory Agenda

On 22 May 2019, the US Environmental Protection Agency (EPA) released its "Spring 2019 Unified Agenda of Regulatory and Deregulatory Actions."

According to the agenda, a Notice of Proposed Rulemaking on new heavy-duty engine low NOx emission standards (Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine Standards) could be issued as early as February 2020.

EPA announced in November 2018 its plan to update standards for NOx emissions from highway heavy-duty trucks and engines in the Cleaner Trucks Initiative.

California Air Resources Board (CARB) action on a lower NOx standard for on-road heavy-duty engines is expected by March 2020.

More info is at www.reginfo.gov/public/do/eAgendaViewRule?pubId=201904&RIN=2060-AU41.

ASIA PACIFIC

China's Clean Diesel Action Plan: 2018-2020

On 29 May 2019, the International Council on Clean Transportation (ICCT) published a summary of China's clean diesel action plan for 2018-2020.

In January 2019, China launched a new action plan to address air pollution by cleaning up diesel-powered on-road vehicles, off-road equipment, and ships. This plan is one part of the larger, three-year National Plan of Blue-Sky Defence, and it places stricter requirements on air pollution-prone areas.

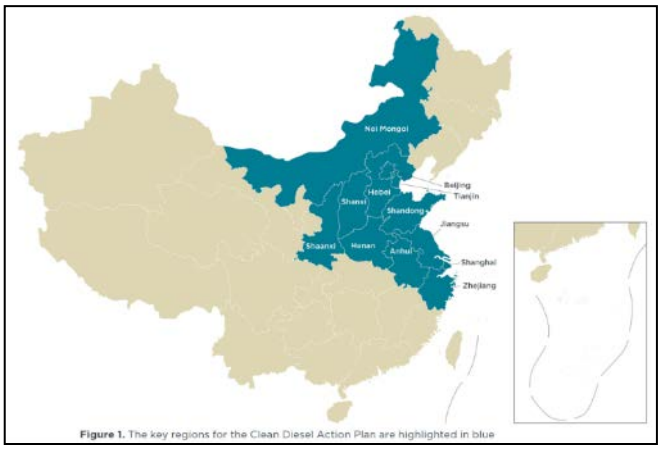


Figure 1. The key regions for the Clean Diesel Action Plan are highlighted in blue

The plan details 18 different actions over four programme areas: clean diesel vehicles, clean diesel engines, clean transportation, and clean diesel fuel; with three overarching targets:

- ensure that 90% of diesel vehicles are in compliance with current emission standards (95% in key regions);
- ensure that 95% of diesel fuel meets 10 ppm sulfur content limit, and that 95% of urea (by volume) is in compliance with current national standards (98% in key regions); and
- increase railroad freight transportation by 30% compared with 2017 level.

The ICCT summary is at www.theicct.org/sites/default/files/publications/ICCT_China_Clean_Clean_Diesel_2018_2020_20190529.pdf.

Shanghai moves to China 6b Emissions Standards in July

On 6 May 2019, Shanghai's municipal government announced that it was moving ahead with China's 6b emissions standards for new gas-powered light vehicles as of 1 July 2019, a year before the national start date.

The China 6b emissions standard is based on Euro 6 standards and the Ultra-Low Emission Vehicle (ULEV) standard used by the California Air Resources Board, but it has more stringent testing requirements and remote emissions monitoring systems.

With the fast increase in the number of vehicles on the road in major Chinese cities in recent years – from around 62 million in 2009 to more than 320 million in 2018 – vehicles have become one of the major sources of urban air pollution.

The stricter standard will reduce emissions by 50% compared to the current China 5 standard that is still applicable in most areas, according to government statements.

Shanghai joins other cities (Beijing, Tianjin, Hangzhou, Guangzhou, and Chengdu) and the provinces of Shandong, Hainan, Hebei, and Shaanxi in announcing earlier adoption of the China 6b standard, most either on 1 July 2019, or 1 January 2020. In Beijing, new light-duty passenger vehicles will need to meet the China 6b requirements by 1 January 2020. Guangzhou, the capital of Guangdong province, was the first to adopt the China 6b standard, starting on 1 March 2019.

AFRICA

Kenya to expand Vehicle Emissions Testing Programme

On 16 May 2019, Martin Eshiwani, director of road and railway transport in the Kenyan Ministry of Transport, Infrastructure, Housing and Urban Development told China's news agency, *Xinhua*, in Nairobi that input from all relevant stakeholders will be sought in order to develop inclusive vehicle emission regulations.

"The new regulatory framework should be in place early next year and will help improve air quality in the country by allowing government to outsource vehicle emission tests to the private sector," Eshiwani said during a public forum on the traffic challenge in the city of Nairobi. Eshiwani noted that Kenya is keen to reduce air pollution from motor vehicles because they play a role in accelerating climate change. He added that the Traffic Act requires all motor vehicles above the age of four to be subjected to an annual roadworthiness test including a vehicle emission test.

"Those cars that fail the emission test are not permitted on the roads," he added. The Ministry of Transport official said that there are currently only 17 government vehicle inspection centres, which are not sufficient to inspect all vehicles on the road. "The proposed regulations will expand the number of vehicle inspection centres and help ensure that all cars on the road are clean," Eshiwani added. He revealed that transport sector emissions are set to expand due to the projected increase in the number of cars on the road.

UNITED NATIONS

UNECE New Recommendation on Adequate Fuel Quality

On 24 May 2019, the World Forum for Harmonization of Vehicle Regulations' Working Party on Energy and Pollution (GRPE) of the United Nations' Economic Commission for Europe (UNECE) endorsed an amendment to the Consolidated Resolution on the Construction of Vehicles (R.E.3) on the recommended market fuel quality.

In line with emissions requirements for Euro 5 and Euro 6 standards, sulfur levels must remain below 10 ppm for both gasoline and diesel fuels.

On-road vehicles

Recommended levels of sulphur in Euro emission standards

Euro standard	*Recommended sulphur level (ppm)*
Euro 2	<500
Euro 3	<350 and <150
Euro 4	<50
Euro 5	<10
Euro 6	<10

Reducing sulfur to minimum levels will not only ensure optimal and reliable operation of emission control systems, it will also improve air quality, benefitting the environment and human health. All countries willing to adopt more stringent vehicle emissions limits in line with applicable UN vehicle regulations, should therefore first upgrade their fuel

quality standards according to the UNECE recommendation, which applies to cars and trucks.

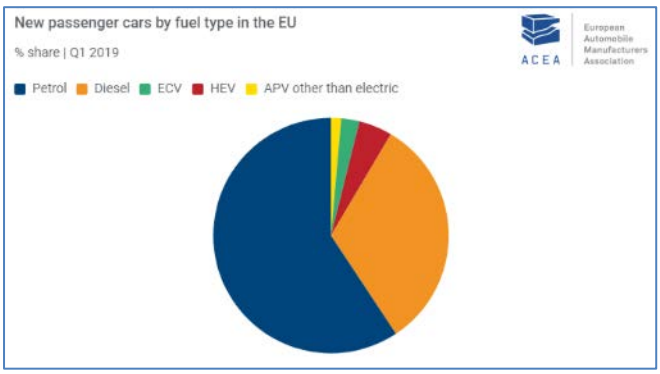
More info is at www.unece.org/info/media/presscurrent-press-h/transport/2019/ueces-new-recommendation-on-fuel-quality-will-help-countries-to-reduce-air-pollution/doc.html.

GENERAL

Fuel Types of New Cars Registered in the EU

On 8 May 2019, the European Automobile Manufacturers' Association (ACEA) published, by fuel type, the new passenger cars registration figures in the EU during the first quarter of 2019.

In the first quarter of 2019, nearly 60% of all new passenger cars registered across the EU ran on petrol, while fewer than one third were fuelled by diesel. All alternatively-powered cars combined accounted for 8.5% of the EU market, with electrically chargeable vehicles (ECV) accounting for 2.5% of all cars sold in the region during the first quarter of this year.



With the exception of Germany, demand for petrol cars increased in the five largest EU car markets, with Italy posting the highest percentage gain (+21.6%). As a result, petrol's market share increased from 55.5% to 59.3% in the first quarter of 2019. On the other hand, diesel car registrations contracted in most EU member states except Germany, Estonia, Latvia and Lithuania. The share of diesel cars in the market fell by almost six points compared to the same quarter one year ago, now accounting for 32.2% of the market.

In the first quarter of 2019, demand for alternatively powered cars in the EU increased by 25.9%. Growth was driven by the electrically chargeable vehicle segment, up 40.0% with 99 174 units registered. Within this segment, battery electric vehicle (BEV) sales grew substantially (+84.4%), while registrations of plug-in hybrids remained practically flat.

Hybrid electric vehicles (HEV) also performed well (+33.3%), totalling 184 808 units sold during the first three months of the year.

By contrast, registrations of LPG and NGV cars declined by 7.2% in the first quarter, mainly due to a sharp drop in demand for natural gas vehicles (NGV).

Alternatively powered vehicle registrations significantly increased in all major EU markets. Demand for APV saw the highest percentage gains in Germany (+62.9%) – mainly due to a doubling of sales in the hybrid segment – as well as in Spain (+48.9%).

More info is at www.acea.be/press-releases/article/fuel-types-of-new-cars-diesel-17.9-petrol-3.3-electric-40.0-in-first-quarte.

T&E Report on Diesel Recalls across EU Member States

On 29 May 2019, NGO Transport & Environment (T&E) published a report analysing data on diesel car recalls.

According to T&E, progress on recalls of manipulated diesel cars is stalling in the EU. Even the cheapest and least effective form of diesel fixes – software updates – are making very slow progress in the EU and would take another two years to be completed at the current pace. They also cover only 10 out of 43 million grossly polluting diesels cars and vans on Europe's roads, leaving the vast majority of dirty diesels unaddressed.

Progress is not only slow but also very unequal across Member States and manufacturers, with consumers from Central and Eastern Europe, in particular, being left behind: there only 55% of Volkswagen Group's cars are updated compared to 83% in the West. Recall rates are particularly low for Opel Cascada and Zafira (12%) as well as for Audi's A6 (30%).

For T&E, this failure to effectively tackle the Dieselgate legacy is due to a design flaw of the Single Market: whereas cars can be sold freely across the EU once they have been type-approved in only one Member State, there is currently no European system for car recalls. New, improved rules will only apply as of September 2020 and will only cover new cars approved after this date. In the meantime, Europe is left with a fleet of polluting diesel cars. Solutions are immediately available as the recent EU 'Roadmap towards clean vehicles' shows. Car makers must accelerate updates and use or develop hardware retrofits. Governments must order mandatory recalls across the whole EU, especially in cases where a national authority has already issued such a measure. Unfixed cars should not be allowed to be exported unless there is proof of an effective fix. And in parallel, the EU should expand its testing capacities. Finally, T&E calls on the European Commission to reform without delay, provisions for periodical technical inspection (PTI) and roadworthiness testing, e.g. to enable better tools to detect future manipulations (e.g. via remote sensing), as proposed in the EU roadmap.

The T&E report is at www.transportenvironment.org/sites/te/files/publications/2019_05_Analysis_Diesel%20recalls_have_stalled_final.pdf.

ICCT Report on Emissions of a GDI and Post-Euro 6 Recommendations

On 7 May 2019, the International Council on Clean Transportation (ICCT) published a study of regulated and unregulated emissions from a Euro 6c Gasoline Direct Injection (GDI) Golf tested in the lab and on the road.

The vehicle, a 2018 Volkswagen Golf TSI not fitted with a Gasoline Particulate Filter (GPF), exhibited good emissions performance for regulated pollutants and was below Euro 6 standards, with the exception of the cold ambient test at -7°C. At these low temperature tests, the Euro 6 limits were exceeded for hydrocarbons (HC) and particulate number (PN).

Figure 4. Tailpipe emission factors over the tested cycles for the regulated pollutants
Notes: The average (bars) and minimum/maximum (error bars) are shown. Only one valid test was run for results without error bar.

There were a substantial number of particles in the unregulated size range, from 10 to 23 nm. If solid particles in this sub-23 nm range had been accounted for, the total emissions of solid PN would have been up to 114% higher. Accounting for volatile particles would further increase PN emissions by up to 78%.

Ammonia emissions are comparable to the emissions of nitrogen oxides (NOx). Ammonia emissions are becoming a significant source of reactive nitrogen compound in gasoline exhaust. Ammonia emissions amounted to half the mass NOx emissions and were 10% higher than the molar NOx emissions.

Methane and nitrous oxide were found in non-negligible amounts in the exhaust gas. Their combined effect accounted for up to 0.75% of the vehicle's greenhouse gas (GHG) footprint when using the 20-year global warming potential factors.

Formaldehyde was found in non-negligible amounts in the exhaust gas. Formaldehyde emissions were constrained to the cold-start test and were mostly emitted within the first minute of operation.

According to the ICCT, these results point to the following policy recommendations for post-Euro 6 standards:

- Extend the low temperature test at -7°C to include all regulated pollutants, in particular PN.
- Reduce the size threshold for solid particle counting from 23 nm to 10 nm and consider the inclusion of volatile particles in the measurement methodology.
- Introduce technology- and application-neutral limits for vehicular ammonia emissions.
- Establish technology- and application-neutral limits for methane and nitrous oxide emissions, or account for their CO_2-equivalent emissions in the CO_2 standards.
- Introduce technology- and application-neutral limits for vehicular formaldehyde emissions. These are already regulated in the US.

The ICCT report on GDI car emissions is at www.theicct.org/publications/beyond-nox-emissions-unregulated-pollutants.

ICCT Report comparing CO_2 Emissions of Diesel and Gasoline Cars

On 7 May 2019, the International Council on Clean Transportation (ICCT) published a report in which the CO_2 emissions levels of two versions of the Volkswagen Golf, one diesel and one gasoline, were compared both in laboratory tests and in on-road measurements under real-world driving conditions.

The vehicles selected were a 2016 Euro 6b 2.0l TDI Blue Motion technology 110 kW diesel and a 2018 Euro 6c 1.5l TSI ACT Blue Motion 96 kW gasoline.

For all tests performed under laboratory conditions, the gasoline-powered Golf TSI showed lower CO_2 emissions than the diesel-powered Golf TDI. This also was observed for tests at lower ambient temperatures, where the CO_2 emissions were higher for both vehicles. The CO_2 emission benefit of the Golf TSI also prevailed for warm-start tests. A comparison of cold-start tests with tests started with a warm engine showed that the gasoline engine warms up considerably faster than the diesel engine. However, the gasoline engine performs a fuel intensive, rapid catalyst heat-up at the beginning of a cold-start test, which partly counteracts the CO_2 benefit of an engine that warms up more quickly. Even though lower CO_2 emissions were measured for the Golf TSI during the real-world driving on public roads as well, the subsequent analysis of the driving dynamicity and ambient temperature effect on the test

results suggests that both vehicles, when driven in the same manner under the same ambient conditions, have similar real-world CO_2 emissions, with a slight benefit for the Golf TSI. These findings also are supported by the CO_2 emission values reported by consumers on the independent German website Spritmonitor, which are on average lower for the Golf TSI than for the Golf TDI.

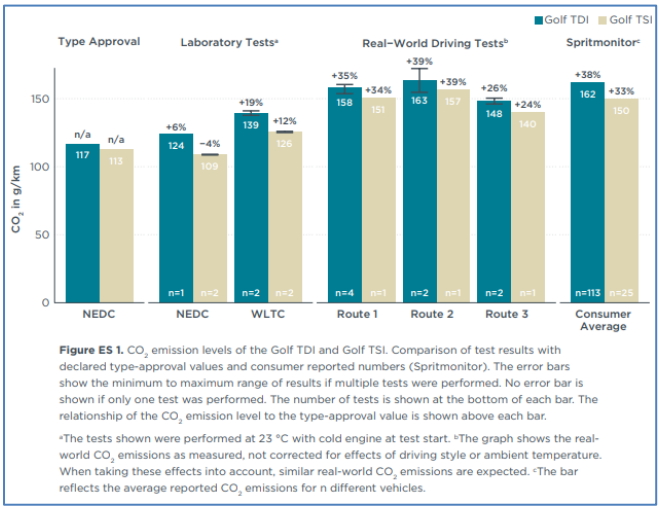


Figure ES 1. CO_2 emission levels of the Golf TDI and Golf TSI. Comparison of test results with declared type-approval values and consumer reported numbers (Spritmonitor). The error bars show the minimum to maximum range of results if multiple tests were performed. No error bar is shown if only one test was performed. The number of tests is shown at the bottom of each bar. The relationship of the CO_2 emission level to the type-approval value is shown above each bar.

[a]The tests shown were performed at 23 °C with cold engine at test start. [b]The graph shows the real-world CO_2 emissions as measured, not corrected for effects of driving style or ambient temperature. When taking these effects into account, similar real-world CO_2 emissions are expected. [c]The bar reflects the average reported CO_2 emissions for n different vehicles.

The ICCT report on gasoline vs. diesel CO_2 is at www.theicct.org/sites/default/files/publications/Gas_v_Diesel_CO2_emissions_FV_20190503_1.pdf.

Report on GHG Emissions from Energy and Transport Sectors

In May 2019, the Environmental Resources Management (ERM) published a new report titled "Comparing value chain GHG emissions in the power and transport sectors for selected technologies".

The European Commission has recently published the EU Long-term Vision for a Climate Neutral Economy in which the EU aims to achieve net-zero greenhouse gas (GHG) emissions by 2050, in line with the requirements of the Paris Agreement. It also aligns with the need for global emissions to be significantly curbed and, more broadly, for our economies to substantially decarbonise. As a result, changes are required in all main sectors that make up the EU emissions: power generation, industry, transport, buildings, construction, and agriculture. This study focuses on the contribution (and the potential for reduction) from the power generation and transport sectors. An innovative methodology was developed by coupling life-cycle tools with energy transition scenarios by 2030 and 2050.

The transport sector analysis compares GHG emissions per kilometre emitted by an electric vehicle vs. a methane (compressed and liquefied natural gas) vehicle, a diesel vehicle, a petrol vehicle, and a plug-in hybrid vehicle, and uses the outcome of the power sector analysis for the inputs related to power generation in 2015, 2030 and 2050.

In particular, a hybrid methodology derived from the approach developed by the EU Joint Research Centre (JRC), combining a well-to-wheel boundary and a life cycle analysis, is used to estimate the GHG emissions emitted by a vehicle per kilometre.

Main assumptions considered for the transport analysis include the following:

- An electric vehicle efficiency increase of 24% to 2030, and 34% to 2050 (with respect to baseline);
- An internal combustion engine vehicle efficiency increase of 20% to 2030, and 25% to 2050 (with respect to baseline);
- A biofuels content of 10% ethanol in petrol and 7% biodiesel in diesel;
- A biomethane content of 10% in compressed natural gas in 2030 and 2050; and
- A vehicle lifetime of 160 000 km, except for diesel vehicles (208 000 km).

The transport analysis for C segment vehicles shows that, both under worldwide-harmonized light vehicle test procedure (WLTP) conditions and in real driving ones, electric vehicles already outperform internal combustion vehicles in all the geographies considered (Italy, Germany, France, Spain and Romania). Electricity has lower final GHG emissions compared to fossil fuels. Electric vehicles benefit also from a higher tank-to-wheel efficiency in balanced electricity systems compared to internal combustion vehicles. As of today, an electric vehicle generates on average well-to-wheel + lifecycle GHG emissions of around 30-40% less than internal combustion vehicles. Analogue results are found when comparing also A and B vehicle segments.

The projected evolution up to 2050 shows that the overall emissions per kilometre from electric vehicles are expected to significantly decrease in all the scenarios considered, mainly due to a less carbon-intensive electricity supply. In particular, at the EU28 level, the projected emissions in 2050 from electric vehicles are expected to be less than half of those calculated in 2015. In 2030 electric vehicles outperform combustion vehicles by 40-50%, in 2050 by 60-70% under the WLTP test conditions. The benefit of an electric vehicle is higher if real driving conditions are considered. If only energy related emissions are considered, the gap between electric vehicles and internal combustion vehicles becomes further enlarged.

The study shows that if an 8- or 15-year lifetime of electric vehicles is considered, the energy related CO_2 emissions (WTW) further decrease by 9% and 18% respectively, thanks to an ever-increasing penetration of renewable energy sources in Europe. If instead a 2030 European EV is considered, its emissions will decrease on average by 11% (in an 8-year lifetime) and by 22% (in a 15-year lifetime).

The ERM study is at https://erm.com/globalassets/documents/publications/2019/erm-report-ghg-emissions-in-the-power-and-transport-sectors.pdf.

RESEARCH SUMMARY

Effects of Emissions and Pollution

Particle Depletion Does Not Remediate Acute Effects of Traffic-Related Air Pollution and Allergen: A Randomized, Double-Blinded Crossover Study, Denise Wooding, et al.; *American Journal of Respiratory and Critical Care Medicine* (in press), doi: 10.1164/rccm.201809-1657OC.

How do particle number, surface area, and mass correlate with toxicity of diesel particle emissions as measured in chemical and cellular assays? Jian Xue, et al.; *Chemosphere* (August 2019), Vol. 229, pp. 559-569, doi: 10.1016/j.chemosphere.2019.05.010.

Associations of long-term exposure to ambient PM_1 with hypertension and blood pressure in rural Chinese population: The Henan rural cohort study, Na Li, et al.; *Environment International* (July 2019), Vol. 128, pp. 95-102, doi: 10.1016/j.envint.2019.04.037.

Short-term exposure to traffic-related air pollution reveals a compound-specific circulating miRNA profile indicating multiple disease risks, Julian Krauskopf, et al; *Environment International* (July 2019), Vol. 128, pp. 193-200, doi: 10.1016/j.envint.2019.04.063.

Effects of maternal exposure to ambient air pollution on newborn telomere length, Lulu Song, et al.; *Environment International* (July 2019), Vol. 128, pp. 254-260, doi: 10.1016/j.envint.2019.04.064.

Air Quality, Sources and Exposure

Assessing Exposure to Outdoor Air Pollution for Epidemiological Studies: Model-based and Personal Sampling Strategies, Cole Brokamp, et al.; *Journal of Allergy and Clinical Immunology* (in press), doi: 10.1016/j.jaci.2019.04.019.

Measurement-based assessment of the regional contribution and drivers of reduction in annual and daily fine particulate matter impact metrics in Paris, France (2009-2018), Christopher Malleya and Elsa Lefèvre; *Atmospheric Environment* (15 August 2019), Vol. 211, pp. 38-54, doi: 10.1016/j.atmosenv.2019.04.061.

Air pollution prediction with clustering-based ensemble of evolving spiking neural networks and a case study on London area, Piotr Maciąg, et al.; *Environmental Modelling & Software* (August 2019), Vol. 118, pp. 262-280, doi: 10.1016/j.envsoft.2019.04.012.

Community Outdoor Air Quality: Sources, Exposure Agents and Health Outcomes, D. Shendell; *Reference Module in Earth Systems and Environmental Sciences* (2019), doi: 10.1016/B978-0-12-409548-9.11824-X.

Aggravating O_3 pollution due to NOx emission control in eastern China, Nan Wang, et al.; *Science of The Total Environment* (August 2019), Vol. 677, pp. 732-744, doi: 10.1016/j.scitotenv.2019.04.388.

Emissions Measurements and Modelling

Emission Factors Derived from 13 Euro 6b Light-Duty Vehicles Based on Laboratory and On-Road Measurements, Victor Valverde, et al.; *Atmosphere* (2019), Vol. 10 (5), 243, doi: 10.3390/atmos10050243.

Development and emissions performance analysis of local driving cycle for small-sized passenger cars in Nanjing, China, Yang Yang, et al.; *Atmospheric Pollution Research* (in press), doi: 10.1016/j.apr.2019.04.009.

VOCs emission characteristics in motorcycle exhaust with different emission control devices, Narayan Dhital, et al.; *Atmospheric Pollution Research* (in press), doi: 10.1016/j.apr.2019.04.007.

Strong Temperature Dependence for Light-Duty Diesel Vehicle NOx Emissions, Stuart K. Grange, et al.; *Environ. Sci. Technol.* (in press), doi: 10.1021/acs.est.9b01024.

Impacts of gasoline aromatic and ethanol levels on the emissions from GDI vehicles: Part 1. Influence on regulated and gaseous toxic pollutants, Jiacheng Yang, et al.; *Fuel* (in press), doi: 10.1016/j.fuel.2019.04.143.

Impacts of gasoline aromatic and ethanol levels on the emissions from GDI vehicles: Part 2. Influence on particulate matter, black carbon, and nanoparticle emissions, Jiacheng Yang, et al.; *Fuel* (in press), doi: 10.1016/j.fuel.2019.04.144.

Emissions Control, Catalysis, Filtration

Aftertreatment Protocols for Catalyst Characterization and Performance Evaluation: Low-Temperature Oxidation, Storage, Three-Way, and NH_3-SCR Catalyst Test Protocols, Kenneth Rappé, et al.; *Emiss. Control Sci. Technol.* (2019), Vol. 5: 183, doi: 10.1007/s40825-019-00120-7.

Effect of Reductants on the NOx Storage Performance of a Pd/CZO Low Temperature NOx Adsorber, J. Theis and C. Lambert, *Emiss. Control Sci. Technol.* (in press), doi: 10.1007/s40825-019-00121-6.

A reduced PM index for evaluating the effect of fuel properties on the particulate matter emissions from gasoline vehicles, Taoyang Wu, et al.; *Fuel* (October 2019), Vol. 253, pp. 691-702, doi: 10.1016/j.fuel.2019.05.059.

Transport, Climate Change & Emissions

What fuels the adoption of alternative fuels? Examining preferences of German car drivers for fuel innovations, Anika Linzenich, et al.; *Applied Energy* (September 2019), Vol. 249, pp. 222-236, doi: 10.1016/j.apenergy.2019.04.041.

Fuel economy analysis under a WLTP cycle on a mid-size vehicle equipped with a thermoelectric energy recovery system, E. Massaguer, et al.; *Energy* (15 July 2019), Vol. 179, pp. 306-314, doi: 10.1016/j.energy.2019.05.004.

Life cycle environmental impacts of natural gas drivetrains used in road freighting, Jasmin Cooper and Paul Balcombe; *Procedia CIRP* (2019), Vol. 80, pp. 334-339, doi: 10.1016/j.procir.2019.01.070.

Cars and kids: Childhood perceptions of electric vehicles and sustainable transport in Denmark and the Netherlands, Benjamin Sovacool, et al.; *Technological Forecasting and Social Change* (July 2019), Vol. 144, pp. 182-192, doi: 10.1016/j.techfore.2019.04.006.

How do road grade, road type and driving aggressiveness impact vehicle fuel consumption? Assessing potential fuel savings in Lisbon, Portugal, Marta Faria, et al.; *Transportation Research Part D: Transport and Environment* (July 2019), Vol. 72, pp. 148-161, doi: 10.1016/j.trd.2019.04.016.

FORTHCOMING CONFERENCES

SIA Paris 2019 Power Train & Electronics

12-13 June 2019, Port-Marly, France
www.sia.fr/evenements/136-sia-power-train-electronics-2019
To support the automotive industry in the transition towards ever more environmentally friendly mobility, a new automotive event in France named SIA power train & Electronics broadens the scope of the Powertrain Conference to include electric traction technologies, along with internal combustion engines (ICE), low carbon fuels, and transmissions.

8th International Congress on Combustion Engines

17-18 June 2019, Krakow, Poland
www.congress.ptnss.pl
The main topics of the congress include fuel injection systems and mixture formation; combustion processes control in SI and CI engines; engine thermal loading and utilization of heat released; alternative fuels; emission measurements and aftertreatment; alternative sources of power; engine testing, durability, reliability and diagnostics; modelling and optimization of engine processes; and global trends in engine technology.

ETH Conference on Combustion Generated Nanoparticles

18-20 June 2019, Zurich, Switzerland
www.nanoparticles.ch
The conference serves as an interdisciplinary platform for expert discussions on all aspects of nanoparticles, freshly emitted from various sources, aged in ambient air, technical mitigation aspects, impact of particles on health, environment and climate and particle legislation.

Integer Emissions Summit & AdBlue® Forum Europe

25-27 June 2019, Munich, Germany
www.integer-research.com/conferences/ies-europe-2019

AECC will give a presentation on "Low NOx emissions with modern diesel cars" and will chair a session on "future technology choices"

India & ASEAN Diesel Powertrain Summit

26-28 June 2019, Chennai, India
www.fiveoit.com/iadp
India & ASEAN Diesel Powertrain Summit 2019 is dedicated to providing the next 5-10 years of policy direction and supporting technological innovations as well as exploiting the market opportunities in India and ASEAN countries.

Combustion Aerosol Conference & Cambridge Particle Meeting 2019

26-28 June 2019, Cambridge, UK
https://aerosol-soc.com/events/combustion-conference-2019
The conference focuses on the fundamentals of particle formation, combustors and engine technology, emissions and emissions measurements and regulation and regulated emissions.

15th International CTI Conference SCR Systems

1-2 July 2019, Stuttgart, Germany
http://cti.euroforum.de/en/events/scr_systems_2019
The conference topics include low temperature SCR, innovative vanadium-based catalysts, news of SCR on filter, thermal management of exhaust gas aftertreatment, future powertrain concepts, and RDE- compliant exhaust systems.

5th International FEV Conference Diesel Powertrain 3.0

2-3 July 2019, Rouen, France
www.fev.com/coming-up/fev-conferences/fev-conference-diesel-powertrains-30/introduction.html
The conference will highlight that the modern Diesel engine still represents a favourable platform for a highly-valuable future propulsion system unit even under changing regulatory boundary conditions and an altering market environment.
AECC will give a keynote presentation on "Consistent low NOx emissions on the road: Reality with modern Diesel vehicles"

Low Carbon Vehicle Partnership's 2019 Annual Conference

8 July 2019, London, UK
www.lowcvp.org.uk/events/conference/2019.htm
The LowCVP's 2019 Annual Conference will focus on the low carbon fuels agenda; acknowledging the momentum behind moves to 'electrify everything', while analysing which other fuel types can support the drive to cut emissions in the short, medium and long-term as well as which policy interventions are required to support them. The event will feature discussions around sustainable biofuels, hydrogen and new generation, low emission fuels.

SAE Powertrains, Fuels and Lubricants

26-29 August 2019, Kyoto, Japan
www.pfl2019.jp

ACEA Summit 2019: 'Leading the mobility transformation: The future of the EU auto industry'

4 September 2019, Brussels, Belgium
www.acea.be/events/event/leading-the-mobility-transformation-the-future-of-the-eu-auto-industry

14th International Conference on Engines & Vehicles

15-19 September 2019, Capri, Italy
www.sae-na.it
Topics of the conference include engine modelling and diagnostics; engine combustion; new engines, components, actuators and sensors; hybrid and electric powertrains and eco-CAV; fuels and lubricants; and exhaust aftertreatment and emissions.
AECC and IAV will present a joint paper on "Diesel Vehicle with ultra-low NOx emissions on the road"

IAQM Routes to Clean Air

16-17 September 2019, London, UK
https://iaqm.co.uk/event/rtca19/
The Institute of Air Quality Management (IAQM) presents Routes to Clean Air 2019, where air quality, public health and transport professionals share their experiences of improving traffic emissions. Speakers will discuss a range of topical issues offering their insight into the steps required to improve air quality, including best practice examples and practical challenges faced during implementation.

3rd Annual Real Driving Emissions Forum

24-25 September 2019, Berlin, Germany
www.rde-realdrivingemissions.com
The Forum will showcase the forefront practices and approaches towards RDE and Energy Consumption reduction, compliance with recent update of the legislation on RDE, main automotive technology trends based on cost-and-energy-efficient solutions.

28th Aachen Colloquium Automobile and Engine Technology

7-9 October 2019, Aachen, Germany
www.aachener-kolloquium.de
The congress provides a wide range of technical presentations addressing current challenges of the vehicle and engine industry.
AECC and IAV will present a joint paper on "Contribution of light-duty diesel mild-Hybrid electric Vehicle and novel exhaust aftertreatment systems in the context of future post Euro 6 RDE and CO_2 requirements"

European Transport Conference

9-11 October 2019, Dublin, Ireland
www.aetransport.org
The conference attracts transport practitioners and researchers from all over Europe where they can find in-depth presentations on policy issues, best practice and research findings across the broad spectrum of transport.

13th Conference on Gaseous Fuel Powered Vehicles

22-23 October 2019, Stuttgart, Germany
https://fkfs-veranstaltungen.de/3/conference-on-gaseous-fuel-powered-vehicles

3rd International FEV Conference Zero CO_2 Mobility

7-8 November 2019, Aachen, Germany
www.fev.com/coming-up/fev-conferences/fev-conference-zero-co2-mobility/introduction.html

Integer Emissions Summit USA

12-13 November 2019, Indianapolis, USA
www.integer-research.com/conferences/ies-usa-2019/

12th International ECMA Conference & Exhibition 2019 on Cleaner IC Engines for Sustainable Environment with Innovative Emission Control Technologies

14-15 November 2019, Pune, India
Info will be at www.ecmaindia.in
The ECT 2019 conference will address implementation of Bharat Stage VI emission norms and will look beyond, to forthcoming regulations such as RDE and World Harmonized Test procedures which will ensure that vehicles that come on the road in future are emissions-compliant in the true sense.

9th China International Diesel Engine Summit 2019

21-22 November 2019, Beijing China
www.borscon.com/2019de9/cn/index.html
The 9th China International Diesel Engine Summit will provide an opportunity to discuss China' s energy-saving and emission-reduction policies and regulations for diesel engine, the latest technology progresses and future trends of new energy and alternative fuels, as well as innovative ideas in business modes.

POLIS Annual Conference

27-28 November 2019, Brussels, Belgium
www.polisnetwork.eu/2019conference
Europe's leading event on sustainable urban mobility in cities and regions

EU Clean Air Forum

28-29 November 2019, Bratislava, Slovakia
https://ec.europa.eu/info/events/eu-clean-air-forum-2019-nov-28_en
The European Commission is organizing the 2nd Clean Air Forum in close collaboration with the Ministry of Environment of the Slovak Republic. It will focus on three themes: air quality and energy; air quality and agriculture; and clean air funding mechanisms.

Internal Combustion Engines and Powertrain Systems for Future Transport

11-12 December 2019, West Midlands, UK

http://events.imeche.org/ViewEvent?code=CON6849

The 2019 conference will provide a forum for IC engine, fuels and powertrain experts to look closely at developments in powertrain technology required to meet the demands of the low carbon economy

SAE World Congress Experience (WCX)

21-23 April 2020, Detroit, USA
www.sae.org/attend/wcx

TRA2020

27-30 April 2020, Helsinki, Finland
https://traconference.eu/
TRA, The Transport Research Arena is the biggest European Research and Technology Conference on transport and mobility. In 2020 TRA is themed "Rethinking transport - towards clean and inclusive mobility" and brings together the experts from around the world to discuss the newest innovations and the future of mobility and transport.

SAE Powertrains, Fuels and Lubricants

22-24 September 2020, Krakow, Poland
www.sae.org/pfl

Call for abstracts opens in August 2019
Deadline for abstract: 18 February 2020

SAE Heavy-Duty Diesel Emissions Control Symposium

13-14 October 2020, Gothenburg, Sweden