



# Newsletter

September - October 2015

## INTERNATIONAL REGULATORY DEVELOPMENTS

### Table of Contents

<b>EUROPE</b>	<b>2</b>
European Union agrees on Real Driving Emission Performance Requirement	2
VW recalls 8.5 Million Diesel Cars to fix Emissions Defeat Device	2
Parliament Resolution on Vehicle's Emission Measurements	3
Council and Parliament discussions on Real Driving Emissions	3
Parliament adopts Report on "Pot-Pourri" Proposal	4
Parliament Report on Non-Road Stage V Emissions Standard	4
Directive on Medium Combustion Plants' Emissions adopted in Parliament	5
New National Emission Ceilings approved by Parliament	5
Parliament Resolution on Implementation of White Paper on Transport	5
Public Consultation to evaluate Car Labelling Directive	6
GEAR 2030 High-Level Group on Automotive Industry	6
EEA Report on Greenhouse Gas Trends and Projections	6
Horizon 2020 Draft Work Programme 2016-17	6
Member States launch Test Campaigns to check Passenger Cars Emissions Control	7
French Action Plan on Air Quality	7
UK Report on In-Service Emissions Performance of Euro 6/VI Vehicles	8
Emissions Inventory Report for 1990-2013 in the UK	8
UK Air Quality Consultation	8
Stage IIIA Standards enter Force for Construction Equipment in London	8
UK Clean Bus Technology Fund 2015	9
Report on WLTP Impact on CO <sub>2</sub> Emissions from UK Cars	9
Madrid adopts Protocol to tackle Air Pollution Episodes	9
Danish Report on Air Quality Benefits related to Low Sulfur Marine Fuel	10
Norwegian Report on On-Road Emissions of Euro 6/VI Vehicles	10
Oslo to ban Private Cars from City Centre	10
<b>NORTH AMERICA</b>	<b>10</b>
ARB introduces Enhanced Emissions Testing for Light-duty Diesel Vehicles	10
US EPA tightens Ground-Level Ozone Standards	11
ARB Feasibility Assessment of Low PM Measurement	11
Tractor Supply Company agrees Settlement in US Clean Air Act Violation	11
US Federal Enforcement of California's Truck and Bus Regulation	11
<b>ASIA PACIFIC</b>	<b>12</b>
China 6 Emissions Standard brought forward	12
India to introduce Bharat Stage V Emissions Standard in 2019	12
<b>UNITED NATIONS</b>	<b>12</b>
WHO Report on the Reduction of Health Risks from Climate Pollutants	12
COP21 Paris Climate Change Conference	13
<b>GENERAL</b>	<b>13</b>
MECA Paper on Morphology of Soot Particles from GDI	13
ICCT Report on Euro 6 Diesel DeNO <sub>x</sub> Technologies	13
T&E Report on Air Pollution from Vehicles	14
DUH Report on Aftermarket Catalysts	14
DUH Report on NO <sub>x</sub> Emissions of Euro 6 Diesel Opel Zafira	14
SwRI to launch 7 <sup>th</sup> Clean Diesel Engine Consortium	15
ICCT Report on CO <sub>2</sub> Gap between Lab and Road	15
T&E Report on Car CO <sub>2</sub> Discrepancy between Lab and Real World	15
OECD Report on Fossil Fuels Subsidies	15
<b>RESEARCH SUMMARY</b>	<b>16</b>
<b>FORTHCOMING CONFERENCES</b>	<b>18</b>

## EUROPE

### European Union agrees on Real Driving Emission Performance Requirement

On 28 October 2015 the 28 Member States of the European Union agreed in the Technical Committee of Motor Vehicles (TCMV) on the content of the second legislative package of implementing measures to introduce Real Driving Emissions (RDE) tests for air pollutant emissions of light-duty vehicles.

The NO<sub>x</sub> Conformity Factor (CF) will first be set to 2.1 (110% above the Euro 6 limit) from 1 September 2017 for new models and two years later for all new vehicles while it will be reduced in a second step to 1.5 (50% above the Euro 6 limit) from 1 January 2020 for new models and one year later for all new vehicles.

The EU becomes the first and only region in the world to mandate on-road emissions testing methods. According to the European Commission, the agreement on the allowed divergence between the regulatory limit measured in real driving conditions and measured in laboratory conditions is a significant improvement compared to the current discrepancy (400% on average).

Ms Ségolène Royal, the French Minister for Ecology nevertheless issued a statement on the following day saying that the agreement was not satisfactory and should be re-discussed amongst Ministers.

The European Commission and, to a less extent, the European Automobile Manufacturers' Association (ACEA) welcomed the agreement but strong criticism was expressed by environmental NGOs, such as Transport & Environment, and by a number of political groups in the European Parliament, including the Socialists & Democrats (S&D), the Liberals (ALDE), and the Greens.

The text will now be sent to the European Parliament and Council for a legal 3-month scrutiny period.

This agreement follows the adoption of a first RDE legislative package in May 2015 that included the test procedure and is expected to come into force in early 2016 once it is published in the Official Journal.

The 2<sup>nd</sup> RDE package adopted is at <http://ec.europa.eu/transparency/regcomitology/index.cfm?do=sear.ch.documentdetail&hxb86lcmgg3oYE/bjESk4sY+mUxt5zTyDIGuuTctW+y0yjcmiFTUQTSkkOVTUeCz>.

### VW recalls 8.5 Million Diesel Cars to fix Emissions Defeat Device

On 15 October 2015 Volkswagen announced the recall of 8.5 million diesel vehicles in the EU.

The announcement followed the decision by the German Federal Motor Transport Authority (KBA) to order a mandatory recall of the 2.4 million vehicles

registered in Germany equipped with the EA189 engine affected with the admitted exhaust emissions defeat device. Remedial action on affected European vehicles will begin in January 2016. The technical solutions for the 1.2, 1.6, and 2.0 l engines can involve software as well as hardware measures, Volkswagen said.

On 18 September 2015 the US Environmental Protection Agency (EPA) issued a notice of violation of the Clean Air Act to the Volkswagen group. EPA alleged that four-cylinder, 2.0l VW and Audi diesel cars from model years 2009-2015 include software that circumvents US emissions standards for certain air pollutants. California issued a separate In-Use Compliance letter to VW. The US EPA said a sophisticated software algorithm detects when the car is undergoing official emissions testing based on various inputs including the position of the steering wheel, vehicle speed, the duration of the engine's operation, and barometric pressure. It turns full emissions controls on only during the test. The effectiveness of these vehicles' pollution emissions control devices, Selective Catalytic Reduction or Lean NO<sub>x</sub> Trap, is greatly reduced during all normal driving situations. This results in cars that meet emissions standards in the laboratory, but during normal operation, emit between 10 and 40 times more NO<sub>x</sub> than the standard. The software produced by VW is a "defeat device," as defined by the Clean Air Act.

EPA and CARB uncovered the defeat device software after West Virginia University published results of a study commissioned by the International Council on Clean Transportation (ICCT) that found significantly higher in-use emissions from two light-duty diesel vehicles, a 2012 Jetta and a 2013 Passat (see *AECC Newsletter May-June 2014*). On 3 September 2015, after EPA and CARB demanded an explanation for the identified emission problems, VW admitted that the cars contained defeat devices.

On 22 September 2015 VW admitted that as many as 11 million vehicles equipped with Type EA 189 engine worldwide could be affected by the software used to identify emissions tests. On 23 September, Martin Winterkorn resigned as CEO of the company while denying being aware of the emissions manipulation.

The European Commission said on 22 September 2015 that it had contacted the US EPA to "learn more about the facts behind their decision", and took the situation "very seriously". Several Member States, including Germany, France, Italy and the UK called for investigations in the EU.

On 23 September 2015 the Environment Committee of the European Parliament held a debate on the issue with the European Commission. Many MEPs highlighted the need to speed up the introduction of the Real-Driving Emissions (RDE) testing requirements,

while others compared the EU's decentralized type-approval system unfavourably with the US one. Concerns that other carmakers could use similar methods were also voiced by MEPs. The Commission vowed to "get to the bottom" of the case.

On 24 September 2015 Bosch said it had delivered components including delivery and metering modules for exhaust gas treatment and common rail injection systems to VW that were at the centre of investigations. But Bosch said also that "the responsibility for configuring handling characteristics" of these components "lies with Volkswagen."

On 8 October 2015 a committee of the US House of Representatives received testimony from Volkswagen North America President and CEO, Michael Horn. In response to questions on a potential fix and timing of these repairs for the impacted vehicles, Horn said that the remedies will depend on the model year and generation of the emission control system involved.

Generation 3 exhaust systems installed on model year 2015 and 2016 vehicles that include an SCR-coated DPF will receive a software update early in 2016 which will render them fully operable and able to meet all of the standards. There are approximately 70 000 Gen 3 vehicles affected by this enforcement action in the US.

Generation 2 exhaust systems were installed on approximately 95 000 US vehicles. The emission control devices include a DOC, DPF, and urea-SCR. Horn testified that a solution for these vehicles may be ready by mid-2016 and the repair of these vehicles may also be possible with a software change.

Generation 1 emission control systems were installed on approximately 430 000 vehicles sold in the US and included a lean NOx trap and DPF. These models will likely require both a hardware and software change to allow them to fully comply with all emission requirements and retain the level of performance expected by customers. The possible hardware fixes mentioned by Horn may include additional NOx catalyst and urea dosing systems. Exact repairs necessary will likely not be identified before end 2016.

On 22 October 2015 the car manufacturer clarified that no software constituting an improper defeat device as defined in law is installed in vehicles with the Euro 5 or Euro 6 versions of the successor generation EA 288 diesel engines.

## **Parliament Resolution on Vehicle's Emission Measurements**

On 27 October 2015 the European Parliament adopted a resolution on emission measurements in the automotive sector.

MEPs welcomed on-going investigations into vehicle emissions test manipulation in several EU countries

and worldwide, and supported the European Commission's call to national surveillance authorities to conduct extensive checks on a wide range of vehicle makes and models. The investigations should involve the Commission, which is asked to report back to Parliament by 31 March 2016.

Parliament urged the Commission to adopt and put in place the new Real Driving Emissions (RDE) test procedure without delay, adding that while current plans for RDE tests would be used only for NOx emissions, these tests should be put in place for all pollutants.

The EU type-approval regime should be redesigned to guarantee that type-approvals and certificates issued by national competent authorities can be checked independently and can be reassessed by the Commission and by EU countries' authorities with a view to requiring recalls and halting the placing on the market of vehicles that do not comply with emission limits, MEPs said. They also called "for consideration to be given to the establishment of an EU-level surveillance authority".

A representative sample of new models taken off production lines at random should be tested annually, using RDE tests to check their compliance with EU pollutant and CO<sub>2</sub> limits, said MEPs, who also want better on-road surveillance through periodic technical inspections.

The resolution was passed by 493 votes in favour to 145 against, with 25 abstentions.

The resolution is at

[www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2015-0375+0+DOC+PDF+V0//EN](http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2015-0375+0+DOC+PDF+V0//EN).

## **Council and Parliament discussions on Real Driving Emissions**

The Volkswagen case and possible implications for emissions legislation in the EU were discussed with Elżbieta Bieńkowska, the Commissioner for Internal Market, Industry, Entrepreneurship and SMEs, at the Competitiveness Council meeting of 1 October 2015 attended by EU Ministers of Industry.

During a meeting of the Transport Council on 7 October 2015, Commissioner Bieńkowska stressed that although discussion around Real-Driving Emissions (RDE) started in 2011, four years before the Volkswagen affair appeared, the emissions rigging controversy has added urgency to finalising the RDE rules. "Public opinion will not forgive us if we don't do this as soon as possible", she said. Ms Bieńkowska also said that the Commission plans to "reassess" its proposal for the revision of the Type-Approval system in light of the VW case.

On 13 October 2015 the Environment Committee of the European Parliament also held an exchange of views with the Commission on the state-of-play of RDE.

MEP Groote (DE, S&D) wondered what the European Commission had been doing since 2011 on RDE and on what basis the Conformity Factors would be proposed. He also questioned whether European climate and air quality objectives were compatible.

MEP Gerbrandy (NL, ALDE) argued that on-road emissions measurement “did not sound like rocket science” and challenged the Commission on the lack of transparency in the process for establishing CFs. He asked that TCMV meeting minutes are published and include the respective positions of Member States.

MEP Eickhout (NL, Greens) asked for a legal assessment of CF higher than 1 like the [then] ‘leaked’ CF1 of 1.6 for 2017/18 which means increasing exhaust emission limits via comitology rather than co-decision. He also referred to publications showing that there are diesel cars already available on the market that emit, on the road, NOx emissions below the Euro 6 limit of 80 mg/km. Technical feasibility has been proven, he concluded.

MEP Dalli (MT, S&D) said that no CF above 1.5 can be acceptable, even as an intermediate value.

MEP Belet (BE, EPP) discussed the idea of an EU-independent type-approval authority and said there is no need for a brand new agency, an existing one should be selected.

Mr Cozigou, director in the Commission’s DG-Growth, replied that there are three distinct elements in the Commission’s approach: coordinate Member States’ investigations on defeat devices and ensure corrective actions are taken; finalize the RDE requirements as soon as possible; and reinforce EU type-approval provisions and market surveillance.

## **Parliament adopts Report on “Pot-Pourri” Proposal**

On 23 September 2015 the Environment (ENVI) Committee of the European Parliament adopted its report on the Commission’s so-called “pot-pourri” proposal that will amend the light-duty Euro 5&6 and the heavy-duty Euro VI Regulations.

The ENVI Committee wanted the introduction of a Real-Driving Emissions (RDE) test for all Euro 6 vehicles from 2015 and a Conformity Factor reflecting only the tolerance of emissions measurement procedure to be in place by 2017.

MEPs also ask the Commission to propose, if appropriate, an NO<sub>2</sub> limit value in addition to the NOx limit. Regarding CO, HC, NOx and NO<sub>2</sub> limits at cold temperature (-7°C test), MEPs deny the right for the

Commission to propose a comitology amendment to the Euro 6 regulation but require a co-decision act.

MEPs also want to require mandatory fitting of fuel consumption meters and gear shift indicators for all new vehicles from 2019.

In the Euro VI Regulation, the Commission’s proposal to delete the 10 ppm ammonia limit for Positive Ignition engines was rejected.

Finally, a new recital was adopted, stressing the large and complex air pollution issue and climate impacts of road traffic and the need for a comprehensive approach to road emissions to ensure that small legislative changes which risk creating conflicts with the objectives of other legislation and which can have disproportionate implications for the competition between complying manufacturers are avoided.

MEPs adopted their position by 66 votes to one, with no abstention and gave the rapporteur Mr Dess (EPP, Germany) a mandate to open trilogue negotiations with the Council.

The ENVI report is at

[www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A8-2015-0270+0+DOC+PDF+V0//EN](http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A8-2015-0270+0+DOC+PDF+V0//EN).

## **Parliament Report on Non-Road Stage V Emissions Standard**

On 15 September 2015 the Environment Committee of the European Parliament adopted, by 64 votes to 3 with no abstentions, its report on the legislative proposal for a Stage V emissions standard for Non-Road Mobile Machinery (NRMM).

The draft rules would cover internal combustion engines used in machines ranging from small handheld equipment, such as lawn mowers and chain saws, through agricultural and farming machinery (harvesters, cultivators), construction machinery (bulldozers, excavators), to railcars, locomotives and inland waterway vessels.

The Stage V standard introduces, except for rail engines and large engines >560 kW, a limit on particle numbers (PN). Some MEPs proposed an amendment weakening the Commission proposal for inland shipping emission limits but it was rejected.

Non-road engine manufacturers will have to make emission testing results available to third parties; they will also have to publish CO<sub>2</sub> data for the first time.

MEPs added provisions allowing for replacement engines to be used in construction machines for 15 years after the introduction of Stage V (replacement engines have to be Stage IIIA or more) and in trains also for 15 years but without any emissions Stage limit.

Retrofit-supporting amendments were adopted. Member States are encouraged to put in place financial

incentives for retrofit of NRMM, especially in areas breaching EU air quality legislation.

Finally the review clause was further detailed with a request for the Commission to consider by end 2020 lowering the PN standard in line with heavy-duty Euro VI requirements, adding a PN limit to engine categories that do not have one, and lowering the methane slip allowance for gas engines. By end 2025 the Commission should submit a report on In-Service Monitoring PEMS testing and how well it describes engine emissions in normal use.

The Rapporteur, Ms Gardini (Italy, EPP), was given a mandate to start trilogue informal negotiations with the Council with a view to reaching a first-reading agreement, which would then be put to a plenary vote in Parliament.

The ENVI report is at

[www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A8-2015-0276&format=PDF&language=EN](http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A8-2015-0276&format=PDF&language=EN).

## **Directive on Medium Combustion Plants' Emissions adopted in Parliament**

On 7 October 2015 the European Parliament approved a new Directive on emissions from Medium Combustion Plants (MCP) between 1 and 50 MW, such as electricity generators, domestic or residential heating and cooling systems, or applications providing heat or vapour for industrial processes.

While small combustion plants can be covered by EU ecodesign legislation, and large ones by the industrial emissions Directive, emissions of air pollutants from MCP have not been regulated at EU level so far.

For new plants, the limits would take effect within three years. For existing ones, with a thermal output above 5 MW, SO<sub>2</sub>, NO<sub>x</sub> and dust emission limits would come into force from 2025. The smallest plants, with a thermal output from 1 to 5 MW, most of which are operated by small or medium-sized enterprises, would have to comply with emission limit values from 2030.

The legislation does not prevent Member States from enforcing tougher standards than are required by the Directive. In areas where emissions breach EU air quality standards, EU countries would be required to assess whether to introduce stricter limits.

The new limits, already informally agreed in trilogue negotiation, still need to be formally approved by the EU Council of Ministers.

The text adopted is at

[www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2015-0339+0+DOC+PDF+V0//EN](http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2015-0339+0+DOC+PDF+V0//EN).

## **New National Emission Ceilings approved by Parliament**

On 28 October 2015 the European Parliament endorsed the Commission proposal on more ambitious national caps on inventories of emissions of six key pollutants.

MEPs approved the proposed caps for sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), non-methane volatile organic compounds (NMVOC), methane (CH<sub>4</sub>) ammonia (NH<sub>3</sub>), and fine particulates (PM<sub>2.5</sub>), to be achieved by 2020 and 2030.

MEPs want the future national emission ceilings (NEC) Directive to contribute to the reduction of mercury emissions, but an impact assessment should be carried out before national emission reduction commitments are determined.

MEPs also voted to remove a Commission proposal for flexibility to allow Member States to offset reductions in emissions of NO<sub>x</sub>, SO<sub>2</sub> and PM<sub>2.5</sub> from international shipping. Instead, the Commission should consider measures to reduce emissions from international shipping and, if appropriate, submit a legislative proposal to this end, MEPs said.

Finally, MEPs said that the Commission and Member States should immediately agree on the Real Driving Emissions (RDE) proposal to ensure that all EU source-based air pollution policies are fit for purpose.

MEPs will now enter into negotiations with the Council of Ministers with a view to reaching a first-reading agreement.

The text adopted is at

[www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2015-0381+0+DOC+PDF+V0//EN](http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2015-0381+0+DOC+PDF+V0//EN).

## **Parliament Resolution on Implementation of White Paper on Transport**

On 9 September 2015 the European Parliament adopted a resolution backing the goals of the 2011 White Paper on Transport.

The White Paper objectives are to reduce greenhouse gas emissions by 40% in 2030 compared to the 1990 level and to 60% by 2050 (compared to the 1990 level). In an analysis of responses to a recent consultation on the White Paper's midterm review, the Commission said in August 2015 that the strategy's ambition is considered "too high, the goals unrealistic, while the progress and coordination, in particular at Member State level, remain unsatisfactory".

But MEPs backed the original targets, including cutting greenhouse gas emissions from transport by 60% by 2050. They called on the Commission to re-evaluate whether actions set out in the White Paper are

sufficient to meet that target. If not, additional legislative measures should be proposed, they said.

Commissioner for Transport Violeta Bulc told the plenary session in Strasbourg that the main weakness of EU transport policy was poor implementation.

MEPs said funding for the Connecting Europe Facility, which finances missing links in European transport, should be “drastically increased”. They called for predictable, long-term EU investment in rail infrastructure to support a ‘modal shift’ in European transport from road to rail.

On car transport, MEPs called for a “general framework for national road charging schemes” to encourage a transition toward electric vehicles.

MEPs voted by 547 to 125 in favour of the resolution; 21 MEPs abstained.

The Commission analysis of consultation on midterm review is at

<http://ec.europa.eu/transport/media/consultations/doc/2015-white-paper-2011-midterm-review/analysis.pdf>

and the Parliament resolution is at

[www.europarl.europa.eu/sides/getDoc.do?pubRef=-](http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2015-0310+0+DOC+PDF+V0//EN)

[//EP//NONSGML+TA+P8-TA-2015-0310+0+DOC+PDF+V0//EN.](http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2015-0310+0+DOC+PDF+V0//EN)

## Public Consultation to evaluate Car Labelling Directive

On 19 October 2015 the European Commission’s Directorate General for Climate Action (DG-CLIMA) launched a public consultation to support the evaluation of the car labelling Directive 1999/94/EC.

The consultation will help DG-CLIMA to assess the extent to which the Directive has achieved its objectives of ensuring that information on fuel economy and CO<sub>2</sub> emissions is displayed prominently and in an understandable way to consumers prior to/at the point of sale; increasing the awareness of CO<sub>2</sub> emissions and fuel economy among consumers; influencing consumers to purchase more fuel efficient cars; and encouraging car manufacturers to produce more fuel efficient cars. The evaluation will also examine the costs and the benefits of the Directive and whether the impacts could have been achieved at lower cost.

The questionnaire asks in particular whether the car labelling Directive would have been more effective if information on pollutants (e.g. NO<sub>x</sub>) had been included in addition to CO<sub>2</sub> emissions and fuel consumption.

The consultation is open until 15 January 2016 and is at [http://ec.europa.eu/clima/consultations/articles/0027\\_en.htm](http://ec.europa.eu/clima/consultations/articles/0027_en.htm).

## GEAR 2030 High-Level Group on Automotive Industry

The European Commission set up on 19 October 2015 the new High-Level Group on the Competitiveness and

Sustainable Growth of the Automotive Industry in the European Union (GEAR 2030).

The group should help to develop recommendations to reinforce both the short-term and long-term competitiveness of the European automotive industry. GEAR 2030 shall be composed of up to 25 members consisting of the national authorities and organisations in EU countries, and shall be chaired by a representative of the Commission.

A call for applications was opened for the selection of members other than national authorities. GEAR 2030 members will be selected from EU umbrella associations and federations from the automotive industry value chain (manufacturers, OEMs, suppliers, retailers, repair and maintenance providers), trade unions, civil society organisations (NGOs and consumers associations), ICT associations, network operators and digital services associations active in the field of connected vehicles and/or autonomous vehicles, and academia.

## EEA Report on Greenhouse Gas Trends and Projections

On 20 October 2015 the European Environment Agency (EEA) released their annual 'Trends and projections' report that provides an updated assessment of progress made by the EU towards their climate mitigation and energy targets.

The report reveals that greenhouse gas emissions in Europe decreased by 23% between 1990 and 2014 and reached the lowest levels on record. Latest projections show that the EU is heading for a 24% reduction by 2020 with current measures in place, and a 25% reduction with additional measures already being planned in Member States. The EU is therefore on track towards its Kyoto Protocol target for 2020.

Reductions in greenhouse gas emissions are projected to continue beyond 2020 but at a slower pace. According to projections submitted by Member States, planned reductions are estimated to bring emissions to between 27% (with current measures) and 30% (with additional measures) below 1990 levels by 2030. New policies will therefore need to be put in place to meet the 40% reduction target by 2030, the EU’s contribution towards the new global climate change agreement in Paris in December 2015.

EEA report No 4/2015 is at

[www.eea.europa.eu/publications/trends-and-projections-in-europe-2015](http://www.eea.europa.eu/publications/trends-and-projections-in-europe-2015).

## Horizon 2020 Draft Work Programme 2016-17

The European Commission has made available a draft work programme for 2016-2017 of the EU research and innovation programme Horizon 2020.

Horizon 2020, with nearly €80 billion of funding available over 7 years (2014 to 2020), is the financial instrument implementing the Innovation Union, a Europe 2020 initiative aimed at securing Europe's global competitiveness.

The draft Horizon 2020 work programme in the area of transport is called 'Smart, green and integrated transport' and amounts to €206.5 million funding over the two years. It is structured in four broad lines of activities: resource-efficient transport that respects the environment; better mobility, less congestion, more safety and security; global leadership for the European transport industry; socio-economic and behavioural research and forward looking activities for policy making. These activities are addressed by three calls for proposals: mobility for growth, automated road transport, and European green vehicles initiative.

In particular, topics such as 'innovations for energy efficiency and emission control in waterborne transport', 'optimisation of heavy-duty vehicles for alternative fuels use', 'technologies for low emission light-duty powertrains', and 'system and cost-optimised hybridisation of road vehicles', address internal combustion engine emissions reduction.

Documents have been made public before the adoption process of the work programme to provide potential participants with the currently expected main lines of the work programme 2016-2017. The adoption and publication of the work programme are expected in mid-October 2015.

The Horizon 2020 draft work programme is at <https://ec.europa.eu/programmes/horizon2020/en/draft-work-programmes-2016-17>.

## **Member States launch Test Campaigns to check Passenger Cars Emissions Control**

On 1 October 2015 French Minister of Ecology Ségolène Royal chaired at UTAC, the French technical services, a first meeting of the newly established Committee of inquiry on passenger cars NOx emissions control.

The Committee is composed of consumer associations (UFC Que Choisir, 40 Millions d'automobilistes), environment protection NGOs (Réseau Action Climat, France Nature environnement), Members of Parliament (Christophe Bouillon, Denis Beaupin, Fabienne Keller, Louis Nègre), agencies and experts (Ademe, IFPEN, DGCCRF, INERIS, ISTAR), and services of the Ministry of Ecology. They will validate measurements conducted by UTAC under a brand new, dedicated test protocol. The aim of the campaign is to detect possible defeat devices and check that type-approval requirements are met.

Chassis-dyno tests will be conducted in conditions slightly modified compared to type-approval conditions. PEMS NOx emissions tests will then be conducted on the UTAC track.

UTAC has admitted that the test protocol will first need to be validated so testing will start first on 10 vehicles: an Audi Q3 (Euro 5), a VW Tiguan (Euro 5), a Peugeot 208 (Euro 5), a Citroën C5 or Peugeot 508 (Euro 6), a Renault Espace 4 or Laguna 3 (Euro 5), a Clio 4 or Captur (Euro 6), a Toyota Verso (Euro 4), a Ford Focus (Euro 5), a BMW 3 series (Euro 6), and a Mercedes Class A (Euro 6). The two VW vehicles will be chosen amongst vehicles identified by the manufacturer as equipped with the defeat device to ensure the method can detect it.

Tests will then be extended to another 90 vehicles including 12 Citroën, 12 Peugeot, 12 Renault, 9 Dacia, 6 Audi, 6 BMW Mini, 6 Mercedes, 6 Ford, 6 Opel, 3 VW, 3 Fiat, 1 Volvo, 2 Hyundai, 2 Kia, 6 Nissan, 3 Toyota and 1 Suzuki. Vehicles will be selected based on availability, UTAC said.

In the UK, the Vehicle Certification Agency (VCA), which is responsible for regulating cars, is to re-run laboratory tests and compare them against emissions from real-world driving.

The Air and Climate Agency of Wallonia, the South region of Belgium, is calling on volunteers to bring their Euro 5 Diesel cars, with engines between 1.4 and 2.1 l, for an evaluation of their exhaust emissions if their car has run for less than 100 000 km. 100 vehicles will be selected and owners will be invited to come for a chassis-dyno test at the Advanced Technology Centre in Mons. CO, CO<sub>2</sub>, NO<sub>x</sub>, HC, and PM emissions will be measured.

## **French Action Plan on Air Quality**

On 30 September 2015 French Minister of Ecology Ségolène Royal presented to the Council of Ministers the action plan to improve air quality.

The plan includes five key actions: prevent and contain pollution peaks; setting up a bicycle mileage allowance of €0.25/km; emissions control checks on 100 vehicles; award 25 cities with support to become "respirable cities in 5 years"; and deploy air quality certificates for vehicles.

Air quality certificates are based on first registration dates of vehicles and thus refer to their Euro standard. It will allow classification of passenger cars, 2- and 3-wheelers, quadricycles, and heavy-duty vehicles including buses, as a function of their pollution level. For passenger cars, four labels are defined. The green label goes to "zero engine emissions" cars, i.e. fully electric and hydrogen cars; class 1 purple label goes to Euro 5 and 6 gasoline cars while Euro 5 and 6 diesel cars get the Class 2 yellow sticker together with Euro 4

gasoline cars. Euro 2 and 3 gasoline and Euro 4 diesel cars get the Class 3 orange label.

The system will allow local authorities to implement access or parking restrictions and incentives. The cities of Grenoble and Strasbourg have expressed interest in the system already, for trials until the end of 2015.

The system will enter force on 1 January 2016. Stickers will be sent to vehicle owners that request it online.

The plan (in French) is at [www.developpement-durable.gouv.fr/IMG/pdf/Dossier\\_de\\_presse\\_Qualite\\_de\\_l\\_air.pdf](http://www.developpement-durable.gouv.fr/IMG/pdf/Dossier_de_presse_Qualite_de_l_air.pdf).

## **UK Report on In-Service Emissions Performance of Euro 6/VI Vehicles**

Transport for London (TfL) has published a report on the performance of Euro 6/VI diesel car and goods vehicles emissions in 'real life' as part of its efforts to develop an Ultra-Low Emission Zone in the city.

Testing was undertaken using a set of laboratory drive cycles that mimic the velocities and accelerations of vehicles in urban driving conditions.

The key findings were that Euro 6 diesel cars offer a substantial reduction in NOx emissions over previous Euro standards – petrol cars are also shown to be very low; the PM mass limit is comfortably met by all vehicles as a result of the widespread use of Diesel Particulate Filters; emissions of NOx are significantly higher than the type-approval limits, as has been seen with previous Euro standards; under the right conditions, average NOx emission levels from Euro VI heavy-duty engines are now almost as low as diesel cars with a particular improvement at lower speeds which is important for urban driving environments such as central London.

The report concluded that policies designed to accelerate the uptake of Euro 6/VI vehicles would be effective at reducing NOx emissions. Nevertheless, there remains a clear need for Real Driving Emissions legislation. Some models of light-duty diesel vehicles may require re-calibration to satisfy the RDE protocol depending on the conformity factors that are agreed. It is therefore extremely important that the level of conformity factor is set so as to be challenging and that the implementation date is not allowed to slip beyond the proposed 2017/2018, the report said. This is necessary to ensure that NOx emission reductions are maximised.

The TfL report is at <http://content.tfl.gov.uk/in-service-emissions-performance-of-euro-6vi-vehicles.pdf>.

## **Emissions Inventory Report for 1990-2013 in the UK**

On 11 September 2015 the UK Department for Environment, Food and Rural Affairs (Defra) published the annual report "Air Quality Pollutant Inventories for

England, Scotland, Wales and Northern Ireland: 1990 – 2013" prepared by Aether and Ricardo-AEA.

The report presents emission inventories for the Devolved Administrations of the UK for the period 1990 to 2013, for ammonia (NH<sub>3</sub>), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub> as NO<sub>2</sub>), non-methane volatile organic compounds (NMVOCs), sub-10 micron Particulate Matter (PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), and lead (Pb).

In England, Scotland, Wales, and Northern Ireland all seven pollutant emission levels are lower in 2013 than they were in 1990. Ammonia emissions show the lowest decline rate though.

The report is at [http://uk-air.defra.gov.uk/assets/documents/reports/cat07/1509110857\\_DA\\_AQPI\\_1990-2013\\_Report\\_Issue1.pdf](http://uk-air.defra.gov.uk/assets/documents/reports/cat07/1509110857_DA_AQPI_1990-2013_Report_Issue1.pdf).

## **UK Air Quality Consultation**

On 12 September 2015 the UK Department for Environment, Food and Rural Affairs (Defra) launched a consultation to seek views from local and transport authorities, businesses and members of the public on what local action can be taken to improve air quality.

This consultation seeks views on draft plans to improve air quality. The Government's primary driver for action on air quality is the impact it can have on health and the environment. The consultation opens five months after the UK's Supreme Court ordered the Government to take action to tackle pollution.

Defra said that the UK environment has never been cleaner and even the busiest cities have seen falls in harmful emissions, with a 15% reduction in average roadside concentrations of NO<sub>2</sub> since 2010. But further action is needed at a local and national level to meet clean air targets, especially in major cities such as London, Birmingham, Leeds, Nottingham, Southampton and Derby.

Building on the success of similar schemes across the UK, the plans ask local authorities who are facing particular challenges to look at further action such as creating Clean Air Zones, introducing low emission buses and taxis, and using data to inform new road layouts. Defra states that local authorities should "consider access restrictions for certain types of vehicles" to cut nitrogen dioxide (NO<sub>2</sub>).

## **Stage IIIA Standards enter Force for Construction Equipment in London**

On 1 September 2015 new emission requirements for construction sites equipment of net power between 37 and 560 kW entered force in London, UK.

Under the new rules, all construction sites in the centre of London and sites building more than ten homes or measuring more than 1000 square feet (93 m<sup>2</sup>) in



Greater London will have to meet the Stage IIIA standard. This means that polluting equipment which is more than 10 years old will have to be either replaced or retrofitted. Some exemptions will be provided where pieces of equipment are not available at the emission standard stipulated or in the volumes required to meet demand in a construction environment as dynamic as London's, the Mayor said. A dedicated website [www.nrmm.london](http://www.nrmm.london) has been launched for construction site managers to check the rules affecting their specific pieces of equipment.

## **UK Clean Bus Technology Fund 2015**

On 10 September 2015 the UK Department for Transport (DfT) announced a new £5 million (€6.8 million) grant scheme that aims to curb emissions from the UK's bus fleet.

The Clean Bus Technology Fund 2015 will allow local authorities to bid for up to £500 000 – enough to retrofit hundreds of buses that will reduce NOx (nitrogen oxides) emissions and improve air quality, DfT said.

The fund is open for bids until the end of October 2015, with a particular focus on pollution hotspots in cities and urban areas. The winners will be announced towards the end of the year.

This funding fits existing bus fleets with green technology which reduces NOx pollution from buses by at least 50%.

This new £5 million scheme will add to the £20 million the UK Government has already invested since 2011 in similar local retrofit schemes for different types of vehicles. So far, around 1500 buses have been retrofitted in London and in other parts of England and last year's Clean Vehicle Technology Fund provided over £8 million to Councils to upgrade over 1200 vehicles – vans, taxis, buses and even fire engines.

The UK Department for Environment, Food and Rural Affairs (Defra) also launched the £500 000 (€680 000) Air Quality Grant Scheme for 2015/16 on 10 September 2015. This scheme supports local authority projects to improve air quality with successful schemes previously encouraging local cycling projects, developing and implementing local low emission strategies and local engagement and awareness raising initiatives.

## **Report on WLTP Impact on CO<sub>2</sub> Emissions from UK Cars**

On 7 September 2015 the Committee on Climate Change, an advisor to the UK Government and Parliament, released a new report prepared by the International Council on Clean Transportation (ICCT) and Element Energy titled "Quantifying the impact of real-world driving on total CO<sub>2</sub> emissions from UK cars and vans".

Passenger cars and vans contribute to 17% of the UK's total carbon dioxide emissions, and therefore have an important role to play in meeting future CO<sub>2</sub> targets. Despite rapid falls in the official CO<sub>2</sub> emissions of new cars sold in the UK in recent years, evidence of a growing 'gap' between official and real-world driving CO<sub>2</sub> emissions for new cars has received much attention. The study therefore aims at understanding in more detail the specific contributions to the emissions gap for the UK car and van fleet.

This study explores in detail the effects of the transition from the current regulatory NEDC cycle to the new WLTP test procedure on the future emissions gap, and estimates the impact of the gap on the overall UK light vehicle fleet rather than only on a per vehicle basis.

The report says that between 2002 and 2014, the gap between official and real-world CO<sub>2</sub> emissions for new passenger cars increased from around 10% to about 35%. Most of this growth in the gap is due to increased exploitation of 'flexibilities' in laboratory testing (for example minimising the weight and rolling resistance of the vehicles being tested or optimising the environmental conditions in the laboratory) by vehicle manufacturers. The current real-world emissions gap for new cars is expected to continue to grow to almost 50% in a hypothetical business-as-usual scenario with the NEDC still in place in 2020. The anticipated, but not yet guaranteed, introduction of the WLTP in 2017 is expected to reduce the gap for new cars to about 23%. This is because aspects like vehicle test weight, test temperature and test driving pattern are estimated to be more in line with real-world driving for WLTP than it is currently the case in NEDC.

Beyond 2020, the analysis suggests that the emissions gap could grow again to about 31%, even under WLTP, driven by possibilities for vehicle manufacturers to exploit shortcomings of the new test procedure, as well as a further increase in the market share of hybrid and plug-in hybrid vehicles.

The introduction of an in-use conformity testing scheme, supplemented by on-road vehicle testing could help to reduce the gap to about 5% by 2030.

The report concludes that future post-2021 CO<sub>2</sub> targets defined using WLTP should be highly ambitious to ensure genuine real-world CO<sub>2</sub> emission reductions.

The report is at [www.theccc.org.uk/wp-content/uploads/2015/09/Impact-of-real-world-driving-emissions-for-UK-cars-and-vans.pdf](http://www.theccc.org.uk/wp-content/uploads/2015/09/Impact-of-real-world-driving-emissions-for-UK-cars-and-vans.pdf).

## **Madrid adopts Protocol to tackle Air Pollution Episodes**

On 17 September 2015 the City of Madrid adopted a four-phase protocol for tackling episodes of severe NOx pollution.

Public warnings will now be issued when NO<sub>x</sub> levels reach 200 mg/m<sup>3</sup> in two measuring stations within a given area for two consecutive hours. During warning episodes, city-centre car parking for non-residents will be suspended, 50% of private vehicle traffic will be banned from entering the centre, lower speed limits will apply on motorways and public transport will be made free of charge. The city administration expects the new protocol to come into force by the end of October 2015. Had the protocol been in force from the beginning of 2015, NO<sub>x</sub> levels would have activated these measures on 7 days so far, a spokeswoman for the City council said.

Broader plans were submitted to the European Commission that has warned Spain in June 2015 in relation to poor air quality in Madrid and Barcelona. They include extending restrictions on car access for non-residents to the whole of central Madrid.

The protocol (in Spanish) is at [www.madrid.es/UnidadesDescentralizadas/Sostenibilidad/Otros/ProtocoloNO2InfPub.pdf](http://www.madrid.es/UnidadesDescentralizadas/Sostenibilidad/Otros/ProtocoloNO2InfPub.pdf).

## **Danish Report on Air Quality Benefits related to Low Sulfur Marine Fuel**

On 5 October 2015 the Danish Centre for Environment and Energy (DCE) at the University of Aarhus published a report entitled “effect of the reduction of sulfur in marine fuel on the concentrations of SO<sub>2</sub>”.

The sulfur Directive entered force on 1 January 2015 and requires ships sailing in the North European Emission Control Area to use low-sulfur bunker fuel with a maximum sulfur content of 0.1% instead of conventional heavy fuel oil which has a sulfur content of 1%. The Danish Environmental Protection Agency used sulfur detection devices to inspect compliance with the new regulation.

The report shows a quick effect on air quality since the level of atmospheric sulfur dioxide (SO<sub>2</sub>) has fallen by up to 60% since the end of 2014 in parts of Denmark.

The report (in Danish) is at [http://dce.au.dk/fileadmin/dce.au.dk/Udgivelser/Notater\\_2015/Fokuspunkt\\_SO2\\_v2\\_2\\_.pdf](http://dce.au.dk/fileadmin/dce.au.dk/Udgivelser/Notater_2015/Fokuspunkt_SO2_v2_2_.pdf).

## **Norwegian Report on On-Road Emissions of Euro 6/VI Vehicles**

The Institute of Transport Economics (TØI) of the Norwegian Centre for Transport Research has published a new report on exhaust emissions from vehicles with Euro 6/VI-technology.

TØI and VTT, the Technical Research Centre of Finland, have conducted emission measurements of twelve Euro VI Heavy vehicles, and seven Euro 6 diesel cars since 2011. Results indicate that NO<sub>x</sub> emissions in real traffic and in cold weather (-7°C) from

new Euro 6 light diesel vehicles are still high, between 4 and 20 times the Euro 6 limit of 80 mg/km. Heavy-duty Euro VI vehicles, including city buses, now have effective deNO<sub>x</sub> technology.

It is noted that no heavy vehicles have yet been tested in cold weather conditions.

The seven Euro 6 diesel passenger cars tested generally have low emissions of particulate matter (PM). The PM limit value for Euro 6 approval is significantly higher than the measured values. New diesel cars have efficient and well-functioning particulate filters, the report says.

For fuel consumption and CO<sub>2</sub> emissions, the values from all kinds of new light vehicles are higher than those measured in the type-approval test. A car that has low CO<sub>2</sub> emissions on NEDC will have, as a rule, emissions ranging from 20-95% higher in real traffic, TØI reports. A car with high CO<sub>2</sub> emissions on the NEDC will have even higher emissions in real traffic.

A summary (in English) of the report is at [www.toi.no/environment-and-climate/diesel-cars-have-high-emissions-in-real-traffic-article33388-1314.html](http://www.toi.no/environment-and-climate/diesel-cars-have-high-emissions-in-real-traffic-article33388-1314.html).

## **Oslo to ban Private Cars from City Centre**

The new City Council of Oslo, Norway announced on 19 October 2015 that it plans to ban private cars from the city centre by 2019 to cut pollution.

The measure is part of an air quality plan to reduce NO<sub>x</sub> emissions by 60% by 2022. For Oslo as a whole, the Council plans to reduce the number of cars by 20% by 2019 and by 30% by 2030.

The Council wants Oslo to become fossil fuel-free by 2030. It targets 50% greenhouse gas emission cuts by 2020 compared to 1990 levels and 95% by 2030.

## **NORTH AMERICA**

### **ARB introduces Enhanced Emissions Testing for Light-duty Diesel Vehicles**

On 25 September 2015 the California Air Resources Board (ARB) sent a letter to automobile manufacturers notifying them that ARB will begin using enhanced testing procedures for modern light-duty diesel vehicles to determine compliance with emission levels to which they were originally certified.

Auxiliary Emission Control Devices (AECD) that reduce the effectiveness of emission control systems under normal vehicle operation conditions are considered as defeat device unless certain conditions are met; they need to be disclosed and properly identified at the time of certification, ARB recalled.

In addition to the standard certification emissions test cycles, ARB announced that AECD and defeat device screening tests will now be based on detection

methods combining On-Board Diagnostic (OBD) system interrogation, on-road testing using Portable Emissions Measurement Systems (PEMS), and the use of special driving cycles and conditions.

## **US EPA tightens Ground-Level Ozone Standards**

---

On 1 October 2015 the US Environmental Protection Agency (EPA) announced that, based on extensive scientific evidence about ozone's effects on public health and welfare, it has lowered the National Ambient Air Quality Standards for ground-level ozone from 75 down to 70 parts per billion (ppb).

EPA indicated that a standard of 70 ppb is below the level shown to cause adverse health effects in the clinical studies and essentially eliminates exposures that have been shown to cause adverse health effects, protecting 99.5% of children from even single exposures to ozone at 70 ppb.

Several clinical studies have shown effects in some adults following exposure to ozone at levels as low as 60 ppb. However, the evidence is uncertain that those effects are harmful or "adverse", EPA added.

EPA also is strengthening the secondary standard to improve protection for trees, plants and ecosystems. Like the primary standard for health, an area will meet the standard if the fourth-highest maximum daily 8-hour ozone concentration per year, averaged over three years, is equal to or less than 70 ppb.

More information is at

[www3.epa.gov/ozonepollution/actions.html](http://www3.epa.gov/ozonepollution/actions.html).

## **ARB Feasibility Assessment of Low PM Measurement**

---

The California Air Resources Board (ARB) has published a staff report on investigations into low Particulate Matter (PM) measurements.

ARB staff indicates that the gravimetric method specified for vehicle emission testing in section 40 of the Code of Federal Regulations (CFR) Part 1065/1066 is suitable for measuring PM emissions below the LEV III standard of 1 mg/mile. This conclusion is based on evaluations of the potential sources of measurement variability, determination of the PM measurement precision, and a comparison of measurements of selected sampling options.

ARB staff has evaluated other metrics for measuring PM emissions, including solid particle number (SPN), integrated particle size distribution with effective density, and black carbon (BC) measurement.

Although previous studies have reported more repeatable emission measurements with the SPN method and there are potential cost savings with the method, one major drawback is that it only measures a

portion of the constituents that make up the total PM emissions, ARB notes. Specifically, it does not measure the semi-volatile components nor particles smaller than 23 nm in diameter. Various studies have shown that the portion of PM attributed to semi-volatiles or to particles smaller than 23 nm can vary substantially based on the engine fuel, engine technology, and exhaust aftertreatment applied. Given the uncertainty as to both the chemical nature of PM that future vehicles will emit and the possible effects in adverse public health from PM in these excluded portions, ARB will continue to utilize the gravimetric mass measurement method as the recognized method for official emission tests. However, ARB staff will continue to monitor developments from the UNECE Particle Measurement Programme (PMP) working group which is seeking improvements in the SPN instrument calibration and extension of the particle size measurement range to include smaller particles, possibly down to 10 nm in diameter.

The report is at

[www.arb.ca.gov/msprog/levprog/leviii/lev\\_iii\\_pm\\_measurement\\_feasibility\\_tsd\\_20151008.pdf](http://www.arb.ca.gov/msprog/levprog/leviii/lev_iii_pm_measurement_feasibility_tsd_20151008.pdf).

## **Tractor Supply Company agrees Settlement in US Clean Air Act Violation**

---

The US Environmental Protection Agency (EPA) and the US Department of Justice announced on 30 September 2015 a settlement with Tractor Supply Company Inc., a US rural lifestyle retail supply chain, that resolves an alleged violation of the Clean Air Act.

US authorities alleged that from 2006 to 2009, Tractor Supply Company imported from China and sold in the US over 28 000 vehicles and engines, representing at least 10 vehicle and engine models, that varied from the certificates of conformity that had been submitted to EPA. The vehicles had adjustable carburetors that were not described in the applications for certification, were produced by different manufacturers than the ones specified in the applications, were manufactured prior to the dates of the certificates of conformity, had model names that were not identified on the certificates of conformity, or were significantly more powerful than described.

Under the settlement, Tractor Supply Company will implement a compliance plan to prevent future violations and mitigation projects to reduce air pollution. Tractor Supply Company will also pay a \$775 000 (€690 000) civil penalty.

## **US Federal Enforcement of California's Truck and Bus Regulation**

---

On 8 October 2015 the US Environmental Protection Agency (EPA) announced that Virginia-based for-hire trucking company Estes Express Lines will pay a

\$100 000 (€89 000) penalty for violations of the California Truck and Bus Regulation, for failing to install Diesel Particulate Filters (DPF) on 73 of its heavy-duty diesel trucks (15% of its California fleet).

The California Truck and Bus Regulation was adopted into federal Clean Air Act plan requirements in 2012 and applies to privately-owned diesel trucks and buses. The rule also requires any trucking company to ensure their subcontractors are only using compliant trucks, and requires companies to upgrade their vehicles to meet specific NOx and PM<sub>2.5</sub> performance standards in California. Heavy-duty diesel trucks in California must meet 2010 engine emissions levels or use a DPF.

In addition to the fine, Estes Express Lines will spend \$580 000 (€515 000) towards out-of-state trucking industry education programs on the regulation and a program to replace wood-burning devices with cleaner ones in California's San Joaquin Valley district.

## ASIA PACIFIC

### China 6 Emissions Standard brought forward

On 13 September 2015 the director of the technological standards department at the Ministry of Environmental Protection, Pei Xiaofei, announced that China's government has decided to introduce the China 6 emissions standards for light vehicles in 2017.

The original schedule for implementation of China 6 was in 2018. Pei Xiaofei also said that China 6, expected to be published at the end of 2016, will cut pollutant emissions by a further 30% compared to the current China 5 standard.

On the same day, speaking also at the 2015 International Forum on Chinese Automotive Industry Development, an official with the Ministry of Industry and Information Technology noted that the average fuel consumption of vehicles will be capped at 4 litres per 100 kilometres by 2025.

### India to introduce Bharat Stage V Emissions Standard in 2019

The Government of India announced on 28 October 2015 that it will implement the Bharat Stage (BS) V emissions standard across the country from 2019.

This ends the debate around skipping BS V and directly progressing from the current BS IV to BS VI norms to speed up the green initiative.

It was actually decided that BS V (based on Euro 5) fuel quality and emission norms will be implemented in the entire country from 2019 and that BS VI (based on Euro 6) emission norms for four-wheelers shall be implemented from 2023.

According to the roadmap laid in the Auto Fuel Vision and Policy 2025, released in 2014, the BS V norms were to be implemented between April 2020 and March 2021 for all four-wheelers. The BS VI was to be rolled out from April 2024.

On 15 September 2015 the International Council on Clean Transportation (ICCT) published a position brief supporting a direct progression from Bharat Stage (BS) IV to BS VI in India, skipping the BS V standard.

The case for expediting progress to BS VI standards, which are based on the European Euro 6/VI standards, was supported by five main considerations:

- Superior technical design relative to the Euro 5/V emission standards.
- Measurement of in-use emissions reveal that Euro VI standards achieve a much greater reduction in NOx emissions from Euro IV/V levels than the emissions limits alone would indicate.
- By 2020, the emission control technology needed to meet Euro 6/VI standards will be in its fourth generation, with minimal impact on fuel efficiency.
- A scrappage programme for heavy commercial vehicles can create economic incentives necessary to alleviate auto industry concerns about impact on vehicle sales.
- Economic benefits of advancing BS VI standards far outweigh costs, and fully justify investments made in supplying ultra-low sulfur fuel.

The ICCT Position Brief is at

[http://theicct.org/sites/default/files/publications/ICCT\\_position-brief\\_BSIV-to-BSVI\\_sept2015.pdf](http://theicct.org/sites/default/files/publications/ICCT_position-brief_BSIV-to-BSVI_sept2015.pdf).

## UNITED NATIONS

### WHO Report on the Reduction of Health Risks from Climate Pollutants

On 22 October 2015 the World Health Organization (WHO) released a new report titled "Reducing global health risks through mitigation of short-lived climate pollutants".

The report, produced in collaboration with the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (SLCP), highlights the urgent need to reduce emissions of black carbon, ozone and methane – as well as CO<sub>2</sub> – which all contribute to climate change.

WHO rated more than 20 available measures to mitigate SLCP, including vehicle emissions standards, capturing landfill gas, switching from fossil fuels to renewables, reducing food waste and improving household cooking fuels, to see which have the greatest potential to improve health, reduce SLCP emissions and prevent climate change. Emissions from diesel vehicles (on- and off-road) that account for about 20% of global black carbon emissions present a

particularly good mitigation opportunity, WHO said. Two promising technological approaches with potential to substantially reduce black carbon and particulate matter are therefore retrofitting Diesel Particle Filters and implementing more stringent vehicle emission and efficiency standards.

The 2011 assessment from the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) estimated that a global deployment of 16 SLCP reduction measures would prevent an average of 2.4 million premature deaths annually by 2030. New estimates could raise that to 3.5 million lives saved annually by 2030, and between 3 to 5 million lives per year by 2050.

The WHO report is at <http://who.int/phe/publications/climate-reducing-health-risks/en>.

## **COP21 Paris Climate Change Conference**

On 10 September 2015 the French presidency officially kicked-off the COP21 Paris Climate Change Conference.

France will chair and host the 21<sup>st</sup> conference of the United Nations on Climate from 30 November to 11 December 2015. "The stakes are enormous," said French Prime Minister Manuel Valls. "The whole of humanity is concerned; the survival of our planet depends on it." He went on to say that the first seven months of 2015 were the hottest on record for the world's surface and that those who suffer the consequences of extra-violent weather conditions are the most vulnerable people.

195 countries are expected to attend COP21 with a view to sign a new international agreement aimed at capping global warming by 2°C above pre-industrial levels.

## **GENERAL**

### **MECA Paper on Morphology of Soot Particles from GDI**

On 4 September 2015 a new paper involving MECA, the AECC-sister organization in the US, was published in the *Environmental Science Technology Journal* on "Effect of Drive Cycle and Gasoline Particulate Filter on the Size and Morphology of Soot Particles Emitted from a Gasoline-Direct-Injection Vehicle".

The paper abstract says "The size and morphology of particulate matter emitted from a light-duty gasoline-direct-injection (GDI) vehicle, over the FTP-75 and US06 transient drive cycles, have been characterized by transmission-electron-microscope (TEM) image analysis. To investigate the impact of gasoline particulate filters on particulate-matter emission, the results for the stock-GDI vehicle, i.e. the vehicle in its original configuration, have been compared to the

results for the same vehicle equipped with a catalyzed gasoline particulate filter (GPF).

The stock-GDI vehicle emits graphitized fractal-like aggregates over all driving conditions. The mean projected area-equivalent diameter of these aggregates is in the 78.4-88.4 nm range and the mean diameter of primary particles varies between 24.6 and 26.6 nm.

Post-GPF particles emitted over the US06 cycle appear to have an amorphous structure, and a large number of nucleation-mode particles, depicted as low-contrast ultrafine droplets, are observed in TEM images. This indicates the emission of a substantial amount of semi-volatile material during the US06 cycle, most likely generated by the incomplete combustion of accumulated soot in the GPF during regeneration. The size of primary particles and soot aggregates does not vary significantly by implementing the GPF over the FTP-75 cycle; however, particles emitted by the GPF-equipped vehicle over the US06 cycle are about 20% larger than those emitted by the stock-GDI vehicle. This may be attributed to condensation of large amounts of organic material on soot aggregates. High-contrast spots, most likely solid non-volatile cores, are observed within many of the nucleation-mode particles emitted over the US06 cycle by the GPF-equipped vehicle. These cores are either generated inside the engine or depict incipient soot particles which are partially carbonized in the exhaust line.

The effect of drive cycle and the GPF on the fractal parameters of particles, such as fractal dimension and fractal prefactor, is insignificant."

Source: [doi: 10.1021/acs.est.5b02185](https://doi.org/10.1021/acs.est.5b02185).

### **ICCT Report on Euro 6 Diesel DeNOx Technologies**

On 3 September 2015 the International Council on Clean Transportation (ICCT) published a white paper on "NOx control technologies for Euro 6 diesel passenger cars".

This study analyses the results of emissions tests performed by Europe's largest car club, Allgemeiner Deutscher Automobil-Club (ADAC) as part of its EcoTest programme. These covered 32 Euro 6 diesel passenger cars from ten different manufacturers, equipped with different types of exhaust aftertreatment technologies, tested over both the NEDC and WLTC driving cycles.

The findings indicate that the implementation of NOx control technologies by a few manufacturers is delivering acceptable results over both cycles, whereas other manufacturers are mostly focusing on meeting the limit over the regulatory NEDC while neglecting real-world operating conditions, even on the relatively low-load WLTC.

All vehicles tested except one met the legislative limit of 80 mg/km of NO<sub>x</sub> over the less demanding NEDC cycle. Most EGR- and SCR-equipped vehicles performed better than LNT-equipped vehicles over the WLTC, but their average emissions were still far higher than those over the NEDC (by a factor of 2.3 for EGR-equipped vehicles and 2.8 for SCR-equipped vehicles). The factor was 8 for the average of all LNT-equipped vehicles. Three LNT-equipped vehicles exhibited very poor performance over the WLTC, with one car emitting up to 1167 mg/km of NO<sub>x</sub>, 15 times the Euro 6 limit. This casts a shadow of doubt over the real-world performance of all current (pre-RDE) NO<sub>x</sub> control approaches, especially those relying on LNTs, and underscores the importance of engine and aftertreatment calibration to realize the full potential of available technologies and achieve satisfactory real-world performance.

The ICCT concludes that “an effective implementation of RDE would be a major step in the right direction that should help address Europe’s urban air quality problems in the long run.”

ICCT also commented that since RDE does not include cold-start emissions, the allowed increase will be substantially higher than is indicated by the conformity factor. The second step of RDE, “likely to apply from 2019 onward, should bring conformity factors close to 1 and make Euro 6 diesel cars come closer to delivering on their promise (albeit seven years after their initial market introduction).” (See page 2 for the actual agreement reached in the EU)

The report is at [www.theicct.org/sites/default/files/publications/ICCT\\_NOx-control-tech\\_09032015.pdf](http://www.theicct.org/sites/default/files/publications/ICCT_NOx-control-tech_09032015.pdf).

## **T&E Report on Air Pollution from Vehicles**

On 14 September 2015 the green transport federation Transport & Environment (T&E) launched a new report titled ‘Don’t Breathe Here: Tackling air pollution from vehicles’.

The report covers most transport emissions issues, including passenger cars, heavy-duty vehicles (HDV), and non-road mobile machinery (NRMM).

For passenger cars, T&E has built on publicly-available real-world emissions data from Euro 6 diesel vehicles and says that most of Euro 6 diesel cars fail the NO<sub>x</sub> emissions limit in real life.

The report included 6 recommendations for EU action:

- Agree an ambitious Euro 6 RDE package that has strict not-to-exceed (NTE) limits for all pollutants, and which includes all engine operating conditions.
- Align emission limits and testing for NRMM with the Euro VI provisions in place for HDVs.

- Introduce a system of random conformity of production checks and in-service testing overseen by an independent EU Type-Approval Authority.

- The European Commission should propose Euro 7/VII limits for cars, vans and trucks that align limits for diesel, gasoline and natural gas vehicles to enable World Health Organization (WHO) air pollution guidelines to be met.

- Agree on Euro 5 standard for motorcycles and scooters and promote electric two-wheelers within a wider EU strategy on electro-mobility.

- Simplify EU infringement procedure to shorten the steps leading to penalties for non-compliant Member States.

The report is at [www.transportenvironment.org/publications/dont-breathe-here-tackling-air-pollution-vehicles](http://www.transportenvironment.org/publications/dont-breathe-here-tackling-air-pollution-vehicles).

## **DUH Report on Aftermarket Catalysts**

On 1 October 2015 Deutsche Umwelthilfe (DUH) released a report, prepared by TÜV Nord, evaluating the emissions control performance of seven aftermarket catalysts.

Aftermarket three-way catalysts were evaluated and compared against the Original Equipment (OE) replacement part for a VW Euro 4 1.6l gasoline Passat according to the requirements of the “Blue Angel” environmental label. The OE part and three aftermarket catalysts passed the test. Two aftermarket systems failed the emissions test after aging. Two others failed the emissions test in both fresh and aged state.

DUH said it has informed the German Federal Ministry of Transport (BMVI) and calls for a review of the replacement catalyst approval scheme.

The DUH report is at [www.duh.de/uploads/media/DUH-Kat-Test\\_T%C3%9CV-Nord-Bericht\\_2015.pdf](http://www.duh.de/uploads/media/DUH-Kat-Test_T%C3%9CV-Nord-Bericht_2015.pdf).

## **DUH Report on NO<sub>x</sub> Emissions of Euro 6 Diesel Opel Zafira**

On 23 October 2015 Deutsche Umwelthilfe (DUH) published the results of NO<sub>x</sub> emissions investigations conducted at the Biel University in Switzerland on a Euro 6b 1.6l diesel Opel Zafira fitted with a Selective Catalytic Reduction (SCR) system.

Emissions were measured on the regulatory cold-start NEDC test cycle and on warm test cycles including parts up to 150 km/h. Results show that the vehicle behaves differently when the chassis dynamometer is operated in 4- or 2-wheel mode. While the vehicle met the Euro 6 NO<sub>x</sub> limit of 80 mg/km when the NEDC cycle was driven on the 2-wheel dyno, it failed the limit when the rear wheels were turning.

Opel called the DUH claim “wrong and unfounded” and insisted it had by no means violated European

environmental standards. In a letter to the DUH, Opel wrote the differences in emission levels were not replicable in its own tests conducted in the presence of TÜV Hessen.

The DUH report is at [www.duh.de/uploads/media/DUH\\_test\\_report\\_nox\\_231015-unofficial\\_translation.pdf](http://www.duh.de/uploads/media/DUH_test_report_nox_231015-unofficial_translation.pdf).

## SwRI to launch 7<sup>th</sup> Clean Diesel Engine Consortium

Texas-based Southwest Research Institute (SwRI) is launching Clean High-Efficiency Diesel Engine VII, the seventh phase of the industry's longest-running diesel research consortium.

Consortium members will select research topics related to low-emission, high-efficiency diesel engine technology. Building on more than 24 years of experience, the consortium will develop pre-competitive diesel engine technology initiatives for the next five to ten years.

SwRI manages a number of automotive consortia including High-Efficiency, Dilute Gasoline Engine (HEDGE®) focusing on improving gasoline engine technology; Advanced Combustion Catalyst and Aftertreatment Technologies (AC2AT), which is looking at emissions solutions for future engines; and the Particle Sensor Performance and Durability (PSPD) program, aimed at evaluating heavy-duty engine exhaust sensors.

## ICCT Report on CO<sub>2</sub> Gap between Lab and Road

On 24 September 2015 the International Council on Clean Transportation (ICCT) released "From laboratory to road: a 2015 update" that extends their analysis of the gap between official and real-world fuel consumption and CO<sub>2</sub> emissions values for passenger cars in Europe and investigates the reasons for the increasing gap.

This 2015 update to a series begun in 2013 analysing 11 data sources covering 14 years, 6 countries, and almost 600 000 vehicles. The analysis shows that in the EU the gap between official vehicle CO<sub>2</sub> emissions and real-world CO<sub>2</sub> emissions continues to grow. From 8% in 2001, it reached 38% in 2014.

A number of reasons can explain the increasing gap, ICCT said. Flexibilities in the type-approval procedure allow for unrealistically low driving resistances and unrepresentative conditions during laboratory testing (these flexibilities account for the majority of the gap in 2014). Fuel-saving technologies such as stop-start systems and hybrid powertrains also prove more effective at reducing CO<sub>2</sub> emissions during lab testing than during real-world driving. Lastly, the type-approval

process fails to take into consideration auxiliary devices such as air conditioning and entertainment systems.

According to ICCT, the key implication of the study is the urgent need for improved test procedures. While a new type-approval procedure, the Worldwide Harmonized Light vehicle Test Procedure (WLTP), is expected to be introduced in the EU in 2017, WLTP will not close the gap on its own. On-road tests, similar to the Real-Driving Emissions (RDE) test procedure for air pollutants, and in-use conformity tests of randomly selected production vehicles should also be introduced, ICCT concludes.

The ICCT report is at [http://theicct.org/sites/default/files/publications/ICCT\\_LaboratoryToRoad\\_2015\\_Report\\_English.pdf](http://theicct.org/sites/default/files/publications/ICCT_LaboratoryToRoad_2015_Report_English.pdf).

## T&E Report on Car CO<sub>2</sub> Discrepancy between Lab and Real World

On 28 September 2015 Transport & Environment (T&E) released their annual report "Mind the gap" which analyses the gap between fuel economy and CO<sub>2</sub> emissions test results and real-world performance, based on data gathered by the International Council on Clean Transportation (ICCT).

T&E said the gap has grown from 8% in 2001 to 31% in 2012 and now 40% in 2014. Without action this gap will grow to nearly 50% by 2020, the NGO concludes.

According to the report, Mercedes cars have the biggest average gap between test and real-world performance, with real-world fuel consumption exceeding test results by nearly half. None of the improvement in CO<sub>2</sub> emissions measured in tests of Opel/Vauxhall cars since 2008 has delivered improvement on the road, and their real-world fuel economy is actually getting worse. Also, just a fifth of the apparent improvement in CO<sub>2</sub> emissions from the launch of the Mark 7 VW Golf (Europe's best-selling car) has been achieved on the road.

The report lists 5 policy solutions to the problem: a robust introduction of WLTP (with less flexibilities), strengthening the testing framework (with an independent European Type-Approval authority), a Commission proposal for a 2025 CO<sub>2</sub> target, a Commission proposal to improve consumer information, and an investigation into the use of defeat devices to distort CO<sub>2</sub> tests.

The report is at [www.transportenvironment.org/sites/te/files/publications/TE\\_Mind\\_the\\_Gap\\_2015\\_FINAL.pdf](http://www.transportenvironment.org/sites/te/files/publications/TE_Mind_the_Gap_2015_FINAL.pdf).

## OECD Report on Fossil Fuels Subsidies

On 21 September 2015 the Organisation for Economic Co-operation and Development (OECD) released the "OECD Companion to the Inventory of Support Measures for Fossil Fuels 2015".

The OECD assessed 800 policies across OECD countries and six partner economies (Brazil, China, India, Indonesia, Russia and South Africa). For the third year in a row, fossil fuels subsidies fell; from \$184 billion (€165 billion) in 2013 to \$167 billion in 2014.

The OECD attributed the recent decrease to both falling oil prices and policy reforms, such as France and the Netherlands removing excise tax exemptions for fuels used by households. But the biggest factor underpinning the global trend was major reform of diesel and gasoline subsidies implemented by Mexico and India in recent years.

The OECD noted that over two-thirds of the 800 policies were introduced prior to 2000, within a different political environment and when climate change was a lower priority for policymakers. It called on countries to “reassess the relevance of some of their support measures in today’s context”.

The OECD’s estimate of the scale of fossil fuel subsidies is smaller than that by the International Energy Agency and the International Monetary Fund due to different methodologies.

In July 2015 the OECD Secretary-General warned that fossil fuel subsidies could derail the global climate deal to be negotiated in Paris in December this year.

The OECD report is at [www.oecd.org/environment/oecd-companion-to-the-inventory-of-support-measures-for-fossil-fuels-2015-9789264239616-en.htm](http://www.oecd.org/environment/oecd-companion-to-the-inventory-of-support-measures-for-fossil-fuels-2015-9789264239616-en.htm).

## RESEARCH SUMMARY

### Effects of Emissions and Pollution

**The contribution of outdoor air pollution sources to premature mortality on a global scale**, J. Lelieveld, J. S. Evans, M. Fnais, et al.; *Nature* (17 September 2015), Vol. 525, pp. 367-371, [doi: 10.1038/nature15371](https://doi.org/10.1038/nature15371).

**Association between long-term exposure to air pollution and mortality in France: A 25-year follow-up study**, Malek Bentayeb, Verene Wagner, Morgane Stempfelet, et al.; *Environment International* (December 2015), Vol. 85, pp. 5-14, [doi: 10.1016/j.envint.2015.08.006](https://doi.org/10.1016/j.envint.2015.08.006).

**Exposure to long-term air pollution and road traffic noise in relation to cholesterol: A cross-sectional study**, Mette Sørensen, Dorrit Hjortebjerg, Kirsten T. Eriksen, et al.; *Environment International* (December 2015), Vol. 85, pp. 238-243, [doi: 10.1016/j.envint.2015.09.021](https://doi.org/10.1016/j.envint.2015.09.021).

**Ultrastructural observations of adult and breastfeeding Balb/C mice lung tissues after exposure to airborne pollutants at heavy traffic sites** (poster), Maria Bousnaki, Chrysanthi Simou, Katerina Kaidoglou, et al.; *Reproductive Toxicology* (November 2015), Vol. 57, pp. 226-227, [doi: 10.1016/j.reprotox.2015.06.041](https://doi.org/10.1016/j.reprotox.2015.06.041).

**Pulmonary inflammatory effects of source-oriented particulate matter from California’s San Joaquin Valley**, Laurel Plummer, Christopher Carosino, Keith Bein, et al.; *Atmospheric Environment* (October 2015), Vol. 119, pp. 174-181, [doi: 10.1016/j.atmosenv.2015.08.043](https://doi.org/10.1016/j.atmosenv.2015.08.043).

**Reduced gene expression levels after chronic exposure to high concentrations of air pollutants**, Pavel Rossner, Elena Tulupova, Andrea Rossnerova, et al.; *Mutation Research/Fundamental and*

*Molecular Mechanisms of Mutagenesis* (October 2015), Vol. 780, pp. 60-70, [doi: 10.1016/j.mrfmmm.2015.08.001](https://doi.org/10.1016/j.mrfmmm.2015.08.001).

**Ambient and Emission Trends of Toxic Air Contaminants in California**, Ralph Propper, Patrick Wong, Son Bui, et al.; *Environ. Sci. Technol.* (2015), Vol. 49 (19), pp. 11329-11339, [doi: 10.1021/acs.est.5b02766](https://doi.org/10.1021/acs.est.5b02766).

**Reactive Oxygen Species Generation Linked to Sources of Atmospheric Particulate Matter and Cardiorespiratory Effects**, Josephine T. Bates, Rodney J. Weber, Joseph Abrams, et al.; *Environ. Sci. Technol.* (in press), [doi: 10.1021/acs.est.5b02967](https://doi.org/10.1021/acs.est.5b02967).

**Assessing public health burden associated with exposure to ambient black carbon in the United States**, Ying Li, Daven Henze, Darby Jack, et al.; *Science of The Total Environment* (1 January 2016), Vol. 539, pp. 515-525, [doi: 10.1016/j.scitotenv.2015.08.129](https://doi.org/10.1016/j.scitotenv.2015.08.129).

**Impact of urban air pollution on the allergenicity of *Aspergillus fumigatus* conidia: Outdoor exposure study supported by laboratory experiments**, Naama Lang-Yona, Timor Shuster-Meiseles, Yinon Mazar, et al.; *Science of The Total Environment* (15 January 2016), Vol. 541, pp. 365-371, [doi: 10.1016/j.scitotenv.2015.09.058](https://doi.org/10.1016/j.scitotenv.2015.09.058).

**Does maternal exposure to benzene and PM<sub>10</sub> during pregnancy increase the risk of congenital anomalies? A population-based case-control study**, Marco Vinceti, Carlotta Malagoli, Marcella Malavolti, et al.; *Science of The Total Environment* (15 January 2016), Vol. 541, pp. 444-450, [doi: 10.1016/j.scitotenv.2015.09.051](https://doi.org/10.1016/j.scitotenv.2015.09.051).

**Long-term traffic air and noise pollution in relation to mortality and hospital readmission among myocardial infarction survivors**, Cathryn Tonne, Jaana Halonen, Sean Beevers, et al.; *International Journal of Hygiene and Environmental Health* (in press), [doi: 10.1016/j.ijheh.2015.09.003](https://doi.org/10.1016/j.ijheh.2015.09.003).

**Ambient Particulate Matter Air Pollution Exposure and Mortality in the NIH-AARP Diet and Health Cohort**, George D. Thurston, Jiyoung Ahn, Kevin R. Cromar, et al.; *Environ. Health Perspect.* (in press), [doi: 10.1289/ehp.1509676](https://doi.org/10.1289/ehp.1509676).

**Comparison of cellular toxicity caused by ambient ultrafine particles and engineered metal oxide nanoparticles**, Senlin Lu, Wenchao Zhang, Rui Zhang, et al.; *Particle and Fibre Toxicology* (2015), Vol. 12 (5), [doi: 10.1186/s12989-015-0082-8](https://doi.org/10.1186/s12989-015-0082-8).

**Nitrative stress, oxidative stress and plasma endothelin levels after inhalation of particulate matter and ozone**, Prem Kumarathanan, Erica Blais, Anushyadevi Saravanamuthu, et al.; *Particle and Fibre Toxicology* (2015), Vol. 12 (28), [doi: 10.1186/s12989-015-0103-7](https://doi.org/10.1186/s12989-015-0103-7).

**The health benefits of reducing air pollution in Sydney, Australia**, Richard A. Broome, Neal Fann, Tina J. Navin Cristina, et al.; *Environmental Research* (November 2015), Vol. 143 (A), pp. 19-25, [doi: 10.1016/j.envres.2015.09.007](https://doi.org/10.1016/j.envres.2015.09.007).

**Ethnic differences in ambient air pollution and risk of acute ischemic stroke**, Jeffrey J. Wing, Sara D. Adar, Brisa N. Sánchez, et al.; *Environmental Research* (November 2015), Vol. 143 (A), pp. 62-67, [doi: 10.1016/j.envres.2015.09.031](https://doi.org/10.1016/j.envres.2015.09.031).

**Health externalities of ship air pollution at port – Piraeus port case study**, Stefanos D. Chatzinikolaou, Stylianos D. Oikonomou, Nikolaos P. Ventikos; *Transportation Research Part D: Transport and Environment* (October 2015), Vol. 40, pp. 155-165, [doi: 10.1016/j.trd.2015.08.010](https://doi.org/10.1016/j.trd.2015.08.010).

### Air Quality, Sources and Exposure

**Air quality evaluation of London Paddington train station**, Uven Chong, Jacob Swanson, Adam Boies; *Environment Research Letters* (2015), Vol. 10 (9), [doi: 10.1088/1748-9326/10/9/094012](https://doi.org/10.1088/1748-9326/10/9/094012).

**Fine particulate matter components and mortality in Greater Houston: Did the risk reduce from 2000 to 2011?** Suyang Liu, Kai Zhang; *Science of The Total Environment* (15 December 2015), Vol. 538, pp. 162-168, [doi: 10.1016/j.scitotenv.2015.08.037](https://doi.org/10.1016/j.scitotenv.2015.08.037).



**A modeling framework for characterizing near-road air pollutant concentration at community scales**, Shih Ying Chang, William Vizuete, Alejandro Valencia, et al.; *Science of The Total Environment* (15 December 2015), Vol. 538, pp. 905-921, [doi: 10.1016/j.scitotenv.2015.06.139](https://doi.org/10.1016/j.scitotenv.2015.06.139).

**Mobile assessment of on-road air pollution and its sources along the East–West Highway in Bhutan**, Tenzin Wangchuk, Luke Knibbs, Congrong He, et al.; *Atmospheric Environment* (October 2015), Vol. 118, pp. 98-106, [doi: 10.1016/j.atmosenv.2015.07.040](https://doi.org/10.1016/j.atmosenv.2015.07.040).

**Variation and co-variation of PM<sub>10</sub>, particle number concentration, NO<sub>x</sub> and NO<sub>2</sub> in the urban air – relationships with wind speed, vertical temperature gradient and weather type**, M. Grundström, C. Hak, D. Chen, et al.; *Atmospheric Environment* (November 2015), Vol. 120, pp. 317-327, [doi: 10.1016/j.atmosenv.2015.08.057](https://doi.org/10.1016/j.atmosenv.2015.08.057).

**On-bicycle Exposure to Particulate Air Pollution: Particle Number, Black Carbon, PM<sub>2.5</sub>, and Particle Size**, Steve Hankey, Julian Marshall; *Atmospheric Environment* (December 2015), Vol. 122, pp. 65-73, [doi: 10.1016/j.atmosenv.2015.09.025](https://doi.org/10.1016/j.atmosenv.2015.09.025).

**Urban air quality comparison for bus, tram, subway and pedestrian commutes in Barcelona**, Teresa Moreno, Cristina Reche, Ioar Rivas, et al.; *Environmental Research* (October 2015), Vol. 142, pp. 495-510, [doi: 10.1016/j.envres.2015.07.022](https://doi.org/10.1016/j.envres.2015.07.022).

**Molecular characterization of brown carbon (BrC) chromophores in secondary organic aerosol generated from photo-oxidation of toluene**, Peng Lin, Jiumeng Liu, John E. Shilling, et al.; *Phys. Chem. Chem. Phys.* (2015), Vol. 17, pp. 23312-23325, [doi: 10.1039/C5CP02563J](https://doi.org/10.1039/C5CP02563J).

**The curious case of NO<sub>x</sub> pollution**, Andy Coghlan; *New Scientist* (3 October 2015), Vol. 227 (3041), pp. 10-11, [doi: 10.1016/S0262-4079\(15\)31295-1](https://doi.org/10.1016/S0262-4079(15)31295-1).

**Air pollution in moderately polluted urban areas: How does the definition of “neighborhood” impact exposure assessment?** Quentin Tenailleau, Frédéric Mauny, Daniel Joly, et al.; *Environmental Pollution* (November 2015), Vol. 206, pp. 437-448, [doi: 10.1016/j.envpol.2015.07.021](https://doi.org/10.1016/j.envpol.2015.07.021).

**Short-term exposure to fine and coarse particles and mortality: A multicity time-series study in East Asia**, Hyewon Lee, Yasushi Honda, Masahiro Hashizume, et al.; *Environmental Pollution* (December 2015), Vol. 207, pp. 43-51, [doi: 10.1016/j.envpol.2015.08.036](https://doi.org/10.1016/j.envpol.2015.08.036).

**Atmospheric polycyclic aromatic hydrocarbons in the urban environment: Occurrence, toxicity and source apportionment**, Nitika Mishra, Godwin A. Ayoko, Lidia Morawska; *Environmental Pollution* (in press), [doi: 10.1016/j.envpol.2015.08.015](https://doi.org/10.1016/j.envpol.2015.08.015).

**Spatial variation of PM elemental composition between and within 20 European study areas – Results of the ESCAPE project**, Ming-Yi Tsai, Gerard Hoek, Marloes Eeftens, et al.; *Environment International* (November 2015), Vol. 84, pp. 181-192, [doi: 10.1016/j.envint.2015.04.015](https://doi.org/10.1016/j.envint.2015.04.015).

**Nitrogen isotope composition of thermally produced NO<sub>x</sub> from various fossil-fuel combustion sources**, Wendell W. Walters, Bruce Tharp, Huan Fang, et al.; *Environ. Sci. Technol.* (2015), Vol. 49 (19), pp. 11363-11371, [doi: 10.1021/acs.est.5b02769](https://doi.org/10.1021/acs.est.5b02769).

**Source prioritization for urban particulate emission control in India based on an inventory of PM<sub>10</sub> and its carbonaceous fraction in six cities**, Prashant Gargava, V. Rajagopalan; *Environmental Development* (in press), [doi: 10.1016/j.envdev.2015.07.009](https://doi.org/10.1016/j.envdev.2015.07.009).

## Emissions Measurements and Modelling

**Diminishing Returns or Compounding Benefits of Air Pollution Control? The Case of NO<sub>x</sub> and Ozone**, Amanda Pappin, S. Morteza Mesbah, Amir Hakami, et al.; *Environ. Sci. Technol.* (2015), Vol. 49 (16), pp. 9548-9556, [doi: 10.1021/acs.est.5b00950](https://doi.org/10.1021/acs.est.5b00950).

**Reactive Nitrogen Species Emission Trends in Three Light-/Medium-Duty United States Fleets**, Gary A. Bishop, Donald H. Stedman; *Environ. Sci. Technol.* (2015), Vol. 49 (18), pp. 11234-11240, [doi: 10.1021/acs.est.5b02392](https://doi.org/10.1021/acs.est.5b02392).

**Vehicular Emission Ratios of VOCs in a Megacity Impacted by Extensive Ethanol Use: Results of Ambient Measurements in São Paulo, Brazil**, Joel Brito, Florian Wurm, Ana Maria Yáñez-Serrano, et al.; *Environ. Sci. Technol.* (2015), Vol. 49 (19), pp. 11381-11387, [doi: 10.1021/acs.est.5b03281](https://doi.org/10.1021/acs.est.5b03281).

**Intermediate-Volatility Organic Compound Emissions from On-road Diesel Vehicles: Chemical Composition, Emission Factors and Estimated Secondary Organic Aerosol Production**, Yunliang Zhao, Ngoc Nguyen, Albert Presto, et al.; *Environ. Sci. Technol.* (2015), Vol. 49 (19), pp. 11516-11526, [doi: 10.1021/acs.est.5b02841](https://doi.org/10.1021/acs.est.5b02841).

**Variability in Light-Duty Gasoline Vehicle Emission Factors from Trip-Based Real-World Measurements**, Bin Liu, H. Christopher Frey; *Environ. Sci. Technol.* (2015), Vol. 49 (20), pp. 12525-12534, [doi: 10.1021/acs.est.5b00553](https://doi.org/10.1021/acs.est.5b00553).

**Particle- and gaseous emissions from a LNG powered ship**, Maria Anderson, Kent Salo, Erik Fridell; *Environ. Sci. Technol.* (2015), Vol. 49 (20), pp. 12568-12575, [doi: 10.1021/acs.est.5b02678](https://doi.org/10.1021/acs.est.5b02678).

**Comparison of Over-the-Rail and Rail Yard Measurements of Diesel Locomotives**, Brandon M. Graver, H. Christopher Frey; *Environ. Sci. Technol.* (2015), Vol. 49 (21), pp. 13031-13039, [doi: 10.1021/acs.est.5b02497](https://doi.org/10.1021/acs.est.5b02497).

**Effects of cold temperature and ethanol content on VOC emissions from light-duty gasoline vehicles**, Ingrid J. George, Michael D. Hays, Jason S. Herrington, et al.; *Environ. Sci. Technol.* (2015), Vol. 49 (21), pp. 13067-13074, [doi: 10.1021/acs.est.5b04102](https://doi.org/10.1021/acs.est.5b04102).

**Load-dependent emission factors and chemical characteristics of IVOCs from a medium-duty diesel engine**, Eben Cross, Alexander Sappok, Victor Wong, et al.; *Environ. Sci. Technol.* (in press), [doi: 10.1021/acs.est.5b03954](https://doi.org/10.1021/acs.est.5b03954).

**On the use of small and cheaper sensors and devices for indicative citizen-based monitoring of respirable particulate matter**, Milena Jovašević-Stojanović, Alena Bartonova, Dušan Topalović, et al.; *Environmental Pollution* (November 2015), Vol. 206, pp. 696-704, [doi: 10.1016/j.envpol.2015.08.035](https://doi.org/10.1016/j.envpol.2015.08.035).

**NO<sub>x</sub> emissions from low-temperature combustion of biodiesel made of various feedstocks and blends**, Hamid Omidvarborna, Ashok Kumar, Dong-Shik Kim; *Fuel Processing Technology* (December 2015), Vol. 140, pp. 113-118, [doi: 10.1016/j.fuproc.2015.08.031](https://doi.org/10.1016/j.fuproc.2015.08.031).

**Diesel-related hydrocarbons can dominate gas phase reactive carbon in megacities**, R. E. Dunmore, J. R. Hopkins, R. T. Lidster, et al.; *Atmos. Chem. Phys.* (2015), Vol. 15 (17), pp. 9983-9996, [doi: 10.5194/acp-15-9983-2015](https://doi.org/10.5194/acp-15-9983-2015).

**The Repeatability and Reproducibility of Particle Number Measurements from a Heavy Duty Diesel Engine**, M. Yusuf Khan, Shirish A. Shimpi, William T. Martin; *Emission Control Science and Technology* (October 2015), Vol. 1 (4), pp. 298-307, [doi: 10.1007/s40825-015-0026-7](https://doi.org/10.1007/s40825-015-0026-7).

**Air Quality Improvements Following Implementation of Lisbon's Low Emission Zone**, F. Ferreira, P. Gomes, H. Tente, et al.; *Atmospheric Environment* (in press), [doi: 10.1016/j.atmosenv.2015.09.064](https://doi.org/10.1016/j.atmosenv.2015.09.064).

## Emissions Control, Catalysis, Filtration

**Experimental and Simulation Analysis of Temperature and Particulate Matter Distribution for a Catalyzed Diesel Particulate Filter**, Boopathi S. Mahadevan, John H. Johnson, Mahdi Shahbakhti, et al.; *Emission Control Science and Technology* (October 2015), Vol. 1 (4), pp. 255-283, [doi: 10.1007/s40825-015-0022-y](https://doi.org/10.1007/s40825-015-0022-y).

**Rh Supported on LaPO<sub>4</sub>/SiO<sub>2</sub> Nanocomposites as Thermally Stable Catalysts for TWC Applications**, Haris Puspito Buwono, Taishi Eidome, Saki Minami, et al.; *Emission Control Science and Technology* (October 2015), Vol. 1 (4), pp. 284-291, [doi: 10.1007/s40825-015-0024-9](https://doi.org/10.1007/s40825-015-0024-9).

**Measurement of Vanadium Emissions from SCR Catalysts by ICP-OES: Method Development and First Results**, T. J. Schildhauer, M. Elsener, J. Moser, et al.; *Emission Control Science and Technology* (October 2015), Vol. 1 (4), pp. 292-297, [doi: 10.1007/s40825-015-0023-x](https://doi.org/10.1007/s40825-015-0023-x).

**Emissions during active regeneration of a diesel particulate filter on a heavy duty diesel engine: Stationary tests**, Dieter Rothe, Markus Knauer, Gerhard Emmerling, et al.; *Aerosol Science* (December 2015), Vol. 90, pp. 14-25, [doi: 10.1016/j.jaerosci.2015.07.007](https://doi.org/10.1016/j.jaerosci.2015.07.007).

**Flame-Made WO<sub>3</sub>/CeOx-TiO<sub>2</sub> Catalysts for Selective Catalytic Reduction of NOx by NH<sub>3</sub>**, Katarzyna Michalow-Mauke, Ye Lu, Kazimierz Kowalski, et al.; *ACS Catal.* (2015), Vol. 5 (10), pp 5657-5672, [doi: 10.1021/acscatal.5b01580](https://doi.org/10.1021/acscatal.5b01580).

**Reaction-driven Ion Exchange of Copper into Zeolite SSZ-13**, A. K. S. Clemens, A. Shishkin, P.-A. Carlsson, et al.; *ACS Catal.* (2015), Vol. 5 (10), pp. 6209-6218, [doi: 10.1021/acscatal.5b01200](https://doi.org/10.1021/acscatal.5b01200).

**Effects of Alkali and Alkaline Earth Cocations on the Activity and Hydrothermal Stability of Cu/SSZ-13 NH<sub>3</sub>-SCR Catalysts**, Feng Gao, Yilin Wang, Nancy Washton et al.; *ACS Catal.* (2015), Vol. 5 (11), pp. 6780-6791, [doi: 10.1021/acscatal.5b01621](https://doi.org/10.1021/acscatal.5b01621).

**Hydrogen-assisted SCR of NOx over alumina-supported silver and indium catalysts using C<sub>2</sub>-hydrocarbons and oxygenates**, Linda Ström, Per-Anders Carlsson, Magnus Skoglundh, et al.; *Applied Catalysis B: Environmental* (February 2016), Vol. 181, pp. 403-412, [doi: 10.1016/j.apcatb.2015.08.009](https://doi.org/10.1016/j.apcatb.2015.08.009).

**Effects of temperature and rich-phase composition on the performance of a commercial NOx-Storage-Reduction material**, Juliette Dupré, Philippe Bazin, Olivier Marie, et al.; *Applied Catalysis B: Environmental* (February 2016), Vol. 181, pp. 534-541, [doi: 10.1016/j.apcatb.2015.08.033](https://doi.org/10.1016/j.apcatb.2015.08.033).

**The impact of CO and C<sub>3</sub>H<sub>6</sub> pulses on PtOx reduction and NO oxidation in a diesel oxidation catalyst**, Adéla Arvajová, Petr Kočí, Volker Schmeißer, et al.; *Applied Catalysis B: Environmental* (February 2016), Vol. 181, pp. 644-650, [doi: 10.1016/j.apcatb.2015.08.004](https://doi.org/10.1016/j.apcatb.2015.08.004).

**Ship Compliance in Emission Control Areas: Technology Costs and Policy Instruments**, Edward Carr, James Corbett; *Environ. Sci. Technol.* (2015), Vol. 49 (16), pp. 9584-9591, [doi: 10.1021/acs.est.5b02151](https://doi.org/10.1021/acs.est.5b02151).

**Role of Alternative Fuels on Particulate Matter (PM) Characteristics and Influence of the Diesel Oxidation Catalyst**, Mohammed A. Fayad, Jose M. Herreros, Francisco J. Martos, et al.; *Environ. Sci. Technol.* (2015), Vol. 49 (19), pp. 11967-11973, [doi: 10.1021/acs.est.5b02447](https://doi.org/10.1021/acs.est.5b02447).

**Variability in Light-Duty Gasoline Vehicle Emission Factors from Trip-Based Real-World Measurements**, Bin Liu, H. Christopher Frey; *Environ. Sci. Technol.* (2015), Vol. 49 (20), pp. 12525-12534, [doi: 10.1021/acs.est.5b00553](https://doi.org/10.1021/acs.est.5b00553).

**Selective catalytic reduction of nitric oxide over cerium-doped activated carbons**, Annaprabha Athappan, Melanie Sattler, Sumathi Sethupathi; *Environmental Chemical Engineering* (December 2015), Vol. 3 (4) Part A, pp. 2502-2513, [doi: 10.1016/j.jece.2015.08.028](https://doi.org/10.1016/j.jece.2015.08.028).

**Low-Temperature CO Oxidation over a Ternary Oxide Catalyst with High Resistance to Hydrocarbon Inhibition**, Andrew J. Binder, Todd J. Toops, Raymond R. Unocic, et al.; *Angewandte Chemie* (November 2015), Vol. 127 (45), pp. 13461-13465, [doi: 10.1002/ange.201506093](https://doi.org/10.1002/ange.201506093).

## Transport, Climate Change & Emissions

**Hybrid-Electric Passenger Car Carbon Dioxide and Fuel Consumption Benefits Based on Real-World Driving**, Britt Holmén, Karen Sentoff; *Environ. Sci. Technol.* (2015), Vol. 49 (16), pp. 10199-10208, [doi: 10.1021/acs.est.5b01203](https://doi.org/10.1021/acs.est.5b01203).

**Assessment of the effectiveness of fuel and toll pricing policies in motorway emissions: An ex-post analysis**, T. Fontes, S. Pereira, J. Bandeira, et al.; *Research in Transportation Economics* (in press), [doi: 10.1016/j.retrec.2015.07.010](https://doi.org/10.1016/j.retrec.2015.07.010).

**The greenhouse gas automotive advertisement study**, Pasquale Scopa, Maria Luisa Scapellato, Egle Perissinotto, et al.; *Transport Policy* (January 2016), Vol. 45, pp. 77-85, [doi: 10.1016/j.tranpol.2015.09.009](https://doi.org/10.1016/j.tranpol.2015.09.009).

**Pathways for GHG emission reduction in Norwegian road transport sector: Perspective on consumption of passenger car transport and electricity mix**, Bhawna Singh, Linda Ager-Wick Ellingsen, Anders Hammer Strømman; *Transportation Research Part D: Transport and Environment* (December 2015), Vol. 41, pp. 160-164, [doi: 10.1016/j.trd.2015.09.028](https://doi.org/10.1016/j.trd.2015.09.028).

## FORTHCOMING CONFERENCES

### Ricardo Motorcycle Conference

16 November 2015, Milan, Italy

[www.motorcycleconference.com](http://www.motorcycleconference.com)

*Main subject areas of the conference will be future powertrain technologies, future vehicle technologies, and motorcycle market drivers.*

### 4. Fachtagung Homologation

16-17 November 2015, Munich, Germany

[www.tuev-sued.de/akademie-de/congress/automobilbahn/homologation](http://www.tuev-sued.de/akademie-de/congress/automobilbahn/homologation)

*On the first day of the conference general topics on homologation will be treated; on the second day specific aspects of type-approval for agricultural and forestry vehicles, for commercial vehicles and the environment theme will be addressed in parallel workshops.*

### Les Respirations

23 November 2015, Paris, France

[www.lesrespirations.org/edition-2015](http://www.lesrespirations.org/edition-2015)

*The Theme of the forum, organized one week ahead of the COP21 conference, is 'Air Quality: growth work for cities'.*

### MAA2015: Air Quality Monitoring - Evolving Issues and New Technologies

9-10 December 2015, London, UK

[www.eventbrite.co.uk/e/maa-2015-air-quality-monitoring-evolving-issues-and-new-technologies-registration-19236784741](http://www.eventbrite.co.uk/e/maa-2015-air-quality-monitoring-evolving-issues-and-new-technologies-registration-19236784741)

*The conference will focus on vehicle emissions along with other high profile topics and new measurement techniques. The conference will be held in conjunction with DEFRA's Air Quality Expert Group and will include sessions based on topics that AQEG are currently scoping to help gather evidence.*

## 9<sup>th</sup> International Exhaust Gas and Particulate Emissions Forum

23-24 February 2016, Ludwigsburg, Germany

[www.forum-emissions.com/index.html?lang=en](http://www.forum-emissions.com/index.html?lang=en)

*The AVL Forum will focus on further development of spark-ignition and compression-ignition combustion processes including hybrid solutions and the use of conventional and alternative fuels. In all of this, capturing real-driving emissions is as important as quantifying lowest emissions during steady-state and transient operations via measuring techniques.*

## 6<sup>th</sup> Integer Emissions Summit & ARLA 32 Forum Brazil 2016

1-2 March 2016, São Paulo, Brazil

[www.integer-research.com/conferences/ies-brazil-2016](http://www.integer-research.com/conferences/ies-brazil-2016)

*The conference will provide an in-depth insight into the latest research, developments, technologies and opinions on all aspects of Diesel emissions reduction in Brazil.*

## AVL Workshop Real Driving Emissions

15 March 2016, Pfungstadt, Germany

Info will be at [www.avl-fahrzeugmesstechnik.de](http://www.avl-fahrzeugmesstechnik.de)

## 31<sup>st</sup> BAUMA 2016

11-17 April 2016, Munich, Germany

[www.bauma.de](http://www.bauma.de)

*31<sup>st</sup> edition of the world's leading trade fair for construction machinery, building material machines, mining machines, construction vehicles and construction equipment.*

## SAE 2016 World Congress & Exhibition

12-14 April 2016, Detroit, Michigan, USA

[www.sae.org/congress](http://www.sae.org/congress)

## 6<sup>th</sup> European Transport Research Conference – Moving Forward: Innovative Solutions for Tomorrow's Mobility

18-21 April 2016, Warsaw, Poland

[www.traconference.eu](http://www.traconference.eu)

*The conference topics address the main challenges in transport and mobility of people and goods with respect to energy, environment, safety and security as well as socio-economic issues.*

## 7<sup>th</sup> AVL Large Engines TechDays

19-20 April 2016, Graz, Austria

[www.avl.com/large-engines-techdays](http://www.avl.com/large-engines-techdays)

*Forum for information, exchange and discussion for the large engine industry community, representing manufacturers, suppliers and users.*

## 9<sup>th</sup> Integer Emissions Summit & AdBlue® Forum Asia 2016

26-28 April 2016, Shanghai, China

[www.integer-research.com/conferences/ies-asia-2016](http://www.integer-research.com/conferences/ies-asia-2016)

*The conference will address Asia's unique emissions control challenges and examine cost-effective, regulation compliant emissions reduction strategies.*

## 37<sup>th</sup> International Vienna Motor Symposium

28-29 April 2016, Vienna, Austria

[www.xn--vk-eka.at/index\\_en.htm](http://www.xn--vk-eka.at/index_en.htm)

*The conference will discuss latest results in worldwide engine and powertrain development, fuel cell, hydrogen and infrastructure, fuels and components, drivetrain electrification, connectivity, autonomous driving, hybrid technology, Real Driving Emissions (RDE), CO<sub>2</sub> reduction, and exhaust emissions control.*

## 21<sup>st</sup> International Transport and Air Pollution (TAP) Conference

24-26 May 2016, Lyon, France

<http://tap2016.sciencesconf.org>

*The aim of TAP 2016 will be "Towards energy transition and cleaner transport" and their implication to air quality, with an emphasis on the exhaust and non-exhaust emissions from transport modes, emission control and technologies, transport, energy consumption and greenhouse gas emissions, urban and suburban air quality, and transport policies and mobility challenges towards cleaner cities. Modes addressed include road, rail, air, waterborne, and cross-modality.*

**Deadline for abstracts: 30 November 2015**

## SIA Powertrain: The clean compression ignition engine of the future

1-2 June 2016, Rouen, France

[www.sia.fr/evenements/12-sia-powertrain-rouen-2016](http://www.sia.fr/evenements/12-sia-powertrain-rouen-2016)

*The topics to be addressed include new Diesel engines for passenger cars, commercial vehicles, heavy-duty trucks, off-road, industrial applications, and range extenders; downsizing, fuel injection technology, combustion processes, turbocharging, air & EGR management systems and exhaust aftertreatment; electrification and hybridization; innovative concepts for emissions and CO<sub>2</sub> reduction; engine, vehicle tests & calibration techniques; new fuels and lubricants; future emission regulations; environment and air quality; eco-mobility; and worldwide market evolution.*

## 6<sup>th</sup> Freiburg Workshop "Air Pollution and models"

7-8 June 2016, Freiburg, Germany

[www.ivu-umwelt.de](http://www.ivu-umwelt.de)

## 28<sup>th</sup> International AVL "Conference Engine & Environment"

9-10 June 2016, Graz, Austria

[www.avl.com/engine-environment-2016](http://www.avl.com/engine-environment-2016)

*The topic of the conference is “Powertrains for the Chinese market: a challenge for the global automotive industry”.*

### **20<sup>th</sup> ETH Conference on Combustion Generated nanoparticles**

13-16 June 2016, Zurich, Switzerland

<http://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.*

### **Diesel Powertrains 3.0**

14-15 June 2016, Leipzig, Germany

[www.fev.com/fev-conferences/fev-conference-on-diesel-powertrains-30.html](http://www.fev.com/fev-conferences/fev-conference-on-diesel-powertrains-30.html)

*The international conference will highlight current developments in the Light-Duty Diesel Powertrain segment with a widespread list of topics, offering multiple interesting paths for best compliance with upcoming demands.*

### **FAD Real Driving Emissions Workshop**

16-17 June 2016, Dresden, Germany

Info will be at [www.fad-diesel.de](http://www.fad-diesel.de)

### **12<sup>th</sup> Integer Emissions Summit & AdBlue<sup>®</sup> Forum Europe 2016**

21-23 June 2016, Brussels, Belgium

[www.integer-research.com/conferences/ies-europe-2016](http://www.integer-research.com/conferences/ies-europe-2016)

*The conference will address emissions control strategy and technology for the on-road, non-road and marine sectors.*

### **6<sup>th</sup> International Conference on MinNOx**

22-23 June 2016, Berlin, Germany

[www.iav.com/MinNOx](http://www.iav.com/MinNOx)

*MinNOx has become an internationally established conference, focusing on minimizing nitrogen oxide emissions from combustion engines using exhaust gas aftertreatment.*

**Deadline for abstracts: 31 December 2015**

### **FISITA 2016 World Automotive Congress**

26-30 September 2016, Busan, South Korea

[www.fisita2016.com](http://www.fisita2016.com)

*FISITA 2016 will focus on energy-efficiency, safety, eco-friendly technology, and connectivity.*

### **25<sup>th</sup> Aachen Colloquium**

10-12 October 2016, Aachen, Germany

[www.aachener-kolloquium.de](http://www.aachener-kolloquium.de)