

NEWSLETTER

International Regulatory Developments

TABLE OF CONTENTS

EUROPE	2
Meetings of the Advisory Group on Vehicle Emission Standards	2
Parliament and Council reach Informal Agreement on Climate Obligation	3
Council Request to Permanent Representatives for Euro 6 Guidance	3
Adoption of EU Taxonomy Measures Package	3
Alternative Fuels Infrastructure Directive Implementation Appraisal.....	4
Extension of French Government Automotive Industry Support	5
UK Emissions Reduction Target increased to 78% by 2035	5
NORTH AMERICA	5
US EPA Heavy-Duty Emission Standards Update	5
Cost Analysis of CARB Low-NOx Rule	5
US Revised Carbon Reduction Target	6
Proposal for California to be allowed to set own Emissions Rules	6
ASIA PACIFIC	6
Gasoline and Diesel Fuel Quality Survey in India.....	6
Australia Light-Duty Vehicle CO ₂ Emissions	7
New Zealand Light Vehicle CO ₂ Emissions.....	7
UNITED NATIONS	7
Cities' Commitment to halve Emissions by 2030.....	7
GENERAL	7
AECC Ultra Low Heavy-Duty Emissions Presentation at Vienna Motor Symposium	7
Estimated Costs of Emissions Control Technologies to meet Euro VII.....	8
TNO Testing of Light-Duty and Heavy-Duty Vehicles and Non-Road Machines.....	8
ICCT Seminar on Vehicle CO ₂ Standards.....	9
RESEARCH SUMMARY	10
FORTHCOMING CONFERENCES	11

EUROPE

Meetings of the Advisory Group on Vehicle Emission Standards

On 8 April 2021, the European Commission's Advisory Group on Vehicle Emission Standards (AGVES) held its ninth meeting. The AGVES meeting was conducted in a virtual setup and was chaired by EU Commission DG GROW's Dr Penny Dilara. The agenda covered light-duty (LD) and heavy-duty (HD) results of CLOVE study Part A. Evaporative, non-exhaust emissions, on-board monitoring (OBM) and geofencing were discussed as well.

The Consortium for ultra LOW Vehicle Emissions (CLOVE) presented revised scenarios for light- and heavy-duty including testing conditions, which differ to the scenarios presented in October 2020. Technology packages were defined for each and expected feasible emissions results presented. CLOVE included normal and extended test conditions, with different limits. A so-called cold-start budget was defined to cover emissions for short trips. An approach to cover emissions under regeneration, considering the regeneration frequency, was also presented.

For evaporative emissions, limit scenarios and technology packages were presented as well. For non-exhaust emissions, CLOVE presented its considerations so far but cautioned that these will be revised according to the results from the work conducted by the Particle Measurement Programme (PMP), an informal working group at UNECE level. For OBM introduction, CLOVE suggested two phases.

The European Commission stated that the objective of the CLOVE presentation is not to give sufficient information to start designing the vehicle or components. It was clarified that the proposals and scenarios shown are the opinion of the consultants and not an official position from the Commission. Further intense discussion will be needed to define the implemented regulation. The CLOVE reports will be made public together with the impact assessment at the release of the EC proposal in the last quarter of 2021.

A further AGVES meeting was held on 27 April.

Development of post-Euro 6/VI emission standards for cars, vans, lorries and buses

- Future pollutant emissions standards (known as Euro7) will make sure that **new vehicles placed on the market are as clean as possible**. The Commission's new proposal will set **realistic but necessary levels of ambition** based on careful evaluation of various aspects, including different air pollutant emissions stringency scenarios, technological progress and international developments.
- The interplay of both initiatives will provide a predictable, realistic and technology-neutral pathway to clean road transport.
- **Does not have the objective to put an end to the Internal Combustion Engines**



At the start of the meeting, the EU Commission stated that the CO₂ targets and Euro 7 initiatives need to take into consideration that new vehicles placed on the market should be as clean as possible.

The interplay between these initiatives will provide a predictable, realistic and technology-neutral pathway to clean road transport. The Commission emphasised the objective of the Euro 7 standard is not to put an end to internal combustion engines (ICEs).

For light-duty vehicles, CLOVE clarified the budget concept and its applicability; limit setting for extended conditions compared to normal conditions; definition of minimum reference test distance; options for nitrous oxide (N₂O) and methane (CH₄) limits with direction by the Commission to evaluate N₂O and CH₄ as pollutants and not as greenhouse gases; and gasoline particulate filter (GPF) filtration efficiency, amongst other items. An update of the CLOVE scenarios for LD was presented, including increased N₂O and CH₄ limits. Only slight changes were introduced for Scenario 2 values as these need to be challenging to what is expected from the future technologies. CLOVE reconsidered the former Test Conformity Indicator (TCI) concept and reformulated it as "strengthening the Malfunction Indicator Lamp (MIL) functionality".

CLOVE explained that detection limits of portable emissions measurement systems (PEMS) devices have been taken into consideration when proposing limits and that sufficient margin (15% for nitrogen oxides, 50% for particulates) is foreseen between the limit and expected performance.

For heavy-duty vehicles, CLOVE clarified that the different technology scenarios do not mean the concept of technology neutral limits is abandoned. There is a link between different emission limits (cold-start budget, 100th and 90th percentile moving average window) and how these limits would apply for engine tests that are to be kept for CO₂ certification. An update to the HD scenarios was presented, with several adjustments.

Stakeholders presented comments and concerns on the scenarios presented by the CLOVE consortium. ACEA said that the LD and HD CLOVE package as presented is still a big concern for industry and criticised the lack of any air quality impact consideration. Specific feasibility comments were made for different technologies for both LD and HD because regulation will require compliance under worst-case conditions. CLEPA presented its comments on the CLOVE scenarios, supporting the cold-start budget and requesting that unrealistic combinations of parameters should be excluded. T&E said that CLOVE Scenario 2 should be the least that should be imposed. T&E is concerned that the amount of budget is too high for HD. The ICCT welcomed the depth of the most recent CLOVE scenarios and believes that further focus should be put on urban driving conditions. For HD, ICCT said that CLOVE scenarios would be less stringent than CARB's low NOx proposals. In the discussion, ICCT commented that they fear the focus on feasibility under worst case conditions will result in less reduction/technology than is possible under most driving conditions.

There are currently no further AGVES meetings scheduled. The Commission requested stakeholders to send comments in writing on what has been presented so far by 7 May.

Parliament and Council reach Informal Agreement on Climate Obligation

On 20 April 2021, MEPs reached an informal agreement with Member States on the EU Climate Law.

The Commission has confirmed that it will propose that the Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF) be revised to raise EU carbon sinks to levels above 300 million tons CO₂eq by 2030, which would correspond to a 2030 reductions target of 57%. The provisional agreement also sets an aspirational goal for the EU to strive to achieve negative emissions after 2050.

The Commission shall also make a proposal for a 2040 target at the latest six months after the first global stock-take of the Paris Agreement. In line with Parliament's proposal, the Commission must take into account the EU's projected indicative GHG budget, defined as the total GHG emissions expected to be emitted without risking the EU's commitment under the Paris Agreement, for the period 2030-2050.

An independent scientific body will be set up to assess whether policy is consistent and to monitor progress. The Advisory Board will consist of 15 scientific experts appointed for four years. The Commission will also facilitate sector-specific climate dialogues and partnerships by bringing together key stakeholders to encourage sectors to draw up roadmaps towards climate neutrality.

The announcement of the agreement can be found at europarl.europa.eu/news/en/press-room/20210419IPRO2302/meps-reach-deal-with-council.

Council Request to Permanent Representatives for Euro 6 Guidance

On 16 April 2021, the Council of the European Union published an invitation to the Permanent Representatives Committee to deliver political guidance for future negotiations on Euro 6 conformity factors.

The document outlines the state of play on the trilogue negotiations, the first of which took place on 9 October 2020. Further trilogues have been conducted on 10 November, and 2 December 2020.

In the third trilogue, the Council and the European Parliament were unable to reach an overall agreement, mainly due to the Parliament's amendment to phase out conformity factors for NOx by a mandatory date (30 September 2022). The Council stressed that measurements by PEMS remain inaccurate and therefore any phase-out of conformity factors for NOx under Euro 6, without scientific evidence and significant technical progress, would be inappropriate. The document states that for both co-legislators, this issue remains a red line.

Since the beginning of the Portuguese Presidency, the Working Party discussed possible compromise proposals on this file on 14 and 27 January, 10 February, 3 and 23 March 2021.

On 22 February 2021, the Joint Research Centre (JRC) released its third report on "Real Driving Emissions (RDE): 2020 assessment of Portable Emissions Measurement Systems (PEMS) measurement uncertainty".

The report concludes that the PEMS measurement uncertainty margin for NOx can be further reduced to 0.23 for the current generation of measurement equipment, and that an additional reduction is possible by improving the permissible tolerances for the equipment in the Commission Regulation (EU) 2017/1151 and the method by which the zero drift is taken into account. Under this future scenario, the future margin for NOx could be reduced to 0.10, but this requires first changes in the referred regulation.

The report also sets the measurement uncertainty margin for particle number (PN), suggesting that the PEMS measurement uncertainty margin for PN be lowered from 0.50 to 0.34. A technical meeting to discuss the report took place on 18 March 2021.

The Council's proposal says that The European Parliament wants to adopt the values contained in the latest JRC report (released in February 2021) and to provide for a mandatory date for phasing out the measurement uncertainty margins. In its last mandate, the Council proposed to set the uncertainty margin for NOx at 0.32, as recommended in the previous JRC report (released in February 2020).

The document states that, as no solution to the deadlock has yet been found, the Portuguese Presidency considers it is important to clarify whether the Council is ready to take a further step towards the European Parliament, with the view to finding an agreement before the final ruling of the Court.

The Permanent Representatives Committee is therefore asked to provide political guidance for further work on whether the Presidency submit a revised mandate for negotiations with the European Parliament on the basis of the JRC report released in February 2021 and the ideas for a compromise for the phase-out of the PEMS measurement uncertainty margin, or whether informal negotiations with the European Parliament should continue at technical level in order to continue seeking European Parliament's flexibility on a mandatory date for the phase-out of conformity factors.

The full document is available to read at data.consilium.europa.eu/doc/document/ST-7813-2021-INIT/en/pdf.

Adoption of EU Taxonomy Measures Package

On 21 April 2021, the European Commission adopted a package of measures to help improve the flow of money towards sustainable activities across the European Union. They are intended to make the EU a global leader in setting standards for sustainable finance.

The package comprises the EU Taxonomy Climate Delegated Act, a proposal for a Corporate Sustainability Reporting Directive, along with six amending Delegated Acts.

A new milestone: the April 2021 package

A comprehensive package of measures to make the financial sector even more sustainable:



The EU Taxonomy Climate Delegated Act will classify which activities best contribute to mitigating and adapting to the effects of climate change.



The new Corporate Sustainability Reporting Directive will ensure companies provide consistent and comparable sustainability information.



Six amending Delegated Acts will ensure that financial firms, such as advisers, asset managers or insurers, include sustainability in their procedures and their investment advice to clients.

The Commission says that the EU Taxonomy is a ‘robust, science-based transparency tool’ for companies and investors. It creates a ‘common language’ that investors can use when investing in projects and economic activities that have a substantial positive impact on the climate and the environment.

The Delegated Act, agreed by the College of Commissioners, introduces the first set of technical screening criteria to define which activities contribute substantially to climate change adaptation and climate change mitigation. It includes sectors such as energy, forestry, manufacturing, transport, and buildings.

Annex 1 of the Delegated Act sets out the technologies covered by the Taxonomy. In the transport sector, this includes: light-duty vehicles with tailpipe emissions lower than 50g CO₂/km until 31 December 2025, and zero from 1 January 2026; motorcycles with zero CO₂ emissions; zero emission heavy-duty vehicles ‘not dedicated to transporting fossil fuels’.

An EU taxonomy: consulting experts and using science to move forward

The work on sustainable finance has solid scientific foundations and is based on:



Research by the EU's Joint Research Centre.



The reports of the EU Technical Expert Group on Sustainable Finance.



A panel of experts from various backgrounds who make up the Platform on Sustainable Finance, who were appointed to further develop the EU Taxonomy and sustainable finance framework.

Where the greenhouse gas emission savings from the manufacture of biofuels and biogas for use in transport and from the manufacture of bioliquids are at least 65% in relation to the GHG saving methodology and the relative fossil fuel comparator, they can be included.

The Commission press release and other documents are at ec.europa.eu/commission/presscorner/detail/en/ip_21_1804.

Alternative Fuels Infrastructure Directive Implementation Appraisal

On 23 April 2021, the European Parliament Think Tank published an implementation appraisal on the Alternative Fuels Infrastructure Directive (AFID) adopted in 2014.

The Commission's March 2021 report on the application of Directive 2014/94/EU is based on its reporting obligations under Article 10(3) of the AFID and presents the results of the assessment of actions taken by Member States to implement the AFID and of the development of markets for alternative fuels and alternative fuels infrastructure. It gives an overview of the current situation of technological progress and development of the markets, highlighting the evolution of the market, in particular for light-duty

electric vehicles and buses (both battery-electric and plug-in hybrid), the growth of the hydrogen fuel cell vehicles market although from a very low starting point, developments in renewable liquid fuels and synthetic fuels production.

The report points out however that development of the alternatively fuelled truck market has been slow, with the stock of vehicles (including retrofitted ones) at a very low level. There has also been a reduction in the number of brands providing compressed natural gas (CNG) vehicles in recent years. It suggests that the directive's impact on the uptake of alternatively fuelled vehicles and their infrastructure has been positive, and that the existing infrastructure deployment level is sufficient to serve the rather low number of alternatively fuelled vehicles currently on the road. However, it also finds that a comprehensive and complete network of alternative fuels infrastructure is still missing across the EU and is unlikely to develop under the current legislative framework.

The 2020 inception impact assessment indicates four problems the new initiative should tackle: not enough recharging and refuelling points across Member States and modes; no comprehensive network connectivity across borders and modes with minimum coherence in the EU; difficult conditions for the use of alternative fuel road vehicles (especially in the area of electric mobility); and poor equipment within current networks.

A review of alternative fuels transport systems carried out in 2020 showed that under the ongoing approaches, oil will remain the main source of energy for transport in the medium to long term, even if its use is declining; electricity will provide for around 4% of transport energy consumption by 2030 and 11% by 2050; hydrogen should represent around 2% of transport energy demand by 2050; and liquid biofuels will remain at similar levels over time (around 6% of the fuel mix). Emissions from transport (including domestic and international aviation but excluding international maritime) would go down by about 19% between 2005 and 2030 and 38% by 2050. The document presents a number of scenarios in which, with further policy intervention (including more ambitious policies to develop alternative fuel infrastructure), deeper decarbonisation of the transport system could be achieved.

In accordance with the requirements of Articles 10(3) and 10(5) of the Alternative Fuels Infrastructure Directive, the Commission began an evaluation of its implementation, noting that since the entry into force of the AFID, evolution of the market had been slow.

The Think Tank points out that MEPs have expressed their interest in the deployment of infrastructure for alternative fuels in the EU on a number of occasions.

Other EU institutions have also taken an interest in the subject. In its 2021 special report, the European Court of Auditors presented the conclusion of its audit on the effectiveness of the Commission's support for the deployment of EU-wide publicly accessible infrastructure for charging electric vehicles. Although the report

acknowledged some progress in the electric vehicle field, the outcome of the European approach is still far from reaching its Green Deal target of 1 million charging points by 2025.

In its 2017 opinion on the action plan for alternative fuels infrastructure, the European Economic and Social Committee (EESC) welcomed the European Commission's initiatives to decarbonise the transport sector, as well as the prioritisation of measures in urban areas. However, the EESC expressed its concerns on a number of issues, including the effectiveness of national policy frameworks and the low level consumer involvement.

The European Committee of the Regions expressed its regret in 2018 that funding and financial resources were often insufficiently accessible to some local and regional authorities. It also highlighted that a key element would be the best possible integration of alternative fuels infrastructure into individual sustainable urban mobility plans (SUMP).

Finally, the Think Tank stated that the Commission has organised two public consultations relating to the evaluation of the alternative fuels infrastructure. The first (February to March 2019) received 49 responses (feedback) from different categories of stakeholders. The second (April to June 2020), collected views in the context of the Commission's intention to review the current directive in 2021. The outcome is pending.

The report is available at [europarl.europa.eu/RegData/etudes/BRIE/2021/662631/EPRS_BRI\(2021\)662631_EN.pdf](http://europarl.europa.eu/RegData/etudes/BRIE/2021/662631/EPRS_BRI(2021)662631_EN.pdf).

Extension of French Government Automotive Industry Support

On 26 April 2021, the French government amended its support plan for the automotive industry, first announced in May 2020.

New measures include changes to incentives for electric light-commercial vehicles, accelerated expansion of the charging network, and additional funding for the production of electrically chargeable vehicle (EV) components. There will also be an assessment of the economic and social impact of vehicle electrification.

The share of battery electric vehicles (BEVs) in the French passenger car market more than trebled in 2020, increasing from 1.9% in 2019 to 6.7% in 2020, according to the French carmakers' association CCFA. Similarly, the commercial vehicle sector aims to treble the share of electric light commercial vehicles (LCVs) in the next two years. Therefore, the bonus scheme for LCVs will be 'adjusted to reduce the difference in acquisition and user costs, which today appears too large to develop sales in this niche,' according to the government announcement.

Full details of the government's support package are at ecologie.gouv.fr/signature-lavenant-au-contrat-strategique-filiere-automobile-et-annonce-plan-dactions-en-faveur.

UK Emissions Reduction Target increased to 78% by 2035

On 20 April 2021, UK Prime Minister Boris Johnson announced that the UK government will set 'the world's most ambitious climate change target' into law to reduce carbon emissions by 78% by 2035 compared to 1990 levels.

The new target will become enshrined in law by the end of June 2021, replacing its current commitment to reduce emissions in 2030 by at least 68% compared to 1990 levels through the UK's latest Nationally Determined Contribution.

The UK is bringing forward blueprints setting out its own vision for transitioning to a net zero economy and how the government can support the public in transitioning to low carbon technologies, including publishing the Transport Decarbonisation Plan later this Spring.

The full announcement can be found at gov.uk/government/news/uk-enshrines-new-target.

NORTH AMERICA

US EPA Heavy-Duty Emission Standards Update

On 19 April 2021, the US EPA is reported to have announced that it expects to issue a notice of proposed rulemaking later this year aimed at establishing new emissions standards for NOx and other pollutants for highway heavy-duty engines. A lot of the focus of the rulemaking is to not just to lower the standards for NOx but also consider other items that need to be done.

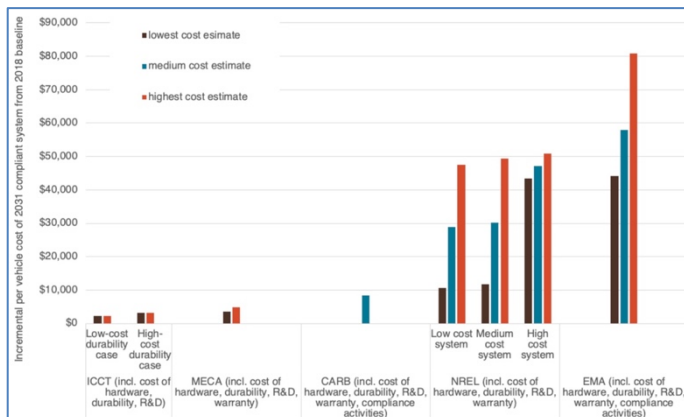
Consideration is being given to the engine and tractor certification process, as well as how engines need to be tested and how the technologies need to perform under different types of operations, such as stop and go compared with long haul. The US EPA's Mr Dennis Johnson is reported to have said that the agency is collaborating with the California Air Resources Board.

The Transport Topics report is at ttnews.com/articles/epa-provides-updates-emissions-standards-smartway-activities.

Cost Analysis of CARB Low-NOx Rule

On 22 April 2021, the International Council on Clean Transportation (ICCT) published analysis of studies looking at the potential cost to manufacturers of California's low-NOx regulation. These studies have been carried out by ICCT, the Manufacturers of Emissions Control Association (MECA), California Air Resources Board (CARB), National Renewable Energy Laboratory (NREL) and the Truck and Engine Manufacturers Association (EMA).

For 12-13 Litre engines, estimates range from \$2 170 (£1 804 - the lowest, from the ICCT study) to \$80 821 (£67 174 - the highest, from EMA).



The ICCT says that the methodology used is the largest factor influencing the difference between cost estimates. The NGO says that it conducted a bottom-up study to estimate the cost of manufacturing the improved emissions controls systems, meaning it determined every component of the new system and priced out how much it would cost in the year 2027.

The EMA study, conducted by ACT Research, included warranty and compliance costs. ICCT stated that this approach was not technically rigorous nor transparent.

It does however say that CARB’s study utilised a sound methodology while also including warranty and compliance costs. That study estimates a per-vehicle cost increment of \$8 478 (€7 046). The hardware/durability/R&D part of that estimate is about \$6 700 (€5 569), about two-and-a-half times the ICCT estimate. The remaining \$1 800 is the added costs for extended warranty and expanded compliance activities. This is calculated to mean a 5% increase in the cost of new heavy-duty vehicles.

The ICCT blog can be found at theicct.org/blog/staff/real-cost-low-nox-trucks-apr2021.

US Revised Carbon Reduction Target

On 22 April 2021, US President Biden announced a new target for the United States to achieve a 50-52% reduction from 2005 levels in economy-wide net greenhouse gas pollution in 2030.

The announcement states that America’s 2030 target picks up the pace of emissions reductions in the United States, compared to historical levels, while supporting President Biden’s existing goals to create a carbon pollution-free power sector by 2035 and net zero emissions economy by no later than 2050.

In relation to transport, the press release says that the United States can reduce carbon pollution from the transportation sector by reducing tailpipe emissions and boosting the efficiency of cars and trucks; providing funding for charging infrastructure; and spurring research, development, demonstration, and deployment efforts that drive forward very low carbon new-generation renewable fuels for applications like aviation, and other cutting-edge transportation technologies across modes.

The full announcement is available to read at whitehouse.gov/briefing-room/2021/04/22/president-biden-sets-2030-greenhouse-gas-pollution-reduction-target.

Proposal for California to be allowed to set own Emissions Rules

On 22 April 2021, the US Department of Transportation, through the National Highway Traffic Safety Administration (NHTSA), proposed to withdraw its portions of the so-called SAFE I Rule, which sought to pre-empt States, including California, from issuing their own greenhouse gas emissions standards and zero-emissions vehicle mandates.

NHTSA stated that the proposed rule would “remove unnecessary barriers to state leadership in regulating greenhouse gases and other air pollutants that spew from the tailpipes of cars.”

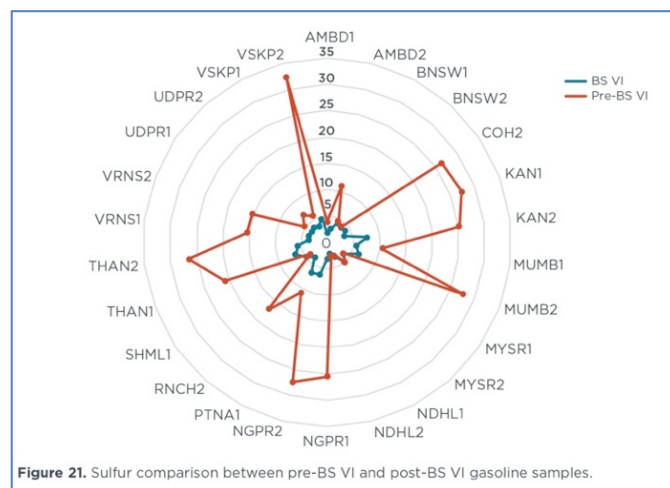
The NHTSA announcement is at nhtsa.gov/press-releases/nhtsa-advances-biden-harris-administrations-climate-jobs-goals.

ASIA PACIFIC

Gasoline and Diesel Fuel Quality Survey in India

On 23 April 2021, the International Council for Clean Transportation (ICCT) published a report looking at gasoline and diesel fuel quality in India, specifically assessing standards shortly before the implementation of BS VI.

All samples analysed in Phase II complied with the more stringent limit of 10 parts per million sulfur in BS VI standards. As shown in the figures below, the sulfur reduction across all retail stations to comply showed a significant difference between samples of Phase I and Phase II. Results also show that more retail outlets transitioned to ethanol blended fuels (E5, E10) in Phase II as compared to Phase I. ICCT also tested fuel for RON, density, aromatics, olefin, benzene, and oxygen content.



ICCT describes India’s transition to BS VI fuel as remarkable but says that the country’s fuel quality monitoring requirements still require significant overhauling. Some of the key recommendations made in a previous ICCT study were to develop a centralised authority responsible for fuel quality compliance, making oil

companies accountable for fuel quality, and increasing the number of independent fuel quality testing labs.

The ICCT report can be found at theicct.org/sites/default/files/publications/gasoline-diesel-fuel-quality-survey-india-part-2-apr2021.pdf.

Australia Light-Duty Vehicle CO₂ Emissions

On 9 April 2021, the Federal Chamber of Automotive Industries released the CO₂ emissions data for each automotive brand as the second reporting step of its industry-led voluntary CO₂ Emissions Standard. The combined industry result was released as the first step on 25 March, which showed 150 gCO₂/km for Passenger Cars and Light SUVs in 2020 and 217 gCO₂/km for Heavy SUVs and Light Commercial Vehicles) based on annual new vehicle sales (NEDC test cycle figures). This follows a voluntary industry agreement in 2020 to adopt a CO₂ standard and work progressively towards a 2030 goal of 100g/km for Passenger Cars and Light SUVs and of 145g/km for Heavy SUVs and Light Commercial Vehicles.

The FCAI announcement is available to read at fcai.com.au/news/index/view/news/712.

New Zealand Light Vehicle CO₂ Emissions

In January 2021, the New Zealand Government, which did not previously have a regulation for lowering CO₂ emissions on light vehicles (new vehicles and used imports), agreed to adopt one. It would see the current average figure of 171g/CO₂ per km (NEDC test cycle) in 2020 for light passenger vehicles and light commercial vehicles fall almost 40% to a target average of 105g (NEDC) in 2025. Targets for 2030 and 2035 will be established subsequently. Legislation will be passed this year and the standard will begin in 2022, phased in through annual targets that get progressively lower to give industry time to adjust. The Government has also agreed that public transport bus purchases from 2025 are to be electric, and, in principle to introduce a mandate for a lower emitting biofuel blend across the transport sector.

Further details of New Zealand's vehicle standards are at transport.govt.nz/area-of-interest/environment-and-climate-change/clean-cars/.

UNITED NATIONS

Cities' Commitment to halve Emissions by 2030

On 19 April 2021, more than 125 city mayors from 31 countries committed to take the action necessary to tackle the climate crisis. The cities, which include Bangkok, Thailand; Chuncheon-si, Korea; Miami Beach, USA; Mumbai, India; and Rabat, Morocco, pledged to implement immediate actions that will deliver their fair share of the greenhouse gas reduction needed to cut emissions in half within the next decade and reach net zero carbon emissions globally by 2050.

The city pledges were shared by Los Angeles Mayor and Chair of C40 Cities, Mr Eric Garcetti during a meeting between mayors and the UN Secretary-General, António Guterres. The gathering was convened to discuss the vital role of cities in delivering emission

reductions, securing a green and just recovery to the COVID-19 crisis and in demonstrating what committed political leaders at every level of government can do to increase credible climate ambition and action ahead of COP26.

96 cities made this commitment through the Paris Declaration, an effort launched by Mayor Anne Hidalgo of Paris in December 2020 on the fifth-year anniversary of the Paris Agreement. The total number of cities committed to net-zero through the Cities Race to Zero campaign now stands at 704.

The full press release can be found at breathelife2030.org/news/700-cities-committed-halve-emissions-2030-reach-net-zero-2050/.

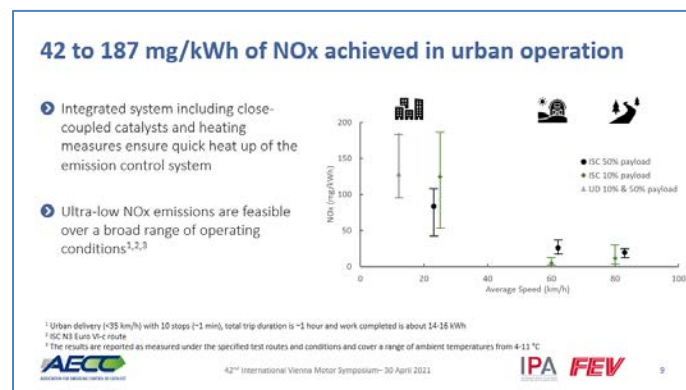
GENERAL

AECC Ultra Low Heavy-Duty Emissions Presentation at Vienna Motor Symposium

On 30 April 2021, AECC's EU Technical Affairs Manager, Pablo Mendoza Villafuerte presented the joint AECC-FEV paper "Demonstration of Extremely Low NO_x Emissions with Partly Close-Coupled Emission Control on a Heavy-duty Truck Application" at the 42nd International Vienna Motor Symposium.

AECC presented the heavy-duty vehicle demonstrator project where the original emission control system of a Euro VI-C N3 truck was replaced with a new one, containing catalyst and filter volumes of appropriate size to cope with engine pollutant emissions. This achievement is a result of a rigorous technical programme co-funded by the AECC members, International Platinum Group Metals Association (IPA), Corning Inc. and CEFIC Automotive Grade Urea Sector Group. The project was undertaken by engineering company FEV in Germany.

The results demonstrate that ultra-low NO_x emissions are feasible within a broad range of driving conditions. The novel emission control technology system layout implemented on the demo vehicle has shown that the close-coupled catalysts perform well by efficiently controlling the cold start and urban emissions.



Other results shown in the presentation included the good thermal response from the system during the cold start as well as under stop and go operation.

Finally, initial results from the validation PEMS campaign were shown for currently non-regulated pollutants on NH₃, N₂O and PN10.

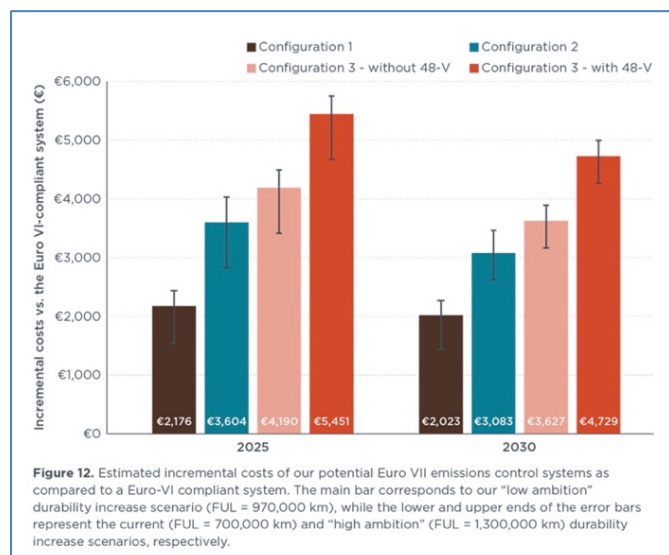
The paper and presentation are at aecc.eu/wp-content/uploads/2021/05/210219_Vienna_HD-diesel-AECC-FEV-paper-final_v2.pdf and aecc.eu/wp-content/uploads/2021/04/210309-AECC_FEV-Vienna-presentation_v4_clean.pdf.

Estimated Costs of Emissions Control Technologies to meet Euro VII

On 28 April 2021, the International Council on Clean Transportation (ICCT) published a working paper on the estimated cost of diesel emissions control technology to meet future Euro VII standards.

The paper assesses the total manufacturing costs of the emissions control systems - including both engine and aftertreatment technologies - that will likely be required to meet these limits. In particular, the study estimates the costs associated with deploying technologies in heavy-duty trucks that enable very low NOx emission levels under cold start and at low load.

On the engine and powertrain side, ICCT says that technologies such as cylinder deactivation, EGR cooler bypass, and 48-volt systems could enable better low-load engine-out NOx control, faster catalyst warm-up, and stay-warm thermal management strategies. On the aftertreatment side, compliance with stricter NOx emissions limits is expected to require the use of close-coupled catalysts, increased catalyst volumes, dual urea injection, heated urea dosing, and electric catalyst heaters, as well as high filtration substrates, amongst others.



The estimated incremental costs of meeting the Euro VII standards compared to a typical Euro VI-compliant emissions control system will be between €1 500 and €4 700 in 2025, and between €1 400 and €4 300 in 2030. Therefore, ICCT says that Euro VII will likely result in a cost increase between 2% and 5% relative to the current

price of new Euro VI tractor-trailer trucks. Engine-out emissions control represents 0%-41% of the incremental costs of compliance to Euro VII, while the rest accounts for improvements in the engine aftertreatment system.

Increasing the full useful life requirements of aftertreatment systems from the current 700 000 km to 970 000 km and 1 300 000 km would lead to average additional costs of approximately €700 and €1 000, respectively, in 2025.

The full working paper can be found at theicct.org/sites/default/files/publications/tech-cost-euro-vii-210428.pdf.

TNO Testing of Light-Duty and Heavy-Duty Vehicles and Non-Road Machines

On 26 March 2021, TNO published results of tests carried out on light-duty diesel and petrol vehicles, heavy-duty vehicles and non-road mobile machinery (NRMM). It says that the knowledge gained is used as a basis for Dutch input in the international negotiations on tightening the emission standards in Brussels and Geneva, as well as forming the basis for an adjustment of the official figures for real-world emissions.

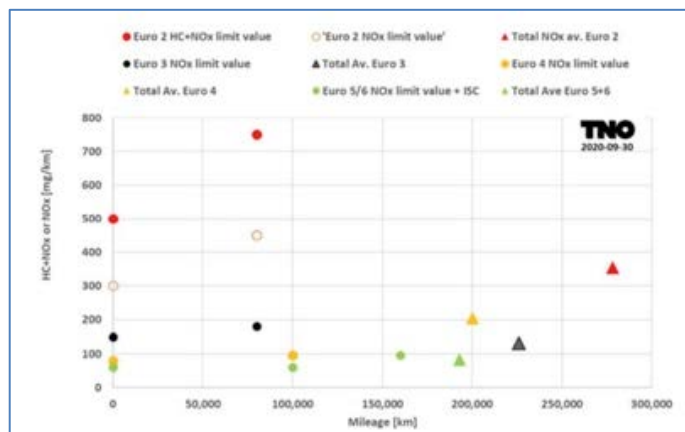
For heavy-duty, the result of the research is that the three tested trucks of the latest Euro VI generation (Euro VI D) can on average be regarded as clean in the daily use in which they have been tested. The NOx emissions per km are on average about 60% of the official standard and the use of particulate filters resulted in very low emissions of soot particles from the exhaust. These test results give an indication that these vehicles are slightly cleaner than the previous generation (with Euro VI A to C emission standard).

The emission screening and monitoring instrument SEMS (Smart Emissions Monitoring System) has been used to provide an indication of whether vehicles meet the European standard for the conformity of vehicles in use. Most of the 40 vehicles tested with a Euro VI engine had a screening result that was lower than the specified limit value when a formal test route was driven. Of the forty trucks tested, four vehicles showed problems. Three different trucks with the same engine type were found to have different problems. The first and second vehicles had a high ammonia emission and a high NOx screening result, respectively. In the third vehicle and a vehicle of a different make and type, the on-board diagnosis system was found to be ineffective in detecting malfunctions of the emission control system.

TNO concludes that the current Euro VI requirements therefore do not yet guarantee low NOx emissions in the city or in some cases when malfunctions occur. The life-time requirements are also limited to approximately half of the normal life and no requirements are imposed on the real-world emissions of NH₃. Further tightening of the European requirements after Euro VI is necessary to regulate this better.

For the testing of petrol vehicles, the primary research question was whether petrol vehicles with increasing age and mileage still show the same emission levels as at their type approval, or whether these increases due to ageing effects.

In this follow-up study with 38 vehicles, a lower proportion of cars with greatly increased NO_x emissions was found than in a previous study with 12 cars. On the other hand, the proportion of vehicles with increased emissions (with emissions up to a factor of 2 to 4 above the original value) was higher than previously thought.



Out of a total of fifty vehicles tested, the average NO_x emissions are 200 mg/km. Limit values vary between Euro classes and are between 60 and 150 mg/km. The weighted limit value over the Euro classes of the vehicles tested is 115 mg/km. The average compliance factor (CF) is therefore 1.74. This means that the measured average NO_x emission is 74% higher than the weighted limit values of the type approval test on the chassis dynamometer. In comparison, emissions of 200 mg/km are higher than those of an average modern diesel car (Euro 6d-Temp). The average NO_x emission of 200 mg/km is on average about twice as high as that of petrol vehicles that were tested earlier when they were new and only had low mileages.

The measurement data of the individual vehicles show that the measured NO_x emissions of the tested vehicles do not depend on mileage (from 160 000 km), vehicle age, Euro class, vehicle make or vehicle model. It was also not possible to establish a link between maintenance history and increased emissions.

The real-world on-road emission performance of five diesel vehicles with Euro 6d-TEMP technologies, using both the current RDE methodology, as well as via emission monitoring, has also been investigated. The total average real-world NO_x emissions of all tested Euro 6d-TEMP vehicles were 35 to 125 mg/km and well below the RDE NO_x limit values of (depending on the vehicle category) 168 or 262.5 mg/km. During short trips, hard accelerations, high velocities, and DPF regenerations (which occurred during normal use), emissions could be substantially higher.

For all vehicles a large proportion of the trips driven had higher average NO_x emissions than the valid RDE trips. There are large differences in average NO_x emissions between the various normal trips made under the emission monitoring programme, although it is unclear what the reasons for these differences are. During 'RDE' trips, no excessive NO_x emission levels were measured. For

comparison, the maximum NO_x emission of all normal-use trips ranged from 250 to over 1 000 mg/km per vehicle.

The measured NH₃ emissions clearly show that low NH₃ emissions are possible with SCR technologies because the technology is available and effective. Furthermore, the numbers indicate that NH₃ emission limit values (like in heavy-duty emission legislation) are needed to avoid the risk of excessive NH₃ emissions. TNO also says that the variation in these results, including the unexpectedly high emissions in the urban test, indicates that more research is needed with regards to N₂O.

The result of the study of heavy NRMM is that the measured large Stage IV and V mobile machines (power 56 - 560 kW) show a good picture in terms of emission levels: the measurements show that the use of Stage IV and V for heavier machines can significantly reduce NO_x emissions in the real-world from 2.8 to 4.9 g/kWh for Stage IIIB to around 0.8 and 0.5 g/kWh for Stage IV and V. By adjusting the driver's behaviour (switching off the engine), the NO_x emissions can decrease by about 30% more. With values of 0.5 to 0.8 g/kWh, the NO_x emission of the measured Stage IV and V machinery is in real-world still above the limit for the Stage IV and V standard (0.4 g/kWh) that applies for an official engine test.

The light mobile machines on the other hand are very dirty, including the newest ones. For small engines (power 8 - 56 kW), TNO says that very mild emission requirements for NO_x apply, also for Stage V, which means that NO_x emissions are high. For example, a Stage V mini excavator (18.5 kW) emits about as much NO_x as a heavy Stage IV or V construction machine. The particulate matter (PM) emissions of the mini excavator are also high, because the emission requirements for PM for light engines (power <19 kW) are very mild.

The reports are available to download from tweedekamer.nl/kamerstukken/brieven_regering/detail?id=2021Z05036&did=2021D11114.

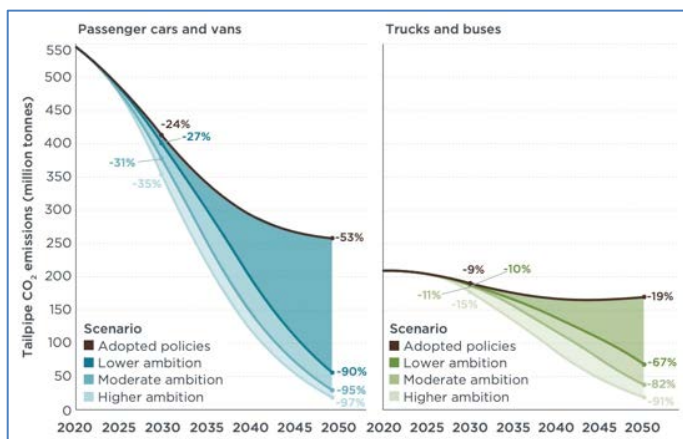
ICCT Seminar on Vehicle CO₂ Standards

On 29 March 2021, the International Council on Clean Transportation (ICCT) published a briefing on the role of the European Union's vehicle CO₂ standards in achieving the European Green Deal. This was followed by a webinar on the subject on 30 March.

The briefing paper identifies several possible levels of stringency for the post-2021 CO₂ standards in the EU for light-duty and heavy-duty vehicles and compares them against economy-wide greenhouse gas reduction targets for 2030 and 2050, as well as the 2050 target for transport sector emission reductions in the EU Green Deal.

The analysis shows that currently adopted policies would reduce 2030 CO₂ emissions by 24% from 2020. A policy scenario that achieves a 50% reduction in light-duty type-approval targets from 2021 to 2030 and sets a 100% zero-emission light-duty vehicle sales target by 2040 would reduce 2030 CO₂ emissions by 27% compared to 2020. By 2050, a 90% reduction would be achieved

compared to only 53% under adopted policies. In a higher-ambition scenario, where 100% zero-emission light-duty vehicle sales are achieved by 2030, CO₂ emissions would be reduced by 35% in 2030 and by 97% in 2050. For heavy-duty vehicles, a higher-ambition policy scenario, in which a zero-emission sales target is achieved in 2040 and efficiency improves by 8.4% for medium-duty trucks and buses and 7.2% for heavy-duty trucks annually until 2030, CO₂ emissions are reduced by 15% in 2030 and 91% by 2050.



ICCT recommendations include setting the overall stringency of the 2030 fleet-average type-approval targets for cars and vans as close to 0 gCO₂/km as feasible, as well as considering stronger 2025 CO₂ standards and a fleet-average maximum for CO₂ emissions from remaining ICE vehicles. In addition, they want the EU to closely monitor real-world CO₂ performance and expedite the adjustment of manufacturers' average CO₂ emissions and to account for the real-world usage of PHEVs and incentivise CO₂ emissions reductions.

The briefing paper can be found at theicct.org/sites/default/files/publications/EU-vehicle-standards-green-deal-mar21.pdf.

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FORTHCOMING CONFERENCES

Integer Vehicle Emissions Live

15-17 June 2021, Online

argusmedia.com/en/conferences-events-listing/integer-vehicle-emissions-live

Hydrogen and P2X European Conference

16-17 June 2021, Copenhagen, Denmark (postponed from February 2021)

fortesmedia.com/hydrogen-p2x-2020,4,en,2,1,4.html

24th ETH Conference

22-24 June 2021, Online

nanoparticles21.scg.ch

Cambridge Particle Meeting

25 June 2021, Online

cambridgeparticlemeeting.org/2021

ICE 2021 - 15th International Conference on Engines & Vehicles

12-16 September 2021, Naples, Italy

drive.google.com/file/d/1ZXsA9F8f18OP_2gOesDhLCC_4PzEsAem/view

Cenex-LCV

22-23 September 2021, Millbrook, UK and online

cenex-lcv.co.uk/

SAE Powertrains, Fuels & Lubricants Digital Summit

28-30 September 2021, Online

sae.org/attend/virtual-events/pfi

30th Aachen Colloquium Sustainable Mobility

4-6 October 2021, Aachen, Germany

aachener-kolloquium.de/en/?idU=1

SAE Heavy-Duty Diesel Emissions Control Symposium

5-6 October 2021, Gothenburg, Sweden (postponed from October 2020)

sae.org/attend/heavy-duty-diesel-emissions-control-symposium

EU Sustainable Energy Week

25-29 October 2021, Online

eusew.eu/

POLIS Annual Conference

1-2 December 2021, Gothenburg, Sweden

polisnetwork.eu/2021-annual-polis-conference/

Powertrain Systems for Net-Zero Transport

7-8 December 2021, London, UK

events.imeche.org/ViewEvent?code=CON7242

CITA International Conference

1-2 June 2022, Amsterdam, Netherlands

citainsp.org/cita-conferences

8th International MinNOx Conference

Spring/Summer 2022, Berlin, Germany (postponed from June 2021)

iav.com/en/events/minnox