European Parliament

Committee of Inquiry into Emission Measurements in the Automotive Sector

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FACTUAL PART OF THE EMIS REPORT

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INFORMAL CONSOLIDATED VERSION

NOTE: This document is meant purely as a documentation tool for ease of consultation.

NOTE

This document provides, for ease of consultation, an informal consolidated version of the "factual part" that is part of the report of the Committee of Inquiry into Emission Measurements in the Automotive Sector.

At the draft report stage, the 7 chapters and 5 appendices making up the "factual part" are subdivided into 12 official working documents.[1]

This "factual part" sets out the methodology of the inquiry and collects and analyses the factual evidence that the committee gathered in order to reach the conclusions.

The draft conclusions of the inquiry and the draft recommendations for the future are respectively included in a separate draft report and in a separate draft motion for a European Parliament recommendation.[2]

[1] *List of working documents making up the factual part of the report:*
- *Chapter 1: Introduction (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.071)*
- *Chapter 2: Technical background (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.072)*
- *Chapter 3: Laboratory tests and real-world emissions (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.073)*
- *Chapter 4: Defeat devices (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.074)*
- *Chapter 5: Type-approval and in-service conformity (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.075)*
- *Chapter 6: Enforcement and penalties (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.076)*
- *Chapter 7: Powers and limitations of the committee of inquiry (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.077)*
- *Appendix A: The mandate of the committee of inquiry (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.078)*
- *Appendix B: The committee of inquiry (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.079)*
- *Appendix C: Activities of the committee of inquiry (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.080)*
- *Appendix D: Timeline (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.081)*
- *Appendix E: Glossary (http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference=PE594.082)*

[2] *The documents are linked on the committee's home page: http://www.europarl.europa.eu/committees/en/EMIS/home.html*

Contents

1. Introduction

1.1. The committee of inquiry and its mandate

On 17 December 2015, the European Parliament decided to set up a **committee of inquiry** to investigate alleged **contraventions** or **maladministration** in the application of Union law in relation to **emission measurements in the automotive sector**, without prejudice to the jurisdiction of national or Union courts.

The concerns that led to the setting up of the committee of inquiry trace their origin to the Notice of Violation of the Clean Air Act issued on 18 September 2015 by the United States Environmental Protection Agency (EPA) to the Volkswagen group. The notice alleged that the group installed software on certain diesel vehicles to detect when the vehicle is undergoing emissions testing, and that the software turns on full emissions controls only during the test but reduces their effectiveness during normal driving. The result is that cars that meet emissions standards in the laboratory emit nitrogen oxides at levels up to 40 times the standard during normal operation. According to the EPA, this software is a "defeat device" and is prohibited under the US Clean Air Act.

In the EU, emission standards for light duty vehicles are laid down in **Regulation (EC) No 715/2007** on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (**Euro 5 and Euro 6**). The general context is provided by the **framework Directive 2007/46/EC** on type-approval, which sets out the safety and environmental requirements that motor vehicles have to comply with before being placed on the EU market.

Regulation (EC) No 715/2007 requires that "*the components likely to affect emissions are designed, constructed and assembled so as to enable the vehicle, in normal use, to comply*" with the emission standards and prohibits "*the use of defeat devices that reduce the effectiveness of emission control systems*" (except where the device is justified by the need to protect the engine or for safety).

The findings of the US EPA spurred several investigations across the European Union on the possible use of prohibited defeat devices and in general on the discrepancies between pollutant emissions measured in the laboratory during the type-approval process and the same emissions measured in real world conditions.

Since 2010-2011, several studies, including reports published by the Commission's Joint Research Centre, showed large discrepancies in nitrogen oxides emissions of diesel cars sold on the EU market.

On 27 October 2015, the European Parliament adopted a resolution on emission measurements in the automotive sector, calling inter alia for "*a thorough investigation regarding the role and responsibility of the Commission and of Member State authorities, bearing in mind inter alia the problems established in the 2011 report of the Commission's Joint Research Centre*".

Following up on its resolution, on 17 December 2015 Parliament set up a committee of inquiry consisting of 45 members, with the brief of carrying out such an investigation. In summary, the

mandate adopted by Parliament – which is included in full in **Appendix A** – required the committee of inquiry to:

- investigate whether the Commission had complied with the obligation laid down in Regulation (EC) No 715/2007 to **review the test cycles** used to measure emissions and to adapt them so as to reflect **real-world emissions** in a timely manner when it had evidence of the **discrepancies** existing between emissions measured in the laboratory and those measured on the road;

- investigate whether the **ban on defeat devices** was properly enforced by the Member States and overseen by the Commission, whether measures addressing the use of defeat devices were adopted by the Commission, and whether there was evidence of the use of prohibited defeat devices before the Notice of Violation of the US EPA (also as regards CO_2 emissions);

- investigate whether the Member States had laid down the required **penalties** for infringement by manufacturers of Regulation (EC) No 715/2007 and had taken all necessary measures for their implementation;

- analyse the implementation of the provisions of Directive 2007/46/EC to ensure the **conformity** of production vehicles and systems to the approved type.

The committee was required to submit to Parliament this **final report** containing the **results and conclusions** of its inquiry within 12 months of starting its work.

The committee of inquiry was also mandated to make any **recommendations** that it deemed necessary on the matter within its remit. Those recommendations are being submitted to the consideration of Parliament in a **separate motion**.

1.2. Working methods

The committee of inquiry of the European Parliament into emission measurements in the automotive sector was constituted on 2 March 2016 and met 27 times. It was chaired by Kathleen Van Brempt (S&D, BE). The committee appointed Pablo Zalba Bidegain (EPP, ES) and Gerben-Jan Gerbrandy (ALDE, NL) as rapporteurs. On 24 November 2016, Mr Zalba Bidegain left Parliament and was replaced by Jens Gieseke (EPP, DE) as rapporteur. The full list of the members of the committee and their functions is included in **Appendix B**.

The **working plan** put in place by the committee to collect the oral and written evidence necessary for the fulfilment of its one-year mandate included several lines of action, summarised below.

- A programme of **hearings of experts and witnesses** was organised with a view to gathering relevant **oral evidence**. The committee heard 64 witnesses in 48 hearings. **Verbatim transcripts** of all hearings are available on the website. To prepare each hearing, the committee requested each invited expert or witness to answer a set of **written questions** in advance, and where needed follow-up questions were asked after the hearing.

- The committee sent **written questionnaires** to the Commission, to Member States' authorities, car manufacturers, automotive suppliers and to the European Investment Bank (EIB).

- The committee **requested documents** from the Commission and the Member States with a view to gathering relevant **written evidence**. The evidence received totalled thousands of pages.

- Two **fact-finding missions** were organised to gather on-site information, one to the Commission's Joint Research Centre and one to Luxembourg, France and Germany.

- The committee commissioned **two studies** and several **briefings**.

- A public **call for evidence** was opened on the committee's website through which information could be sent for the attention of the committee.

- Additional presentations and **exchanges of views** with relevant actors were also included on the agenda of the committee's meetings.

Other actions were undertaken in support of the above, including asking for a formal written opinion from Parliament's Legal Service as regards inviting guests to testify where they may be subject to legal proceedings.

A full and detailed list of all of the committee's activities under its plan of work is presented in **Appendix C**, and **all the public evidence** gathered by the inquiry is available on the **committee's website**:
http://www.europarl.europa.eu/committees/en/emis/publications.html?tab=Evidence.

All official communications by the committee, as well as supporting research and other relevant documents, are also available on the website:
http://www.europarl.europa.eu/committees/en/emis/publications.html

On 13 July 2016, as required by its mandate within 6 months of starting its work, the committee unanimously adopted its **interim report**. The interim report was adopted by Parliament on 13 September 2016.

On 28 February 2017 the present **final report** was adopted by the committee of inquiry and submitted to Parliament. The committee's **recommendations** were adopted on the same date.

1.3. Structure of the report

This report is organised in **thematic chapters**, with a view to a structured presentation of all the information needed to fulfil the mandate of the committee of inquiry.[1]

Chapter 2 sets the stage by providing some background information on the pollutants emitted by road vehicles into the atmosphere and on the technologies available to reduce those emissions.

[1] At the draft stage, each chapter of this report is included in a separate working document. All the chapters (and the conclusions of the inquiry) will be merged into a single report after the adoption in the committee.

The analysis of the evidence gathered by the inquiry starts in **Chapter 3**, which focuses on the observed **discrepancies** between the emissions of nitrogen oxides by diesel cars measured in the laboratory and those measured in real use, and on the details and timeline of the process of **adapting the tests** used to assess compliance with regulatory emission limits in such a way as to reflect real-world conditions. The chapter ends with an analysis of the planned introduction of **real driving emissions tests** and of their effectiveness.

Chapter 4 presents the evidence gathered on the possible use of **defeat devices**. The chapter describes various strategies employed in vehicles that could point towards the use of prohibited defeat devices, and discusses the issues identified by the inquiry as regards the **enforcement of the ban** on defeat devices enshrined in EU law.

The analysis of the functioning – and in particular of the gaps – of the **system of type-approval** of light duty vehicles as regards pollutant emissions, as currently provided for by EU legislation, including the provisions on **in-service conformity** and **market surveillance**, is the subject of **Chapter 5**.

Chapter 6 closes the presentation of the evidence gathered by the inquiry by pointing out issues in the **enforcement** of the EU legislative framework on emissions from light duty vehicles, including as regards the **penalties** set by the Member States.

Each of the thematic chapters (3-6) comprises a short **introductory section** containing essential elements to set the theme, followed by a section that presents a **factual analysis of the evidence gathered** by the inquiry, with **references** to the sources providing the evidence[1]. The resulting **conclusions** adopted by the committee of inquiry on the possible contraventions and maladministration in the implementation of EU law constitute the final section of each chapter[2].

Finally, **Chapter 7** concludes the report with an analysis of the **legal and practical limitations** that affected the work of the committee during the course of its inquiry.

Several appendices complement the main text. **Appendix A** contains the European Parliament decision of 17 December 2015 on setting up a committee of inquiry into emission measurements in the automotive sector, its powers, numerical strength and term of office (the committee's mandate).

Appendix B lists the Members of the European Parliament participating in the committee of inquiry's work and their functions.

Appendix C details the **hearings**, **requests for documents**, **studies**, **fact-finding missions** and other activities undertaken by the committee to collect the evidence necessary for the fulfilment of its inquiry mandate. This Appendix also constitutes the **bibliography**, providing the **key** to the **references** used throughout the thematic chapters.

[1] The factual part of each chapter contains **references** in square brackets (e.g. [COM]), which identify the main **sources** taken into consideration by the committee when arriving at its findings. It is understood, however, that the committee's findings may not be an exact reflection of the submissions made by any specific source, and remain the sole responsibility of the committee.

[2] The conclusions are not included in the working documents at the draft stage, and will be merged into the final report after the vote in committee.

Finally, a **timeline of the events** related to the remit of the committee of inquiry is presented in **Appendix D**, while **Appendix E** contains a **glossary** of the terms and abbreviations used throughout the report.

2. Technical background

2.1. Analysis of the evidence gathered

Pollutant emissions from vehicles

Among the main atmospheric pollutants emitted by road vehicles, and in particular by diesel engine-powered vehicles, there are:

- **Carbon Dioxide (CO_2)**, which poses no direct threat to human health but is a greenhouse gas;
- **Particulate Matter (PM)**, such as soot, a carcinogenic;
- **Nitrogen Oxides** (NO and NO_2 – collectively indicated as **NO_x**), gases which cause irritation of the respiratory tract and acid rain and are ozone precursors.

The reduction of the emissions of these pollutants into the atmosphere is on the one hand fundamental for ecosystem conservation and human health (PM and NO_x), and on the other hand an important factor for mitigating climate change (CO_2), and is required by EU law.

Air pollution is the single largest environmental health risk in Europe and results in a substantial public health burden and premature deaths. The transport sector, in particular, is the largest contributor to NO_x emissions, accounting for 46 % of total EU NO_x emissions in 2014.

At the level of the combustion taking place in an engine, reducing emissions of CO_2, PM and NO_x simultaneously are conflicting goals [AECC, TNO, Borgeest]. CO_2 emissions are correlated with the fuel efficiency of the engine – the more efficient the combustion process, and the powertrain as a whole, the less fuel consumed and CO_2 emitted. While particulates are emitted relatively more during a cold or incomplete combustion, nitrogen oxides are emitted relatively more during high combustion temperatures. In summary, there is in general an inverse correlation between CO_2 and PM emissions on the one hand, and NO_x emissions on the other.

Emission control technologies

Technologies exist which, when properly applied also taking into consideration the design of the vehicle, can stop or reduce the inverse correlation between CO_2 and PM emissions on the one hand and NO_x emissions on the other [JRC, AECC, TNO, Borgeest]. These emission control technologies (ECTs) include:

- **Exhaust Gas Recirculation (EGR)** in the engine, whereby a part of the exhaust gas is mixed with fresh air before injection into the combustion chamber, which helps to keep peak temperatures down; a valve controls the rate of recirculation: if EGR is considered in isolation, a smaller rate implies higher NO_x emissions, while a higher rate implies higher PM production; high pressure, low pressure as well as hybrid EGR systems are currently in use and offer specific advantages and disadvantages [Borgeest, Faurecia]; EGR is usually combined with one or more of the after-treatment technologies mentioned below;

- **Selective Catalytic Reduction (SCR)**, a special catalyst where ammonia reacts with NO_x to produce harmless nitrogen and water vapour; SCR requires an ammonia source, most often in the form of a urea solution stored in a specific tank that needs to be periodically refilled; it has been used successfully for years in heavy-duty vehicles but is less effective in low-load driving conditions [EA, Borgeest];

- **Lean NO_x trap (LNT)**, consisting of a special ceramic that binds NO_x to the catalyst, which then undergoes cyclic regenerations. LNT is less effective in high-load driving conditions;

- **Combined SCR and LNT (SCR+LNT)**, an SCR unit located downstream of the LNT which allows higher NO_x conversion efficiencies and does not require reductant fluid in many driving situations;

- **Diesel Particulate Filter (DPF)**, designed to remove diesel particulate matter (soot) from the exhaust gas of a diesel engine, which also undergoes cyclic regenerations.

The control of ECTs is usually assigned to a specific electronic control unit (ECU). The systems are run by software which is calibrated by assigning values to a large number of labels [Borgeest, Lange, Bosch].

The inverse correlation between CO_2 and NO_x emissions can be stopped or reduced by optimising the engine for low fuel consumption and low CO_2 emissions while handling the reduction of the resulting higher NO_x emissions at the after-treatment stage [JRC, AECC, TNO, Borgeest].

The consensus among experts and suppliers of ECTs is that, by means of a combination of EGR with either LNT or SCR or with the combined SCR and LNT (SCR+LNT), ECTs allowed diesel cars to reach the Euro 6 NO_x emission limit of 80 mg/km by the date of its entry into force in real use on the road and not only in laboratory conditions. Some experts also mentioned that Euro 5 limits were attainable at the time of their entry into force [JRC, AECC, TNO, Borgeest, EA, Bosch, Faurecia, Q:Suppliers, LUX mission].

A lower NOx emission limit of 44 mg/km was already in place in the US at the time of the introduction of Euro 5 limits [EPA, US study], and diesel cars placed on the US market already had to comply with that limit. As regards CO_2 emissions, EU fleet average targets are more ambitious than those in place for CO_2 emissions in the US.

The development of ECTs by car manufacturers was also financed via loans from the European Investment Bank (EIB). Between 2005 and 2015, the EIB granted loans amounting to about EUR 13.6 billion to the EU automotive industry in order to invest in research and development [Q:EIB]. An OLAF investigation into the matter is still ongoing.

3. Laboratory tests and real-world emissions

3.1. Introduction

For regulatory purposes, the emissions of light-duty vehicles are currently measured only by means of a laboratory test on a chassis dynamometer, using the **New European Driving Cycle (NEDC)**.

The NEDC, performed on a cold vehicle at 20-30 °C, consists of four repeated ECE-15 urban driving cycles (UDC), characterised by low vehicle speed, low engine load, low exhaust gas temperature and one Extra-Urban driving cycle (EUDC) to account for higher load driving conditions. It was last updated in 1997. By definition, the NEDC test cannot detect the illegal use of a defeat device.

Euro 5/6 Regulation (EC) No 715/2007 requires car manufacturers to "*equip vehicles so that the components likely to affect emissions are designed, constructed and assembled so as to enable the vehicle, in normal use, to comply with this Regulation and its implementing measures*" and empowers the Commission to adopt "*the specific procedures, tests and requirements for type-approval*".

Article 14(3) of the regulation requires the Commission to "*keep under review the procedures, tests and requirements [...] as well as the test cycles used to measure emissions*" and states that "*if the review finds that these are no longer adequate or no longer reflect real world emissions, they shall be adapted so as to adequately reflect the emissions generated by real driving on the road*".

If procedures, tests and requirements need to be adapted, the "*necessary measures [...] shall be adopted in accordance with the regulatory procedure with scrutiny*". The regulatory procedure with scrutiny requires the Commission to submit a draft measure to the Technical Committee on Motor Vehicles (TCMV – the main regulatory committee dealing with vehicle type-approval). If the TCMV issues a positive opinion by qualified majority, the measure is adopted unless opposed by the European Parliament or the Council. If the TCMV issues a negative opinion or no opinion, the Commission submits a proposal directly to the Council, which acts on it by qualified majority.

3.2. Analysis of the evidence gathered

Emission behaviour in the laboratory versus real driving

According to the experts and witnesses heard, there were indications from at least 2004-2005 – when the proposal for the Euro 5/6 Regulation was being prepared – that, while diesel cars respected the successive legal Euro limits for NO_x emissions when tested in the laboratory during the type-approval process with the NEDC, the emissions of those vehicles in real use were in fact much higher [JRC, ICCT, Lambrecht, TNO, EEA, DUH, Borgeest, ADAC, T&E, Dimas, Verheugen, RDW, Q:MS].

Since 2010-2011 a large number of studies have confirmed the large discrepancies between the

NO_x emissions measured in the laboratory and the NO_x emissions measured in real driving conditions in Euro 3, Euro 4, Euro 5 and Euro 6 diesel cars [JRC, ICCT, TNO, ADAC]. Since then the results of these studies have been made publicly available and transmitted to the Commission, the Parliament, and Member State authorities and stakeholders [JRC, ICCT, TNO, ADAC, DUH, T&E], so that the existence of the discrepancies was common knowledge in the field [Lambrecht, Borgeest, Potočnik, KBA, RDW, Q:MS].

The data also show that diesel cars did not deliver real-world NO_x emission reductions in line with what was expected following the entry into force of the successive Euro standards.

For a wide range of reasons, historically diesel had a strong position in Europe and had become an important element in the EU car fleet [Royal, Zourek]. The increased share of diesel cars in the fleet was also due to the generally lower cost of diesel fuel and the incentives given in the context of EU climate policy to diesel technology as being more fuel-efficient and less CO_2-emitting than gasoline [COM, Dings, ACEA, Renault, VW, FCA, Mitsubishi, Dimas, Verheugen, Potočnik, Falkenberg].

The persistent exceedances of NO_x emissions by the automotive sector, coupled with the increased share of diesel cars in the EU fleet, hindered rapid reduction of NO_x (and in particular NO_2) concentrations in cities, despite the 58 % overall reduction in NO_x emissions since 1990 in the EU [Lambrecht, EEA, TNO, DUH]. There remain persistent, widespread exceedances of EU air quality standards for NO_2, which contributed to a total of approximately 72 000 premature deaths in 2012 [EEA, Vella]. It is estimated that in the urban areas where we see those exceedances, around 60 % of the NO_2 measured comes from road transport [EEA]. The data on air quality were transmitted to stakeholders and decision-makers [Lambrecht, EEA, TNO, DUH, Potočnik].

The introduction of the Euro 6 standards, which were supposed to address, among other things, the issue of NO_x emissions, did not improve the situation in the case of most cars. The entry into force of the stricter NO_x emission limit of 80 mg/km increased the relative magnitude of the discrepancies between laboratory emissions and real-world emissions, as the latter have stayed essentially constant for the last 15 years [JRC, ICCT, TNO, DUH, ADAC].

Generally, before the Volkswagen emissions case erupted in September 2015, the discrepancies between NO_x emissions from diesel cars measured in the laboratory and measured on the road were attributed to the following causes [JRC, ICCT, TNO, Borgeest, DUH, ADAC, T&E, EA, EPA, Verheugen, Potočnik, Tajani, Millbrook, EU study]:

- the **inadequacy of the NEDC** used in roller-bench testing to measure emissions in the laboratory; the cycle had been known for a long time to be **outdated and not representative** of pollutant emission during normal vehicle operation on the road, in particular as it foresees low speed and low engine load and lends itself to optimisation strategies;

- the **optimisation strategies** put in place by car manufacturers specifically to meet the emission limits during the NEDC.

The general view was that the discrepancies were attributable to the inadequacy of the testing cycle and not to the use of defeat devices, banned by Regulation (EC) No 715/2007, despite the fact that those devices were found in the US in the 1990s [JRC, ICCT, TNO, DUH, Borgeest,

ADAC, T&E, COM, ACEA, Verheugen, Potočnik, Tajani, Vella, MIT, Millbrook, KBA, SCNH, Dobrindt, Q:MS, Q:Suppliers].

Discrepancies were also shown in CO_2 emissions and fuel economy, with on-road CO_2 emissions up to 40 % higher than measured in type-approval tests [ICCT, EEA, DUH, EA]. Discrepancies in NO_x emissions ranged from a factor of 2-4 times the regulatory limit for average NO_x emissions up to a factor of 14 for individual test windows [JRC, ICCT, TNO, ADAC].

As regards the response to the observed discrepancies, Article 5(1) of Regulation (EC) 715/2007 requires manufacturers to "*equip vehicles so that the components likely to affect emissions are designed, constructed and assembled so as to enable the vehicle, in normal use, to comply with this Regulation and its implementing measures*". Vehicles thus have to comply with the regulation "*in normal use*" and not just in laboratory tests [DUH, Dimas, Verheugen]. Several witnesses pointed out that "normal use" itself is a term used in other pieces of legislation in the automotive sector but is not defined in the legislation, and in particular no specific test methods were provided for to replicate "normal use" during the type-approval procedure or in assessing compliance with EU law [Renault, VW, ACEA, Mitsubishi, MIT, KBA, UTAC, Millbrook, Verheugen, Q:OEM].

To address the issue of NO_x discrepancies, the Commission focused on the development of a new test procedure that could ensure that the emission limits were met in real driving conditions, as provided for by Article 14(3) of the Euro 5/6 Regulation [COM, Potočnik, Tajani, Vella, JRC mission].

Adaptation of the tests

At the time of the preparation of its legislative proposal for the Euro 5/6 regulation, the Commission was already aware of the issue of the discrepancies between laboratory emissions and real-world emissions in the case of Euro 3/4 vehicles, in particular for NO_x emissions from diesel passenger cars, and of the inadequacy of the existing laboratory test [Dimas, Verheugen]. Other cycles existed, such as the Common Artemis Driving Cycle, based on a large database of driving behaviour, which reflected real emissions better. However, the Artemis test cycle was not designed for type-approval testing, but rather for emissions inventory, and therefore it would have required adaptations in order to be used in type-approval procedures [JRC]. Nevertheless, the main priority was to achieve a timely reduction of the emissions of carcinogenic PM [Dimas, Verheugen, Dings]. The legislators chose to prioritise the entry into force of the new Euro 5 PM standards, focus on NO_x reduction in the subsequent Euro 6 standards, and include in the legislation a mandate for the Commission to keep the test cycles under review and revise them if necessary so as to adequately reflect the emissions generated by real driving on the road [Dimas, Verheugen].

In August 2005 the Commission's Joint Research Centre (JRC) was mandated to carry out research on real driving emissions [JRC, Dimas]. The experimental programme of on-road tests of Euro 3 and 4 light-duty vehicles with Portable Emissions Measurement Systems (PEMS), which measure emissions from combustion engines as the vehicle is being used, allowing real-world in-use testing, started in 2007, with the first results published in 2007 and 2009, and continued with the first on-road test of a Euro 5 vehicle in June 2009, on the request of then Commissioner for Enterprise and Industry Günter Verheugen [JRC, Verheugen]. The research programme ended in April 2010 and was discussed internally in the new Barroso II Commission

in September 2010, and the anonymised results were presented in a workshop entitled "Approach to emission legislation" with Member States and stakeholders on 23 November 2010 and published in a report in early 2011. The results by the JRC showed that the NO_x emission of light-duty diesel vehicles differed substantially between laboratory NEDC testing and actual on-road driving, and that the on-road emissions substantially exceeded the Euro 3-5 limits (ranging from a factor of 2-4 times the regulatory limit for average NO_x emissions up to a factor of 14 for individual test windows). The JRC also concluded that PEMS testing was able to provide accurate on-road measurement of NO_x emissions in light-duty vehicles and could provide a robust tool for new regulation [JRC, Dimas]. The November 2010 workshop concluded that the Real Driving Emissions (RDE) test method should be ready for adoption by the end of 2012 (summary document by the European Commission of the 23 November 2010 workshop [CIRCA]).

The working group "Real Driving Emissions – Light-Duty Vehicles" (RDE-LDV), reporting to the TCMV, was initiated by the then Commissioner for Enterprise and Industry Antonio Tajani in January 2011, after the JRC had presented its results about the discrepancies in NO_x emissions, with the objective of developing a procedure to assess the real driving emissions of light-duty vehicles in a robust manner with a view to its regulatory implementation. The work of the RDE-LDV group led eventually to approval by the TCMV of the introduction of real driving emission testing as of 2017.

The inquiry gathered evidence about the process leading to the approval of the RDE package, in particular about its duration, in order to ascertain possible delays and their causes (a more detailed timeline of events is included in **Appendix D**).

PEMS testing had been used in the JRC research programme, and Recital 15 of Regulation (EC) No 715/2007 states that the use of PEMS and the introduction of the 'not-to-exceed' regulatory concept should also be considered. Nevertheless, alongside PEMS, the group assessed other candidate procedures, including multiple test cycles, random test cycles and emissions modelling. One of the tasks of the group was to establish a methodology to evaluate the test results.

The RDE-LDV group's planning initially foresaw that a decision on the choice of procedure would be taken by February 2012, that, if the PEMS option were selected, the legislative drafting for the final test procedure would be concluded by September 2013, and that the resulting test procedures would be applied for compliance purposes as of the mandatory Euro 6 dates [RDE-LDV, CARS21].

In March 2012 the JRC presented a preliminary assessment of the procedures for data evaluation and the first results, and the overview of the evaluation of the RDE procedures was presented on 28 June 2012 [RDE-LDV]. In October 2012 the dedicated task force within the group proposed adopting PEMS on-road testing as the regulatory RDE procedure, and in February 2013 the RDE-LDV group settled on the PEMS option [RDE-LDV, JRC mission].

On 8 November 2012, the Commission published its communication "CARS 2020: Action Plan for a competitive and sustainable automotive industry in Europe". The communication proposed that "*real driving emissions (RDE) of* NO_x *[...] should be recorded and communicated as from the mandatory Euro 6 dates (in 2014)*" and that "*at the latest three years after these dates, the RDE procedure should be applied together with robust not-to-exceed (NTE) emission limits, which will ensure a substantial reduction of real driving* NO_x *emissions*". The

Commission considered those three additional years necessary because "*a significant redesign of diesel vehicles will be required to achieve Euro 6 NO_x emission limits under normal driving conditions*".

The Member States agreed with the recommendations contained in the CARS 2020 communication at the Competitiveness Council on 10-11 December 2012 [Tajani]. Parliament commented in its resolution of 10 December 2013 that the planned development of a new, accurate driving test cycle and procedures should reflect real driving conditions, and it called for those procedures to be introduced without delay.

On 1 October 2013 a dedicated task force for the development of an RDE data evaluation method within the RDE-LDV group met for the first time, and in June 2014 a drafting subgroup chaired by the JRC was established to draft the technical specifications [RDE-LDV, JRC mission].

The first of four RDE regulatory packages, setting out the RDE procedure with PEMS, was completed in November 2014 and adopted by the TCMV in May 2015.

The work on the second RDE package, setting out the not-to-exceed limits for NO_x emissions, started in February 2015 [JRC mission], and accelerated after the Volkswagen revelations in September 2015 [Bieńkowska, Dobrindt]. The second package was adopted by the TCMV on 28 October 2015.

Commenting on the timeline of the development of the RDE tests, some Member States and other witnesses pointed out that developing a significant and repeatable test procedure is a complex process [MIT, Q:MS]. They also highlighted the fact that it took time for PEMS equipment to become a suitable measurement technology for regulatory purposes and for testing procedures to give comparable results [Renault, ACEA, MIT, Q:MS]. The first research programme to measure NO_x emissions of light-duty vehicles with PEMS started in 2007, and before this date PEMS were designed for tests of heavy-duty vehicles only. The first generation of PEMS lacked measurement accuracy (because of packing constraints, additional weight, etc.) and the reproducibility of tests was limited [ICCT, JRC mission]. However, in subsequent years technological development continued and PEMS became more accurate and reliable.

From the point of view of the legislative process itself, several witnesses considered the duration of the development of RDE testing to be too long [COM, Bieńkowska]. Witnesses argued that, rather than political interference [JRC, COM, Zourek], delays were due to the fact that decision-making at EU level is a consensus-building process that takes time [Dimas, Potočnik], that administrative processes are often unable to keep up with technological development [Zourek], and that the focus of the EU and the Member States was on avoiding burdens on the industry after the crisis started in 2008 [Potočnik].

The findings of the analysis of the TCMV minutes showed that certain Member States prevented the formation of a qualified majority in the TCMV, which resulted in the postponement of the vote on the first RDE package from 24 March to 19 May 2015 [JRC, COM, TCMV].

In order to clarify the regulatory process on emission measurements, the inquiry also gathered information on the role played by the various Commission departments. Under the Commission's principle of collective responsibility, the portfolio of the Commissioner for

Industry (and the Directorate-General for Enterprise and Industry DG ENTR/GROW) includes emission standards, while the portfolio of the Commissioner for the Environment (and the Directorate-General for the Environment DG ENV) includes air quality. The two DGs pursue separate objectives but cooperate to find workable compromises [Dimas, Verheugen, Potočnik, Vella]. In the US the responsibilities for setting emission standards, for issuing type-approvals and for air quality all reside with the same authority [EPA, Potočnik].

In January 2013 the Danish Minister for the Environment, Ida Auken, wrote to the then Commissioners Tajani and Potočnik raising concerns as to the possibility for Denmark and many other Member States to reach NO_2 air quality targets in view of emissions from light duty vehicles, considering the RDE timeline "unacceptable" and asking for action on the "critical situation as soon as possible". The Commissioners replied in March 2013, recognising the need to reduce RDE NO_x emissions to meet the EU air quality objectives. They explained that the RDE test procedure was under development and would apply from 2017/2018 at the latest.

The then Commissioner Potočnik and DG ENV focused their action on ensuring that the agreed timeline for the introduction of RDE tests was respected [Potočnik, Vella, Falkenberg]. On 12 February 2013 the then Commissioner Potočnik wrote to the then Commissioner Tajani urging him to minimise any further delays in the process. In his answer of 26 March 2013 Mr Tajani explained that the Commission had initiated as early as 2011 the RDE procedure to bring about a robust procedure test, which would apply at the latest from 2017.

One year later, in a note dated 19 November 2014, the former Director-General of DG ENV complained to the former Director-General of DG ENTR about "delays" and stated that "now that action to address the real-world emissions has been postponed several times, the Commission will be seen as acting incoherently and even remaining passive facing the evidence on car emissions". In his reply the DG ENTR Director-General stated that "DG ENTR takes all necessary actions in order to finalise without delays the proposal on the Real Driving Emissions (RDE) procedure" [CIRCA].

The inquiry also gathered information on the possible influence of lobbying by the industry at the various stages of the process [CEO, T&E]. Generally, witnesses acknowledged that the Commission had consulted with industry and non-industry stakeholders as well as independent experts [AECC, T&E, Verheugen, Tajani, MIT, Q:MS]. According to the documents examined, the Commission services were concerned about the car manufacturers' resistance to the introduction of PEMS testing [CIRCA, CEO].

However, some witnesses raised concerns about the balance of the composition of some groups [CEO, T&E, EU study]. The inquiry gathered information on the composition of the most relevant working group for the issue in question, the RDE-LDV group. Access to the RDE-LDV groups is open, and no application for participation has been rejected. The inquiry found, for instance, that in three group meetings that took place between May and September 2016 with 43 to 47 participants, 21-23 represented car manufacturers, 9-12 other automotive industry actors, 5-7 Member States, 1-5 technical services, and 1-2 research institutes, civil society or NGOs [RDE-LDV].

The important role played by industry experts in certain technical subgroups has been attributed to the high specialisation of those groups, to the lack of sufficient technical expertise in the Commission, and to the fact that civil society organisations and NGOs lack proper resources to ensure they can be present at the substantial number of group meetings [CEO, T&E, Q:MS, EU

study]. The relevant Commission Directorates-General do not have technical departments able to follow technological developments closely. Mobility policies may also prevent the accumulation of specific know-how, including in the JRC.

The RDE tests with PEMS

The unanimous view of the experts and witnesses heard is that the introduction into the EU type-approval system of RDE testing with PEMS is a definite improvement that will help towards a real reduction in pollutant emissions from light-duty vehicles into the atmosphere [JRC, ICCT, TNO, DUH, Borgeest, ADAC, EA, ACEA, Renault, VW, Mitsubishi, FCA, COM, Faurecia, Bosch, Potočnik, Tajani, Bieńkowska, Vella, EPA, MIT, Millbrook, KBA, TÜV, SNCH, UTAC, RDW, Dobrindt, EU study].

The maximum additional measurement uncertainty of PEMS for light-duty vehicles with respect to laboratory tests has been steadily decreasing and is currently at about 30 %, and the average uncertainty was estimated by the Commission to be 18.75 %, with a concrete possibility of reaching 10-15 % within a short period of time [JRC, EA]. According to experts, if the test is conducted on a test track, thereby eliminating the effect of unpredictable traffic flow, that variability falls to approximately 10 % [EA]. The measuring and statistical uncertainties can be properly accounted for, so that testing with PEMS is fit for measuring road emissions of vehicles for regulatory purposes. In particular, the current discrepancies between laboratory and on-road NO_x emissions are large, so the level of accuracy of the PEMS is already sufficient for identifying them [JRC, ICCT, TNO, ADAC, EA].

However, the specifications of the test and evaluation procedures should be set out very carefully in order for RDE tests to be effective and to result in a decrease in the discrepancies between emissions measured in the laboratory and on the road [JRC, ICCT, TNO, DUH, Borgeest, ADAC, EA]. In particular, on-road tests with PEMS must be devised in such a way that they cover a wide range of driving conditions, including temperature, engine load, vehicle speed, altitude, type of road (urban, suburban, highway) and other parameters commonly found when driving in the EU, and also in order to avoid as much as possible the manipulation of test results [TNO, Borgeest, EU study, Q:MS].

A complete evaluation of the RDE tests will only be possible once all four packages have been adopted.

The transition period and the conformity factor

The majority of invited experts claimed that sufficient time was given to car manufacturers to reach the Euro 5 and Euro 6 targets [TNO, Borgeest, Lange]. According to its Recital 5, the Euro 5/6 regulation already included Euro 6 limits in order to provide industry with clear information on future emission limit values. According to the test results, it is possible to achieve Euro 6 emission limits on the road with currently available technology [ICCT, DUH].

Owing to the emission control technologies commonly used by manufacturers in the current fleet so far, a period to allow car manufacturers to install the proper technological equipment in vehicles to meet the requirements of the new RDE test is considered necessary by experts, but should be kept as short as possible so that actual improvements in air quality can be achieved in a timely manner. A “conformity factor” applied to the results of RDE tests for NO_x emissions, which allows cars to emit up to a fixed multiple of the legal emission limit when tested on the

road because of the inherent measuring uncertainties of PEMS, is needed if the tests are used for regulatory purposes [TNO, Lange, EPA, ENVI/EMIS].

The second of four RDE packages, adopted by the TCMV in October 2015, sets out the not-to-exceed limits for NO_x emissions, allowing a divergence between the results of PEMS tests and the legal limits by a conformity factor of 2.1 at most for new models by September 2017 (September 2019 for new vehicles), and by a factor of 1.5 by January 2020 for new models (January 2021 for new vehicles). This two-step approach to lowering the conformity factor was a compromise supported by the industry and most Member States [ACEA, MIT].

The conformity factor will be subject to annual review, as explicitly provided in the second RDE package, in order to bring it as close to 1 as possible, only accounting for the real margin of error. The Commission, in its statement "Towards comprehensive and efficient emission testing in the EU", committed itself to making use of this revision clause to propose a reduction in the second conformity factor in 2017 and to follow the evolution of PEMS technology on an annual basis thereafter [COM, Bieńkowska, MIT].

The conformity factor is not the only aspect that will determine the effectiveness of the new test procedure though. As mentioned above, the net stringency of RDE testing will also crucially depend on the broadness of the testing range and on the methodology applied to evaluate the test results [TNO]. That said, from a purely technical point of view, a conformity factor of 2.1, as currently foreseen for the first phase of the implementation of RDE testing for NO_x emissions, is perceived by the majority of invited experts and by the Commission as unnecessarily high, as many cars currently in production could already meet emission limits on the road if the conformity factor was set at about 1.5 [ADAC, EA, Mitsubishi, Bieńkowska, Vella, LUX mission, ENVI/EMIS]. In its initial draft for the second RDE package, the Commission had proposed to the TCMV conformity factors towards the lower end of the 1.6-2.2 range for the first phase and of the 1.2-1.6 range for the second phase [COM].

4. Defeat devices

4.1. Introduction

A **defeat device** is defined in Regulation (EC) No 715/2007 as "*any element of design which senses temperature, vehicle speed, engine speed (RPM), transmission gear, manifold vacuum or any other parameter for the purpose of activating, modulating, delaying or deactivating the operation of any part of the emission control system, that reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal vehicle operation and use*".

The regulation prohibits the use of defeat devices, except where:

"*(a) the need for the device is justified in terms of protecting the engine against damage or accident and for safe operation of the vehicle;*

(b) the device does not function beyond the requirements of engine starting;

or

(c) the conditions are substantially included in the test procedures for verifying evaporative emissions and average tailpipe emissions."

Defeat devices were found in the US in light-duty vehicles in 1995 and in heavy-duty vehicles in 1998 [JRC, EPA, CARB]; as a consequence, the ban on defeat devices and the corresponding exceptions were introduced in Union law on light-duty vehicles in Directive 1999/96/EC, and have been kept essentially unchanged ever since.

4.2. Analysis of the evidence gathered

Knowledge of the possible use of prohibited defeat devices

As a result of the cases that took place in the US in the 1990s, the risk of the possible use of defeat devices was generally known for light-duty and heavy-duty vehicles. However, from the evidence gathered it seems that generally it was not suspected that defeat devices could be in actual use in any passenger car produced in the EU until Volkswagen admitted to having used defeat software in its diesel cars sold on the US market [JRC, ICCT, TNO, DUH, Borgeest, ADAC, T&E, COM, ACEA, Verheugen, Potočnik, Tajani, Vella, MIT, Millbrook, KBA, SCNH, Dobrindt, Q:MS, Q:Suppliers].

Nevertheless, in its 2013 report entitled "A complementary emissions test for light-duty vehicles", the JRC mentions the possibility of "the use of defeat strategies under normal conditions of use" and states that while the use of defeat devices is generally prohibited, the exceptions that exist leave room for interpretation and provide scope, together with the currently applied test procedure, for tailoring the emissions performance of light-duty vehicles to a narrow set of type-approval conditions.

Defeat devices were generally not considered among the possible reasons behind the discrepancies between NO_x emissions from diesel cars measured in the laboratory and measured on the road, because it was believed that these discrepancies could be sufficiently explained by the fact that the NEDC laboratory test was not representative of real driving, and that manufacturers could optimise their vehicles in order to pass the test cycle while apparently complying with the letter of EU law [JRC, ICCT, TNO, DUH, Borgeest, ADAC, T&E, EA, EPA, Potočnik, Millbrook, KBA].

On 30 April 2012 an internal e-mail from the JRC, with DG GROW in copy, was sent on the subject of a Euro 5a diesel passenger vehicle that was being tested by the JRC. The test results showed that the Euro 5 emission limits were only fulfilled in the temperature range between 20 and 30 °C, but were not met outside of that temperature window. The e-mail also mentions a "memory effect" that was found to influence the engine strategy for at least 20 minutes after starting the engine at a specific temperature. The official in DG GROW who replied to the e-mail, with DG ENV and DG MOVE in copy, stated that "*this is very useful and a clear case of "hard" cycle beating*" [CIRCA].

In their hearing before the committee, the then Director and Director-General of DG GROW stated that they were not informed about this e-mail and therefore no follow-up action was taken [Zourek].

Other correspondence between the JRC and DG GROW, DG ENV and DG CLIMA, discussing possible "strange" emissions behaviour in 2008 and 2010, seemingly had no follow-up either. However, the lack of any indication of the possible use of defeat devices by car manufacturers was given as a reason by the Commission why the JRC was not mandated by the Commission to look further into the subject.

Identifying defeat devices

After the notice of violation issued by the US EPA in September 2015, Volkswagen admitted to fitting in its Euro 5 EA 189 diesel engine a piece of software that enables the vehicle to recognise that it is undergoing testing and to change the NO_x emission characteristic in that testing [VW, KBA]. Test detection is not per se an indication of the presence of a prohibited defeat device [VW, Bosch]. However, under the legislation, the goal of test detection must not be to reduce the effectiveness of the emission control system outside the test.

After Volkswagen's admissions about the software installed in its Euro 5 vehicles, the emission control strategies used by car manufacturers came under scrutiny. The issue remains as to whether those strategies constitute an illegal use of defeat devices in the strict sense of Regulation (EC) No 715/2007, or if those strategies constitute a lawful application of the exceptions provided for in Article 5(2) of that regulation. This article provides for the legal use of defeat devices where the need for the device is justified inter alia for "protecting the engine against damage or accident and for safe operation of the vehicle". In their answers to the questionnaire sent by the committee, all car manufacturers stated that they used these exceptions [Q:OEM].

In fact, often the choice of the emission control strategies employed by some manufacturers seems driven only by the goal of passing the test, which they interpreted as the only legal requirement to be fulfilled in spite of the clear air quality objectives of the legislation [Borgeest, ACEA, MIT, SNCH, Millbrook]. For example, some manufacturers calibrate ECUs to decrease

the effectiveness of ECTs outside specific "thermal windows" that are close to the ambient temperature range prescribed by the NEDC, for instance by switching off emission control systems at ambient temperatures below 17 °C, while others are able to keep ECTs effective in much larger temperature ranges [Mitsubishi, VW, PSA, Q:OEM]. As a reference, the cycles used to test vehicles in the US are performed in a range of ambient temperatures from -7 to +35 °C [EPA].

Several car manufacturers reassessed the temperature ranges used in the calibration process of the ECTs and have adjusted these ranges to a much broader spectrum [Renault, Mitsubishi, Q:OEM].

The experts' consensus view is that the effectiveness of NO_x after treatment systems such as LNT and SCR does not depend on the ambient temperature once a sufficient temperature is reached in the exhaust line. When the above condition is fulfilled, there is no plausible technical reason to switch off after treatment ECTs at any ambient temperature [AECC, TNO, DUH, Borgeest, Faurecia, Q:Suppliers], so optimisation strategies that turn them off can be attributed to choices made by car manufacturers in order to achieve different objectives, such as reducing fuel consumption (which is, for example, increased by the periodic regenerations required by an LNT system), increasing user convenience (by, for example, requiring fewer refills of urea solution in an SCR system), increasing the durability of other engine components, reducing costs by using cheaper parts or addressing design constraints.

Driving at very low ambient temperatures (or at very high altitudes where air pressure is low), can pose a challenge for EGR systems, due to the possible creation of soot, hydrocarbons and condensates that may clog the EGR valve or intercooler, and cause, for instance, increased PM or hydrocarbon pollutant emissions [TNO, Borgeest, Renault, ACEA, Q:Suppliers]. However, manufacturers seem to switch off EGR systems unjustifiably quickly and unjustifiably close to the temperature range used in the test cycle (the aforementioned "thermal windows") [Borgeest, KBA, Dobrindt]. Experts stated that additional technical measures could be applied quickly to solve the issue and reach operating ambient temperatures of around 0 °C [TNO, Borgeest], for example by using waste heat from the engine, if available, to increase the air inlet temperature [TNO].

Besides "thermal windows", other software calibration strategies applied by car manufacturers could point towards the illegal use of defeat devices:

- one example is stopping or modulating ECTs to decrease their efficiency after a certain time from the start of the engine, close to the duration of the test (approximately 20 minutes), has elapsed [KBA];

- another case is where NO_x emissions measured on a test cycle with a warm start are higher than when running the same cycle with the cold start prescribed by the NEDC [TNO, DUH, Borgeest, Bosch, Millbrook, EPA]; this behaviour is found in many vehicles in the EU, and the EPA confirmed that this was one reason why they decided to further question Volkswagen [EPA].

Enforcing the ban on defeat devices

The fact that defeat devices are banned across the EU is clear and was not disputed by any speaker. The Commission maintains that the definition of a defeat device is clear, and very

similar to the definition used in the US [COM, Dimas, Verheugen, Bieńkowska]. The prohibition of the use of defeat devices is explicit, carried over from the previous Euro 3/4 legislation, and was not a subject of debate during the adoption process of Regulation (EC) No 715/2007 [Verheugen]. The Commission also confirmed that no Member States had asked for more clarity on the definition and its implementation since its introduction [COM, Bieńkowska, Verheugen].

Some experts and witnesses and some Member States questioned the level of clarity of the exceptions provided for in Article 5(2) of the Euro 5/6 regulation and pointed out the lack of a list of assessment criteria to evaluate whether emission control strategies used by car manufacturers are instances of prohibited defeat devices or can be justified on grounds of engine protection and safety [ICCT, TNO, Lange, ADAC, RDW, Renault, Verheugen, MIT, Dobrindt]. Witnesses confirmed they had not asked for clarifications before. The implementing Regulation (EC) No 692/2008 did not include the requirements for the implementation of the exceptions that the Commission was mandated to adopt pursuant to Article 5(3) of the Euro 5/6 regulation.

Before the adoption of the 2nd RDE package, car manufacturers were not required to declare or justify their emission strategies (except at specified low temperatures): notably, the requirement to disclose the "auxiliary emission strategies", which change the base strategies for a specific purpose and in response to a specific set of ambient or operating conditions, was not provided for in the legislation until April 2016 [COM, Renault, VW, MIT], and no type-approval authority requested such information [Q:OEM].

Under Regulation (EC) No 692/2008, the Commission is entitled to request Member States' type approval authorities to provide information on the functioning of emission technology at low temperatures. The Commission has not used this provision [COM].

A similar requirement was instead introduced in the Euro III/IV implementing legislation for heavy-duty vehicles after the cases discovered in the US in 1998-1999 (the current Euro V/VI legislation for heavy-duty vehicles does not provide for any exceptions to the ban on defeat strategies). However, it was not included earlier in the implementing law for light-duty vehicles. Commission representatives in their hearings argued that the requirement in the light-duty vehicles legislation was not included because the development and the deployment of defeat devices for light-duty vehicles were considered too expensive [Verheugen, Zourek].

In fact, the request by the US EPA to Volkswagen to justify the emission strategies used in their diesel cars in the US was at the origin of the admission of the use of prohibited defeat devices [EPA]. Without the obligation for car manufacturers to disclose and, where necessary, justify their emission strategies, identifying with certainty a defeat device implemented in software requires a lengthy and burdensome reverse-engineering procedure with no guarantee of success. This reverse engineering procedure would be impractical as a way of systematically searching for defeat devices during the type-approval process [JRC, ICCT, Borgeest, Lange, Bosch, RDW, Q:Suppliers, Q:OEM]. On the other hand, abnormalities can possibly be uncovered by varying the parameters of the test.

Germany pointed out that the legislation does not require the use of best available techniques for the emission control systems before an exception can be invoked on grounds of engine protection [Dobrindt], as the specifications of the components offered by the suppliers may vary [Bosch, Faurecia], but several experts and car manufacturers questioned the effectiveness of

using the concept of best available technology in the legislation [Q:OEM].

However, in the Transport Council of 7 June 2016 the Commission and a majority in the Council considered the exceptions in Article 5(2) to be clear and identified a lack of enforcement on the Member States' part to be at the origin of the problem, as the enforcement of the ban on defeat devices is a task for national market surveillance authorities [Bieńkowska].

Type-approval authorities in the Member States are responsible for verifying that vehicles comply with the requirements of Regulation (EC) No 715/2007, which include the prohibition of defeat devices.

Before the Volkswagen revelations in September 2015, despite evidence of significant exceedances of on-road NO_x emissions compared to the regulatory limits made available by the Commission and other independent bodies, and despite the ban on defeat devices enshrined in EU law, no Member State applied specific protocols or test methods, or took any other measure, to search for the possible use of prohibited defeat devices. Several type-approval authorities and technical services also mentioned the lack of a test method to identify defeat devices [MIT, KBA, SNCH, RDW, UTAC]. The legislation did not prevent Member States carrying out additional testing [MIT, UTAC, Calleja, Royal].

After September 2015 Germany, France, the UK, Italy, Spain, Sweden and the Netherlands undertook additional tests beyond the NEDC test, and used the outcomes of these complementary tests to search for the potential use of prohibited defeat devices (Finland will start tests next year). In almost all cases the investigating authorities asked the manufacturers for explanations of their emission strategies.

Among the Member States that have issued EU type-approval certificates, Ireland, Romania, Luxemburg and Malta have not carried out complementary tests.

A report on the Member States' investigations, drafted by the Commission in response to the European Parliament resolution of 27 October 2015 on emission measurements in the automotive sector, is available on the committee website:
http://www.europarl.europa.eu/committees/en/emis/publications.html?tab=Evidence

The national investigations conducted after September 2015 tested a large sample of diesel vehicles present on the EU market and, while confirming the known discrepancies between laboratory emissions and real-world emissions of NO_x, they did not consider the evidence on the use of prohibited defeat devices by manufacturers other than Volkswagen to be conclusive. When deviations from the expected emission behaviour were observed, the car manufacturers provided justifications on the grounds of engine protection and safety, which the authorities in most cases did not conclude to be in violation of the exceptions to the ban on defeat devices [MIT, KBA, UTAC, Dobrindt, Q:MS].

At the time of writing, in a few cases type-approval authorities have reached different conclusions. One such case is constituted by the allegations by the German type-approval authority KBA that certain vehicles of the FCA group employ a prohibited defeat device. The Italian authorities responsible for the type-approval of those vehicles do not share this view, and a mediation procedure under Article 30(6) of Directive 2007/46/EC has been initiated [KBA, MIT, FCA].

In addition, the Netherlands type-approval authority RDW investigated 30 vehicles and identified the potential use of a prohibited defeat device on one Volkswagen vehicle [RDW]. Non-standard behaviour was detected in 16 of the 30 vehicles, which produced increased emissions at a particular speed, time, distance or ambient temperature. The RDW asked the manufacturers of these vehicles for explanations and has the option of withdrawing the EU type-approval if no satisfactory explanation is provided.

According to the initial test results performed by the ICCT in the framework of the diesel emissions screening campaign conducted by the French Government, a large number of the vehicles tested had suspicious emissions behaviour. Only 4 out of 52 vehicles met their corresponding emission limit when tested outside of the laboratory.

In general, it emerged that Member States do not seem to apply comparable approaches to assessing and evaluating compliance with EU law on defeat devices, and that authorities and technical services in the Member States are waiting for the interpretation guidelines on defeat devices, which are to be issued by the Commission by the end of 2016, to clarify the limits on the use of the exceptions to the ban, thus leading to a common interpretation as to which emission control strategies are legal [Bieńkowska, MIT, RDW].

The invited experts and witnesses agreed that RDE testing will make the use of prohibited defeat devices significantly more difficult due to the less predictable test conditions. Nevertheless, there could still be ways to detect RDE testing, such as sensing exhaust backpressure or if a vehicle operates with an open trunk [DUH, JRC, TNO, ADAC, EA, ICCT].

5. Type-approval and in-service conformity

5.1. Introduction

The framework Directive 2007/46/EC on type-approval sets out the safety and environmental requirements that motor vehicles have to comply with before being placed on the EU market. It focuses on pre-market compliance checks on vehicles that come off the manufacturing assembly line. The specific type-approval requirements for pollutant emissions are included in Regulation (EC) No 715/2007 and in the implementing Regulation (EC) No 692/2008.

EU type-approval is a complex process, with several options available to car manufacturers for providing information to one of the 28 national **type-approval authorities** in order to obtain an EU vehicle type-approval certificate authorising the sale of the vehicle type in the EU. During the type-approval process, the compliance of vehicles with technical requirements, including the emission limits, is tested by **technical services** specifically designated by the type-approval authority for each Member State. A type-approval authority may also designate itself as a technical service.

The glossary in **Appendix E** includes links to the lists of type-approval authorities and technical services in the Member States.

Manufacturers have to ensure that each vehicle rolling off the assembly line is in conformity with the approved type (**conformity of production**). Every vehicle produced must be accompanied by a certificate of conformity in order to be registered.

Verifying that the vehicles placed on the market are safe and not harmful to the environment and conform to the approved type (**in-service conformity**) is a task for **market surveillance authorities**. These are public authorities (at the national or subnational level), usually also in charge of general product safety. In some cases market surveillance authorities linked to vehicle compliance activities are the same as the type-approval authorities. The obligations for in-service conformity are set out in Article 4(2) of the Euro 5/6 regulation, and the detailed provisions are spelled out in Annex II of the implementing Regulation (EC) No 692/2008. There are no specific provisions on market surveillance in Directive 2007/46/EC.

On 27 January 2016 the Commission adopted a proposal for a **new regulation**, repealing and replacing Directive 2007/46/EC, to tackle the perceived shortcomings of the current EU type-approval system. The aim of the proposal is to:

- reinforce the independence and quality of testing that allows a car to be placed on the market;

- introduce an effective market surveillance system to control the conformity of cars already in circulation;

- reinforce the type-approval system with greater European oversight.

5.2. Analysis of the evidence gathered

Type-approval

The inquiry collected evidence on the functioning of the EU type-approval system and its alleged shortcomings.

Under the current legislation – and the EU single market rules – type-approval granted in a Member State is recognised throughout the Union. Although common rules on type-approval and test specifications are laid down [ACEA, MIT], many witnesses highlighted the existence of a variety of interpretations in their application across the Member States [MIT, Mitsubishi, Q:MS, EU study].

While in many cases the choice by a car manufacturer of the type-approval authority of a certain Member State is due to geographical or historical reasons [MIT, KBA, SNCH, Q:MS], the lack of a harmonised interpretation of the rules can lead to a situation of competition among the type-approval authorities of different Member States [ACEA, MIT, Millbrook, Q:MS, EU study], as car manufacturers may choose an authority on the basis of its flexibility in the interpretation of the rules [UTAC, EU study]. However, the car manufacturers' choice of type approval authority seems to be also influenced by other factors, such as the rapidity of processing applications, the set of minimum tests required, technical specialisation, linguistic flexibility and the amount of the fees required [SNCH, Millbrook, LUX mission, UTAC, EU study].

In addition, the level of technical expertise and the number of human and financial resources may vary substantially between type-approval authorities (and technical services) [EU study]. The presence of adequate in-house independent, qualified human resources and the availability of in-house state-of-the-art testing facilities are essential to ensuring effective monitoring of the emission standards [EPA].

The tests required for the type-approval procedure are often carried out in the car manufacturers' certified laboratories [MIT, UTAC, EU study], under the supervision of the designated technical service, often because of the lack of resources on the side of the authorities (so-called witness testing) [MIT]. Technical services may also be partly owned by manufacturers [Millbrook, EU study], or integrated into the type-approval authorities [MIT, Q:MS, EU study], which raises questions with regard to independence and scientific neutrality. It is the car manufacturer that usually chooses the technical service to be used: in principle, the type-approval authority can challenge the choice, but it seldom does so [SNCH]. National authorities have never asked technical services to perform additional tests to ensure the implementation of the requirement to meet the regulatory limit in "normal use" or of the ban on defeat devices. For technical services, running additional tests on their own initiative would entail supplementary costs and might put their commercial relationships with manufacturers at risk. [UTAC].

Type-approval authorities do not have access to ECU source code under the current system. It has also been pointed out that ECU software analysis is very complex and would not guarantee detection of fraudulent practices.

The fact that type-approval authorities and technical services are usually financed in part by fees paid directly to them by the car manufacturers can give rise to conflicts of interest due to

the need to maintain commercial relations [EU study]. Moreover, some technical services also do consultancy work for manufacturers on emission tests. However, it is common practice in regulated product sectors in the EU for manufacturers to pay for the compliance costs linked to the authorisation for placing a product on the market [COM]. The Commission has no concrete evidence of conflicts of interest [COM], and type-approval authorities and technical services reject the notion that the structure of financing constitutes a problem for their independence [MIT, SNCH, Millbrook, UTAC, LUX mission]. Some witnesses were of the opinion that type-approval authorities should supervise the financial relations between technical services and manufacturers [SNCH].

By contrast, the US system is based on indirect, more independent financing: the US EPA collects fees from manufacturers to cover the cost of administering their certification and compliance programmes. These fees are submitted by the EPA to the US Treasury, and the US Congress in turn allocates funds to the EPA for the agency to implement its programmes [EPA, US study].

Under Directive 2007/46/CE, a type-approval authority must notify the authorities in the other Member States when it decides to reject a type-approval application. However, there is no uniform interpretation among the Member States as to whether the manufacturer is allowed to approach another type-approval authority in that case [MIT, Q:MS]. Some Member States only require a written declaration that a type-approval has neither been applied for nor rejected before [SNCH]. In fact it was noted that it is very unusual for a decision not to issue a type-approval to be reached, as the manufacturer would stop the process if this risk emerged [Millbrook, UTAC, Q:MS].

In general, type-approval authorities exchange information at specific meetings and in the Type Approval Authorities Expert Group set up by the Commission in 2010, as well as informally [COM, MIT, Q:MS]. However, issues may arise when there are differences of interpretation between the authorities [COM, KBA, MIT, SNCH]. Contrary to type-approval authorities, there is currently no specific system in place for exchanging information between technical services [COM, UTAC, EU study], neither is such a system foreseen in the Commission's proposal for reform of EU type-approval.

There is currently no EU oversight of type-approval of vehicles, and the new Commission proposal aims to introduce an oversight role for the Commission [COM]. Work on the new proposal started in 2010, and was speeded up after the emissions case [Tajani, Bieńkowska]. The possibility of a more centralised system was discussed before the entry into force of Directive 2007/46/EC, but was discarded by the Member States [Verheugen].

As regards conformity of production, the legislation requires verification of whether vehicles straight off the production line conform to the approved type, both at type-approval and afterwards, including as regards emissions. The tests to verify conformity of production are normally undertaken by car manufacturers in their facilities and not by the authorities. Technical services may supervise tests or perform inspections. The type-approval authorities only very rarely take production samples to verify conformity of production, despite having the legal option of doing so. In most cases they commission technical services to audit the car manufacturers' documentation at more or less regular intervals in order to verify that conformity of production tests are performed and the required quality management system is in place [KBA, Millbrook, UTAC, EU study].

The committee learned that in the USA the responsible authorities also test vehicles coming off production lines to check whether production vehicles match the pre-production design that was type-approved [EPA, US Study].

In-service conformity and market surveillance system

The majority of witnesses indicated that effective in-service conformity checks and market surveillance are paramount to the functioning of the system [JRC, ICCT, TNO, Borgeest, Lange, COM, EPA, EU study]. Market surveillance should, for instance, uncover cases where production vehicles and their installed software do not conform to the sample optimised to pass the type-approval tests [Millbrook, UTAC].

However, some Member States have not tested any vehicle for in-service conformity, while others carry out tests regularly, on different numbers of vehicles, and others started measurement campaigns only recently as a consequence of the emissions case [MIT, Q:MS].
In the USA the responsible authorities recruit vehicles (on the basis of both random and targeted criteria) from private owners and test them to ensure that the cars remain clean in actual use, even after many years of operation [EPA, US Study].

In-service testing for emissions is mostly conducted in car manufacturers' laboratories, and under the current implementing regulation has been limited to the NEDC laboratory tests required for type-approval. Also, the legislation does not provide for in-service testing performed by independent certified laboratories [ACEA, MIT, RDW, EU study].

In general, in-service conformity checks should be part of the general market surveillance put in place by the Member States, but the current legislation on motor vehicles lacks specific provisions [COM, Bieńkowska, MIT]. Moreover, there is uncertainty about which bodies are responsible for market surveillance in the Member States. In some cases the market surveillance bodies that have been officially communicated to the Commission by the Member States are not aware of the designation and are in fact not involved in market surveillance [UTAC].

In 2012 the then Commissioner Tajani reminded the Member States of their obligation to establish effective market surveillance systems and to ensure the necessary structures and resources to identify and take corrective actions in relation to vehicles that do not comply with the relevant EU type-approval requirements or represent a serious risk to safety and the environment [COM, Tajani].

6. Enforcement and penalties

6.1. Introduction

Under Article 13 of Regulation (EC) No 715/2007, the Member States were to "*lay down the provisions on penalties applicable for infringement by manufacturers of the provisions of [the] Regulation*" and "*take all measures necessary to ensure that they are implemented."* Those penalties were to be *"effective, proportionate and dissuasive*". The Member States were required to report those provisions to the Commission by 2 January 2009.

The Article also lists some of the types of infringement that must be subject to penalties:

> "*(a) making false declarations during the approval procedures or procedures leading to a recall;*
>
> *(b) falsifying test results for type-approval or in-service conformity;*
>
> *(c) withholding data or technical specifications which could lead to recall or withdrawal of type-approval;*
>
> *(d) use of defeat devices; and*
>
> *(e) refusal to provide access to information."*

In addition, Article 30(1) of the framework Directive 2007/46/EC on type-approval mentions that if a Member State finds that vehicles "*do not conform to the type it has approved, it shall take the necessary measures, including, where necessary, the withdrawal of type-approval, to ensure that production vehicles [...] are brought into conformity with the approved type. The approval authority of that Member State shall advise the approval authorities of the other Member States of the measures taken*". Under Article 32 of the framework directive, Member State authorities may order manufacturers to issue a recall of vehicles when this is necessary to bring non-compliant vehicles back into conformity with their approved type.

Under Article 46 of the framework Directive, "*Member States shall determine the penalties applicable for infringement of the provisions of this Directive, [...] and shall take all necessary measures for their implementation. The penalties determined shall be effective, proportionate and dissuasive. Member States shall notify these provisions to the Commission no later than 29 April 2009 and shall notify any subsequent modifications thereof as soon as possible*".

6.2. Analysis of the evidence gathered

Penalties in the Member States

The Member States did not notify the Commission of the penalties put in place pursuant to Regulation (EC) No 715/2007 and Directive 2007/46/EC within the deadlines set out in those acts (January and April 2009). Only four countries (Denmark, Ireland, Finland and Hungary) transmitted information to the Commission by the end of 2009. On 12 February 2013 the

Commission reminded the Member States of their obligations and asked them to provide the information on penalties by 28 February 2013. The Commission reiterated its request on 1 October 2015 and asked for further clarification on the penalty regimes in February 2016 [CIRCA].

Almost all the Member States now consider that they have established the necessary rules on penalties. Penalties may be covered by various laws, such as traffic acts, motor vehicle acts or the criminal code [Q:MS, EU study]. So far no Member State has issued any penalties to car manufacturers for the infringements listed in Article 13 of the Euro 5/6 regulation [Q:MS, EU study], and in particular there have been no instances of withdrawal of type-approval.

There is a lack of consistency in the penalties laid down by the Member States. The penalties vary greatly, and range from financial sanctions, frequently combined with partial or full annulment of type-approval, to imprisonment [Q:MS, EU study, ACEA].

The clarity and appropriateness of the penalties have been questioned by some witnesses. Sometimes it is, for instance, unclear whether the established fines are per vehicle or whether the car manufacturers face criminal charges [EU study]. The Commission pointed out that under the current system it cannot impose penalties for non-compliance directly [COM], and argued that the fines established by the Member States may be too low and may not be applied effectively to the industry [Bieńkowska, Vella, LUX mission].

Enforcement of EU law

The inquiry gathered evidence on the enforcement of EU legislation on road emissions by the Member States, before and after the Volkswagen case, and on how the Commission oversaw that enforcement.

Under the current rules, the responsibility for implementing and enforcing EU law, including market surveillance, lies with the Member States for most provisions of Directive 2007/46/EC and Regulation (EC) No 715/2007 [Verheugen, Tajani, Bieńkowska, Vella], and the Commission may launch infringement procedures against a Member State only if it considers that the Member State has failed to fulfil an obligation under EU law [COM, Tajani, Bieńkowska]. As regards motor vehicles, in the past, only one infringement procedure was launched (against Germany, on air conditioning systems), while no infringement cases were ever started concerning pollutant emissions from vehicles [Verheugen, Tajani]. However, Commissioner Bieńkowska announced that infringement procedures would be initiated in the weeks following her hearing in September 2016, when all the relevant evidence had been gathered [Bieńkowska]. On 8 December 2016, the Commission initiated infringement procedures against the Czech Republic, Germany, Greece, Lithuania, Luxembourg, Spain and the United Kingdom as regards their provisions on penalties, and against Germany and the United Kingdom for lack of disclosure of technical information on the results of their national investigations.

The Commission did not find the evidence of the discrepancies to be cause to initiate infringement procedures [Tajani], and focused on the development of RDE tests to ensure that new vehicles comply with the emission limits in real use [COM, Potočnik, Tajani, Vella]. No enforcement action was taken by the Commission as regards the discrepancies between the on-road NO_x emissions of diesel vehicles and the same emissions measured in the laboratory, despite the indications available since 2004-2005.

In their written answers and during the hearings, Member States and car manufacturers stated that they interpreted the legislation in such a way that the NEDC test in the laboratory was the only requirement for vehicles to pass, despite the air-quality objectives of the legislation[Renault, VW, ACEA, Mitsubishi, MIT, KBA, UTAC, Millbrook, Verheugen, Q:OEM].

The Commission's DG ENV asked for better enforcement of the Euro 3/4/5 emission standards as regards the existing fleet [Potočnik, Vella], as even when the RDE procedure is fully in place and new diesel vehicles meet emission limits in real use, the mass presence in EU cities of older diesel vehicles with unsatisfactory NO_x emission performance may impact on air quality for a long time to come [Lambrecht, DUH]. However, the proposal by the then Commissioner Potočnik to the then Commissioner Tajani to examine policy options with respect to the current fleet was not taken on board by the latter [Potočnik], on the grounds that no legal action was considered possible towards cars that complied with the existing testing protocols under the current legislation [Tajani].

On this point, the inquiry noted that some experts regarded retrofitting the existing fleet of light-duty diesel vehicles to meet the emission limits in real use as technically difficult [AECC, Borgeest]. However, Commissioner Vella argued that retrofitting was needed and the technology available [Vella]. Some car manufacturers also explained that they were ready to retrofit cars [VW].

The Volkswagen case originated from activities of car manufacturers that were fraudulent and banned by the applicable legislation [Verheugen, Tajani]. Before Volkswagen's admissions about the ECU software, type-approval authorities did not analyse software or perform any tests that would allow them to enforce the ban on defeat devices laid down in Article 5(2) of Regulation (EC) No 715/2007, limiting themselves to approving without further consideration the results of the NEDC laboratory test conducted by technical services. Tests in addition to the standard were not considered. [MIT, KBA, SNCH, RDW, UTAC, EU study].

After the case erupted, many Member States started investigations on pollutant emissions from passenger cars, running additional tests in the laboratory and on the road [KBA, MIT, Dobrindt, Q:MS]. No type-approval authority concluded that any vehicle under their responsibility used prohibited defeat devices, except the known Euro 5 Volkswagen cars [MIT, KBA, UTAC, Dobrindt, Q:MS]. In the only case where a possible prohibited defeat device was identified, enforcement action was prevented by the difference of interpretation between the German authority that pointed out the possible issue and the authority of the other Member State responsible for type-approval of the vehicle – Italy –, so that a mediation procedure involving the Commission was initiated [KBA, MIT, FCA].

Before considering enforcement measures for vehicles found not to be in conformity with the law, such as the withdrawal of type-approval or binding recalls, type-approval authorities often agree with car manufacturers on voluntary recalls of vehicles. German Federal Minister Alexander Dobrindt stated that Volkswagen agreed to a voluntary recall with the national type-approval authority because of the imminent withdrawal of type-approval for vehicles illegally using a defeat device. Volkswagen representatives stated that the recall would bring the affected vehicles into line with the type-approval certification while keeping the essential durability, quality and efficiency parameters unchanged. Some experts questioned whether the proposed recall measures would not impact the durability and efficiency of the affected

vehicles. Application of fines provided for in Regulation 715/2007 and Directive 2007/46/EC, or compensation for customers, have not been foreseen, since the defective vehicles can be rectified and made compliant with the law consequent to the recall measures [KBA, VW], contrary to the situation in the US, where this is not possible for the analogous vehicles [EPA]. Despite the Commission's view that consumers should be adequately compensated [Bieńkowska], some witnesses stated that there is no legal basis for EU-wide financial compensation [VW, Lies].

The recall programmes in the EU have been implemented only partially (sometimes as voluntary and sometimes as mandatory actions) and have not been overseen or coordinated at EU level [KBA, MIT], as there is no legal basis for the Commission to call for or coordinate a Europe-wide recall programme [Bieńkowska]. The Commission has been in constant contact with Member States on the issue of recalls and has asked for updates during each meeting of the relevant groups [Bieńkowska].

7. Powers and limitations of the committee of inquiry

7.1 Introduction

The European Parliament's right to set up temporary committees of inquiry is rooted in the Treaty on the Functioning of the European Union (Article 226). The detailed rules governing the exercise of Parliament's right of inquiry are laid down in Decision 95/167/EC, which was adopted by common accord between the European Parliament, the Council and the Commission on 19 April 1995 and which has remained unchanged since then.

The only innovation in the right of inquiry was introduced by the Lisbon Treaty, whereby the Parliament acquired the right of initiative to determine, by means of regulations, the detailed provisions on the exercise of this power with the consent of the Council and the Commission.

Before the present committee of inquiry into emission measurements in the automotive sector was set up, the European Parliament had used its right of inquiry on only three occasions: on the Community Transit System (1995), on the bovine spongiform encephalopathy (BSE) crisis (1996), and in 2006 on the crisis of the Equitable Life Assurance Society. In June 2016, the Parliament also set up an inquiry committee on money laundering, tax avoidance and tax evasion.

The powers of the Parliament's committees of inquiry are limited compared to those granted to national parliaments in the Member States. Since committees of inquiry are set up with the task of investigating alleged contraventions or maladministration in the implementation of Union law, the main targets of investigation are Union and Member States institutions in charge of that law.

Thus the main power of a committee of inquiry is derived from Article 3(2) of Decision 95/167/EC, according to which a "*temporary committee of inquiry may invite an institution or a body of the European Communities or the Government of a Member State to designate one of its members to take part in its proceedings"*. Union institutions and governments of Member States are obliged to appear before Parliament's inquiry committees "*unless grounds of secrecy or public or national security dictate otherwise*".

A committee of inquiry cannot request a specific official to appear before it, as the Union institution or government invited have discretion on who participates in the proceedings (Article 3(3) of Decision 95/167/EC).

Last but not least, the committee does not have the power to impose sanctions on witnesses who are invited but refuse to cooperate with an inquiry.

This represents an important difference from the investigative powers granted to national parliamentary inquiry committees, which in general have the right to subpoena individually named representatives of the government/administration or other citizens. This right is further supported by the power to impose sanctions of varying degrees of stringency in cases of violation, i.e. refusal to cooperate.

7.2 Analysis of the experience of the committee

The committee of inquiry into emission measurements in the automotive sector was the first inquiry committee to be set up following the entry into force of the Lisbon Treaty. The last time a committee of inquiry was set up before this was exactly ten years ago.

As such, the committee had to start its work practically from scratch both vis-à-vis the external actors concerned by the investigation and with regard to the internal workings of the institution itself. This required time in the beginning to develop practices and ad hoc procedures to adapt existing rules for standing committees to the specific characteristics and needs of a committee of inquiry.

Given the lack of experience with committees of inquiry in the last ten years, a new culture of cooperation had to be established, in particular with the Commission and the Member States, based on a common understanding of the actual powers of the committee and on the application of the detailed rules contained in Decision 95/167/EC.

Time was needed at the beginning to differentiate between a committee of inquiry and special committees, an instrument more commonly used by Parliament, with which it has a lot more institutional experience.

Unlike special committees, which are not set up on a specific legal basis and are subject to the general interinstitutional agreements and to the ordinary rules applicable to Parliament's standing committees, committees of inquiry have their legal basis in Decision 95/167/EC and are governed by a different set of rules. Institutional adjustment to this non-standard and more specific committee format took some time, which did not necessarily facilitate the work of the committee especially in its first few months.

Evidence gathering

The main shortcomings encountered were related to the way evidence and information was gathered, i.e. by means of public hearings and requests for documents. In both cases, successful results depended on the loyal cooperation among the EU institutions and, more generally, on the good will of the parties involved.

Overall, the committee succeeded in hearing witnesses from the Commission, the Member States and other parties whose oral evidence was deemed necessary to the inquiry.

However, the committee also encountered difficulties in inviting guests to attend hearings, because it lacked subpoena power. Only as a result of political and media pressure, did guests who had initially refused, eventually agree to participate. This was a very time-consuming process and delayed the gathering of key information, which was obtained only towards the end of the mandate.

Concerning the request for written information, apart from the ordinary requests for documents, the committee introduced the practice of sending written questions to all guests ahead of the hearings. Follow-up questions were also sent to guests, where needed, to provide clarification on issues raised during the hearings.

Furthermore, questionnaires were sent to Member States and national type-approval authorities,

car manufacturers and automotive suppliers, which proved an important source of complementary information despite the fact that it took many months to receive all the replies.

Lastly, a public call for evidence was set up on the EMIS website to allow citizens to send any information or evidence they considered relevant for the ongoing inquiry.

Cooperation with the Commission

Cooperation with the Commission was satisfactory in terms of inviting current Commissioners and Commission officials to attend; their readiness and availability to attend on requested dates facilitated the organisation of the committee's works.

As regards the invitation of former Commissioners, Antonio Tajani, Stavros Dimas and Janez Potočnik immediately accepted to appear before the committee.

The participation of other former Commissioners proved more problematic. Under the current Code of Conduct for Commissioners, they have no legal obligation to cooperate with an ongoing inquiry, despite having been party to important and pertinent information relating to events that happened and decisions taken under their responsibility during their term in office.

In this respect, Mr Günter Verheugen, the former Commissioner for Enterprise and Industry (2004 - 2010), declined to attend a hearing a number of times and only agreed to come following political and media pressure, four months after the original invitation was made.

Furthermore, Mr Erkki Liikanen, the former Commissioner for Enterprise and the Information Society (1999 - 2004) and Ms Margot Wallström, the former Commissioner for the Environment (1999 - 2004), declined to participate on grounds of limited memory and knowledge of what happened during their respective mandates more than ten years ago. The committee accepted their justification, and both eventually agreed to answer a set of written questions from the committee. The committee also considered inviting Mr Ferdinando Nelli Feroci, the former Commissioner for Industry and Entrepreneurship (2014) but decided against it, because of the limited contribution he could provide given his short time in office.

Cooperation with the Commission proved less satisfactory as regards the timely delivery of written evidence to the committee.

The committee sent six requests to the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) – as the coordinating Directorate-General within the Commission for any requests of documents for the present inquiry – and two requests to the JRC, asking for the relevant correspondence both within the Commission and with the Member States that the committee deemed essential for its inquiry.

The timely delivery of the requested information was problematic, and it was not always possible for Members of the committee of inquiry to consult the documents ahead of the hearings of Commission representatives. In fact, some requested documents were delivered only after repeated requests or further clarification of previous requests. The Commission attributed these difficulties to the internal procedures in place for dealing with parliamentary inquiries and to the fact that retrieving information from many years ago had proved to be a difficult and lengthy process. Moreover, many of the documents made available were illegible due to the redaction of substantial parts of the text. The system used to transmit the documents

(electronic sending via a closed interest group) was generally efficient, but the documents provided were not classified in a clear and user-friendly way.

Finally, interpreting how to handle the committee's request for the minutes of the TCMV proved to be a lengthy and complicated process, which delayed the sending of these key documents by several months, due to the time needed to receive the consent of all Member States to share this information with the committee.

Eventually the Member States consented subject to the condition that these documents were only to be consulted in a secure reading room, in effect forcing Parliament to handle this information using the stringent arrangements applied to classified information, without this being the case. The lengthy negotiations on the consultation conditions resulted in the TCMV minutes being delivered to the committee only at the end of July 2016, after important hearings, for which this information was crucial, had already taken place.

Cooperation with the Member States

According to Decision 95/167/EC, Member States are obliged to designate an official or servant to appear before a committee of inquiry when so requested.

In the case of the present committee of inquiry, the main interlocutors from the Member States were the responsible Ministers and the national type-approval authorities.

While all the invited type-approval authorities and technical services agreed to attend a committee hearing, cooperation with national Ministers was much more problematic. Of the invited representatives, only the German Federal Minister, Alexander Dobrindt, and the Regional Minister, Olaf Lies, immediately agreed to appear before the committee. The former Danish Minister for the Environment, Ida Auken, did not immediately confirm that she would attend. However, French Minister Ségolène Royal, Italian Minister Graziano Delrio and Slovak Minister Árpád Érsek (in the end represented by State Secretary Viktor Stromček) took a very long time to confirm their attendance, which was eventually obtained only after insistent political pressure was applied.

All Member States answered the request to provide written evidence in the form of a questionnaire. However, several Member States did not respect the deadlines by up to a few months.

Cooperation with other parties

The committee invited a substantial number of representatives of relevant stakeholders: experts from academia and civil society, representatives of industry (car manufacturers, automotive suppliers, and trade associations), US type-approval authorities as well as private technical services from key Member States. Almost all car manufacturer and automotive suppliers provided timely answers to the committee's invitation to reply to a questionnaire.

Internal rules and procedures

Internally, the committee had to adapt to existing rules in place for standing committees since no special administrative rules are in place for committees of inquiry. This covers issues such as:

- the organisation and running of the committee's public hearings – existing rules on Commissioners' hearings and standard public hearings by standing committees were used as reference;

- the number of reimbursable guests invited to a public hearing – the committee was allocated the same quota of 16 experts as any standing committee;

- the availability of committee meeting rooms in terms of size and slots – the calendar had to be drawn up taking into account existing committee meetings; as a consequence interpretation was also not always in line with the language profile of the committee and few extra slots were available in Brussels, meaning that Strasbourg was frequently used for extraordinary committee meetings;

- the commissioning of studies/briefings by policy departments and the European Parliamentary Research Service (EPRS) – the committee used the same services as standing committees under a given policy, without any increase in additional resources, or priority in dealing with the requests, taking into account the limited duration of the committee's mandate;

- the internal rules of procedure on access to confidential information, especially as regards the restricted access for accredited parliamentary assistants to non-classified "other confidential information".

Appendix A. The mandate of the committee of inquiry

P8_TA(2015)0462

European Parliament decision of 17 December 2015 on setting up a Committee of Inquiry into emission measurements in the automotive sector, its powers, numerical strength and term of office (2015/3037(RSO))

The European Parliament,

– having regard to the request presented by 283 Members for a committee of inquiry to be set up to investigate alleged contraventions and maladministration in the application of Union law in relation to emission measurements in the automotive sector,

– having regard to the proposal by the Conference of Presidents,

– having regard to Article 226 of the Treaty on the Functioning of the European Union,

– having regard to Decision 95/167/EC, Euratom, ECSC of the European Parliament, the Council and the Commission of 19 April 1995 on the detailed provisions governing the exercise of the European Parliament's right of inquiry[1],

– having regard to Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6), and on access to vehicle repair and maintenance information[2],

– having regard to Directive 2007/46/EC of the European Parliament and of the Council of 5 September 2007 establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles[3],

– having regard to Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe[4], and ongoing infringement procedures in respect of it,

– having regard to Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO_2 emissions from light-duty vehicles[5],

– having regard to its resolution of 27 October 2015 on emission measurements in the automotive sector[6], which calls for a thorough investigation regarding the role and responsibility of the Commission and of Member States' authorities, bearing in mind,

1 OJ L 113, 19.5.1995, p. 1.
2 OJ L 171, 29.6.2007, p. 1
3 OJ L 263, 9.10.2007, p. 1.
4 OJ L 152, 11.6.2008, p. 1.
5 OJ L 140, 5.6.2009, p. 1.
6 Texts adopted, P8_TA(2015)0375.

inter alia, the problems established in the 2011 report of the Commission's Joint Research Centre,

– having regard to the draft Commission Regulation amending Regulation (EC) No 692/2008 as regards emissions from light passenger and commercial vehicles (Euro 6) (D042120),

– having regard to the opinion delivered on 28 October 2015 by the Technical Committee – Motor Vehicles (TCMV) established by Article 40(1) of Directive 2007/46/EC,

– having regard to Rule 198 of its Rules of Procedure,

1. Decides to set up a Committee of Inquiry to investigate alleged contraventions and maladministration in the application of Union law in relation to emission measurements in the automotive sector, without prejudice to the jurisdiction of national or Union courts;

2. Decides that the Committee of Inquiry shall:

   – investigate the alleged failure of the Commission to comply with the obligation imposed by Article 14(3) of Regulation (EC) No 715/2007 to keep under review the test cycles used to measure emissions and to adapt them, if they are no longer adequate or no longer reflect real world emissions, so as to adequately reflect the emissions generated by real driving on the road, despite information relating to serious and persistent exceedances of the emissions limit values for vehicles in normal use, in contravention of the obligations set out in Article 5(1) of Regulation (EC) No 715/2007, including the Commission's Joint Research Centre's reports of 2011 and 2013 and research by the International Council on Clean Transportation (ICCT) made available in May 2014;

   – investigate the alleged failure of the Commission and the Member States' authorities to take proper and effective action to oversee the enforcement of, and to enforce, the explicit ban on defeat devices, as provided for in Article 5(2) of Regulation (EC) No 715/2007;

   – investigate the alleged failure of the Commission to introduce tests reflecting real-world driving conditions in a timely manner and to adopt measures addressing the use of defeat mechanisms, as provided for in Article 5(3) of Regulation (EC) No 715/2007;

   – investigate the alleged failure of Member States to lay down provisions on effective, proportionate and dissuasive penalties applicable to manufacturers for infringements of the provisions of Regulation (EC) No 715/2007, including the use of defeat devices, the refusal to provide access to information, and the falsification of test results for type-approval or in-service conformity, as required by Article 13(1) and (2) of that Regulation;

   – investigate the alleged failure of the Member States to take all measures necessary to ensure that the provisions on penalties applicable for infringements of Regulation (EC) No 715/2007 are implemented as required by Article 13(1) of that Regulation;

– collect and analyse information to ascertain whether the Commission and the Member States had evidence of the use of defeat mechanisms before the Notice of Violation issued by the Environmental Protection Agency of the United States of America on 18 September 2015;

– collect and analyse information on the implementation by the Member States of the provisions of Directive 2007/46/EC, in particular as regards Article 12(1) and Article 30(1), (3) and (4);

– collect and analyse information to ascertain whether the Commission and Member States had evidence of defeat devices being used for CO2 emissions tests;

– make any recommendations that it deems necessary in this matter;

3. Decides that the Committee of Inquiry shall present an interim report within six months of starting its work and shall submit its final report within 12 months of starting its work;

4. Decides that the Committee of Inquiry shall have 45 members;

5. Instructs its President to arrange for publication of this decision in the *Official Journal of the European Union.*

Appendix B. The committee of inquiry

Chair:

Ms Kathleen VAN BREMPT (S&D, BE)

Bureau:

Mr Ivo BELET, 1st Vice-President (EPP, BE)
Mr Mark DEMESMAEKER, 2nd Vice-President (ECR, BE)
Ms Kateřina KONEČNÁ, 3rd Vice-President (GUE/NGL, CZ)
Ms Karima DELLI, 4th Vice-President (Greens/EFA, FR)

Coordinators:

Mr Krišjānis KARIŅŠ (EPP, LV)
Mr Jens GIESEKE (EPP, DE) – *Vice-Coordinator*
Mr Seb DANCE (S&D, UK)
Mr Hans-Olaf HENKEL (ECR, DE)
Mr Fredrick FEDERLEY (ALDE, SE)
Ms Merja KYLLÖNEN (GUE/NGL, FI)
Mr Bas EICKHOUT (Greens/EFA, NL)
Ms Eleonora EVI (EFDD, IT)
Mr Marcus PRETZELL (ENF, DE) – *from 17.5.2016*
Mr Georg MAYER (ENF, AT) – *until 17.5.2016*

Rapporteurs:

Mr Jens GIESEKE (EPP, DE) – *from 24.11.2016*
Mr Pablo ZALBA BIDEGAIN (EPP, ES) – *until 24.11.2016*
Mr Gerben-Jan GERBRANDY (ALDE, NL)

Shadow Rapporteurs:

Ms Christine REVAULT D'ALLONNES BONNEFOY (S&D, FR)
Mr Hans-Olaf HENKEL (ECR, DE)
Mr Neoklis SYLIKIOTIS (GUE/NGL, CY)
Mr Bas EICKHOUT (Greens/EFA, NL) – *for the final report*
Mr Claude TURMES (Greens/EFA, LU) – *for the interim report*
Ms Eleonora EVI (EFDD, IT)
Mr Marcus PRETZELL (ENF, DE)

Other Members:

Mr Nikos ANDROULAKIS (S&D, EL)
Mr José BLANCO LÓPEZ (S&D, ES)
Mr Wim van de CAMP (EPP, NL)
Ms Dita CHARANZOVÁ (ALDE, CZ)
Ms Miriam DALLI (S&D, MT)
Mr Daniel DALTON (ECR, UK)

Mr Ismail ERTUG (S&D, DE)
Ms Ildikó GÁLL-PELCZ (EPP, HU)
Ms Julie GIRLING (ECR, UK)
Ms Françoise GROSSETÊTE (EPP, FR)
Ms Rebecca HARMS (Greens/EFA, DE)
Mr Roger HELMER (EFDD, UK)
Mr Jean-François JALKH (ENF, FR)
Ms Karin KADENBACH (S&D, AT)
Mr Marian-Jean MARINESCU (EPP, RO)
Ms Cláudia MONTEIRO DE AGUIAR (EPP, PT)
Mr Massimo PAOLUCCI (S&D, IT)
Mr Franck PROUST (EPP, FR)
Mr Dominique RIQUET (ALDE, FR)
Mr Massimiliano SALINI (EPP, IT)
Ms Christel SCHALDEMOSE (S&D, DK)
Mr Sven SCHULZE (EPP, DE)
Ms Olga SEHNALOVÁ (S&D, CZ)
Mr Ivan ŠTEFANEC (EPP, SK)
Ms Róża Gräfin von THUN UND HOHENSTEIN (EPP, PL)
Mr Kosma ZŁOTOWSKI (ECR, PL)
Mr Carlos ZORRINHO (S&D, PT)

Other substitute Members:

Ms Lucy ANDERSON (S&D, UK)
Ms Marie-Christine ARNAUTU (ENF, FR)
Ms Inés AYALA SENDER (S&D, ES)
Ms Pilar AYUSO (EPP, ES)
Mr Mario BORGHEZIO (ENF, IT)
Ms Deirdre CLUNE (EPP, IE)
Ms Lara COMI (EPP, IT)
Mr Nicola DANTI (S&D, IT)
Mr Michel DANTIN (EPP, FR)
Mr Ian DUNCAN (ECR, UK)
Ms Cornelia ERNST (GUE/NGL, DE)
Mr Francesc GAMBÚS (EPP, ES)
Ms Evelyne GEBHARDT (S&D, DE)
Ms Theresa GRIFFIN (S&D, UK)
Mr Dennis de JONG (GUE/NGL, NL)
Ms Elisabeth KÖSTINGER (EPP, AT)
Mr Giovanni LA VIA (EPP, IT)
Ms Paloma LÓPEZ BERMEJO (GUE/NGL, ES)
Mr Antonio LÓPEZ-ISTÚRIZ WHITE (EPP, ES)
Ms Gesine MEISSNER (ALDE, DE)
Mr Siegfried MUREŞAN (EPP, RO)
Mr Dan NICA (S&D, RO)
Ms Angelika NIEBLER (EPP, DE)
Mr Luděk NIEDERMAYER (EPP, CZ)
Mr Gilles PARGNEAUX (S&D, FR)
Mr Pavel POC (S&D, CZ)

Ms Julia REDA (Greens/EFA, DE)
Ms Julia REID (EFDD, UK)
Mr Robert ROCHEFORT (ALDE, FR)
Mr Bronis ROPĖ (Greens/EFA, LT)
Mr Dariusz ROSATI (EPP, PL)
Mr Andreas SCHWAB (EPP, DE)
Mr Remo SERNAGIOTTO (ECR, IT)
Mr Tibor SZANYI (S&D, HU)
Mr Paul TANG (S&D, NL)
Mr Nils TORVALDS (ALDE, FI)
Mr Evžen TOŠENOVSKÝ (ECR, CZ)
Ms Henna VIRKKUNEN (EPP, FI)
Mr Anders Primdahl VISTISEN (ECR, DK)
Ms Martina WERNER (S&D, DE)
Ms Lieve WIERINCK (ALDE, BE)
Mr Flavio ZANONATO (S&D, IT)
Mr Marco ZULLO (EFDD, IT)

Political group staff:

Ms Camilla BURSI (Greens/EFA)
Mr Fabrizio FABBRI (EFDD)
Mr Gareth GOLDSMITH (ECR)
Ms Agnieszka GREGORCZYK (S&D)
Mr Tomas HANUS (ECR)
Ms Tiina HARTMAN (GUE/NGL)
Mr Maximillian KEMP (Greens/EFA)
Ms Terhi LEHTONEN (Greens/EFA)
Mr Lars Ole LOCKE (EPP)
Mr Thierry MASSON (ALDE)
Ms Barbara MAZZOTTI (ENF)
Mr Aleš PECKA (ALDE)
Mr Maxim RAYM (ECR)
Mr Fernando SANCHEZ AMILLATEGUI (EFDD)
Mr Viktor SATA (EPP)
Mr Cameron SMITH (ECR)
Mr Sven Werner TRITSCHLER (ENF)
Mr Jan WISSWAESSER (EPP)

Secretariat

Head of Secretariat:
Ms Elisa DAFFARRA

Administrators:
Mr Anno AEDMAA
Mr Emiliano IMERONI
Ms Maria JUUL
Ms Nora KOVACHEVA

Assistants:
Ms Diane BELIN
Ms Eivyda BUDVYTYTE
Ms Marcia MAGUIRE
Ms Christine VANDENEYCKEN – *Committee Assistant*

Appendix C. Activities of the committee of inquiry

C.1. Overview

This appendix details all the **activities** undertaken by the committee within its **working plan** with a view to collecting the evidence necessary for fulfilling its inquiry mandate.

The appendix also constitutes the **bibliography**: it provides the **key** to the **references** used throughout the thematic chapters and the **links** to the corresponding documents archived on the committee's website: http://www.europarl.europa.eu/committees/en/EMIS/home.html

The expressions in **square brackets** (e.g. **[COM]**) in this appendix provide the list of sources referenced throughout the factual part. As noted in Chapter 1, it is understood that the committee's findings may not be an exact reflection of the submissions made by any specific source, and remain the sole responsibility of the committee.

Since its constitutive meeting of 2 March 2016, the committee of inquiry met 27 times and held 48 public hearings, collecting oral evidence from 64 witnesses. It also requested and analysed written evidence, both public and confidential, organised two fact-finding missions and commissioned several studies and briefings.

The committee adopted its interim report on 13 July 2016 and its final report on 28 February 2017.

The **coordinators** of the committee met 12 times, and their decisions are available on the following website:
http://www.europarl.europa.eu/committees/en/emis/publications.html?tab=Coordinators

C.2. Activities

Public hearings of experts and witnesses

The list of committee hearings is presented below in chronological order.

To prepare each hearing, the committee requested each invited expert or witness to answer a set of **written questions** in advance and, where needed, **follow-up questions** were asked after the hearing. The written answers, as well as the **verbatim transcripts** of all hearings, are available on the following website:
http://www.europarl.europa.eu/committees/en/emis/publications.html?tab=Evidence

Bibliographical note: when a reference is used in the main text, it is intended to refer to **both the written and oral evidence** gathered in the context of one hearing.

19 April 2016

[JRC]	Ms Delilah Al-Khudhairy, Director, and Mr Alois Krasenbrink, Head of the Sustainable Transport Unit,

Joint Research Centre (JRC), European Commission.

[ICCT] Mr Vicente Franco, Senior Researcher,
International Council on Clean Transportation (ICCT).

28 April 2016

[AECC] Mr Dirk Bosteels, Executive Director,
Association for Emissions Control by Catalyst (AECC).

[Lambrecht] Mr Udo Lambrecht, Head of the Transport and Environment Department,
Institute for Energy and Environmental Research.

24 May 2016

[TNO] Mr Richard Smokers, Principal Advisor, and
Mr Rob Cuelenaere, Senior Consultant, Sustainable Transport & Logistics
Netherlands Organisation for Applied Scientific Research (TNO).

[EEA] Mr Paul McAleavey, Head of Air and Climate Change Programme and
Mr Martin Adams, Head of group 'Air pollution, transport and noise',
European Environment Agency (EEA).

16 June 2016

[DUH] Ms Dorothee Saar, Head of Transport and Air Quality team,
Deutsche Umwelthilfe (DUH).

[CEO] Mr Pascoe Sabido, and
Mr Olivier Hoedeman,
Corporate Europe Observatory (CEO).

[Borgeest] Mr Kai Borgeest,
Professor, Aschaffenburg University of Applied Science.

[Lange] Mr Daniel Lange, Chief Executive Officer,
Faster IT, ICT Engineer from the automotive industry.

20 June 2016

[EA] Mr Nick Molden, Chief Executive Officer,
Emissions Analytics.

[ADAC] Mr Christoph Gauss, Head of Vehicle Test and Emissions Lab,
Allgemeiner Deutscher Automobil-Club (ADAC).

21 June 2016

[COM] European Commission representatives to the Type-Approval Authorities

Expert Group and the Technical Committee on Motor Vehicles:

Mr Reinhard Schulte-Braucks,
former Head of Automotive Unit, DG GROW – until December 2007,
European Commission,

Mr Philippe Jean,
former Head of Automotive Unit DG GROW – from January 2008 to May 2015, European Commission,

Ms Joanna Szychowska,
Head of Automotive Unit, DG GROW – as from June 2015,
European Commission,

Mr Gwenole Cozigou,
Director of Industrial Policy and Economics Analysis,
DG GROW – as from June 2015, European Commission.

4 July 2016

[T&E] Mr Jos Dings, Executive Director,
European Federation of Transport and Environment (T&E).

13 July 2016

[Renault] Mr Gaspar Gascon Abellan, Executive Vice-President of Engineering,
Renault Group.

[VW] Dr Ulrich Eichhorn, Chief Technology Officer,
Volkswagen Group.

[ACEA] Mr Paul Greening, Emissions & Fuels Director,
European Automobile Manufacturers' Association (ACEA).

[Mitsubishi] Mr Mitsuhiko Yamashita, Executive Vice-President,
Mr Toru Hashimoto, Senior Executive Officer, and
Mr Motoyuki Kamiya, General Manager of Regulatory Affairs,
Mitsubishi Motors Corporation.

14 July 2016

[Dimas] Mr Stavros Dimas, Commissioner for Environment from 2004 to 2010.

30 August 2016

[Verheugen] Mr Günther Verheugen, Commissioner for Enterprise and Industry from 2004 to 2010.

[Faurecia] Mr Peter Lakin, Vice-President of Sales, Programs and Marketing,
Faurecia Emissions Control Technologies.

5 September 2016

[Potočnik] Mr Janez Potočnik, Commissioner for the Environment from 2010 to 2014.

[Tajani] Mr Antonio Tajani, Commissioner for Industry and Entrepreneurship from 2010 to 2014.

12 September 2016

[Bieńkowska] Ms Elżbieta Bieńkowska, Commissioner for Internal Market, Industry, Entrepreneurship and SMEs.

[Vella] Mr Karmenu Vella, Commissioner for Environment, Maritime Affairs and Fisheries.

15 September 2016

[Bosch] Dr Peter Biesenbach, Head of Corporate Department External Affairs, Governmental and Political Relations, and
Dr Michael Krüger, Senior Vice-President Diesel System Engineering,
Robert Bosch GmbH.

26 September 2016

[EPA] Mr Christopher Grundler, Director of the Office of Transportation and Air Quality,
US Environmental Protection Agency (EPA).

10-11 October 2016

[MIT] Dr Antonio Erario, Head of Division, International Regulatory Affairs, Department for Transport,
Ministry of Infrastructure and Transport, Italy.

[Millbrook] Mr Alex Burns, Chief Executive Officer,
Millbrook Group, United Kingdom.

[KBA] Mr Ekhard Zinke, President,
Kraftfahrt Bundesamt (KBA), Germany.

[TÜV] Mr Leif-Erik Schulte, Head of Technical Service,
TÜV NORD Mobilität GmbH & Co. KG, Germany.

[SNCH] Mr Claude Liesch, Director,
Société nationale de certification et d'homologation (SNCH), Luxembourg.

[UTAC] Mr Laurent Benoit, Chief Executive Officer, and

Ms Béatrice Lopez de Rodas, Director,
UTAC CERAM, France.

[RDW] Mr André Rijnders, Senior Engineer Emissions and Fuels,
Emissions and Fuels Vehicle Technology and Information Centre (RDW), Netherlands.

17 October 2016

[FCA] Mr Harald Wester, Chief Technical Officer,
Fiat Chrysler Automobiles.

20 October 2016

[Dobrindt] Mr Alexander Dobrindt,
Federal Minister for Transport and Digital Infrastructure, Germany.

[Lies] Mr Olaf Lies,
Minister for Economy, Labour and Transport of Lower Saxony, Germany.

8 November 2016

[Zourek] Mr Heinz Zourek,
former Director-General of DG ENTR, from November 2005 to January 2012, European Commission.

Mr Carlo Pettinelli,
Director, DG GROW, European Commission.

[Delbeke] Mr Jos Delbeke,
Director-General of DG CLIMA, European Commission.

14 November 2016

[Calleja] Mr Daniel Calleja Crespo,
former Director-General of DG GROW, from September 2012 to August 2015, European Commission.

[Falkenberg] Mr Karl Falkenberg,
former Director-General of DG ENV, from 2009 to 2015, European Commission.

24 November 2016

[Royal] Ms Ségolène Royal,
Minister for the Environment, Energy and the Sea, France.

28 November 2016

[Auken] Ms Ida Auken,
former Minister for the Environment, Denmark.

1 December 2016

[JRC] Mr Vladimir Šucha, Director-General,
Joint Research Centre (JRC), European Commission.

Mr Giovanni De Santi, Director,
Joint Research Centre (JRC), European Commission.

12 January 2017

[Delrio] Mr Graziano Delrio,
Minister for Infrastructure and Transport, Italy.

[Stromček] Mr Viktor Stromček,
State Secretary of the Ministry of Transport, Construction and Regional Development, Slovakia.

24 January 2017

[Opel] Representative from Opel Group GmbH (TBC)

[Audi] Representative from Audi AG (TBC)

Exchanges of views

7 April 2016

[COM EoV] Exchange of views with the European Commission representatives:

Mr Antti Peltomäki, Deputy Director-General of DG GROW,
European Commission,

Mr Daniel Calleja Crespo, Director-General of DG ENV,
European Commission,

Mr Artur Runge-Metzger, Director of Directorate C – Climate Strategy, Governance and emissions from non-trading sectors, DG CLIMA,
European Commission.

7 November 2016

[ENVI/EMIS] Exchange of views with the Commission on the 3rd and 4th RDE package and the guidelines on defeat devices organised by the Committee on the Environment, Public Health and Food Safety.

5 December 2016

[NatParl] Exchange of views with representatives from the national parliaments of Germany, France, Belgium and the United Kingdom on the parliamentary investigations into emissions measurement in the automotive sector:

Mr Herbert Behrens, Chair of the 5th Committee of Inquiry,
Deutscher Bundestag, Germany;

Ms Delphine Batho, Rapporteur of the parliamentary mission on the French vehicles supply with a fiscal, industrial and sustainable energy approach, Member of the French National Assembly;

Ms Kattrin Jadin, Chair of the Special Committee on 'Dieselgate', Member of the Belgian House of Representatives;

Mr Iain Stewart, Member of the House of Commons Transport Select Committee, United Kingdom.

Written questionnaires

The written answers to the questionnaires are collected on the website:
http://www.europarl.europa.eu/committees/en/emis/publications.html?tab=Evidence

[Q:MS] Questionnaire to the type-approval authorities, market surveillance bodies and responsible ministries of the Member States

[Q:OEM] Questionnaire to car manufacturers

[Q:Suppliers] Questionnaire to automotive suppliers

[Q:EIB] Questionnaire to the European Investment Bank

Requests of documents

Documents requested from the Commission (lists of members, full minutes, non-papers, reports, recordings, legal or technical advices) since 2005 onward related to the works of the:

[TCMV] Technical Committee on Motor Vehicles (TCMV);

[RDE-LDV] Working group on real driving emissions of light-duty vehicles (RDE-LDV);

[TAAEG] Type-Approval Authorities Expert Group (TAAEG);

[CARS21] CARS 21 High-Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union;

[CIRCA] Documents requested from the Commission about any formal and informal correspondence since January 2005 regarding the development of emissions and type-approval legislation, the RDE test procedure, exceedances of NO_x emissions and air quality between:

the Commission and car manufacturers, including their association (ACEA);

the Commission and the Member States (also including information on national investigations);

the relevant Commission Directorate-Generals, including exchanges with respective Commissioners and their Cabinets.

The relevant organograms of JRC, DG ENTR/GROW, DG ENV and DG CLIMA since 2005.

[MS docs] Documents requested from the Member States with the detailed description of the testing methodology and the full test results of individual vehicles used in national investigations on emissions measurement conducted in German, France, Italy and the UK.

[Rapp] Written submission from Mr Bernd Lange, former European Parliament rapporteur on car emissions legislation.

Fact-finding missions

The detailed reports of the two fact-finding missions and the presentations attended during the missions are available on the website:
http://www.europarl.europa.eu/committees/en/emis/events-missions.html

[JRC mission] Mission to the Joint Research Centre's Institute for Energy and Transport (JRC-IET) and their Vehicle Emissions Laboratory (VELA) in Ispra, Italy (18-19 July 2016).

The mission focused on learning about the emissions tests conducted by the JRC and its involvement in the development of the type-approval and emission measurements legislation. 12 Members participated.

[LUX mission] Mission to Luxembourg, France and Germany (21-22 September 2016).

The main aim was to meet with the Luxembourg type-approval authority. The programme of the mission also included a visit to a catalyst plant operated by Umicore in Florange (France) and to a branch of the test service provider TÜV Rheinland in Lambsheim (Germany). 5 Members participated.

Supporting research and legal opinions

Studies and briefings commissioned by the committee are available on the website: http://www.europarl.europa.eu/committees/en/emis/publications.html?tab=Supporting%20research

[EU study]	Policy Department's study on legal obligations as regards emission measurements in the EU automotive sector. The study was presented to the committee on 4 July 2016 by Mr Günther Lichtblau, Head of Unit, Transport & Noise Unit, and Ms Gudrun Stranner, Environment Agency Austria.
[US study]	Policy Department's comparative study on the differences between the EU and US emissions legislation. The study was presented to the committee on 5 December 2016 by Mr Martin Nesbit, Institute for European Environmental Policy.
[EPRS]	DG EPRS's briefing on the current known and ongoing lawsuits related to the EMIS remit. DG EPRS's tailored analysis on consumers rights in the EU compared with the US.
[LS]	European Parliament Legal Service opinion as regards inviting guests who may be subject to legal proceedings to testify. European Parliament Legal Service note on the interpretation of what constitutes contravention and maladministration.

Call for evidence

A call for evidence with a dedicated e-mail address (emis-evidence@ep.europa.eu), through which information considered relevant could be sent to the committee, was published on the EMIS website.

Appendix D. Timeline

This appendix presents a **timeline of events** related to the mandate of the committee of inquiry before its constitution.

1970

Introduction of urban driving cycle test in laboratory for type-approval (ECE R15), representative for city-centre driving with a maximum speed of only 50 km/h.

1990

EEC Directive 90/C81/01: introduction of EUDC (Extra Urban Driving Cycle) test.

1995

General Motors agrees to spend approximately 45 million USD on fines, recalls, retrofits and offset projects to settle US government charges that it put defeat devices inside 470.000 Cadillacs since 1991 that resulted in CO emissions up to three times the legal limit.

1996

Agreement between the European Commission and the car manufacturers: strategy to reduce CO_2 emissions from new passenger cars between the Commission and car manufacturers: the industry commitment to reduce 25% CO_2 emissions during the next decade for new passenger cars.

1997

Last update of the NEDC: the test starts in the same time as the engine starts. 4 ECE segments (urban driving cycle) followed by one EUDC segment.

1998

22 October The US Department of Justice and the US EPA announce a 83.4 million USD penalty against seven major manufacturers for 1.3 million heavy duty diesel engines containing illegal defeat devices. These engines emitted up to three times the legal level for NO_x emissions.

1999

New US Tier 2 rules established to replace Tier 1. NO_x limit decreasing from 1.0 g/mi to 0.07 g/mi.

2000-2005

JRC develops a particle number limit to force the use of Diesel Particulate Filters (LDV Euro 5), in collaboration with UNECE PMP and Member States. HDV: The JRC leads the PEMS Pilot programme with the objective to develop an in-service conformity test procedure based on on-road measurements.

2001

4 May Commission communication on "The Clean Air for Europe (CAFE) Programme: Towards a Thematic Strategy for Air Quality".

2004

Study on the feasibility of Portable Emissions Measurement System (PEMS) for heavy-duty vehicles: start of the on-road testing of heavy-duty vehicles (HDV) with PEMS at the JRC.

2005

February First setup of CARS 21 High Level Group;

August JRC and DG ENV sign an Administrative Arrangement to start exploring the use of PEMS to monitor emissions from light-duty vehicles (LDV); JRC starts to explore the use of PEMS to monitor emission of light duty vehicles.

2006

September Publication of Transport & Environment position paper entitled 'Euro 5 and 6 emissions standards for cars and vans';

2007

March Start of the on-road testing of light-duty vehicles (LDV) with PEMS at the JRC (EURO 3/4);

7 February Publication of the Commission's position on the CARS 21 High Level Group Final Report (COM/2007/0022);

20 June Adoption of the Regulation (EU) No 715/2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information;

5 September Adoption of the Directive 2007/46/EC, establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (Framework Directive);

24 October Adoption of the European Parliament resolution on the Community Strategy to reduce CO_2 emissions from passenger cars and light-commercial vehicles (2007/2119(INI));

November World Forum for Harmonization of Vehicles Regulations (WP.29) decides to set up an informal group under its Working Party on Pollution and Energy (GRPE) to prepare, within the next 2 years, a road map for

the development of WLTP;

December DG ENTR and JRC sign an Administrative Arrangement that includes the continuation of the development of the PEMS tests for RDE for Light Duty Vehicles.

2008

15 January Adoption of EP resolution on CARS 21;

21 May Adoption of Directive 2008/50/EC of the European Parliament and of the Council on Ambient Air Quality and Cleaner Air for Europe (CAFE) or "New Air Quality Directive";

4 June First WLTP plenary meeting;

18 July Adoption of Commission Regulation (EC) No 692/2008 implementing and amending Regulation (EC) No 715/2007, and in particular Articles 4(4), 5(3) and 8;

9 September Establishment of a working group for WLTP at EU level (EU-WLTP) to deliver a single driving data set to WLTP which would be the EU contribution to the data base for a world-harmonised cycle;

22 September DG ENV note to DG ENTR on the use of portable emissions measurements systems (PEMS) in the verification of real-world emissions.

2009

2 January Deadline for Member States to notify to the Commission their provisions on penalties applicable for infringement by manufacturers of the provisions of Regulation (EU) No 715/2007 (Article 13(1) of the same Regulation);

3 January Start of the application of the Regulation (EU) No 715/2007;

29 April Deadline for Member States to determine the penalties applicable for infringement of the provisions of Directive 2007/46/EC (Article 46);

18 June Adoption of the Regulation (EC) No 595/2009 on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (Euro VI) and on access to vehicle repair and maintenance information;

December DG ENTR and JRC sign an Administrative Arrangement on tests on Euro 5 vehicles.

2010

7 February	Launch of the public consultation on development of a new test procedure to better capture real-driving emissions and revise Directive No 2007/46;
12 April	First meeting of the European Commission's Type-Approval Authorities Expert Group (TAAEG);
September	First internal Commission discussion (JRC-ENV-ENTR) on JRC results of the on-road emissions testing of light-duty vehicles;
September	Presentation of the Impact Assessment Roadmap for the Framework Directive 2007/46/EC on type-approval by DG ENTR and setting up of the steering group;
14 October	Re-launch of the CARS 21 High Level Group;
20 November	Note of DG ENV to DV ENTR on the timing of the development of a new test cycle and on the market surveillance;
23 November	JRC presents the results of the on-road emissions testing of light-duty vehicles in a workshop organised by DGs ENTR and ENV and open to stakeholders;
7 December	DG ENTR launches a public consultation with the aim to verify whether the five areas identified by the Commission services as having a potential for improving the enforcement of EU type-approval legislation for motor vehicles would provide the right scope and focus for the intended review of the Framework Directive.

2011

Publication of JRC report on 'Analysing on-road emissions of light-duty vehicles with Portable Emission Measurement Systems (PEMS)'.

January to July	An ex-post evaluation study on the framework directive 2007/46/EC is carried out under the responsibility of DG ENTR;
31 January	Kick-off meeting of the RDE-LDV Working Group (RDE-LDV WG) set up by DG ENTR;
10 February	Meeting between the representatives of German Ministry of Transport and Deutsche Umwelthilfe (DUH) on NO_x emissions;
22 March	Speech by Environment Commissioner Potočnik at the Conference on Air Quality in European Cities in the European Parliament on the state of play in developing realistic test cycles to improve the ambient air quality legislation;
March	Discussion within the RDE-LDV WG on its terms of reference,

	definition and review of candidate procedures (fixed cycle, random cycle, PEMS), discussion on the criteria for the assessment of the procedures;
May	3rd meeting of the RDE-LDV WG: presentation of work plan and planned timing by JRC, presentation by stakeholders on the candidate test procedures;
19 July	Presentation of ADAC test results on a BMW 116i with high NO_x emission values in modified test cycle by DUH;
20 October	6th meeting of RDE-LDV WG: presentation by ACEA and the Netherlands TNO on preliminary emissions test results for diesel vehicles;
10 November	Presentation of EEA briefing on transport and environment in EP TRAN Committee;
2 December	Publication of CARS 21 High Level Group interim report.

2012

1 March	8th meeting of the RDE-LDV WG: JRC presents preliminary tests of random cycles and a matrix to evaluate the candidate testing procedures;
8 March	Commissioner Tajani proposes a moratorium to reduce unnecessary regulation and red tape for the automotive industry; the idea is not followed by the Commission;
13 April	9th meeting of the RDE-LDV WG: JRC presents draft boundary conditions, an overview of stakeholder contributions to the evaluation of the two candidate procedures and the results of back-to-back vehicle testing with random cycles and PEMS;
24 May	10th meeting of the RDE-LDV WG: presentation by DG ENTR on approaches for the implementation of the complementary RDE-LDV test procedure;
25 May	E-mail from DG ENTR to Member States and Commission services on the outcomes of RDE-LDV meeting on 24 May 2012;
6 June	Presentation of final report of the High-Level Group CARS 21 working group;
28 June	11th meeting of the RDE-LDV WG: JRC reports on the final evaluation and the revisions of the work plan, an agreement is reached about the work until the end of 2013;
6 June	Final meeting of the CARS 21 working group;

25 July	Letter from Commissioner Tajani to Member States on setting up an effective and efficient market surveillance system in the automotive sector;
8 November	Adoption by the Commission of Communication COM (2012) 636: 'Action plan for a competitive and sustainable automotive industry or CARS 2020';
10/11 December	Competitiveness Council endorses the recommendations contained in the communication CARS 2020;
12 December	Letter from ACEA to DG ENTR on stopping all activities on the random cycle test.

2013

14 January	Letters from Danish Minister Ida Auken to Commissioners Potočnik and Tajani on the possibilities to meet the limit value of nitrogen dioxide (NO_2) under the Ambient Air Quality Directive;
4 February	JRC announces in the RDE-LDV working group meeting the publication of a report '*A complementary emissions test for light-duty vehicles: Assessing the technical feasibility of candidate procedures*' that summarizes the findings of the comparative assessment of random cycles and on-road emissions testing with PEMS;
12 February	Letter from Commissioner Potočnik to Commissioner Tajani related to concerns regarding the inadequacy of applicable tests for measuring vehicles NO_x emissions;
March	Publication of the results of the assessment of the regulatory framework for the type-approval of motor vehicles by DG ENTR;
12 March	Reply letter from Commissioner Potočnik and Commissioner Tajani to the Danish Minister Ida Auken on the reduction of real driving NO_x emissions and on the development of a new RDE test procedure;
26 March	Reply letter from Commissioner Tajani to Commissioner Potočnik on the initiation and development of the real driving emissions procedure;
April	First meeting of the Working Group on mobile particle number measurements (PN-PEMS);
May	The European Economic and Social Committee delivers a positive opinion on the CARS 2020 communication;
1 October	First meeting of a dedicated Task Force for the development of a RDE data evaluation method;
7 October	The Committee of the Regions delivers a positive opinion on the CARS

2020 communication;

Oct - Dec First JRC assessment of the measurement performance of PN-PEMS concluding that the measurement of particle number emissions on the road is technically feasible;

5 December Publication of TNO report 'Investigations and real world emission performance of Euro 6 light-duty vehicles';

10 December Adoption of the European Parliament resolution on CARS 2020: towards a strong, competitive and sustainable European car industry (2013/2062(INI)).

2014

14 January Adoption of the European Parliament legislative resolution on the proposal for a regulation of the European Parliament and of the Council amending Regulation (EU) No 510/2011 to define the modalities for reaching the 2020 target to reduce CO 2 emissions from new light commercial vehicles (COM(2012)0394 – C7-0185/2012 – 2012/0191(COD));

12 March Adoption of the Phase 1a of the WLTP;

28 March Opinion of Commission's Impact Assessment Board on the review of the Directive No 2007/46;

31 March Presentation of the preliminary results of the ICCT study in RDE-LDV working group in Brussels;

1 April Commission presented to the Member States and TCMV its vision for the architecture of the RDE package;

15 May A study conducted by the Center for Alternative Fuels, Engines and Emissions at West Virginia University for the International Council on Clean Transportation (ICCT) finds that real world nitrogen oxide (NO_x) emissions from two tested Volkswagen (VW) light-duty diesel vehicles exceeds US Environment Protection Agency (EPA) standards by a factor of up to 35;

May EPA and CARB (California Air Resources Board) launch investigation into possible violation of the Clean Air Act by VW through the use of defeat devices;

12-13 June First meeting of the drafting committee as subgroup of the RDE-LDV Working Group on real driving emissions of light duty vehicles on the drafting of the technical requirements for PEMS equipment;

September Start of the introduction of deNO_x technologies on LDV;

Nov - Dec	Completion by the Commission of the first of four regulatory RDE acts making up the full RDE test procedure. The 1st regulatory RDE act sets out the RDE test procedure for NO_x; the 2nd act defines the boundary conditions for the RDE test procedure; the 3rd act extends RDE testing to particle numbers and cold start; and the 4th act covers in-service conformity*;*
	2nd PN-PEMS experimental campaign at JRC, concluding that both condensation particle counters and diffusion charging instruments are technically feasible;
11 October	Publication of ICCT study on real-world exhaust emissions from modern diesel cars.
15 October	42nd TCMV meeting: state of play by Commission services on preparation of a proposal on RDE, Member States in the TCMV agree that the test should be introduced in a two-step approach;
4 November	ICCT presents their report on real world NO_x emissions from Euro 6 diesel cars;
19 November	Letter from Mr Falkenberg, the Director-General of DG ENV to Mr Calleja Crespo, the Director-General of DG ENTR, on deployment of emission abatement techniques. An annex to this letter was transmitted to DG ENTR only in September 2015.
December	VW claims having found the reasons for higher emissions and begins a voluntary recall of certain 2014 and 2015 vehicles equipped with 1.8T and 2.0T four-cylinder engines in the US (nearly 500 000 vehicles).
19 December	Reply letter from Mr Calleja Crespo, Director-General of DG ENTR to Mr Falkenberg, Director-General of DG ENV.

2015

24 March	TCMV postpones vote on the 1st regulatory RDE act due to lack of a qualified majority of Member States in favour;
May	Following the recall, the CARB undergoes a new series of tests with unsatisfactory results, and informs Volkswagen and the EPA. A series of technical meetings between the carmaker and the authorities ensue;
18 May	Publication of TNO report 'Detailed investigations and real-world emission performance of Euro 6 diesel passenger cars';
19 May	TCMV approves the 1st regulatory RDE act;
10 June	Adoption of the Phase 1b of the WLTP;
July	Publication of T&E briefing 'Realistic real-world driving emissions

tests: the last chance for diesel cars?'

Sept 2015-Jan 2016 PN-PEMS inter-laboratory comparison exercise, coordinated by the JRC;

3 September Executives from VW admit in a private call to EPA the existence of defeat device software that served to understate NO_x emissions in official tests and circumvent EPA emissions standards;

10 September 49th TCMV meeting: the Commission presents a document on further development of the legislation and definition of 'not-to-exceed' (NTE) emission limits;

18 September The EPA issues a Notice of Violation of the Clean Air Act to Volkswagen AG, Audi AG, and Volkswagen Group of America, Inc., alleging that model year 2009-2015 VW and Audi diesel cars (approximately 482000 Golf, Jetta, Passat, Beetle, and Audi A3 cars) equipped with 2-liter diesel engines included illegal defeat device software;

18 September VW commits itself to fix the issues as soon as possible and cooperate with the investigation;

24 September Germany confirms that VW vehicles with software installed to cheat emissions tests were sold across Europe. The UK's Department for Transport says it will start its own inquiry into car emissions, as VW faces a barrage of legal claims from British car owners;

24 September The missing annex to the letter of 19 November 2014 from Director-General Falkenberg to Director-General Calleja Crespo is transmitted to DG ENTR.

25 September The EPA announces that it will begin road tests of all new vehicle models and vehicles already on the road to examine emissions claims following the exposure of Volkswagen's scandal;

25 September VW appoints Matthias Müller, previously the Chairman of Porsche AG, as its new CEO;

1 October Detailed assessment of PEMS measurement uncertainty presented by the JRC in the RDE meeting;

2 October Authorities in France and Italy launch investigations into the scandal;

6 October VW CEO Müller says the recall of affected diesel vehicles will start in January and cars will be repaired by the end of 2016;

6 October 50th TCMV meeting: discussion on the Commission proposal the Commission proposal of amending Regulation (EC) No 692/2008 as regards emissions from light passenger and commercial vehicles (Euro

6), with focus on the NTE emission limits and the application dates for the RDE;

8 October Congressional hearing before the Oversight and Investigations Subcommittee of the Committee on Energy and Commerce entitled "Volkswagen Emissions Cheating Allegations: Initial Questions";

9 October VW Australia recalls 90,000 cars. The German transport ministry says 3.6 million cars in Europe require major hardware changes such as a new fuel tank;

15 October VW says it will recall 8.5 million diesel cars across Europe. Its UK head claims the company's cars have not emitted any more toxic nitrogen oxides than expected;

19 October Commission Decision C(2015) 6943 on the establishment of a High Level Group on Automotive Industry 'GEAR 2030';

21 October The German state of Lower Saxony files a criminal complaint against VW;

27 October The European Parliament adopts a resolution (2015/2865(RSP)) on emission measurements in the automotive sector, condemning "*any fraud by automobile manufacturers*" and calling "*for a thorough investigation regarding the role and responsibility of the Commission and of Member State authorities*";

28 October 51st TCMV meeting: agreement on the dates for the two RDE Steps and the NO_x conformity factors at 2.1 and 1.0 plus 0.5 'margin', TCMV voting approves the 2nd regulatory RDE act;

2 November EPA issues a second Notice of Violation which alleges that Volkswagen developed and installed a defeat device in certain light duty diesel vehicles equipped with 3-liter engines for model years 2014 through 2016 that increases emissions of nitrogen oxide up to nine times EPA's standard;

3 November VW admits that up to 800,000 cars understated their carbon dioxide levels and it sets aside €2bn for the problem. (The car figure is revised down to 36,000 on Dec 9);

6 November VW says it will foot the bill for extra taxes incurred by drivers after it admitted understating carbon dioxide emissions;

11 November German car regulators expand their investigation into suspected diesel emissions manipulation to more than 50 models from brands including BMW, Mercedes, Ford, Volvo, Nissan and Jaguar Land Rover;

19 November In a meeting with the EPA Volkswagen admits that emissions cheating devices were also installed 3-liter diesel engines from the 2009 to 2016

model years concerning approximately 85 000 additional vehicles in the US;

20 November VW submits a recall plan to the CARB responding to the violations concerning illegal defeat devices in their 2-liter diesel-powered models;

23 November VW reverses course on the issue of the second defeat device problem, admitting there were defeat devices in 3-litre engines used in Audi, Porsche and VW cars;

24 November VW CEO Müller says German regulators signed off on a software update to fix affected two-litre diesel motors and that most of the affected vehicles will not need major work;

9 December VW says the CO_2 emissions problem is limited to just 36,000 cars, not 800,000 as originally suggested. The €2bn cost projection "has not been confirmed" but the CO_2 issue is "largely concluded";

10 December Volkswagen admits a "mindset" tolerated rule-breaking. Says preliminary results show the problem was not *"a one-time error, but rather a chain of errors that were allowed to happen."* Mr Müller calls the crisis an opportunity for VW to introduce "much-needed structural change";

14 December The ENVI Committee opposes the adoption of the draft Commission regulation amending Regulation (EC) No 692/2008 on the grounds that it would effectively introduce a blanket derogation from applicable emissions limits, and hence is not compatible with the aim and content of the basic Regulation;

17 December The European Parliament decides to set up an inquiry committee on emission measurement in the automotive sector (EMIS);

December Publication of the ICCT policy briefing on the RDE legislation;

27-30 December For the first time technical details of the VW defeat device used in the EA 189 engine are presented at the Chaos Computer Club Congress in Hamburg by the two software engineers, Mr Domke and Mr Lange;

2016

4 January The US Justice Department files a complaint against VW for alleged Clear Air Act Violations. The Department of Justice, on behalf of the Environmental Protection Agency (EPA), filed a civil complaint in federal court in Detroit, Michigan, against Volkswagen;

11 January ACEA document to the Commission urging the second RDE package be agreed as soon as possible;

12 January CARB rejects VW's 2-liter recall plan for diesel passenger vehicles sold in California between 2009 and 2015. According to the CARB "*VW's*

submissions are incomplete, substantially deficient, and fall far short of meeting the legal requirements to return these vehicles to the claimed certified condition," The EPA, which is working with California regulators on the VW fraud, had already indicated it was not satisfied with the recall plan as presented by the company;

27 January Commission adopts a proposal for the new Regulation on the approval and market surveillance of motor vehicles (COM(2016)31);

9 February DUH claims that on-road tests performed on a diesel-powered Fiat 500X at the University of Applied science in Bern, Switzerland show that that car exceeds the Euro 6 NO_x limits by 11 to 22 times;

2 March The EMIS inquiry committee of the European Parliament holds its constituent meeting.

Appendix E. Glossary

ARTEMIS
A large-scale European Commission research project to set up and improve the European methods for estimating and inventorying the pollutant emissions from the transports.

California Air Resources Board (CARB)
A department within the California Environmental Protection Agency, with main focus on the reduction of air pollutants.

Conformity factor
Divergence between the regulatory emission limit measured in laboratory conditions and the values of the RDE procedure when the car is tested by a real driver on a real road.

Conformity of production
A requirement stating that production vehicles, systems, components or separate technical units have to be in conformity with the approved type.
(*Directive 2007/46/EC, Article 12(1)*)

Certificate of conformity (CoC)
A document issued by the manufacturer, certifying that a vehicle belonging to the series of an approved type complies with all regulatory acts at the time of its production.
(*Directive 2007/46/EC, Article 3(36), Annex IX*)

Defeat device
Any element of design which senses temperature, vehicle speed, engine speed (RPM), transmission gear, manifold vacuum or any other parameter for the purpose of activating, modulating, delaying or deactivating the operation of any part of the emission control system, that reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal vehicle operation and use.
(Regulation (EU) No 715/2007, Article 3(10) and Article 5(2))

Diesel exhaust fluid (DEF)
An aqueous urea solution made with urea and water, used in the selective catalytic reduction (SCR) in order to lower NOx emissions in diesel exhaust gases.

Diesel Particle Filter (DPF)
A device designed to remove diesel particulate matter or soot from the exhaust gas of a diesel engine.

Emission control technology (ECT)
Technology to reduce different pollutants emitted during the combustion.

Electronic control unit (ECU)
Electronic component unit that controls systems or subsystems of an internal combustion engine to ensure optimal performance.

Euro standards
A set of Light Duty Vehicle emission standards, ranging from Euro 1 to Euro 6. The latest Euro 6 standard was established by Commission Regulation (EU) No 459/2012 of 29 May 2012.

Exhaust gas recirculation (EGR)
NOx emissions reduction technique used in gasoline and diesel engines, which recirculates a portion of the engines exhaust gas back to the engine cylinders.

Gaseous pollutants
Carbon monoxide (CO), oxides of nitrogen (NOx) and hydrocarbons, emitted as exhaust gases by combustion engines.
(*Regulation (EU) No 715/2007, Article 3(4)*)

Greenhouse gas (GHG)
Atmospheric gas that contributes to the greenhouse effect by absorbing infrared radiation produced by solar warming of the Earth's surface. They include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3) and water vapour.

Heavy Duty Vehicle (HDV)
Vehicles weighing more than 3.5 tonnes.

In service conformity
A requirement stating that vehicles, systems, components or separate technical units placed on the market are safe and in conformity with the approved type in use.

Light Duty Vehicle (LDV)
Vehicles weighing less than 3.5 tonnes.

Lean NOx trap (LNT)
A device to reduce nitrogen oxides emissions from a lean burn internal combustion engine by means of adsorption. Also called NO_x adsorber.

Joint Research Centre (JRC)
European Commission's science and knowledge service to carry out research in order to provide independent scientific advice and support to EU policy.

Market surveillance
Activities carried out and measures taken by the market surveillance authorities to ensure that vehicles, systems, components or separate technical units comply with the legal requirements and do not endanger health, safety or any other aspect of public interest protection.
(Draft Regulation 2016/0014(COD), Article 3(2))

New European Driving Cycle (NEDC)
The test cycle used in European type-approval procedure to measure fuel consumption and emissions levels of passenger cars. NEDC is a modal driving cycle that consists of:

- four repeated **Urban Driving Cycles (UDC)**, each lasting 195 seconds. UDC was first introduced in 1970 and designed to represent typical driving conditions of busy European cities, and is characterized by low engine load, low exhaust gas temperature, and a maximum speed of 50 km/h (ECE-15 cycles) and
- one **Extra-Urban Driving Cycle (EUDC**) of 400 seconds. EUDC was introduced in 1990 and represents more aggressive, high speed driving modes.

Nitrogen oxides (NO_x)
Generic term for the mono-nitrogen oxides NO and NO_2. NOx is formed whenever combustion occurs, from the reaction among nitrogen, oxygen and even hydrocarbons, in particular at high temperatures.

Not-to-exceed (NTE) concept
A concept introduced by the US Environmental Protection Agency in 1998 to make sure that heavy-duty engine emissions are controlled over the full range of speed and load combinations commonly experienced in use.
The NTE approach establishes a control area (the NTE zone) which represents engine speeds and loads expected to be encountered in normal vehicle operation and use by diesel heavy-duty engines.

Original equipment manufacturer (OEM)
Manufacturer of the original equipment assembled and installed during the construction of a new vehicle. By extension, a car manufacturer.

Particulate matter (PM)
Mixture of solid particles and liquid droplets found in the air. Also called particle pollution. It includes:

- PM10 : inhalable particles, with diameters that are generally 10 micrometers and smaller;
- PM2.5 : fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller.

Portable Emission Measurement System (PEMS)
A portable device installed on a vehicle which allows for continuous measurement of gaseous tail-pipe emissions of vehicles as they occur on the road during normal operation and use.

Random-cycle testing
Refers to any test procedure that employs driving cycles composed of randomly or semi-randomly arranged short trips to measure the tail-pipe emissions of vehicles on chassis dynamometers in the laboratory.

Real-Driving Emissions (RDE)
A vehicle emissions testing procedure in normal driving conditions. The RDE procedure in the EU complements the laboratory based test procedure to check that the emission levels of NOx and particle numbers (PN) measured during a laboratory test are confirmed in real driving conditions.

RDE packages
Regulatory packages prepared by the European Commission for the introduction of RDE test procedure. For practical reasons the RDE procedure has been split into four packages:
1st RDE package: vote in TCMV in May 2015, adopted on 10 March 2016 by Commission Regulation (EU) 2016/427, applies from 1 January 2016, contains the test procedure to determine exhaust emissions from LDVs using a PEMS;
2nd RDE package: vote in TCMV on 28 October 2015, adopted on 20 April 2016 by Commission Regulation (EU) 2016/646, contains the test procedure to determine exhaust emissions from LDVs using a PEMS;
3rd RDE package: RDE testing for PM and

4th RDE package: in-service conformity testing.

RDE Working Group on Light Duty Vehicles (RDE-LDV)
A working group set up by the European Commission to develop the proposal for the RDE procedure.

Selective-catalytic reduction (SCR)
Conversion of NOx with the aid of a catalyst into diatomic nitrogen (N_2) and water (H_2O).
Emission control systems make use of SCR to reduce the NOx pollutants in exhaust gases from combustion in diesel engines. A gaseous reductant, typically a urea ($CO(NH_2)_2$) solution, is added to a stream of flue or exhaust gas and is adsorbed onto a catalyst. When urea is used as the reductant, reaction products are diatomic nitrogen (N_2), water (H_2O) and carbon dioxide (CO_2).

Technical Committee on Motor Vehicles (TCMV)
A regulatory committee made up of representatives of Member States that assists the European Commission in preparing legislative proposals and policy initiatives on motor vehicles.

Technical service
An organisation or body designated by the type approval authority of a Member State as a testing laboratory to carry out tests, or as a conformity assessment body to carry out the initial assessment and other tests or inspections, on behalf of the type approval authority, it being possible for the approval authority itself to carry out those functions.
The updated list of technical services is presented on the Commission's website:
http://ec.europa.eu/DocsRoom/documents?tags=technical-service-auto&pageSize=30&sortCol=title&sortOrder=asc
(*Directive 2007/46/EC, Article 3(31)*)

Technology neutrality
A regulatory concept that neither imposes nor discriminates against the use of a particular type of technology.

Thermal window
An emission control strategy that switches off or modulates ECTs outside a specific range of ambient temperatures (see also *Regulation (EU) No 715/2007, Article 5(2)a)).*

Type-approval
The procedure whereby a Member State certifies that a type of vehicle, system, component or separate technical unit satisfies the relevant administrative provisions and technical requirements.
(*Directive 2007/46/EC, Article 3(3)*)

Type-Approval Authorities Expert Group (TAAEG)
An expert group set up in January 2010 by the European Commission and composed of representatives of national administrations. Its task is to assist the Commission in implementing the Union legislation, programmes and policies in the field of vehicles type-approval by ensuring uniform application of the requirements for motor vehicles within the Community type-approval system and facilitating the exchange of information and experience regarding the implementation of the type-approval legislation.

Type-approval authority (TAA)
The authority of a Member State with competence for all aspects of the type approval, system, component or separate technical unit or of the individual approval of a vehicle; for the authorisation process, for issuing and, if appropriate, withdrawing approval certificates; for acting as the contact point for the approval authorities of other Member States; for designating the technical services and for ensuring that the manufacturer meets his obligations regarding the conformity of production.
The updated list of type-approval authorities is presented on the Commission's website:
http://ec.europa.eu/DocsRoom/documents/18442
(*Directive 2007/46/EC, Article 3(29)*)

United Nations Economic Commission for Europe (UNECE)
United Nations Committee set up to promote a policy, financial and regulatory environment conducive to economic growth, innovative development and higher competitiveness in the European region.

United States Environmental Protection Agency (US EPA)
An agency of the federal government of the United States protecting human health and the environment by writing and enforcing relevant regulations.

Whole Vehicle Type Approval (WVTA)
An EU vehicle approval scheme based on the Directive 2007/46/EC where a manufacturer can obtain certification for a vehicle type in one EU Member State and then market it EU-wide without the need for further tests.

Witness testing
The practice of carrying out the tests required for the type-approval procedure in the car manufacturers' certified laboratories under the supervision of the designated technical service.

Worldwide-harmonized Light-vehicles Test Procedure (WLTP)
Global harmonized standard for determining the levels of pollutants and CO_2 emissions, fuel or energy consumption, and electric range from light-duty vehicles.
The aim of this project was to develop a worldwide harmonized light duty driving Test Cycle (WLTC), to represent typical driving characteristics around the world, to have the basis of a legislative worldwide harmonized type certification test from 2014 onwards.