European Parliament
ENVI Committee - Public Hearing on Air Quality Policy

*Potential for reducing emissions from road traffic and improving air quality*

Klaus Land (ACEA pilot of RDE expert group)
Huge improvements in controlling emissions from new cars and heavy-duty vehicles.

Euro 6 (light-duty) and Euro VI (heavy-duty) will significantly cut transport NOx and particle emissions.

However, ACEA recognises that more can be done to give confidence that the light-duty Euro 6 regulations will deliver improvements in NOx emissions under real driving conditions.
The issue for Real Driving Emissions

RDE – Why do we need RDE?

- To address the environmental need and take action now to enable confidence in Euro6
- COM Communication - A Clean Air Program for Europe:
  - “2.2.1. Completing unfinished business: fixing the light-duty diesel emissions problem.”
    - “The required reductions have been delivered, with one exception: NOx emissions from light-duty diesel engines.”
    - “In its CARS 2020 Communication, the Commission noted the shortcoming of the current procedures and committed to a new test procedure in the type-approval framework to assess NOx emissions of light-duty vehicles under real-world driving conditions.”
    - “This will ensure the substantial reduction of real-world NOx emissions required to achieve Euro 6 NOx emission limits under normal driving conditions.”

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EURO 3 1,0  EURO 4 0,25  EURO 5 0,18  EURO 6 0,08
source: ICCT

EUx Diesel NOx Emissions Standards Real Diesel NOx emissions
How to measure Real Driving Emissions

Application of Real Driving Emissions (RDE)

- Installation of PEMS
- Vehicle and PEMS validation on dyno
- PEMS test

Data evaluation, including normalisation

Selection of CF factor based on boundary conditions

\[ \text{RDE}_{\text{pollutant}} = \text{CF}_{\text{pollutant}} \times \text{Euro 6} \]

Pass or Fail

BC Moderated

BC Extended
Important pillars of RDE

**Real Driving Emissions**
- Most important topics of RDE LDV Regulation

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*Heavy Duty*
The scope of RDE testing must be defined on a legal basis so that it results in the same stringency of RDE test for all OEMs and such that testing by 3rd parties are within reasonable boundaries.

This has to be defined by clear unambiguous boundary conditions.

*gross vehicle weight
RDE - technical Integration in vehicle

- Designs for Euro 6c [from Sept 2017] have already been signed off, huge investments have been made, suppliers and contracts are all ready.
- Significant effort to implement appropriate software changes to address RDE can be accommodated in Euro 6c.
- Further significant Hardware changes will be needed to comply with RDE regulation in a second step.
Massive Hardware changes are not manageable in production plants within two years before end of model lifecycle. Plants are already working on the pilot production of next generation models.
RDE – Real Driving Emissions

- Industry is clear → the only opportunity for the introduction of the RDE Regulation is through a package according to a:

  2-Step approach that includes an intermediate (NT\(^1\)) and a final step (NT\(^1\) & AT\(^1\))

- This will lead to the full RDE introduction (with appropriate CF) from 5 years after publishing in OJ (expected in 2015).
- The industry commitment to the RDE Regulation therefore includes an intermediate step at Sept 2017 (NT) with an appropriate CF\(^2\).
Air Quality benefit

Substantial Improvement of Roadside NO₂

- Detailed emission and air quality simulation for Germany
  Emission factors of HBEF3.1/HBEF3.2 and scenarios adjusted by TU Graz. Fleet emission simulation for traffic sites. Air quality simulation considering urban background NO₂, NO and ozone, road side NO and NO₂ from air quality stations

- 92% of traffic / 97% of all quality stations in Germany compliant (2030)
Conclusions

- Industry is not blocking or delaying RDE – we are supporting it.
- Industry is proposing an RDE Package that will lead to a simultaneous Air Quality benefit:
  - A 2-Step introduction of the RDE-Regulation is technically feasible.
  - The final step of the industry RDE proposal is of comparable stringency to the heavy-duty (Euro VI) “RDE” program.
- The RDE Regulation must be robustly defined in terms of moderate and extended test boundary conditions and achievable Conformity Factors (CFs).
- ACEA is willing to discuss more stringent boundary conditions in a final step for RDE but on the basis of environmental need, representative coverage of EU driving conditions and robust impact assessment.
- The ACEA RDE package can be agreed quickly and then implemented via a monitoring phase – which ACEA will support.
- ACEA’s proposal enables the early start of RDE – other proposals implying massive hardware changes from 2017 will not be achieved – this poses risks to the whole auto industry and its competitiveness.
- However, helping to meet ambient NO2 concentration limits will depend the rate of introduction of new RDE compliant vehicles into the EU fleet – this is not in the control of industry.
Thank you very much for your attention
Road Incline

road incline range [%]

road incline (EU)
appr. 65% of driven distance is flat 0 ... 0,5%
appr. 90% of driven distance is in a range of 0 ... 2%
appr. 95% of driven distance is in a range of 0 ... 3%

Normal driving can be described by a limitation – see Appendix 8 (was App. 7)
Boundary Conditions - Normal Driving

'v • apos'

- **Normal Driving**
  - low acceleration frequency
  - low vehicle speed
  - current worldwide regulation
  - fixed acceleration
  - fixed vehicle speed

- **Relaxed Driving**
  - low acceleration
  - low vehicle speed

- **Type Approval Cycle**
  - fixed acceleration
  - fixed vehicle speed

- **Extreme Driving**
  - High acceleration frequency
  - High vehicle speed

Driving behavior
Vehicle test mass

- The vehicle test mass shall be comprised by including test equipment, mounting and power supply devices and driver(s) like:
  - **Moderate** vehicle test mass conditions:
    - The M1 vehicle test mass shall not exceed the lowest of:
      - a) vehicle unladen mass excluding driver +200kg
      - b) 90% of GVW
      - or
      - c) 2,840Kg
  - **Extended** vehicle test mass conditions:
    - The M1 vehicle test mass shall not exceed the lower of:
      - a) 90% of GVW
      - or
      - b) 2,840kg

- European Trend of persons per car:

The average over all sum of people per car in Europe is about 1.4
Ambient Temperature

Ambient temperature for measurement

- The EMISIA/ACEA study assigns all distance driven in EU-28 for passenger and light-commercial vehicles into various temperature bins.

  +10° C ... +30° C  → 62% of all distance driven in EU28
  +8° C ... +30° C  → 71% of all distance driven in EU28
  +6° C ... +30° C  → 80% of all distance driven in EU28
  +4° C ... +30° C  → 88% of all distance driven in EU28
  +2° C ... +30° C  → 93% of all distance driven in EU28
  0° C ... +30° C  → 97% of all distance driven in EU28

- Temperatures below +3° C are not practical for technical, safety and potential freezing issues.

- For development and verification purposes it is beneficial with a margin to 0° C as the availability of engine/vehicle dynos with sub-zero cooling capacity is limited.

- For a further small step in temperature below 0° C, the corresponding development and investment is a massive step.
backup
Introduction Scenario & Flexibility

US graded %-phase

→ No „alternative phase-in“ for new technologies!

→ „alternative phase-ins“ for new technologies given by US-regulation!

USA: „alternative phase-in“ period / fleet quotas
# Introduction Scenario & Flexibility

## ACEA & JAMA Diesel NOx Fleet Performance of New Registered Vehicles for RDE Moderate Driving Conditions

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<tr>
<td>2014</td>
<td>83%</td>
<td>17%</td>
<td>17%</td>
<td>0%</td>
</tr>
<tr>
<td>2015</td>
<td>75%</td>
<td>19%</td>
<td>19%</td>
<td>5%</td>
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<tr>
<td>2016</td>
<td>60%</td>
<td>21%</td>
<td>21%</td>
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<td>2017</td>
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<td>16%</td>
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<tr>
<td>2018</td>
<td>9%</td>
<td>4%</td>
<td>4%</td>
<td>58%</td>
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<tr>
<td>2019</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
<td>95%</td>
</tr>
<tr>
<td>2020</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
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1. New Types & All Types
2. Conformity Factor

![Graph showing fleet performance](attachment://graph.png)

### Graph Notes:
- EU 6b (09/2014): 
  - 2015: 83%
  - 2016: 75%
  - 2017: 60%
  - 2018: 23%
  - 2019: 9%
  - 2020: 3%
  - 2021: 0%

- Monitoring (2015): 
  - 2015: 17%
  - 2016: 19%
  - 2017: 21%
  - 2018: 16%
  - 2019: 4%
  - 2020: 2%
  - 2021: 0%

- Intermediate Step 09/2017: 
  - 2017: 17%
  - 2018: 19%
  - 2019: 21%
  - 2020: 16%
  - 2021: 4%

- Final Step (5 years after Publ.): 
  - 2021: 100%
6. Type-approval measures controlling vehicle emissions in use, using not-to-exceed concepts, similar to those foreseen for heavy-duty vehicles, have to be evaluated for light duty vehicles application as well. The Portable Emission Measurement System (PEMS) method is one of the candidate methods considered by the RDE-LDV working group. The alternative candidate procedure is the random cycles approach derived from the EU WLTP driving data collection. Both candidate methods/procedures have to be evaluated according to a list of assessment criteria, including cost/effectiveness, reliability and repeatability for regulatory purposes, to examine the possibility for implementing them as from Euro 6. Authorities and vehicle industry need to cooperate in this effort.

7. It has to be taken into account that time will be needed to adapt to these new procedures and to see their complexity, effects and costs. The completion of open issues in the Euro 6 emission legislation should be done in a timely manner, allowing industry sufficient leadtime. This concern could also be alleviated through a progressive application of the measures. This could be done by starting with relatively high compliance factors, taking out the so-called outlying emitters first, and progressively strengthening of these factors over time.