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Industrial Innovation and Mobility Industries
**Automotive industry**

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**SUMMARY OF "WORKSHOP ON APPROACH ON EMISSIONS LEGISLATION" HELD IN BRUSSELS 23 NOVEMBER 2010**

(1) It is well known that traffic is the predominant source of emissions in urban areas. To achieve compliance with the air quality objectives is a challenging task for Member States. The emissions legislation for vehicles play an important role here and it is therefore of great importance that emissions performance from vehicles on the road are in line with the objectives of the legislation. In the TCMV meeting of 17th September the Commission announced the intention to invite for a workshop with the objective to form a road map for the emissions legislation for the coming years. The workshop took place on the 23 November.

Presentations given in the workshop are available on the webpage of the Automotive unit[1]

(2) **Vehicle emissions and air quality**

DG Environment gave a presentation on the state of play for the Air Quality (AQ) Directive 2008/50/EC which merge existing AQ legislation into a single directive. For PM10 member states can ask for time extension to June 2010 and for $NO_2$ and Benzene to January 2015 if all appropriate measures have been taken. Currently approximately 45% of the EU27 population is exposed to PM10 levels exceeding the daily limit value and 49% of the population for the $NO_2$ annual limit value. Local traffic is the predominant reason for NO2 exceedance and is an important factor also for PM10.

UK/DEFRA presented results on a UK study on road side measurements of $NO_x/NO_2$ emissions from vehicles in UK. Generally the trends on road side $NO_x$ have decreased over the past 6-8 years but the slight decrease have more or less flattened out in latest years. The conclusion from road side measurements is that the $NO_x$ emissions from petrol passenger cars have decreased by 96% since early

[1] http://circa.europa.eu/Public/irc/enterprise/automotive/library?l=/workshop_legislation/meeting_novembe r&vm=detailed&sb=Title

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1990s. **For diesel cars the NOx emissions are at best stable for the past 25 years and have not decreased even with the latest Euro 4 and 5 diesel cars. Since the relative share of $NO_2$ emissions has increased for vehicles equipped with DPFs, the absolute $NO_2$ emissions (NOx part, which is most detrimental to human health) even appear to have increased over time.**

The representative from NL presented the results on a study on Euro V trucks[2]. The conclusion of the report is that many Euro V trucks show poor real-world $NO_x$ performance during urban and rural driving conditions. There is a difference in the projections for HD-emissions compared to the real world emissions which have implications for air quality targets. NL also raised the need for Euro VI to be finalised including real-world/in-use procedures. The representative also mentioned the cooperation between some member states on in-use compliance programmes and asked for more member states and also Commission taking part in these activities. Currently NL, DE, UK and SE have in-use compliance programmes and cooperate through the group EURISEC. The representative from NL also made an appeal to the vehicle manufacturers to take responsibility on real-world emissions on current Euro V vehicles. The representative of ACEA said that there are a number of other studies showing different results than the TNO study and questioned the method used by TNO for demonstrating the emission performance.

(3) **Approach on emissions legislation for light duty vehicles**

The Commission representative pointed out that the future light duty emission strategy would be driven by a number of actions, which are basically already foreseen in Regulation 715/2007/EC and the "Euro 5/6" Communication of the Commission (2008/C 182/08) from July 2008 for Euro 6 vehicles. These measures would be applied from the mandatory Euro 6 dates:

(a) Introduction of robust tests at type approvals ensuring that real driving emissions of vehicles correspond to the mandatory emission limits. These tests commonly are referred to as "off-cycle" test procedures.

(b) Revision of the low temperature (type 6 test) emission limits (and possibly test procedures) for positive ignition vehicles (HC, CO and NOx) and introduction of a respective test and limits for diesel vehicles (NOx).

(c) Revision of the evaporative emission test procedure (and possible emission limits) for positive ignition vehicles.

(d) Introduction of particle number emission limits for positive ignition vehicles.

(e) Introduction of Euro 6 OBD threshold limits.

(f) Possible introduction of emission limits for $NO_2$

[2] Real world NOx emissions of Euro V vehicles, TNO Report, 2010

(g) Revision of the durability concept for emission control systems

In the following for points (a) – (c) some research of the JRC was presented (available on the Circa website).

The JRC presentations can be summarised as follows:

For point (a):

DG JRC presented results of on-road measurements of passenger cars (petrol and diesel) using PEMS. The cars were high volume cars on the European market and represented different emission standards from Euro 3 to Euro 5 (petrol and diesel). The vehicles were tested using the conventional emissions test (NEDC) to check that the vehicles was in conformity with the applicable emissions standards and afterwards tested on normal driving routes were the emissions was measured by using PEMS. The main conclusions are that petrol cars exhibit on-road emissions in the same order of magnitude as the type approval emission limits (NB: due to the PEMS methodology cold start or low temperature emissions are not considered). **Euro 4 and 5 diesel cars exhibit much higher NOx on-road emissions (up to 4-5 times the emission limit) than the type approval limit values regardless of driving conditions.** Combining the work of JRC with other results from the mentioned UK study and NL, it can be concluded that NOx emissions under real driving conditions are (at best) more or less flat over the various Euro classes.

Consequently, according to the provisions of Regulation 715/2007/EC, the Commission shall adapt type approval test procedures so that they reflect adequately emissions generated by real driving on the road. In this respect the JRC has investigated several possible methods, which were briefly shown in a second presentation. The two main candidates for "real driving emissions" type approval test procedures are (1) a test cycle with "random" elements derived from real driving routes and constantly updated (2) PEMS testing of vehicles on the road. Both methods have their advantages and disadvantages, which are outlined in the JRC presentation and a report that should be made available to stakeholders by end 2010/beginning 2011.

For point (b):

The current Euro 5 limits for the low temperature type 6 test of positive ignition M1 vehicles are 15 g/km for CO and 1,8 g/km for HC emissions (unchanged since Euro 3). The JRC has analysed type approval data of the German KBA and performed own low temperature type 6 tests on 6 Euro 5 petrol vehicles. The type approval data show a quite high variability of type 6 HC emissions, which are however all well below the mandatory Euro 5 limits. At JRC's own tests all vehicles had HC emissions below 0,62 g/km (~ 1/3 of the mandated type 6 test emission limit).

However, one vehicle tested showed extremely high NOx emissions during the low temperature type 6 test. Since NOx emissions at low temperature are currently not regulated, this observation hints towards a very peculiar combustion strategy (defeat strategy?) the manufacturer applies at low temperature (i.e. immediately after the light off of the catalytic convertor an artificially lean combustion strategy reducing HC/CO but increasing NOx emissions is performed).

The JRC also looked at low temperature type 6 test emissions of 3 Euro 5 and 1 Euro 4 diesel vehicles equipped with DPFs. HC, CO and PM levels turned out to be very low. However, NOx emissions appeared to be very high, between 0,6 g/km and 1,1 g/km for the Euro 5 vehicles (Euro 5 type 1 emission limit is 0,18 g/km). This is probably due to the non-functioning of the EGR at low temperatures. Since Euro 6 vehicles are expected to use to a large extent SCR systems, which are based on a temperature dependent catalytic process, low temperature diesel NOx emissions are expected to become worse.

For point (c):

The JRC presented a quite detailed study of potential modifications to the Euro 5 evaporative emissions type 4 test, considering also the increasingly widespread use of ethanol fuel blends having a higher vapour pressure and deteriorating effects on canister carbon and tank materials. In particular the following issues should be better controlled by Euro 6 regulation:

– Vapour recuperation : canister capacity and purging

– Fuel permeation of the tank

– System integrity (leaks)

– Fuelling losses

– Durability

The study makes some concrete proposals for addressing these issues on basis of the current US requirements.

## (4) Approach on emissions legislation for heavy duty vehicles

### Euro VI HD vehicles

The Commission representative gave a state of play on the Euro VI implementing regulation for HD vehicles. The first comitology package implementing the Euro VI Regulation 595/2009 was voted in the technical Committee on Motor Vehicles (TCMV) on 17th November. This package includes the technical requirements for Euro VI HD engines and vehicles. The Euro VI standards are one of the measures designed to reduce the actual in-use emissions of air pollutants such as particulate pollutants (PM) as well as ozone precursors such as nitrogen oxides (NOx) and hydrocarbons[3]. To achieve the objectives Euro VI introduces a number of measures designed to improve real world emissions compared to current Euro V stage. The more important are: Lower emission limit values, additional limit on particulate number, new type approval test cycle, new off-cycle requirements, new requirements on in-service conformity using road testing of vehicles (PEMS). New requirements on on-board diagnostics (OBD) for the purpose of monitoring the pollution control systems on the vehicle, requirements on anti-

[3] Recital (4) of Regulation (EC) No 595/2009

tampering of the NOx aftertreatment systems and extended durability requirements of the vehicle. To finalise the implementing regulation a 2nd Comitology package is needed which should include provisions on access to vehicle repair and maintenance information as required by Regulation (EC) No 595/2009. The comitology should also include the reference to the PN measurement procedure in UN/ECE Regulation 49 and any specific provision regarding multi-setting engines that are needed according to Article 3(15) of the Implementing Regulation.

Current PEMS provisions in the implementing Regulation only account for gaseous pollutants. JRC has done work on behalf of DG Enterprise regarding Particulate mass using PEMS. A procedure for particulate mass in the PEMS procedure should be introduced at a later stage. At a later stage the possibility to measure particulate number should be investigated.

Article 14 of the implementing Regulation mentions the assessment of the PEMS procedures by 31 December 2014 and based on the result of the assessment the PEMS procedures may be amended.

Article 12 of (EC) Regulation No 595/2009 calls for a limit on $NO_2$ for Euro VI engines if appropriate. A study on the $NO_2$ emissions for Euro VI technologies should therefore be conducted before a proposal on a NO2 limit for Euro VI can be done.

**Retrofit of pollution control for HD vehicles**

The chairman of the UN/ECE Informal group on Retrofit Emission Controls (REC) presented the current status of the work in the group.

The informal group started its work in January 2010 and have a mandate to June 2012. The objective is to develop harmonized requirements for retrofit emission control devices that can be used for type approval of such devices. The informal group will develop a draft UN/ECE regulation for retrofit of emission control devices for particulates and NOx to be fitted to HD vehicles and equivalent requirements for non-road mobile machinery.

The presentation was followed by an exchange of views based on a proposal from the Commission to use this informal group also to give guidance to member states planning to introduce retrofit schemes on a national basis. Some member states were questioning if this informal group would be the right forum for this and said that these discussions in that case should take place on a European level. The Commission representative replied that if this is considered appropriate the group could be mirrored on the European level as the experts in the group would basically be the same. Some member states were of the opinion that as many member states already have national legislation on in place this is more about having mutual recognition of the different national legislation in place. The Commission representative asked the stakeholder to submit their views in writing and the Commission will based on the input consider the options.

(5) **Conclusions and next steps**

The Commission Service will consider the outcome of the workshop and reflect the result of the consultations in the work plan that will be presented in January 2011. Below follows an outline on the specific topics discussed in the meeting.

For light duty vehicles:

- The studies of the JRC on issues (a) – (d) of point (3) above should be made available as soon as possible. Target date is January 2011.

- A special "real driving emissions (RDE)" working group with stakeholder (Member States and industry) should be established, which accompanies the development of an appropriate RDE test method for Euro 6 type approvals by the JRC. The RDE test method should be available by the end of 2012 for adoption by Comitology. The RDE working group should meet the first time in January 2011.

- The Commission service should present a staff working paper with concrete proposals how the issues (b) – (d) of point (3) above should be addressed to MVEG by February 2011

- For point (e) in principle a study will have to re-confirm the Euro 6 OBD threshold limits of the Commission Communication of July 2008

- For point (f) a $NO_2$ test procedure is being developed at WLTP. It would certainly make sense to apply such test at Euro 6 type approvals, regardless of whether regulatory $NO_2$ emission limits are set. The latter point will have to be decided upon air quality needs.

- Issue (g) of point (3) above probably can only be addressed when Euro 6 vehicles are available on the market in a sufficient number.

For heavy duty vehicles Euro VI:

- The Commission service should present a proposal finalising the needed amendments to the implementing regulation to make type approval of Euro VI engines/ vehicles possible. A proposal can be expected during first semester 2011.

- Re- initialise the PEMS group with the objective to introduce particulate mass in the PEMS procedures and to proceed on the assessment of the PEMS procedures mentioned in Article 14 of the implementing Regulation.

- Report on the status on the different open issues for Euro VI (PN-limit for P.I engines, NH3 for P.I engines) in an MVEG meeting beginning of 2011.

Retrofitting of HD vehicles

The Commission representative asked the stakeholder to submit their views in writing and the Commission will based on the input consider the options.