GFV-11-05

FINAL
Meeting Minutes
11th Meeting
Informal Group on Gaseous Fuelled Vehicles (GFV)
8 November 2010
(Brussels – European Commission Brey Building)

The GRPE informal group on Gaseous Fuelled Vehicles (GFV) held its eleventh meeting in Brussels, on 8 November 2010, under the chairmanship of Mr. Rijnders (Netherlands). All working papers of the informal group are publicly available at the GRPE website at:http://www.unece.org/trans/main/wp29/wp29wgs/wp29grpe/gfv11.html

I. Welcome and introductions around the table
1. The chairman, Mr. Rijnders from the Netherlands, welcomes the group of participants and thanked the Commission for providing meeting space.

II. Approval of the Minutes GFV-10-07
Documentation: Working paper GFV-10-07
2. The minutes of the last meeting held in Geneva in June 2010 were approved unanimously.

III. Review of Agenda & Adoption of the Agenda
Documentation: Working paper GFV-11-01
3. The following two changes were agreed by the participants:
4. Insertion under agenda item 3 of the discussion of R.115 various improvements offered by Mr. Piccolo in GFV-11-03
5. WHTC versus ETC correlation factors discussion also to be added under agenda item 7 (Other items) at the request of Westport.

IV. Heavy Duty Dual-Fuel Task Force
Documentation: Working paper GFV-11-02 UNECE HDDF-TF status report and GFV-11 04 updated status report (PowerPoint presentation)
6. Mr. Renaudin's review of the Dual-Fuel Task Force is based upon GFV-11-02 dealing with the following issues:
   - Definition of D-F engines
   - Characterization of heavy duty dual-fuel engines (HD D-F) in three specific types.
   - Emission limits applicable to HD D-F engines. Different emissions test cycles (ESC, ETC, ELR) and emissions limit values for each type of D-F engine were discussed. For THC a proportionality principle toward emissions limit values was proposed in order to take into consideration the various gaseous-diesel fuel ratios in the different types of D-F engines.
   - Cases where the engine may also operate as a mono-fuelled engine (i.e. as a diesel) then the engine also needs to meet the normal diesel standards.
   - Fuel composition and which of the range of gas/LPG fuel specifications should take priority in being considered as the appropriate certification fuels.
7. Certain principles have been discussed and settled at the D-F Task Force meeting in the August and October 2010 meetings, to be validated by the GFV today. The draft time schedule to develop the new certification regulations is identified. The intention is to introduce informal documents in 2011 to GRPE with amendments to UNECE-R-

49 in January 2012 for approval and, hopefully, approved by WP 29 in November 2012. Work on D-F retrofit system certification, which need to be based upon approved amendments in R-49, could begin in January 2012 and, hopefully be finalized by June 2013. The work on the retrofit could begin as soon as a draft amendment for R49 will be available.

8. Comments from Mr. Radzimirski:
   - While Regulation 49 is the priority to amend Regulations 85 and 24 might also need amending. (R.110 and R.67 also should be checked for revisions that might be needed.)
   - Regarding the time table, in the best case the amendments proposed to R49 applicable to Euro V vehicles would enter into force at the end of 2012 while the Euro VI will enter into force on 1/01/2013. If the proposed amendments get delayed it is questionable if, from a legal point of view, we still could propose amendments for Euro V.
   - Remark on testing: The procedure does not seem to be right. First tests are supposed to be for emissions compliance and not for type approval. A Portable Emissions Measurement System (PEMS) vehicle road test might be needed for type approval. This means that manufacturers will not be able to get DF engines approved as a separate 'technical unit.'
9. Mr. Asman. Euro VI should be the main focus. Euro VI has many of the technical provisions to approve the engine as a separate technical unit. By 2010 there will be in-service conformity requirements in order to be compliant with the Euro VI regulation. We need to have provisions for type approval using the PEMS tests.
10. Suggestion from members not to perform this for HDDF Type 2 in order to avoid unnecessary burden at certification (because of the difficulty to find appropriate routes to perform the test).
11. Mr. Renaudin suggests a solution explained in slide 14 (of the working document) and if the standard PEMS test is not agreed in the TF-DF, the question will be reconsidered by GFV.
12. Mr. Whelan indicates that methane emissions will appear as soon as the engine starts to use methane and for measuring this methane a PEMs test could be useful. But a preferred option is to pick a single emissions point where methane emissions appear and use this as a threshold for developing the engine. A THC cap (i.e. 660 mg) might be appropriate. A lean burn D-F engine is going to produce higher THC emissions, but the technology should not be penalized for emissions limits set up for different technologies.
13. Mr. Asman. Discussion of European emissions limits cannot take place at the GFV level because they already are set in place in the regulations. Also there are no emissions limits for gaseous fuel engines in certain other tests. The Type 2 approach for the THC limit as shown in slide 11 would be his preference.
14. Mr. Dekker. We are sure that D-F engines are going to have challenges meeting the THC limits. In the second test alternative the engine would have to apply to all the limits: CH4, THC, and NMHC.
15. Mr. Whelan suggests the 10% limit, characterized as the Type 3 HDDF engine, is unrealistic since no one would create a dual-fuel engine to achieve only a 10% replacement of diesel with gas. Mr. Whelan claims there is no dual-fuel technology (type 2) today that will meet the CH4 limit (500 mg/kWh). He advocates that a dual-fuel engine should not be penalized by the emissions limits now in place.
16. Mr. Rijnders restates that we have to deal with the Euro VI limit values so the 2nd alternative gives us the possibility for a higher THC that would prevent the use of the THC at 160 mg/kWh.

17. Mr. Asman. We must deal within the current limit values of the current legislation otherwise a completely new emissions framework (i.e. Euro VII) is needed. To keep in the timeframe suggested, we can create legislation that allows D-F vehicles.
18. Mr. Dekker suggests that there are two possibilities to consider relative to raising the emissions limit values for methane: 1) that methane no longer be considered as a pollutant but only as a GHG; 2) Other possibility is to look at data on methane emissions supplied by the industry -- looking at methane catalyst efficiencies, etc. -- to see what emissions levels can be achieved
19. **Final outcome:** Regarding Type 2 HDDF engine (one that uses a balanced amount of gaseous and diesel fuel):
    - The 2nd alternative proposal for emissions testing whereby the NMHC number is flat (at 160 mg/kWh); methane number is flat at 500 mg/kWh; and the THC number is variable under a proportionality principle depending on the ratio of gas to diesel. For instance, at a 10% gas replacement the THC would be 210 mg/kWh.
    - According to Clean Air Power achieving the 500 mg/kWh limit at 90% substitution is not possible. While recognizing the existing Euro VI limit value, he indicates that HD DF engines cannot achieve the discussed emission limit levels. They support any political decision/move in changing the THC limits (but this is outside the jurisdiction of the GFV group).
20. There is a discussion of the suggested time-plan for completing the different HDDF amendments. It is suggested to advance the work on the HDDF retrofit kits to June 2011 at GRPE. This is dependent upon finding D-F solutions within R.49. Mr. Piccolo suggests that earlier work can be done on the structure of R.115 in preparation of adopting the amendments that will be completed for OEM HDDF engines. This could be done in the framework of the GFV since it is an update of R.115, which is needed as well.
21. Mr. Rijnders asks if AEGPL and/or NGV Global can provide its experts to work on a new, general structure of R.115 to be ready to accept changes for HDDF Since HDVs and LDVs are 'mixed' throughout the regulation, this will be a challenge.
22. Other elements of the D-F presentation have been agreed: a type 1 DF engine will be treated as a mono-fuelled diesel engine; and that existing fuel composition standards for natural gas (also considering renewable biomethane) and LPG be used initially as the emissions test fuels. (Slides 18 to end of presentation, GFV11-02.)
23. As an outcome of the discussion on HDDF, the working document GFV11-04 is produced.

V. Regulation 115

V.1. New requirements for retrofit systems intended to be fitted on direct injection petrol LDV

Documentation: Working paper GFV-11-03

24. As discussed during the 10th GFV meeting Mr. Piccolo explained that specific provisions are necessary since, in order to safeguard the petrol injectors, a certain amount of petrol needs to be injected also in the gas mode, especially when particular temperature conditions are reached. At this stage, no specific rules have been defined for emissions and fuel consumption calculation and, therefore, the working paper GFV-11-03 introduces those new requirements for the type-approval of retrofit systems intended to be fitted on direct injection petrol vehicles. This proposal aims at relying on a calculation method set out in a new Annex 6 and maximum petrol energy utilization (20% subject to discussion). Thus, the total petrol

injection time on the entire test cycle could exceed the time limits currently set out for ordinary bi-fuel systems (90secs for Euro 3-4 and 60secs for Euro 5-6).

25. Mr. Radzimirski agrees with the need to set new provisions for Direct Injection LDV vehicles; but is skeptical about the way to approach the limit on petrol usage. He mentions the statistical errors that could occur with the proposed calculation method. As an alternative he proposes to specify the time that gas could be used in the total duration of a cycle.
26. Mr. Seisler suggests a change in the proposed language as: In case of LPG retrofit systems intended to be installed on vehicles powered on petrol through a direct injection ~~feeding~~ system, the time periods set out above CAN ~~shall not~~ apply, ~~provided that,~~ during the entire test cycle, SO LONG AS the ~~energy~~ use of petrol does not exceed 20% of the total energy consumed.
27. Mr. Rijnders recalls that an allowance for bi-fuelled vehicles was established to improve cold start performance (heating the catalyst quickly). He asks whether a change of the bi-fuel definition could be made to the Regulation (EC) 692/2008: definition 11: 'bi fuel vehicle' means a vehicle with two separate fuel storage systems that can run part-time on two different fuels and is designed to run on only one fuel at a time; definition 12: 'Flex-fuel gas vehicle' means a vehicle with one fuel storage system that can run on different mixtures of two or more fuels.
28. Mr. Steininger says that the language and definition of bi-fuel vehicle can be changed in Regulation 83 but also in R.115. In a second stage a change in the European legislative framework could be envisaged via a comitology process for mixed fuel operations. Mr. Steininger highlighted his preference for an energy limit if the measurement is accurate.
29. With regard to the pollutant & CO2 emissions, Mr. Piccolo indicates that he can demonstrate that such a change will be conservative in comparison to the accurate measurement of those emissions (refer to working paper GFV-10-06).
30. The AEB and Landi Renzo representatives strongly support a quick solution on this issue as the market demand is high for R115 kits for direct injection engine and using numerous national type approval schemes is not good for the industry, the customers and society in general.
31. Mr. Piccolo says that the LPG industry will develop one package (of suggested language) to improve the definition of bi-fuel vehicle system and in parallel create a new class (fuel injection) in regulations 83 and 115.
32. **Conclusion:** A new proposal will be made by AEGPL and associates for January 2011. It should be proposed at the GFV, also in form of an informal amendment, so it can be proposed, even with some amendments after discussion in the GFV and at the GRPE. The proposal should include consideration of R.83 and R.115.

V.2 Clarification with regard to the R115 applicability to Euro 5 Type Approved vehicles

33. Mr. Radzimirski indicates that from a legal point of view and based on the amendment 4 to R115 (which entered into force on 19 August 2010); R115 type approval cannot be refused. Nevertheless, as the amendment 4 is not complete, some tests on Euro 5 vehicles have be carried out in accordance with Euro 4

methodology. But then (in Poland) they must use the results of the Euro 4 test on Euro 5 vehicles for type approval purposes. Some parts of the regulation 115 need to be amended in order to have a dynamic reference to R83 (please see paragraph 6.1.2.4.1 as example of the type of sentence to be corrected).

34. Mr. Rijnders suggests that this be taken into consideration by the LPG stakeholders to make the proposed amendments or improvements to raise R.115 to an improved level of stringency.
35. Mr. Steininger recalls that the European Commission monitors any developments from the automotive industry that go against the type approval and the emission legislation framework. To him, R.115 is not up to the level he would prefer.
36. Mr. Duvielguerbigny indicates that the retrofit industry is committed to deliver safe and well-performing kits and that it is better to improve Regulation 115 to make it as a minimum standard in Europe.
37. Vehicles can be found that do not meet required emissions regulations. There was a debate in a previous GRPE that concluded there is less miss-use in achieving vehicle certifications than some people have suggested. At this moment data that can be supplied on vehicles achieving the highest level of emissions regulations will be monitored any miss-use or bad results of retrofit vehicle could be identified so that regulators (national and Europe) can react accordingly.

VI. NMHC + CH4 versus THC in R.115

38. Mr. Rijnders. We are waiting for the view of the Commission to see if they would see CH4 as a global warming gas and not as a pollutant.
39. Mr. Steininger indicates this requires a co-decision because methane is included in the HC limits at this moment. He also mentions that not all Commission DGs have the same view on the matter. The World Light Duty Testing Procedure (WLTP) process would allow a change to the hydrocarbon rules – NMHC, ethanol, and others – but they need appropriate measurement methods. His personal view is that it would be possible to exchange the methane value in the emissions limits but include it in a global warming gas regulation. But this does not mean that the pollutant limits would remain the same; they might need to be revised. But some reconsideration is needed for the whole hydrocarbon situation, moving toward 2014 and 2015. If we want to talk about limit values there could be discussion about this, with a role for the GFV to create some suggested values or approaches. This will have to be done by co-decision so the timeframe to 2014/2015 is more or less set if the Commission services starts now to consider such amendments.
40. Mr. Seisler asks, based upon that representation, what can the industry stakeholders do to support a change in the methane regulations, moving toward a GHG value and not a single value only for methane.
41. John May mentions the current US effort to introduce in heavy duty regulations a methane cap or possibly, as an alternative, to add methane to a global warming potential requirement.
42. Mr. Steininger: It could be possible to add the methane component to CO2, with the right coefficient applied for global warming. But he again indicates that there is on-going concern about the influence of methane as an ozone precursor. But a new

'cap' that might be established could be higher than the existing one (heavy duty vehicles). For light duty the limit is 0.068 g/km for non-methane and 0.1 g/km for total hydrocarbons.

43. Mr. Rijnders indicates that the heavy duty vehicles have a different approach (160 mg/kWh for NMHC; and 500 mg/kWh for methane). WLTP is only light duty so making changes for HDVs requires a separate approach or regulatory change.
44. Mr. Steininger says that there might need to be changes in the testing procedures. The GFV group should reflect on what values for THC should be set for LDVs with the methane values put into a GHG or global warming regulation. It might be good to have a higher NMHC value with a higher cap on the THC emissions that could be added to the CO2 emissions. But this approach might better come from a manufacturer although the GFV certainly should take the initiative. The discussion should start with DG Environment.
45. Mr. Rijnders indicates that this group can help with documents, data, etc. and that we now have another important task to fulfill. But we understand that the resolution won't be quick (that it would have to be in line with the co-decision process).

VII. Update and improvements to R.115.

46. Mr. Duvielguerbigny recalls that, as agreed under agenda item V, AEGPL will suggest new amendments for direct injection petrol engines converted to gas. He also stresses that R115 can be disconnected from Euro 5-6 legislation as regards the bi-fuel definition; an extended bi-fuel definition has the preference of the industry. Mr. Duvielguerbigny regrets that Germany is not truly involved in the GFV work. The purpose of GFV effort is to engage in a constructive dialogue in a dedicated working group rather than in the GRPE session proper.
    Mr. Rijnders suggests that proposed amendments be made before the next GRPE.

VIII. World Harmonized Transient Cycle (WHTC) versus European Transient Cycle (ETC)Testing and correlation factors (John Crawford, Westport)

47. Mr. Crawford requests that the group consider having a separate analysis of the correlation factors for gas engines since the original limits and study by TNO was done for diesel engines before gas engines were available.
48. Mr. Dekker. Creating the data can be expensive. TNO wanted Euro VI engines but could not get them so a simulation was done using a calculation model. Normally some of this work is funded by the Commission.
49. Mr. Crawford will bring this back to Westport to see if data on correlation factors can be generated.
50. Mr. Rijnders urges Westport to try and obtain data to bring back to the GFV and the Commission.

IX. Closing & next meeting

49. The next GFV meeting will be in Geneva on Tuesday morning, 11th January 2011, prior to the GRPE meeting. A meeting date for the next Dual-Fuel Task Force will be set for sometime in December 2010 and the results will be presented at the GFV

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