

## MEETING MINUTES

### 20<sup>th</sup> Meeting of the Informal Group on Gaseous Fuelled Vehicles (GFV) 14-15 May 2012 Bologna, Italy (AEB/Landi Renzo)

#### GFV Meeting

##### I. Welcome and introductions

1. Landi Renzo and AEB welcomed the group to their premises. Mr. Rijnders thanked the staff and management for the invitation to see the AEB/Landi Renzo manufacturing facility.

##### II. Agenda for today (changes/additions)

2. Mr. Rijnders asked if there are any additions or changes to the agenda. No comments are made or suggested so the agenda is adopted.

##### III. Adoption of minutes of the previous meetings of the 18<sup>th</sup> and 19<sup>th</sup> GFV,

3. Mr Rijnders notes that the minutes of the 18<sup>th</sup> GFV were already reviewed during the 19<sup>th</sup> GFV but now again on the agenda for adoption. The 19<sup>th</sup> GFV was a short meeting in Zoetermeer, Netherlands on 8<sup>th</sup> March 2012 to also accommodate the Heavy Duty Dual Fuel Task Force (HDDF TF) further development of the annexes to R.49. Mr. Rijnders asks if there are remarks or changes on either minutes and there are none.
4. The group approves the minutes of the 18<sup>th</sup> and 19<sup>th</sup> GFV without comment.

##### IV. Development of formal documents for R83 (ECE/TRANS/WP 29/GRPE/2012/6) and R115-GFV (ECE/TRANS/WP29/GRPE/2012/7).

5. Mr. Rijnders notes that in the UNECE website document 2012/7 was listed as pertaining to R.83. In fact this pertains to R.115. Mr. Seisler will contact Pierpaolo Cazzola (GRPE secretariat) to make the necessary change.

##### R83 Clepa Proposal for an alternative to determine fuel consumption (GFV-20-03 and GFV-20-03a)

6. Mr. Harry Scheule (Continental) Amendment presents the CLEPA document Regulation R83 and document GRPE Working Document ECE/TRANS/WP.29/GRPE/2012/6 regarding the use of petrol in gas mode and its limitation for bi-fuel gas vehicles and the verification during type approval.
7. In Appendix 1 and 2 of GRPE/2012/6, it is proposed to determine the amount of consumed fuel during the type 1 test by measuring the weight of an additional external fuel tank for the gaseous fuel (NG or LPG or H<sub>2</sub>). From the CLEPA point of view this procedure might entail practical and safety problems during development and type approval. For that reason CLEPA proposes an alternative procedure in order to determine the fuel consumption of petrol and the gaseous fuel in the test cycle as an equivalent option as a new Appendix 3.
9. Alternative proposal by CLEPA
  - Based on the injection time and flow rate through the fuel injectors
  - Values should be available in the ECU or in the additional gas control unit (GCU).
  - Implement a new Parameter ID(PID) for generic SCAN tool (J1979/ISO 15031-5)
10. Comparison of fuel consumption has been made for engine management systems and the exhaust of the system.
11. What needs to be done by the car industry?

- A new PID has to be requested at J1979- community. (All vehicles according to R.83 have to support ISO 15031-5 = J1979.)
  - The new PID has to be implemented into the engine management or in the controller of the secondary fuel system.
12. Advantage of the proposed method is:
- Weighing of an external and separate CNG tank is not required
  - No risk of gas leakage or contamination
  - $M_{\text{petrol}}$  could be easily verified by comparison with the Fuel Consumption calculated based on the bag analysis.
  - $M_{\text{petrol}}$  and  $M_{\text{gas}}$  could be verified by calculation of resulting CO<sub>2</sub> emission of  $M_{\text{petrol}}$  and  $M_{\text{gas}}$  and comparison with the CO<sub>2</sub>-Emission based on the bag analysis.
  - $M_{\text{petrol}}$  and  $M_{\text{gas}}$  could be verified by comparison with the injection pulses; if the pulses on both kinds of injections,  $M_{\text{petrol}}$  and  $M_{\text{gas}}$  must increase.
13. AEGPL would support this change. But they would prefer an official test based on official data.
14. The discussion surrounds whether this method can be used for type approval because the data is provided by the manufacturer it is not necessarily good enough to use for type approval. Mr. Rijnders makes a point that a lot of this data may not give a good picture of the amount of energy consumed. It also is a complicated procedure to adopt. Mr. Dekker (TNO) indicates that the data from the manufacturer would have to be 'trusted.' For manufacturers the method is fine but not necessarily from a regulatory view. But it is agreed that the suggested method is an 'elegant' alternative to weighing the gas in an external cylinder. But Mr. Rijnders has some doubts about bringing this recommendation to the GRPE at this stage of its development.
15. There is a way of cross checking the petrol and gas values and adding them together: Portion of injection gasoline mass to portion of injection natural gas mass. The only requirement is to prove that the amount of injected petrol has to be lower than 20%.
16. This method would have to be justified as a good alternative at the GRPE. Mr. Scheule can work to improve the test, and that we would work in the GFV group for alternatives to this methodology (different than weighing-the-tank methodology). While there are concerns about safety these should not be the principle reasons for changing the test procedure. There is general agreement that this method is an 'elegant' solution and is an improvement over the weighing methodology and that it has merit. But some few questions still need to be answered and CLEPA will work to revise the method and satisfy questions at an upcoming GFV, but not necessarily in the short-term for the June GFV session. CLEPA will try to demonstrate that the method be made more robust from a type approval perspective. Mr. Schuele agrees that it is good to have the feedback from this group in order to refine the methodology. The proposal is much more likely to have success at the GRPE once a consensus is achieved at the GFV.
17. **New work item Landi Renzo/AEB Regulations 115 and & 83: Correction factor for G25 weighing process. (Document GFV-20-05)**
18. This proposal describes a modification to previous formulas in order to take into account the presence of inert gas and providing the correct energy ratio.
19. Documents ECE-TRANS-WP29-GRPE-2012-07 (referring to R115) and ECE-TRANS-WP29-GRPE-2012-06 (referring to R83) introduce the calculation of NG/biomethane energy ratio during a Type I Cycle by weighting the NG/biomethane mass consumed. The formulas introduced respectively in Annex 6B (ECE-TRANS-WP29-GRPE-2012-07) and Annex 12 - Appendix 2 (ECE-TRANS-WP29-GRPE-2012-06) are affected by an

- error when G25 reference fuel is used. The error is due to the presence of inert gas (N<sub>2</sub>) in the G25 reference fuel, varying from 12 to 16% in molar fraction units.
20. The proposal in document GFV 20-05 indicates a preferred formula. Mr. Dekker suggests that the process being proposed does not need to include a complex formula since a standard reference fuel is being used. Possibly the calculation and proposal itself can be used as a rationale to support the reference fuel.
  21. It is agreed to take on the proposal but Mr. Rijnders asks if we can agree to accept a fixed factor as opposed to a calculation. Mr. Piccolo and Mr. Castagnini agree. A fixed correction factor of .78 is acceptable.
  22. Procedural aspect: Can this be made as a corrigendum or is another informal document required? This is a correction of something that has been overlooked. The informal document also can become a formal document and they can be merged together. But an informal document must be prepared, and it is now late to launch this to the GRPE.
  23. The resolution is that we accept the document and proposal but that some corrections are needed. If corrections can be made immediately we can submit it as an informal document this week and the GFV secretariat will send it to the GRPE secretariat for submittal as an informal document. The difference between the proposals is that R.115 is restricted to direct injection engines but that R.83 is more general and not applicable only to direct injection engines.
- V. Heavy Duty Dual-Fuel Task Force progress to date & approval of the formal document of amendments to R49 ( ECE/TRANS/WP.29/GRPE/2012/13/Rev. 1) and a new informal document of Annex 15, Appendices 3, 4, 5 and 6. (GFV-20-02 GRPE-64-XX)**
24. At the last meeting the HDDF TF finished addressing almost all of the issues. Two documents were proposed as a supplement to the working document to GRPE and to add the new modification from the appendices. Mr. Renaudin would like confirmation of this work by the group today. There also is a need to add a new item relative to R.85 (added to this agenda). For the next GFV a brief PowerPoint presentation update can be made to inform the group in Geneva (who don't participate regularly) as an update.
  25. Two new documents were made: amendments to the formal document and a consolidated document of the formal and informal documents that have been completed. Mr. Rijnders is concerned that people do not get confused about the two documents (informal document of new updates) and the consolidated 'formal' document plus the new updates. To avoid confusion a new title page will be made identifying that the consolidated document consists of ECE/TRANS/WP.29GRPE/2012/13/Rev.1 and informal document GRPE-XXX1 and GRPE XXX2. The formal text then will appear on page 2.
  26. This new consolidated document will be submitted at the June 2012 GRPE.
- Discussion on GFV document (GFV-20-02) and preparation for a new informal GRPE document (Annex 15, Appendices to 3, 4, 5 and 6)**
27. Some small but significant errors/inconsistencies were made in the document (for example, the inverse use of commas versus periods in the formulae--one in the North American style that uses a period as a decimal separator and commas every third zero in a number versus the European style that uses a comma instead of a period as a decimal separator and a period to separate each third zero).
  28. Section 7.3 (Annex 15, Section 7.3 was amended to identify a diesel vehicle versus a diesel engine.
  29. A discussion about CO<sub>2</sub> calculation has been done by measuring fuel consumption. Both fuel consumption and CO<sub>2</sub> measurements are made directly.

30. HDDF indicator, warning system, operability restriction – Demonstration requirements were addressed in the text.
  31. Appendix 4 (Annex 15): Additional emission test procedure requirements for D-F
    - View on GRPE formal document on R49 CE/TRANS/WP29 GRPE/2012/13/Rev1
    - Regulation 85 in respect to dual-fuel technology
  32. Various clarifying amendments are pointed out and discussed.
  33. Determination of gaseous components, particulate determination and additional requirements regarding the exhaust gas mass flow meter are explained.
  34. Table A6.1 Molar component ratios for a mixture of 50% gaseous and 50% diesel. Table A6.2 Raw Exhaust Gas  $\eta$ -gas values and component densities for a mixture of 50% gaseous fuel and 50% diesel fuel (mass %) have open cells at this moment but can be completed in one week to be sent as a new addition to the informal document. Mr. Renaudin suggests that principal parties might want to look at this prior to its submittal to GRPE. Decision is made that the tables will be completed to the best extent possible but if they are not completed by next Monday, the document will be submitted to GRPE anyway, This should be sent no later than 21<sup>st</sup> May. The document will not be distributed again but can be sent to the UNECE.
  35. From document GFV-20-2a, Annex 15 section 6.0: Demonstration requirements, sub section 6.4 Additional demonstration requirements in case of a universal fuel range type-approval. A lambda sensor that adapts quickly is required to achieve adaptability of the system. The compromise language that was achieved is, “On request of the manufacturer and with approval of the approval authority, a maximum of two times the last 10 minutes of the WHTC may be added to the adaptation run between the demonstration tests.” Mr. Whelen expresses concerns, however, that rapid adaptability is not possible at this point in time.
  36. The new document will be sent to the GRPE secretariat for discussion in Geneva at the next meeting of the GFV and GRPE.
  37. Proposal for an amendment to Regulation No.85, Amendments to informal Document GRPE-62-17 (from June 2011). The document, which remains an informal document, was well received by the GRPE at that time. Mr. Rijnders suggests that approval as a formal document will not be possible. But it is important that this document is approved otherwise type approval is not possible. Paragraph 5.2.1 has been amended to read, “The net power test shall consist of a run at full load, the engine being equipped as specified in Table 1 of Annex 5 to this regulation.” The question that had been raised at the time is between full ‘throttle’ and full ‘load’ but there is not great clarity on this point. The language should be changed to include compression ignition engines and dual-fuel engines. The group feels that, as part of the dual-fuel ‘package’ of legislation, this will be needed to obtain type approval, however, if there is a protest then we will have to wait until a formal document can be submitted. Alignment of the legislation would not be completed.
- VI. GFV input for the European Commission proposal (Co-decision) on Total Hydrocarbon (THC) and methane emissions for NG vehicles (Discussion draft V.9 [GFV-18-06] and V.12 [GFV-20-04]) pertaining to Directive 715/2007.**
38. Mr. Rijnders explained the background to the request from the European Commission to provide a rationale paper supporting a change in the total hydrocarbon regulations (Directive 715/2007). The Commission plans to ask Parliament to give them a mandate to change some specific items through what is known as a ‘delegated act’ (within the co-decision process). This THC amendment is part of what is being called by the Commission as the ‘Potpourri Amendments’; six corrections to Euro VI/6 emission regulations, one of which addresses the problem of having an NMHC while still maintaining a THC. To do this a background statement and impact analysis is required

(done by the Commission). Mr. Rijnders was asked specifically by the Commission to provide input from the GFV. To this point the 'CH4 Position Paper' now in its 12<sup>th</sup> iteration suggested a 'two step' approach: 1) to remove the THC and replace it with a 'methane cap' that, 2) at some point in the future might become obsolete if the Commission decides to regulate methane as a greenhouse gas.

39. Mr. Rijnders reported on the history of the THC/NMHC from 1998 (82, 83 and 84<sup>th</sup> MVEG in 1999) to note that the discussion at the time included a proposal for a 300 mg/km "methane cap," proposed by the ACEA. At that time the Commission had the mandate through the Committee for Adaptation of Technical Progress (CATP). However, at the moment of voting the German delegation objected based on a single auto manufacturer who had built an NGV that achieved the THC of 200 mg/km using a methane catalyst.
40. Mr. Renaudin reminded the group that a great deal of work was done on the heavy duty engines, and in particular the creation of the Enhanced Environment-friendly Vehicle (EEV). Methane eventually was labeled by the Commission as a pollutant but until that time was excluded in engine testing. But including methane as a global warming gas was not done at that time due to the complexity of the issue. Global warming also included secondary particles and NOx (in some circumstances). Methane emissions could be handled through the engine design so it was dealt with at the Commission for Euro IV, V and beyond. Mr. Renaudin clarified that this current action is specifically aimed at light duty vehicles.
41. Mr. Rijnders indicated at that time the THC prevented natural gas engines from being homologated until there was a separation of NMHC and THC. Today the 100 mg/km THC limit value presents a challenge for light duty vehicles to comply without the use of a methane catalyst.
42. There was a wide-ranging discussion of different elements concerning the CH4 Position Paper and specifically the recommendation that a new limit value for methane, as a cap once the THC is eliminated (as one of the proposals in the Commission's Potpourri Amendments). In summary, the concerns expressed and points raised include:
  42. From the auto industry and auto parts/catalyst manufacturers perspective:
    - There is great concern that, since the global warming impact of methane is 23 times more than CO2 that any added methane threatens to result in a potential increased cost to the auto manufacturers to achieve low CO2 (GHG) limits.
    - The price of the catalysts quoted in the CH4 Position Paper are too high. Methane catalysts, according to VW, are more in the €50-100 range rather than the €200-400 stated in the paper. (Further investigation of this point will be done, and particularly with AECC.) The argument is that €50 is cheaper than the potential penalties that would be paid by auto manufacturers to include methane as a greenhouse gas added to CO2.
    - The methane cap proposed in the Position Paper based on the ratios in the Heavy Duty Vehicle standards for the Environmentally Enhanced Vehicle standard (EEV) must be defensible. Using the ratio from HDVs to arrive at 212 mg/km methane actually increases the potential GHG emissions from a vehicle. Even though a light duty NGV reduces GHGs from a petrol LDV by 20-25%, accounting for higher methane limits reduces that potential, all of which is costly to the OEMs in terms of potential penalties they must pay for not achieving low CO2 (or equivalent) levels.
43. The gaseous fuel system industry advocates expressed alternative views:
  - By keeping a 'double limit value' (NMHC and THC) this effectively regulates methane (i.e. the difference between the THC and NMHC). The conclusion, therefore, is that THC need not be regulated and that the methane cap has been introduced merely to satisfy

a perceived political concern about global warming but has no scientific value in terms of emissions from NGVs.

- Eliminating the THC and now considering a methane cap is not, in and of itself, the pathway to future regulations on GHG, which could be a new challenge to the auto industry. This is an old argument by the auto industry and that proposing lower emissions for NGVs is a primary motivator that leads to overall tighter emissions regulations. The argument that the 'first step' proposed in the Position Paper to remove the THC leads to tighter emissions standards is simply unfounded.
- At this point no one is advocating that methane be added to the CO2 requirements facing the auto manufacturers. But if regulators are truly concerned about global warming gases, then the regulations might well include methane, N<sub>2</sub>O, and possibly other emissions/pollutants that GHG limits facing the auto manufacturers. But this is for future consideration by regulators and, at this stage, no one has tabled such a proposal.
- The group is asked if anyone, based on scientific logic, can support the continuation of a THC limit so long as the NMHC limit is in place, which addresses ozone formulation. No one is able to justify the THC but the political issue of creating a methane cap still is critical to the discussion even if it is based on 'politics' and not science. Thus the issue becomes how to justify whatever limit value is agreed on as a methane cap and this is not answered in the discussion.

44. Mr. Rijnders suggests that the industry cannot make an argument why not to have NGVs based on global warming impacts. It could be beneficial, in fact, to add methane emissions in the CO2 'basket'. If this is not going to be the case, then we should eliminate the THC without establishing a 'cap'.

45. Conclusion by Mr. Rijnders: In the June session of GFV we will only briefly deal with the CH4 Rationale document. The goal is to have everyone agree upon a solution inside the GFV. If this is not possible then we approach the Commission that a consensus has not been achieved but some other considerations must be given. After the June GFV session we can continue this dialogue in detail. There is agreement that, for the moment, we will proceed with considerations to support the Commission's request for a position paper but that we should confer further with Mr. Steininger about the discussion today and reconsider the 'two step approach' initially advocated in the position paper.

## **VII. LNG TF meeting report**

46. Mr. D'Alamo, at the GRSG meeting in April discussed the LNG amendments with the European Commission representative. (Mr. Rijnders had requested that the LNG Task Force co-secretaries contact the European Commission staff responsible to the GRSG about the LNG amendments to R.110, Antony Lagrange Legislative Officer Industrie Automobile. NGVAe and NGV Global agree that they should meet together with the European Commission staff person responsible to the GRSG to keep him apprised of the final amendments.

47. Mr. Seisler presented the report on the LNG Task Force activities (GFV-20-06, also presented by Mr. Del Alamo at the GRSG meeting in April). He adds that the development of the LNG amendments has been a very smooth consensus process. These regulations should achieve a timely confluence with the HDDF regulations and that will lead to an opening of the market for L-NGVs. Furthermore, the R110 regulations could provide a foundation for the development of regulations for marine applications.

48. Mr. Renaudin reminds the group of the schedule for ultimate approval by WP29 could be in June 2013 (maybe March 2013?) since the documentation would not be in time to be considered by the November WP29 meeting.

49. Mr. Rijnders indicated that if R.110 is adopted with the amendments it would be applicable for type approval for all European countries.

### **VIII. Next meeting GFV**

50. Agree that 12<sup>th</sup> July Brussels subject to room availability, first at the Commission. Mr. Seisler will contact Bernardo Martinez about the possibility to get a meeting space.

### **IX. Other business**

51. Mr. Piccolo inquires as to whether attention needs to be given to changes in Directive 2007/46 (Framework Directive) as a reference to the annex including LPG and NG systems and not only tanks for LPG and natural gas concerning R.67 and R.110. Mr. Cagnolati suggests that a further explanation and information document could be proposed to change the Framework Directive that some other requirements, such as the number of tanks allowed on a vehicle, be discussed.

### **X. Closing of the meeting**

52. Mr. Rijnders thanks the group for its hard work and the hospitality of AEB/Landi Renzo. The methane document will be put in the agenda as 'other business' as a simple report.
53. The minutes of the meeting will be prepared very quickly to accommodate the upcoming June GFV and GRPE meetings.

### **ACTION ITEMS**

- Mr. Seisler will contact Pierpaolo Cazzola to make the necessary change in reference to document GRPE-2012/7 from R.83 to R.115.(done, 17.05.2012)
- Mr. Piccolo will send a revised document to secretariat for submittal to GRPE secretariat.
- Mr. Seisler will check on the availability of a room on 12<sup>th</sup> July in Brussels at the Commission facility to hold a GFV meeting. (Done & secured at DG Enterprise Brey building)

### Attendees

Andre Rijnders (Chairman – RDW)  
Henk Dekker (TNO)  
Jean-Francois Renaudin (Volvo)  
John May (AECC)  
Francesco Cagnolati (Landi Renzo)  
Salvatore Piccolo (Federchimera)  
Peter Volk (TÜV Thüringen Italia)  
Alex Stoehr (German LPG Association)  
Joseph Gillingwater (Hardstaff)  
Harry Scheule (Continental)  
Steve Whelan (Clean Air Power)  
Jeffrey Seisler (NGV Global/Clean Fuels Consulting)  
Jaime D'Alamo (NGVA Europe)  
Susanne Leifheit (ACEA/Volkswagen)  
Mario Manlein (DFD)