

41st Meeting of the Informal Group on Gaseous Fuelled Vehicles (GFV)
Palais Nations, Geneva
Room XXVII
8th June 2015
14:30-17:30

I. Welcome and Introduction

1. Mr. Rijnders welcomed the group to the GFV. Being in Geneva during GRPE week there are some additional participants not normally at the GFV but who are very welcomed to attend and participate.

II. Agenda for today (changes/additions)

2. There are no requests for changes in the agenda.

III. Adoption of minutes of the GFV-40 on 11 May 2015 (Zoetermeer, Netherlands)

3. The minutes of the last meeting were sent late so the participants are asked for their tentative approval and at the next GFV meeting the minutes can be reconsidered for approval once people have had more time to review the document.

IV. Documents related to gaseous fuelled vehicles for consideration at GRPE-71

4. **GRPE-71-03 (GFV amendment R115 LPG & CNG retrofit).** The proposed amendment has been discussed, agreed and it was approved by the GFV. The proposal is made only to simplify the communication model for gaseous fuel vehicle approval. The amendment is designed to avoid having the manufacturer calculate the CO₂ figure for each engine family. The new proposal uses a CO₂ ratio for all the engine families so the CO₂ and power figure are proposed to be removed. This idea does not represent a loss of information but only a simplification for the manufacturers of the retrofit kits. The proposal will be explained and justified at the full GRPE later this week as an informal document.
5. **ECE-TRANS-WP29-GRPE-2015-13e (VPSD) (although gaseous fuel definitions are not yet included) and GFV-40-03.**
There is still a lot of work being done on the other definitions in the first phase dealing with various propulsion systems. GFV had provided VPSD with a set of definitions and the Chairman responded with his comments. On 11th May the GFV reacted to the VPSD comments and then developed refinements based on those comments and returned them to the VPSD for their further consideration. The VPSD chairman suggested that the gaseous fuel vehicle definitions must be 'technology neutral' and generic as possible. The GFV provided input on definitions for bi-fuel, dual-fuel, mono-fuel, and flex-fuel gaseous fuel vehicles.
6. The European Commission commented that the GFV use of 'compression ignition' in its original definitions was not 'neutral' enough. The new version of the definitions refer only to a 'propulsion energy converter', which is terminology adopted by the VPSD as an engine/motor. The thinking is to provide a generic definition at first and then to narrow it or make it more specific if it is required in some regulations. GFV provided optional definitions as 'preferred' and 'acceptable'. The Commission indicated that, for dual-fuel the GFV's 'acceptable' definition likely is one that can be used.
7. Question was raised how the Commission feels about the removal of 'compression ignition' but leaving in that 'one fuel ignites the other'. The Commission expressed interest that this might be a reasonable approach.

8. India asked if the dual-fuel definition also is applicable to a 'limp-home' option in the dual-fuel energy storage system. The Chairman said that that this issue was fully discussed and that the GFV had settled on the more simplified approach.
9. India felt that the 'limp home' option in a gaseous fuel mono-fuel vehicle has to be an established part of the definition.
10. European Commission indicated that regulations 49 and 83 also have allowances for the limp-home mono-fuel vehicle. Mr. Rijnders indicated that there also are some other technical details of systems (like bi-fuel vehicles that can run on petrol/gas simultaneously).
11. These definitions are designed to be generic but not to replace the definitions in existing regulations. These new definitions would be aimed at new Global Technical Regulations. The new definitions should be clear but also to allow some of the variances and more detail as might be required in a particular regulation for clarification of specifics.
12. The Commission indicated that a definition might be changed in an amendment or made into an explanatory note. The substantive requirement of the definition should be in place.
13. During the second phase of discussions at the VPSD it should be noted that some additional requirements might be made so it is still within the scope of bi-fuel and dual-fuel vehicles in new regulations.
14. Question is whether the explanatory remarks being discussed now will be added to the VPSD. Mr. Rijnders indicated that this will be discussed when the VPSD enters its second phase of work. This document is only an internal GFV document.
15. Question is raised if other groups in the United Nations, like the International Maritime Organization, would be consulted for their input? Answer (by the Commission) is that the idea of harmonization and the use of these definitions will be included in safety and environmental regulations and at some future date other parts of the UN dealing with these issues will be considered.

V. **Report and information exchange on Heavy Duty Dual-Fuel Task Force (Retrofit) (Mr. Dekker) (GFV-41-03)**

16. Some key issues are explained about the HDDF regulations: the D-F retrofit regulation is for type approval of 'systems' while R.49 is for type approval of engines; some tension exists between OEMs and retrofitthers;
17. *Principles of HDDF need some explanation:* Type approval process; retrofit system family; emission tests: Engine test and simplified test; methane emissions; and safety.
18. *Type approval* will require UNECE retrofit system regulations but national requirements also must be considered.
19. *Application range:* means a group of engines to which the retrofit system is approved to be applied. The initial range of the retrofit system is the R49 engine family of the demonstration engine.
20. *Actual applications:* means type approved or notified retrofit systems (fulfilling all emission and other requirements).
21. Question: What happens when a manufacturer wants to add something to the system? This would be possible under national regulations if allowable.
22. *Emissions Tests:* Type Approval Extension: PEMS (portable emissions measurement system) could be used. A back-to-back comparison between a test in the diesel mode and a test in the dual-fuel mode is required. But the details of the simplified method still have to be developed and verified.
23. *Methane emissions:* This is an on-going, difficult issue for CNG/LNG dual-fuel retrofit systems. The challenge is to maintain the environmental performance of the retrofit without compromise on greenhouse gases or general pollution. In creating a good

balance for retrofitters it also is important not to create an R49 “bypass” based on different emission limit values.

Two options have been discussed: 1) *Possibility to claim CO₂ reduction*: All emission limits for dual-fuel mode as specified in the applicable R49 series of amendments apply; or 2) *The applicable R49 series of amendments apply* for NO_x, NMHC, PM and CO emission limits for dual-fuel mode as specified in the regulation. The CH₄ emissions shall not exceed the following gas energy ratio (GER) dependent CH₄ limit: $CH_4 \leq 6.84 * GER/100$ AND $CH_4 \leq 6$ [g/kWh]. It should be discussed whether to amend the 05 series of amendments to R49 to align the CH₄ emission requirements for OEMs and retrofit system.

24. Question: Has an equal relationship been proposed between ETC and PEMS? Mr. Dekker suggested that there is no correlation between a retrofit and the original PEMS test. A back-to-back emissions test on the road was done (the TNO method). Then the test before and after the conversion should have similar results. But this is not a verified test procedure and much more data would be required. If anyone has such test data please help the HDDF TF.
25. Question: What sort of methane emissions levels are anticipated? It depends on the GER and replacement of the diesel. Retrofits might be anticipated to be zero-to-10% CO₂ reduction over the full diesel mode. (This is a ‘best estimate’.)
26. *Safety*: OICA raised concerns regarding possible torque differences between diesel and dual-fuel operation (physical and/or CAN parameters). A possible solution (torque test) is in development
27. Question/clarification: Greater explanation is asked about safety and torque. There might not be a match between the real and indicated torque. There could be a safety issue if this would result in the calculation of incorrect payload information for brake assist, stability control for ABS systems.
28. *Next steps and time schedule*: GFV has the following targets in order to complete the HDDF regulation: 1) An informal document enabling type approval of Engine Retrofit Systems will be submitted to the next GRPE (January 2016); 2) An informal document enabling type approval of Complete Retrofit Systems will be submitted to the June 2016 GRPE; and 3) A formal document for the complete regulation will be submitted for the January 2017 GRPE.
29. Mr. Rijnders summarized that the HDDF TF work has been challenging and putting these complex issues into a comprehensive regulation is taking time. On the other hand the HDDF understands that forward motion is required. But a balance must be achieved between good basic regulation and serving the needs of the HDDF retrofit system manufacturers and suppliers. The regulation must be robust and sensible. Unfortunately we don’t have a draft regulation at this time, however, the HDDF TF stakeholders are working hard on drafting even as some fundamental discussions on specific issues are being finalized. Regular weekly/monthly drafting meetings (teleconferences) are on-going so that the regulation can be drafted in a timely fashion.

VI. AOB

30. No other agenda items or other items are raised by the participants.

VII. Planning next Meetings of GFV & HDDF TF

31. GFV-42: 27 October 2015, DG Enterprise (‘Brey’ Building), Brussels
32. Upcoming teleconferences for HDDF TF (Retrofit): Tuesday, 23rd June 9-11; Tuesday 30th June 9-11. These likely will be weekly meetings through July and the GFV secretariat will inform the larger group of the time, dates, and telephone connection. These are drafting meetings and generally are for the small group of “principal stakeholders”. The face-to-face meetings are more appropriate for others who might want to participate. But

all people who might be interested in drafting language certainly are invited to the teleconferences. Contact with the Secretariat would be appropriate to join these.

VIII. Closing

33. Mr. Rijnders will be making an overview presentation to the GRPE later this week as to the efforts of the GFV and HDDF TF.

ATTENDEES

André Rijnders, Chairman GFV (RDW, Netherlands)
Henk Dekker, Chairman HDDF TF (TNO)
Jeff Seisler, Co-secretariat, (NGV Global/Clean Fuels Consulting)
David Castro Moreira, OICA (MAN Truck & Bus)
Alberto Castagnini, (AEGPL)
Hyunwoo Lee (KATRI)
Junho Lee (KATRI)
JongSoon Lim (KATRI)
Krisztian Uhlik, KTI - Institute for Transport Sciences (Hungary)
Guido Gielen (European Commission DG Growth)
Cécile Favre (AECC)
Hwanjun Jun (KEMCO)
Yuki Toba (JASIC)
Masahito Yamashita (JASIC)
Husein A Nakhawa (ARAI, India)
Shingo Morita (MLIT/Japan)
Kazuyuki Naresawa (NTSEL/Japan)
Daisuke Kawano (NTSEL/Japan)
Xiaolm Chen (VW/China)
Zhixuan Zhang (TMTTC/China)
Yu Jia (UAES/China)
Yunshan Ge (BIT/China)
Ji Liang (CRAES/China)
Yang Zhengjun, (CATARC/China)
Denis Endachov (F GUM NAMI/ Russia)
Alexey Terenchenko, (NAMI/Russia)
Andrew Whitehouse, (CAP) on telephone call-in