

**MEETING MINUTES**  
**25th Informal Group on Gaseous Fuelled Vehicles (GFV)**  
**13-14th March 2013**  
**Rome**

**I. Welcome and introductions**

1. Mr. Rijnders welcomed the group and thanked the Italian delegation and associations for hosting the GFV in Rome: Assogasliquidi for the meeting space and lunches; and Consorzio Ecogas for sponsoring dinner.

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

2. Mr. Piccolo indicated that Item V on the agenda should not be listed as from AEGPL but is a CLEPA document.
3. Mr. Piccolo expressed an interest in making a brief presentation to start the meeting.
4. One CLEPA proposal has been divided into three documents: ECU type approval; mixed fuel operation; and automatic valve operation.

**III. Adoption of minutes of the 24<sup>th</sup> GFV on 15<sup>th</sup> January 2013 (GFV-24-08e)**

5. Mr. Rijnders asked if there were any comments on the minutes of the past meeting. There are no comments and the minutes are adopted.

**IV. New Agenda Item: Update on Gaseous Fuels in Italy (Mr. Piccolo, Assogasliquidi)** (Please see document GFV-25-03)

6. In 2007 an incentive program for purchasing new gas cars resulted in a sharp uptake of gaseous fuel vehicles in Italy.
7. In 2009, the possibility for the customer to accumulate the incentives for purchasing a new gas car and for scrapping an old one has determined a peak in the market
8. Even though incentives were taken away in April 2010, market performance in 2010 was good overall.
9. In 2011, the number of new gaseous fuel vehicle sales dropped significantly due to a "release effect" after the termination of incentives.
10. 2012 showed better performance for both OEM and retrofit (bi-fuel) gas vehicles due to
  - a. A deep economic recession that is emphasized the economic advantage of CNG and LPG prices in relation to petrol/diesel.
  - b. A very large offer of new gas vehicle models (more than 100)
11. Law 14/2012, Incentives for 'low overall emissions' vehicles LPG, CNG, biofuels, electric and hybrid vehicles (entry into force expected in March 2013) will contribute to the consolidation of gaseous fuels markets, even if the program is addressing only commercial users and company fleets. The available funds are very limited.
12. The proposed 2013 EU directive on Alternative Fuels should help increase the infrastructure for alternative fuels, although LPG represents 3% of the road vehicles and, according to the proposed EU directive, does not require EU support for the infrastructure. But LPG vehicles still have general support as . There will be continued debate on the provisions in Parliament and Council before adoption of the alternative fuels directive.

*General discussion following Mr. Piccolo's presentation*

13. Mr. Del Alamo indicated that there is on-going work for the last year in CEN working on gas quality: 1) biogas introduced in the grid' 2) quality specification on gas quality injected; 3) for fossil and biogas blends. Mr. Del Alamo would like to make a presentation at the next GFV meeting to discuss reference fuel and market fuel specifications so the GFV is aware of and has an opportunity to comment on the fuel quality debate.
14. Mr. Rijnders also indicates that LNG and its quality is going to be an important issue.
15. Sulphur content also is going to be an issue for natural gas. In Italy sulphur content of natural gas can be as high as 150 mg/Nm<sup>3</sup> (10% is required by the fuel directive). LPG quality also is an issue.
16. Mr. Rijnders agrees that Mr. Del Alamo should make a presentation at the next GFV meeting regarding gaseous fuel quality since it does impact some of the work on part of the GFV.

***Intervention by Mr. Renaudin regarding the report on HDDF TF***

17. Today Mr. Renaudin made a brief explanation of the progress of the HDDF TF work in advance of a more detailed discussion at the second day meeting session. The UNECE secretariat has extended the deadline for submittal of the Formal document from the HDDF TF from 8 March for one week so that the principals have time to make final refinements in the proposed Euro V Dual Fuel.
18. Mr. Renaudin will discuss informal document GRPE-65-37. They have inserted Appendix 2 and 3 as well as work on Annex 4. Annex 6 will become 5. Also some contradictions in the documents will be addressed. In addition, the term 'CNG' is being changed to 'natural gas' but these editorial changes may become part of an informal document to support the Formal document on Euro 5 HDDF,
19. Mr. Dekker indicated that it is not logical to modify Annex VI but rather propose a new Annex V. He indicated that he and Mr. Renaudin have worked intensively on the document and now would like to have input from other individuals in the group. They would like to have a thorough review of references and editorial changes in the document due to its complexity and the fact that Mssrs. Renaudin and Dekker have been 'very close' to the document and could use a 'fresh eye' on the document.

**V. Proposal for amendments to Regulations numbers 67 and 110 (Mr. Piccolo, also on behalf of CLEPA).**

20. CLEPA is asking for a simplification so that no separate R 110 or R67/01 type approval of the electronic control unit is required if the ECU is approved against R. 10 (regulation for electromagnetic compatibility) requirements through an EMC "vehicle approval". The vehicle type approval shall also be pursuant to the applicable provisions laid down in the relevant annexes of gas Regulations (R.110 and R. 67/01). (Please see ECE/Trans/WP.29.GRSG/2013/10)
21. Though this topic is a GRSG (Group of Experts on General Safety) topic the GFV engaged in the discussion because the expertise for gaseous fuel vehicles is deeper with the GFV than the GRSG.
22. Mssrs. Dekker and Renaudin expressed concerns with the amendment as constructed, but not necessarily the language in the proposed amendment.
23. In particular, proposals for amendments concerning "fuel selection system" should apply to the gas system as a whole and not only to the "selection system" (please see ECE/Trans/WP.29.GRSG/2013/11)
24. Proposals for amendment ECE/Trans/WP.29.GRSG/2013/12 aims to allow the safety valves to remain open during Start-&Stop phases. If the automatic valves are closed during activated stop phases, as a consequence of a more intensive operation of such valves, one of the following shall apply: a) a functional check for

- each valve shall be carried out once in a driving cycle. In the event that the functional check indicates that the valve is not closing, an indicator shall clearly inform the driver; or b) the valves shall comply with more stringent test cycling.
25. New requirements for test cycling now would be from 200,000 to 1,000,000, and this also is a fundamental change to the regulation. Furthermore, the cycle numbers are linked to the Start-&Stop strategies, such as normal S-&-S, hybrid electric and S-&-S with coasting. But no definitions are proposed for these systems.
  26. Mr. Rijnders asked a fundamental question about the procedure to communicate the discussion here at GFV to the GRSG and CLEPA. In principle GFV agreed with the intention of the amendment but there is concern about the actual language being used. There are several possibilities for GFV: 1) do nothing; 2) request CLEPA to improve the text of the document; or 3) ask a contracting party to improve the text in the GRSG as an informal document.
  27. The decision is that Mr. Piccolo, as co-secretariat of GFV, will collect and summarize the comments from GFV and supply them to CLEPA prior to the next meeting of GRSG in April 2013. But their (CLEPA) formal document will have to become a new informal document due to the extent of the changes being suggested by the GFV.
  28. Mr. Renaudin added that the concept of 'start-stop' (and also 'stop-start', as also used in the text) is not properly defined. He also expressed a concern that this same language could refer to heavy duty vehicles, thus creating additional 'loop-holes' in the regulation.

#### **VI. AEGPL Amendment R.115 Fuel Consumption (GFV 25-02)**

29. This represents a correction in the formula in Annex 6A and 6B (see Document ECE/TRANS/WP.29/2012/109), respectively for the calculation of G<sub>lpg</sub> and G<sub>cng</sub> refer to fuel consumption (FC) mean as defined in paragraphs 6.1.2.4.3.2 (LPG) and 6.2.2.4.3.2 (CNG)
30. Mr. Dekker stated that this is something new (he recalls that FC<sub>norm</sub> is not defined in the Regulation 101). This would correct the problem that the 'mean' relates to the average on all the test vehicles while 'norm' refers to the specific parent vehicle .
31. Mr. Rijnders suggested that GFV have an informal document for the June GRPE session. This gives GFV time to consider the change and if there are no comments the informal document amending the WP29 document ECE/TRANS/WP.29/2012/109 would be adopted in WP29 158<sup>th</sup> session.

#### **VII. AEGPL presentation (follow-up) Type approval of Heavy Duty Dual-Fuel (HDDF) Retrofit Systems. (GFV 25-04)**

32. Mr. Castagnini introduced a proposal to create a new UNECE regulation for the provision of HDDF retrofit systems type approval. The task would be to draft a new regulation on uniform provisions concerning the approval of specific LPG (liquefied petroleum gases) or NG (compressed natural gas/bio-methane/liquefied natural gas) dual fuel retrofit systems to be installed in heavy duty vehicles equipped with compression ignition engines. The new regulation might also apply to HDDF retrofit systems for agricultural and forestry tractors and non-road mobile machinery equipped with compression ignition engines.
33. Scope applies to heavy duty dual-fuel retrofit systems for use of natural gas or LPG in compression ignition engines of vehicles of categories M2, M3, and N approved according to R49. Euro III and older engines are excluded. Mr. Castagnini asked the group to agree to extend the scope of the regulation to dual-fuel retrofit systems intended to be fitted on CI engines having a power rating higher than 18 kW but not more than 560 kW installed in non-road mobile machinery (variable, fixed speed or installed on category T vehicles).
34. Definitions are provided for 'Specific LPG (NG) Heavy Duty Dual-fuel (HDDF) retrofit system of an approved type; 'dual-fuel retrofit system type; and dual-fuel engine.

35. Main dual-fuel definitions are taken from OEM dual fuel R49 definitions. Other definitions: 'original engine,' 'the engine family', parent engine and 'application range.' (see document GFV 25-04) refer to specific retrofit system issues. Only D-F retrofit system types 1-B, 2-B and 3-B would be allowed.
36. The HDDF retrofit system shall be tested on the parent engine and the type approval refers to all engines belonging to the engine family. The application range can be extended to other engines using simplified procedures (for example PEMS test).
37. Regarding parent engine exhaust emissions, the test consists in the same cycles as in original R49 type approval, performed in both diesel and dual-fuel mode
38. Durability and OBD requirements are defined.
39. Instruction manuals must include an installation manual and a user/s manual.

*Comments on Mr. Castagnini's presentation.*

40. Mr. Whelan (CAP): Developing a competent retrofit system is a very expensive process (in the range of a million dollars). The retrofit will not perform to the same degree as an OEM system. Thus, if all the requirements are to be fulfilled, the retrofit systems could be too expensive to get into the market.
41. Mr. Rijnders clarified that a completely new regulation is recommended as opposed to amending R.115.
42. Mr. Del Alamo raises the issue that a new Stakeholder Consultation at the European Commission (comments due 8 April 2013) on the revision of Directive 97/68/EC on Non-Road Mobile Machinery includes dual-fuel engines. He clarifies that that this would apply to new, OEM vehicles and not to retrofits.
43. Mr. Renaudin supported the idea of creating a new and separate retrofit regulation but first for road vehicles and at a later time to include non-road machinery. He suggested to write the new regulation in a modular structure, so there could be common dual-fuel principles and different annexes for different applications. For example, a separate annex for non-road vehicles (if it is accepted) should be developed at a later time without affecting other parts of the regulation.
44. Mr. Piccolo preferred that the dual-fuel retrofit regulatory work begins in parallel to the current dual-fuel regulatory work.
45. Mr. Rijnders expressed interest in supporting additional dual-fuel work but stated that the non-road machinery is not within the mandate of GFV. Mr. Dekker agreed that dealing with non-road machinery is completely different than over-the-road vehicles.
46. Mr. Renaudin suggested that the scope also could include the approval of a retrofit system for a single engine separate from the vehicle. Mr. Castagnini observed that currently there is no request from the industry for this solution, but it can be taken into account if it doesn't delay other parts.
47. After many views were aired and discussed, Mr. Rijnders suggested that the debate be continued later in the GFV meeting (the second meeting day) so that the HDDF discussion can proceed since the work on the amendment to R.49 is on a very tight deadline and that GFV approval of the HDDF work is required, as a priority.

**VIII. Report on the progress of the Heavy Duty Dual-Fuel Task Force** (Jean-François Renaudin, Volvo and Henk Dekker, TNO, co-chairs of HDDF TF) (Please see Document GFV 25-05e for details, with some of the key points highlighted, below)

48. The Euro V OEM amendments to R.49 discussed today have been in development, with a Formal Document due 8 March 2013 for the June 2013 GRPE. The UNECE Secretariat has kindly allowed the document finalization to be extended by one week due to difficulties and work burden of the lead authors to prepare the final version by the original deadline.

*New items in Section 4*

49. Dual fuel definitions now fully covered
50. CNG & LNG-20 fuel quality has been introduced. (4.6.3.1.7)
51. Dual-fuel engine family added and LNG has been introduced.
52. CNG in many places has been replaced by 'natural gas'.

53. New paragraph 4.6.3.2 introduces series of labels for dual-fuel engines. Types 1A, 1B, 2B and 3B as defined in Annex 11. (2A type has been deleted)
54. 4.11.1. In the case of an engine fuelled with LNG the label shall state 'ONLY FOR USE WITH LNG'

*New items in Section 8*

55. Section 8.3.1.1.1 dual-fuel engines are tested in the dual-fuel mode; when diesel mode is available, engine also shall be tested in the diesel mode.

Annex 1, Appendices 1 & 3

56. 1.13 Combustion systems: compression ignition/positive ignition (dual-fuel added)
57. 1.13.1-4 included are dual-fuel types, gas energy over the ETC test-cycle; idle on diesel (yes/no) and manufacturer reference of D-F documentation for installing D-F in a vehicle.

*Annex 11: Technical requirements for D-F engines*

58. Many of the changes have already been presented and discussed so only the most recent changes are presented for the GFV consideration.
59. Section 4.2.2.2., Activation of an operability restriction 'abnormality of gas consumption in D-F mode according to paragraph 7.3.3. is eliminated.
60. Footnote added at the request of the European Commission: "A vehicle shall be considered as stationary at the latest 1 minute after the vehicle speed has been reduced to zero km/h. The engagement of any key device such as a park-brake, a trailer-brake, or a hand-brake shall not be necessary for being stationary." (The footnote also will be introduced in Euro VI.) There is a wide-ranging discussion among the members regarding the detailed wording of the final language, which is agreed upon and clarified for the final document.
61. Paragraph 4.3.2.2 'gas abnormality' removed.
62. Paragraph 4.3.1.2 function of the D-F indicator status is addressed, whether driving on diesel or D-F. Indication also is required during at least one minute at key-on, at the request of manufacturer at time of engine cranking. Indication also shall be given on the driver request. (This also is part of Rev.6 as well.)
63. Taken from Euro VI, paragraph 5.2.1.2 on HCE emission limits over the ESC test-cycle are included.
64. 5.2.2.2.1 NG Engines 'NMHC limit' introduced.
65. 5.2.2.2.2 LPG the THC limits over the ETC test-cycle are the THC limits for diesel engines as considered in the previous paragraph. Mr. Dekker explains the relationship between the various annexes in the Euro VI amendments to R.49 and how they complement (or are included) in the Euro V Hddf series of amendments to R.49. Further changes to the annex can be made to be comprehensively harmonized with Euro VI regulations.
66. Section III. Justification: Modifications proposed to complement the 05 series of amendments to Euro V pollutant emission requirements. These are the basis for setting the requirements for type approval for the retrofitting of a diesel vehicle or engine to dual-fuel. The modifications already approved by GRPE in the Framework of Euro VI and introduced in Annex 4 to rev.6 of R49 will be introduced into Annex 4B rev.5 of R.49 submitted via a separate informal document to the 66<sup>th</sup> session of the GRPE.
67. The document transmittal language is finalized for submittal to GRPE.

**IX. Alternative Fuel Vehicle Propulsion System Definitions (VPSD) (see ECE/TRANS/WP.29/GRPE-65-12 and GRPE-65-13)**

68. Mr. Rijnders indicated that there are some inconsistencies in the VPSD informal group and that the GFV must notify the VPSD of the differences and encourage them to update their document to reflect the definitions used and developed within the GFV. There still is time to submit definitions from GFV and provide them to the VPSD group to create a new consolidated document.
69. There was some concern expressed that the communication to participate in the meeting on VPSD on January 30<sup>th</sup> in Brussels was somewhat confused. The co-secretariat indicated that participation was upon request of the VPSD secretariat but the VPSD group was mainly for

- the principals. Mr. Dekker had requested further information to participate VPSD but, in the end, was not notified to participate.
70. The GFV has a wide-ranging discussion to determine who could represent the group and what the process might be to clarify the GFV definitions and position toward them that is represented to the VPSD. One suggestion is that the three participating associations in the GFV – AEGPL, NGV Global and NGVA Europe – form a subgroup to work on the GFV response to VPSD. The three association representatives – Mr. Piccolo, Mr. Seisler and Mr. Del Alamo – each suggest that they would have to receive approval to spend more time on this task.
  71. The definitions currently coming out of VPSD tend to be general and broad, however, if these are going to be the ‘norm’ then these will have to be carried back into all the other regulations. This could present a problem due to the number of regulations using the various different definitions, particularly when the definitions are more complex but comprehensive in their coverage than the recommended VPSD definitions.
  72. NGV Global has supported the idea that the ISO definitions be used in the VPSD document, however, some discussants in the GFV felt that the ISO definitions remain general and are good as ‘models’ but may not be suitable as legislative language. In the Hddf VI regulatory language, for example, the dual-fuel definition is complex and very specific to the D-F regulations being developed. Thus the more generalized definitions (from VPSD) will be inadequate. The current definition of D-F coming from VPSD really is more like a bi-fuel vehicle than a D-F definition.
  73. A possible approach discussed is to have the definitions (speaking specifically of gaseous fuels) in VPSD taken from those existing within the gaseous fuel regulations (as opposed to ISO). While the VPSD definitions could be simpler than the existing, detailed NGV regulatory definitions, they might be designed to encompass the more detailed definitions that must be more appropriate for specific regulations. The examples of D-F and OBD are raised as examples. But the definitions of bi-fuel systems also will be an issue as there continues to be great divergence internationally in defining these terms.
  74. Finally there is a general consensus amongst the group that the basic elements of each definition (speaking of bi-fuel and dual-fuel as examples) be incorporated into a broad definition while details of the definitions that must apply to specific regulations can be subsets of this general, more encompassing definitions that might be created in the VPSD.
  75. Mr. Rijnders would like GFV to be represented, to influence the VPSD in a positive way. But someone has to take responsibility for assessing the VPSD and attempt to suggest improved definitions that represent the GFV position(s). The VPSD has asked for input by 28<sup>th</sup> March, with a web-conference convened on either the 4<sup>th</sup> or 5<sup>th</sup> of April. Clearly, however, the GFV is not ready to make a concrete proposal at this time.
  76. Mr. Rijnders will address the VPSD secretariat and Chairman to express the GFV concerns that the initial gaseous fuel definitions need improvement/refinement. Mr. Piccolo will propose a message for use by Chairman Rijnders to the VPSD before 28<sup>th</sup> March. For GFV a ‘deadline’ is proposed that by the end of April the GFV could create a response to VPSD. But individuals on the GFV are not identified to do the required work.
  77. It also would be appropriate for the associations – AEGPL, NGVA Europe and NGV Global – to try and formulate a GFV proposal on definitions. But the associations need to authorize such involvement.

#### **X. Updating Regulation 115**

78. Updating UNECE R.115 (Approval of LPG and CNG Retrofit Systems on Vehicles) has been on the GFV agenda before, however, there has not yet been a formal effort to mobilize the work to: 1) make improvements and upgrades to R.115; and 2) to determine how Euro 6 for retrofit vehicles can be implemented into the regulation. But someone within the GFV has to take responsibility to lead this effort.
79. Mr. Renaudin had suggested creating a new regulation for Hddf. (See above, Line 41.) However, the discussion to improve R.115 might be contradictory to R.115 which, though

focused on LDVs also can apply to HDVs. Mr. Rijnders indicated that this might lead to a specification that R.115 is for light duty vehicles only. Regardless of the approach, the goal is to safeguard the possibility retrofitting a vehicle within a Euro 6 framework.

80. Mr. Rijnders said he would review R.115 in the first instance to identify which specific elements of the regulation might need upgrading. The GFV is asked that all the members support Mr. Rijnders' effort by also providing input to the initial evaluation of R.115 to identify where improvements might be made.

**XI. Other Items**

81. No additional items are brought up.

**XII. Planning upcoming Meetings of GFV & Task Forces**

82. Mr. Rijnders suggested that the next GFV meeting be on May 23<sup>rd</sup> in Brussels, to which there is general agreement.
83. Mr. Del Alamo suggested that the next meeting potentially be at Eurogas/NGV Europe offices. Mr. Del Alamo will inform the secretariats of room availability.
84. The GFV meeting following that is scheduled for 4<sup>th</sup> June 2013 in Geneva from 14.30 to 17.30.
85. Meeting thereafter is proposed for October (but *not* in the week 43). Mr. Del Alamo suggests that the meeting take place in Madrid, hosted by NGVA Europe.

**XIII. Closing**

86. Mr. Rijnders and the group thank Mr. Piccolo and the associations for hosting this meeting and wishes everyone well in their travels home.

Action items:

- Mr. Piccolo will prepare comments for Mr. Rijnders to the Chairman and Secretariat of VPSD regarding GFV current and future input.
- Mr. Rijnders will provide a first view of R.115 to identify elements that could be amended and updated. The rest of the GFV members are asked to also look at R.115 and send any input to Mr. Rijnders.

**Attendees:**

Andre Rijnders (RDW)  
Jeff Seisler (NGV Global /Clean Fuels Consulting)  
Salvatore Piccolo (AEGPL)  
John Crawford (Westport)  
Jean-Francois Renaudin (Volvo)  
Henk Dekker (TNO)  
Jaime Del Alamo (NGVA Europe)  
Leif-Erik Schulte (TUV Nord)  
Alberto Castagnini (AEB)  
Steve Whelan (Clean Air Power)  
John May (AECC)  
Alex Stoehr (German LPG Association)  
Maciej Szymanski (DG Enterprise)  
Ralf Kleebusch (TÜV Thüringen)  
Peter Volk (TÜV Thüringen Italia)