

**Economic and Social Council**Distr.: General  
20 August 2014

Original: English

**Economic Commission for Europe****Inland Transport Committee****Working Party on the Transport of Dangerous Goods****Ninety-seventh session**

Geneva, 3-7 November 2014

Item 6 (a) of the provisional agenda

**Proposals for amendments to Annexes A and B of ADR:  
construction and approval of vehicles****Use of Liquefied Petroleum Gas (LPG) and Compressed  
Natural Gas (CNG) as fuel for vehicles carrying dangerous  
goods****Transmitted by AEGPL and NGV Global<sup>1</sup>***Summary*

<b>Executive summary:</b>	Amendments to Chapter 9.2 to make the use of compressed natural gas (CNG) and liquefied petroleum gas (LPG) possible as fuel for vehicles carrying dangerous goods.
<b>Action to be taken:</b>	Amendment to subsections 1.6.5, 9.2.4.3, 9.2.4.4 to include CNG and LPG referencing the respective ECE Regulations.
<b>Reference documents:</b>	ECE/TRANS/WP.15/224; informal documents INF.11, INF.22 and INF.26 of the ninety-sixth session; informal documents INF.10, INF.23 and INF.25 of the ninety-fifth session.

<sup>1</sup> The present document is submitted in accordance with paragraph 1(c) of the terms of reference of the Working Party, as contained in document ECE/TRANS/WP.15/190/Add.1, which provides a mandate to “develop and update the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)”.

## Introduction

1. The amending of ADR Regulations to include LNG as vehicle fuel for the transport of dangerous goods was prepared for the ninety-fifth session (November 2013) and for the May 2014 meeting of the Working Party (ninety-sixth session). A suggestion to exclude gaseous fuels other than LNG from the possible use in ADR-certified trucks prompted AEGPL and NGV Global to intervene and suggest an amendment to allow the use of CNG and LPG. In the ninety-sixth session AEGPL presented informal document INF.26 containing an introduction to new fuels and proposals to amend Chapter 9.2 of ADR.

2. Today there are some 24 million LPG vehicles worldwide and approximately nearly 17 million NGVs, (including nearly 1.5 million heavy duty trucks and buses). Many heavier vehicles are fitted with compression ignition engines that operate on diesel and gaseous fuels simultaneously (referred to as dual-fuel vehicles). The ECE regulations for LPG and CNG components and their use on road vehicles (ECE Regulation No. 67-01 and ECE Regulation No. 110 respectively) have been in force for many years. The operation and emissions of LPG and NGVs are regulated by ECE Regulation No. 115. Regulations for dual-fuel vehicles are included in ECE Regulation No. 49 (heavy duty vehicles) and ECE Regulation No. 83 (light duty vehicles) and came into force in July 2014. So LPG and natural gas (CNG and LNG) are fully legitimized fuels and fuel systems governed within a substantial body of existing ECE regulations as well as standards and regulations adopted by many nations worldwide, including those outside of the United Nations regulatory network.

3. Concurrent with the philosophy of creating a harmonized and consistent regulatory approach to LPG and CNG, AEGPL and NGV Global are advocating that these market-proven fuels, fuel systems and vehicles also be specifically called-out and the applicable ECE Regulations (No. 67-01 and No. 110) referenced within ADR. Both organizations, therefore, support the notion that one additional requirement regarding the specifics of dangerous goods transport that are not yet addressed by the World Forum for Harmonization of Vehicle Regulations (WP.29) should be included in ADR (as per Proposal 2 below). This combination of ECE Regulations (Nos. 67-01 and 110) and the aforementioned additional requirement will provide sufficient safety provisions to justify the use of CNG and LPG as fuels for heavy goods vehicles carrying dangerous goods. AEGPL and NGV Global propose to amend the wording in ADR accordingly, and in line with the amendments already adopted for LNG. For ease of acceptance the proposals for amendment are kept to a minimum.

4. As recognized in the existing regulations the physical properties of gaseous fuels compare favourably with liquid fuels.

- First, cylinders for CNG and LPG tanks resist much higher puncture loads than liquid fuel tanks. Second, the method of fastening the tanks to the vehicle frame withstand more severe mechanical stresses than tanks for liquid fuel. Third, CNG cylinders and LPG tanks are fit with valves that close automatically in case of an accident when the engine stops. As no significant volume of fuel is contained in the fuel lines the release of gas is limited, making considerably lowering the risk of a truck fire. As such CNG and LPG fuel systems will withstand higher stresses than diesel fuel systems and are less likely to result in substantial fuel leakage.
- CNG cylinders and LPG tanks are designed with integral fire protection. The suitability of each fuel storage system design is certified through bon-fire tests. When in a fire situation fuel systems for gaseous fuels tend to gradually release fuel in a controlled manner, thereby limiting the amount of fuel added to any vehicle fire not already involving the fuelling system.

More in depth evaluation of the potential hazards and the technical means by which they are addressed can be found in the respective informal documents provided for CNG and LPG that support this Working Document.

## Proposals

5. The following proposed amendments are based on the draft amendments adopted by the Working Party for entry into force in 2017 as agreed in the May 2014 session (ninety-sixth session) (ECE/TRANS/WP.15/224, annex II).

New text will be shown in italics and underlined.

### Proposal 1

6. 1.6.5.17 Amend to read as follows:

"1.6.5.XX FL and OX vehicles registered before 1 July 2017, fitted with an LNG, *CNG or LPG* fuel system, not fully in compliance with the provisions found UN/ECE Regulations Nrs. 110 *respectively 67-01*, may still be used with the approval of the competent authority of the country of registration, if an equal level of safety can be demonstrated."

### Proposal 2

7. Amend sub-section 9.2.4.3 to read as follows:

"9.2.4.3 Fuel tanks

The fuel tanks supplying the engine of the vehicle shall meet the following requirements:

(a) In the event of any leakage in the normal operating conditions of the vehicle, the fuel shall not come into contact with hot parts of the vehicle or of the load. *The discharge opening(s) of pressure relief devices and/or pressure relief valves shall be directed away from fuel tanks of the vehicle or the load;*

8. Amend sub-section 9.2.4.4 to read:

"9.2.4.4 Engine

The engine propelling the vehicle shall be so equipped and situated to avoid any danger to the load through heating or ignition. The use of *compressed natural gas (CNG) or* liquefied natural gas (LNG) as fuel shall be permitted only if the specific components for LNG are approved according *to* ECE Regulation No. 110<sup>7</sup> and their installation on the vehicle complies with the technical requirements of ECE Regulation No. 110<sup>7</sup>. *The use of liquefied petroleum gas (LPG) as fuel shall be permitted only if the specific components for LPG are approved according to ECE Regulation No. 67-01<sup>8</sup> and their installation on the vehicle complies with the technical requirements of ECE Regulation No. 67-01<sup>8</sup>.* In the case of EX/II and EX/III vehicles the engine shall be of compression-ignition construction using only fuels with a flashpoint above 55 °C.

----

<sup>7</sup> ECE Regulation No. 110 (Uniform provisions concerning the approval of:

*I. Specific components of motor vehicles using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion systems;*

*II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system.).*

<sup>8</sup> *ECE Regulation No. 67-01 (Uniform provisions concerning the approval of:*

*I. Approval of specific equipment of vehicles of category M and N using liquefied petroleum gases in their propulsion system*

*II. Approval of vehicles of category M and N fitted with specific equipment for the use of liquefied petroleum gases in their propulsion system with regard to the installation of such equipment)*

Renumber existing footnotes accordingly.

## **Justification for proposals**

### **9.2.4.3 (a)**

9. In case of a vehicle fire the correct orientation of the pressure relief devices (PRDs) or pressure relief valves (PRVs) shall prevent additional heat influx to the load. Although 9.2.4.3 (a) already requires fuel not to come into contact “with hot parts of the vehicle or of the load”, directing the efflux of the PRD/PRV away from the load may be regarded as an additional level of safety.

### **9.2.4.4**

10. The safety requirements of LPG and natural gas (CNG and LNG) are elaborated in the respective ECE Regulations Nos. 67-01 and 110. Both ECE Regulations are approved by WP.29. Although these regulations do not take into account the specialties of operation in vehicles for the carriage of dangerous goods, an equal level of safety for all fuel containers for LPG, CNG and LNG can be assumed.

## **General justification**

Safety:	See specifics in respective informal documents provided for each fuel.
Feasibility:	Individual contracting parties have already approved the operation of gaseous fuelled vehicles and have gathered extensive experience with CNG and LPG. Transporters and heavy goods vehicles manufacturers will have the option to have vehicles of this type approved for the carriage of dangerous goods.
Enforceability:	No specific problems foreseen.

---