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**Economic Commission for Europe****Inland Transport Committee****Working Party on the Transport of Dangerous Goods****Joint Meeting of the RID Committee of Experts and the  
Working Party on the Transport of Dangerous Goods**

Bern, 25-28 March 2024

Item 5 (a) of the provisional agenda

**Proposals for amendments to RID/ADR/ADN:****Pending issues****Revised definition of liquefied petroleum gas****Transmitted by Liquid Gas Europe\*\****Summary*

**Executive summary:** Several years ago, the liquefied petroleum gas (LPG) industry introduced bioLPG, i.e. LPG (C3/C4) of identical molecular composition, but of bio/renewable origin. However, the existing definition of LPG in RID/ADR/ADN, described as a “petroleum” product, does not reflect any more either the renewable origin of bioLPG, or the conventional LPG of natural gas origin. In addition, other molecules, blended with LPG, like dimethyl ether (DME), particularly that of renewable origin (rDME), are already present in the market of the United States of America (USA) and will be available in Europe during 2024. A revised definition of LPG needs to be defined and agreed.

**Action to be taken:** Approve a revised definition for LPG in RID/ADR/ADN.

**Related documents:** Previous informal documents INF.11 (September 2022) and INF.35 (March 2023) to the Joint Meeting, and informal documents INF.18, INF.19 and INF.35 of the UN Sub-Committee of Experts on the Transport of Dangerous Goods (TDG) at its sixty-third session.

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\* A/78/6 (Sect.20), table 20.5.

\*\* Circulated by the Intergovernmental Organisation for International Carriage by Rail (OTIF) under the symbol OTIF/RID/RC/2024/11.



## I. Background

1. Liquefied Petroleum Gas (LPG) has been a commercial fuel for just over a century. It consists of mostly propane and butane, supplied until a few years ago from two sources:

(a) **Petroleum refining** (covered by the existing definition), currently meeting 30-40 % of world demand and decreasing; and

(b) **Natural Gas (NG) processing** (often not covered by the existing definition that refers only to “petroleum”, although the industry has been applying the same regulations/standards as for “petroleum” origin products): currently meeting 60-70 % of world demand.

2. Today, in the context of energy transition and aiming at de-fossilisation, decarbonisation and reduction of overall carbon footprints, the LPG industry is transforming by including within its product range, also propane  $C_3H_8$  and butane  $C_4H_{10}$  products, of bio or renewable origin. These are being introduced as the industry gradually moves away from petroleum refining and natural gas to non-fossil and renewable sources.

3. The RID/ADR/ADN regulate the safe carriage of these products and as such their origin, where historically referenced, is not relevant or correct.

4. In addition, the LPG industry recently started including within the LPG that it transports, also other products and blends of bio, renewable and recycled carbon origin, which are of a lower carbon footprint. The inclusion of biogenic, renewable, or recycled carbon propane and butane constitutes no technical challenge as it relates to the same molecules as the conventional LPG. More relevant, is the inclusion of DME (Dimethyl Ether), as a blend component with LPG. DME is a molecule with similar physical properties to LPG, that can originate from fossil, non-fossil and/or renewable or recycled carbon sources. Renewable DME (rDME), is a complementary liquefied gas that can be produced from multiple renewable and recycled carbon feedstocks. With no negative safety implications, rDME is a cost-effective and clean-burning fuel, providing a viable sustainable addition to the energy mix. With its low greenhouse gas (“GHG”) footprint, it can reduce emissions by up to 85 % compared to fossil fuel alternatives and can achieve even significantly negative carbon intensities. In its blended form with LPG, rDME can help the de-fossilisation and decarbonisation of the LPG industry in all types of applications. DME/LPG blends with a maximum DME content by mass of 12 % are compatible with existing LPG infrastructure and equipment, proven through extensive research and testing, funded by the industry.

5. DME has the same classification code as LPG (2F), the same label (2.1) and an identical hazard identifications number (HIN) 23.

6. A DME/LPG blend constitutes a complementary product offering and requires a revised definition and specification.

7. For several years, there have been a variety of offerings in the global market, that do not correspond well to the current international regulatory and standard definitions, like the examples below, and there will be additional offerings in the future that will fall into these categories:

(a) BioLPG (renewable LPG from biological or recycled carbon feedstock) available today in many European markets, is not of petroleum origin as the current LPG definition describes it. This product exists as standalone bioLPG or as a blend with conventional, fossil LPG.

(b) LPG blends with DME, commercialised many years ago in some countries outside Europe (e.g. China, Indonesia), do not have a specific name and associated definition in regulations and standards. Recently, a blend of propane with rDME was made available in the USA market. Such a blend will be available on the European market in 2024.

8. The proposal below, includes an amendment of the existing definition of “LPG” (which will continue to be primarily composed of propane and/or butane) to:

(a) allow products from all possible sources (hence deletion of any “petroleum” references is necessary) and also,

(b) allow the inclusion of DME (C<sub>2</sub>H<sub>6</sub>O) up to a drop-in level of 12 % by mass blend/composition i.e. the level at which the resulting LPG/DME (rDME) blend will be interchangeable with today’s conventional C3/C4 LPG, without any reduction in safety or the need for any changes in supply chain and customer infrastructure, equipment and appliances. This is analogous e.g. to the automotive E10 fuel, that incorporates the addition of 10 % ethanol in petrol.

(c) include the UN numbers for propene (propylene), butene and isobutene (isobutylene), as *Note 1* after the definition of LPG only permits gases assigned to the listed UN numbers to be regarded as LPG.

9. World LPG Association (WLPGA) submitted informal documents INF.18<sup>1</sup>, INF.19<sup>2</sup> and INF.35<sup>3</sup> to the sixty-third session of the TDG Sub-Committee in November/December 2023, requesting a special provision to be applied to the entries in the *Model Regulations* of UN 1075 and UN 1965 as follows:

“Amend the Dangerous Goods List in 3.2.2 as follows:

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provision
(1)	(2)	(3)	(4)	(5)	(6)
1075	PETROLEUM GASES, LIQUEFIED	2.1			392, <u>XXX</u>
1965	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S.	2.1			274, 392, <u>XXX</u>

Add a new special provision ‘XXX’ in 3.3.1 as follows:

XXX This substance may contain hydrocarbon gases from non-petroleum sources and may also contain up to 12% by mass of UN 1033 DIMETHYL ETHER. When UN 1033 DIMETHYL ETHER is present in the substance its percentage by mass shall be included with the technical name.”

10. As a relevant outcome of its November/December 2023 session, the Sub-Committee had welcomed the above stated proposal from WLPGA and all the supporting documents, and they all received a good support from the majority of the delegations that took the floor. Only one delegation opposed, while another one appreciated that more time was needed to process the extensive documentation provided and clarify some key issues. An alternative option was raised again as reflection if it is best to insert a new special provision to UN numbers UN 1075 and UN 1965 as per current proposal, following the guidance given to WLPGA at the sixty-first session (see report ST/SG/AC.10/C.3/122, para. 23 “most of the experts who spoke preferred to go forward with the introduction of a new special provision”) or to insert a new UN number for different blends of hydrocarbon and DME (which touches the other WLPGA proposal in informal document INF.12 of the sixty-third session of the Sub-Committee). Proposals for improvement were stated from some delegations, that are to be taken into account for the preparation of the final official document. Most experts who took the floor felt that the second sentence of the new special provision was not needed. The Sub-Committee recommended to clarify the transport conditions for blends higher than 12 percent (see informal document INF.12<sup>4</sup> of the sixty-third session of the Sub-Committee). The Sub-Committee agreed to resume discussions at its next session on the basis of a new official document that the World LPG Association agreed to submit.

<sup>1</sup> <https://unece.org/sites/default/files/2023-11/UN-SCETDG-63-INF18e.pdf>

<sup>2</sup> <https://unece.org/sites/default/files/2023-11/UN-SCETDG-63-INF19e.pdf>

<sup>3</sup> <https://unece.org/sites/default/files/2023-11/UN-SCETDG-63-INF35e.pdf>

<sup>4</sup> <https://unece.org/sites/default/files/2023-10/UN-SCETDG-63-INF12e.pdf>

## II. Proposal

11. In RID/ADR/ADN amend all existing names, definitions and references of LPG (Liquefied Petroleum Gas) that are not the title/scope of a regulation or standard to exclude any references to "Petroleum" as follows:

(a) In 1.2.1 amend the current definition of LPG to read (new text is underlined, deleted text is stricken through):

" ~~"Liquefied Petroleum Gas (LPG)"~~ means a low-pressure liquefied gas composed of propane and/or butane or mixtures of the two, which can also include dimethyl ether (UN 1033) up to 12 % by mass, as well as one or more other light hydrocarbons such as propene (propylene), isobutane, isobutylene or butene (butylene), which are assigned to UN Nos. 1011, 1012, 1055, 1075, 1077, 1965, 1969 or 1978 with traces of other hydrocarbon gases; " (The notes remain unchanged.);

(b) Consequential amendments to replace "Liquid Petroleum Gas" by "LPG" (new text in bold, deleted text is stricken through):

“(ADR:) 1.1.3.2 (a) the table – ~~Liquefied Petroleum Gas (LPG)~~

1.2.3 – “LPG” ~~means liquefied petroleum gas~~ (see 1.2.1)

3.3.1 – Special provision 201

201 Lighters and lighter refills shall comply with the provisions of the country in which they were filled. They shall be provided with protection against inadvertent discharge. The liquid portion of the gas shall not exceed 85% of the capacity of the receptacle at 15 °C. The receptacles, including closures, shall be capable of withstanding an internal pressure of twice the pressure of the ~~liquefied petroleum gas~~ **LPG** at 55 °C. The valve mechanism and ignition devices shall be securely sealed, taped or otherwise fastened or designed to prevent operation or leakage of the contents during carriage. Lighters shall not contain more than 10 g of ~~liquefied petroleum gas~~ **LPG**. Lighter refills shall not contain more than 65 g of ~~liquefied petroleum gas~~ **LPG**.

5.2.2.2.1.6 (d) – Labels conforming to model No. 2.1 displayed on cylinders and gas cartridges for ~~liquefied petroleum gas~~ **LPG**, where they may be shown in the background colour of the receptacle if adequate contrast is provided.”