



**Economic and Social  
Council**

Distr.  
GENERAL

ECE/TRANS/WP.1/2010/6  
12 January 2010

Original: ENGLISH

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**ECONOMIC COMMISSION FOR EUROPE**

**INLAND TRANSPORT COMMITTEE**

Working Party on Road Traffic Safety

Fifty-ninth session  
Geneva, 22-24 March 2010  
Item 6 (a) of the provisional agenda

**CONVENTION ON ROAD SIGNS AND SIGNALS, 1968**

**Consideration of amendments to the Consolidated Resolution on Road Signs and Signals**

**Proposals by the Government of Norway and the International  
Association for Natural Gas Vehicles**

1. According to its Terms of Reference, the Working Party on Road Traffic Safety (WP.1) shall “Develop, update and circulate the Consolidated Resolutions on Road Traffic (R.E.1) and on Road Signs and Signals (R.E.2), and make them documents for recommending best road safety practices; also draft recommendations on specific subjects” (TRANS/WP.1/100/Add.1, point 1 (c)).
2. The present document is prepared by the secretariat, based on two proposals received from the Government of Norway and the International Association for Natural Gas Vehicles (IANGV). The Working Party is expected to consider it and possibly decide on the inclusion of this proposal into the R.E.2.

## **I. Proposal by the Government of Norway**

1. Encouraging the use of alternative fuels, especially low- or zero-emission fuels such as hydrogen (H<sub>2</sub>), has become a global priority. Although vehicles using hydrogen and fuel-cell vehicles at present have limited use, there is potential for more widespread use. Many manufacturers will produce about 100 fuel cell vehicles a year for fleet demonstrations, and regular mass production of H<sub>2</sub> and fuel-cell vehicles is expected by 2015, when fuelling stations will rise at a rate of about two to four a month worldwide, with an expected US\$500 billion in infrastructure development.<sup>1</sup>

2. In order to facilitate the use of such vehicles and to provide Governments with safety and environmental regulations, the World Forum for Harmonization of Vehicle Regulations (WP.29) has already included “Hydrogen and Fuel-Cell Vehicles (HFCV)” on its agenda, with a view to regulating on this subject, especially on systems for compressed and liquid hydrogen and related electric safety issues. The World Forum estimates that a global technical regulation on hydrogen and fuel-cell vehicles could be available by 2014.

3. It can be expected that an increasing number of vehicles using alternative types of fuel will cross borders. Appropriate international standardized signs would simplify the task of vehicle drivers seeking to refuel with hydrogen gas. It might also encourage both the use of vehicles using alternative fuels and the growth of fuelling stations offering these types of fuel.

4. In light of the above, it is proposed that the signage for H<sub>2</sub> fuelling stations as a standardized indicator shall be further incorporated into the Consolidated Resolution on Road Signs and Signals.

## **II. Proposal by IANGV**

5. At this time, the IANGV is proposing the introduction into the R.E.2 of one additional road sign; for liquefied natural gas (LNG). While this was not in the original request by the IANGV (dating back to September 2003), since that time there has been a significant increase in the use of LNG as a vehicle fuel and increasingly more countries have public fuelling outlets for LNG, mostly for over-the-road truck applications. With the advent of road signage for compressed natural gas (CNG) and liquefied petroleum gas (LPG) fuelling stations, it now also becomes imperative to distinguish LNG stations as separate from CNG or LPG (even though fuelling stations may deliver multiple fuels).

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<sup>1</sup> “Global Market for Hydrogen Energy, Fuel Cells, and Related Nanotechnology Expects to Reach \$14 Billion by 2014” <http://www.azonano.com/news.asp?newsID=12224> June 23, 2009.

6. When natural gas is lowered to a temperature of  $-163^{\circ}\text{C}$  it is stored as a cryogenic liquid and is referred to as liquefied natural gas (LNG). In its liquefied state LNG is more energy intensive than CNG. Vehicles using LNG can travel much further than on CNG. (CNG is roughly 30% of the energy in the same volume as diesel; LNG is roughly 60% of the energy in the same volume as diesel.) As such, LNG is growing in popularity as a fuel for long distance, heavy duty trucks. (LNG is also being used in inland-waterway vessels and even railway locomotives).

7. The current level of global trade in LNG is anticipated to nearly double by 2020 and, potentially, triple by 2030 and beyond (Figures 1 and 2, below), so the market for liquefied natural gas vehicles (L-NGVs) should strengthen as more countries incorporate LNG into their energy strategies. The cryogenic upgrading of renewable biogas into liquefied bio-methane as a high grade fuel for vehicles is yet another creative application that is being developed in Sweden, Switzerland, United Kingdom and Germany, among others. As such, the appearance of LNG fuelling stations, particularly for the trucking industry, is anticipated to expand concurrently with the increased worldwide transportation, trading and importation of LNG. Given that long distance trucks frequently cross international borders, the use of consistent fuelling station signage between countries would be valuable in ensuring efficient international trade.

Figure 1: IEA projections for LNG Trade showing regional growth

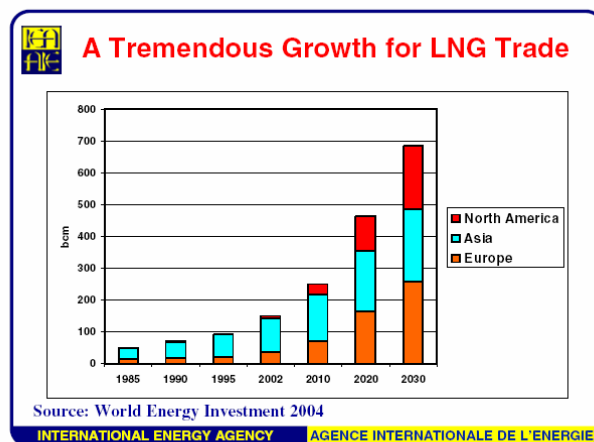
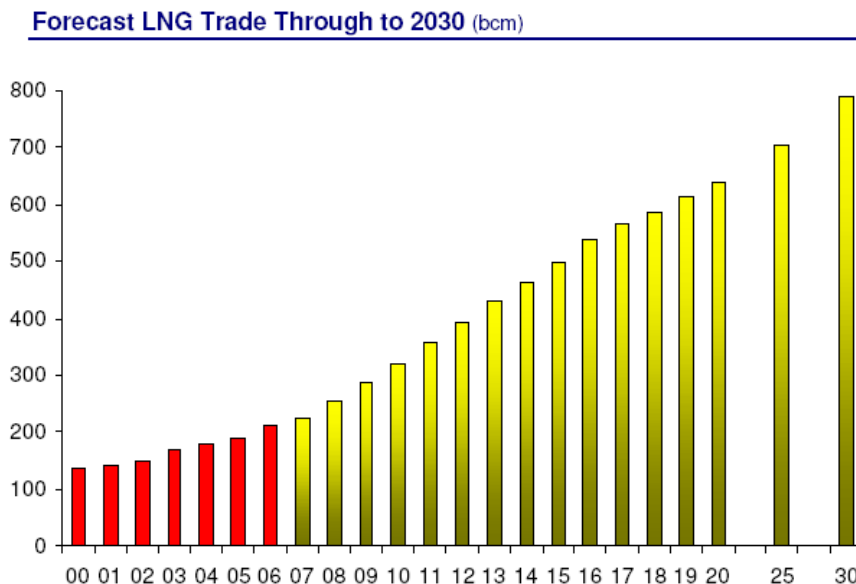


Figure 2: Updated view of LNG Growth to 2030 (2008)



Source: LNG to 2030: A Detailed Review of Future Volumes and Trends, Ocean Shipping Consultants Ltd., UK, August 2008. (for the European Commission)

8. Additional figures show that:

- (a) In the United States LNG is being used more extensively by over-the-road trucks and in ports such as Los Angeles and Long Beach California. Plans are underway to establish fuelling station 'corridors' between Los Angeles and Denver, Colorado as well as between Los Angeles and cities in Texas where LNG is being made and transported to California. Today there are 4000 L-NGVs served by a growing network of 60 LNG fuelling stations, most of which are in the western USA.
- (b) The United Kingdom has six LNG stations along the M-6 motorway and five LNG stations on the A-1 to enable LNG trucks to refuel on the public highway.
- (c) China boosted its 2007 LNG imports to 1M tons from just 100,000 tons in 2006. 40,000 taxis run on CNG in Shanghai sourced from LNG, supplied in part by a 100,000 gallon/day liquefaction plant. There is one LNG refuelling station for Beijing Bus; one LNG station in Changsha (Hunan province); four proposed LNG fuelling stations for buses and taxis in Guyiang and Guizhou Provinces and 12 LNG stations being built in Sujian Province, with potentially 41 stations by 2010, using LNG from a nearby terminal.
- (d) South Korea. Almost all of S. Korea's 36 bcm of natural gas demand comes through three LNG receiving terminals. Three currently operating liquefied-to-compressed natural gas (L-CNG) stations are only a fraction of the ambitious plans to create 200-300 LNG stations supplying heavy duty trucks, with principal support from the Korean Gas Company Kogas.

- (e) Australia and Tasmania now have long distance ‘road-trains’ (trucks with 3 or more trailers) operating on LNG and expanded use between the East and West coasts will see increased use of LNG as an environmental and economic truck fuel.
- (f) Russia established a ‘Blue Corridor’ concept to include LNG trucks (Economic Commission for Europe, Working Party on Gas, “Blue Corridor Project: On the Use of Natural Gas as a Motor Fuel for International Freight and Passenger Traffic”, United Nations, 2003). Although not yet activated, the plan evaluated a route for LNG trucks from Moscow through Poland and Germany to Italy.

### III. Amendment proposal

9. In brief, the reasons why H<sub>2</sub> and LNG fuelling stations signage should become part of the R.E.2 are:

- (a) To help clarify the difference in the fuels, with safety as a primary concern;
- (b) To help legitimize the H<sub>2</sub> and LNG not just as alternative fuels but as fuel alternatives to petrol and diesel now and in the future; and
- (c) To help legitimize and promote related government policies for clean air and energy, and for reduced global warming.

10. With the introduction of these signs into the R.E.2, any on-site or approaching indication of alternative fuel stations will bear the same format so as to be clear and comprehensive. The pictogram that was developed for both CNG and LPG, can be modified with the letters “H<sub>2</sub>” and “LNG” to identify the availability of H<sub>2</sub> and LNG at service stations along public highways, and to distinguish these fuelling stations from those serving CNG or LPG.

11. Taking into account the above, it is proposed to modify section 1.13 of the R.E.2 as contained in document ECE/TRANS/WP.1/119/Rev.1 as follows:

“Road sign to indicate fuelling stations selling **alternative fuels** ~~Compressed Natural Gas (CNG)~~ ~~or Liquefied Petroleum Gas (LPG)~~”<sup>2</sup>

As the **alternative fuels such as** Compressed Natural Gas (CNG), ~~and~~ Liquefied Petroleum Gas (LPG), **hydrogen (H<sub>2</sub>) and liquefied natural gas (LNG)** fuelling infrastructure continues to grow internationally and vehicles using one or the other fuel increasingly frequently cross borders, drivers in international traffic are experiencing difficulties in knowing where they can buy **alternative fuels** ~~CNG or LPG~~ because there is no **corresponding** recognizable, international standard for ~~CNG or LPG~~ fuelling station highway signs.

In order to facilitate the task of consumers, it is recommended that, when a pictogram is used to indicate that CNG, ~~or~~ LPG, **H<sub>2</sub> and LNG** can be obtained in a service station, the type of pictogram shown in annex 6 of this Resolution should be used.

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<sup>2</sup> See document TRANS/WP.1/100

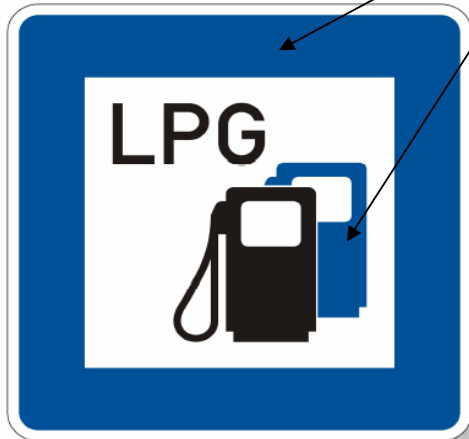
The pictogram is composed of the existing service station symbol F, 4 in black, as defined in the ~~Vienna~~ Convention on Road Signs and Signals, **1968**, with the same symbol in blue in the background, shifted diagonally to the right. It should be completed by the English acronyms CNG, ~~or~~ **LPG, H<sub>2</sub> or LNG** in black lettering to indicate the type of fuel available in the fuelling station. This sign may be completed if necessary by an additional panel indicating the corresponding acronym or name in use in the language of the country in question.

12. Consequently it is also proposed to modify Annex VI of the R.E.2 as contained in document ECE/TRANS/WP.1/119/Rev.1 as follows.

**ROAD SIGNS FOR FUELLING STATIONS SELLING ALTERNATIVE FUELS**  
~~COMPRESSED NATURAL GAS (CNG) OR LIQUEFIED PETROLEUM GAS (LPG)~~

(Paragraph 1.13)

Blue



Sign "Liquefied Petroleum Gas"



Sign "Compressed Natural Gas"



Sign "Hydrogen"



Sign "Liquefied Natural Gas"

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