UNECE Group of Experts on Gas

Task Force D Removing barriers to the use of natural gas as a transportation fuel

Geneva. April 22, 2016

Manuel Lage
Secretary General
Contributing parties

- European Union
- International Gas Union; Study Group 5.3 (NGVs)
- NGVA Europe
- European Business Congress; Industry & Construction
- Associations and other experts
- Fleet Owners/Operators
- Vehicle Manufacturers

UN ECE, Sustainable Energy Department, Group of Experts on Gas, Task Force D
Some of existing barriers

Financial
- Differing Standards
- Limited Access to Pipeline
- Legal (Regulatory)
- High Incremental NGV Cost
- Underdeveloped Filling Infrastructure
- Discouraging Price Differential
- Limited LNG Availability
- Administrative

Human Issues
- Poor Incentives
- Oil Lobby
- Misleading Measuring Units
- Lack of Awareness

Safety Issues
- Demotivating Taxes
- Demotivating Taxes

Other
- Oil Lobby
- Limited Access to Pipeline
- Administrative
- Financial

Limited Access to Pipeline
- Financial
- Other
- Limited Access to Pipeline
- Financial

Underdeveloped Filling Infrastructure
- Financial
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- Limited Access to Pipeline
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Discouraging Price Differential
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Limited LNG Availability
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Misleading Measuring Units
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Lack of Awareness
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Demotivating Taxes
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Activities, for all vehicle modes

- Define internal structure & responsibilities
- Identify target groups & establish communications
- Recruit contributing volunteers
- Classify barriers
- Propose Final report (Recommendations) format
- Prepare & spread questionnaire
- Develop work plan
- Prepare presentation at WGC’2015 NGV Workshop
The group of experts:

- Manuel Lage (Spain) (co-chair)
- Andrej Stusek (Slovenia)
- José Poblet (Spain)
- Nuno Moreira (Portugal)
- Eugene Pronin (Russia)
- Alberto Pincherle (Italy)
- Manfred Seitz (Austria)
- Nadège Leclercq (France)
- Dan Bowerson (USA)
Goal of the Task Force D

Work to be undertaken:

- Analyze the use of natural gas as a transportation fuel from the perspective of energy infrastructure
- In collaboration with a group of experts from different countries and other associations, to prepare Recommendations on Removing Barriers to the Use of Natural Gas as a Transportation Fuel.

Deliverable:

- Document containing Recommendations on Removing Barriers to the Use of Natural Gas as a Transportation Fuel.
Natural Gas for mobility

CNG

1
Cars, vans, light & medium delivery trucks, urban buses, urban services trucks and short distances heavy trucks.

10

25

35

100

200

25.000

LNG

Long distance heavy trucks, coaches, railway, auxiliary and main propulsion maritime use.

• Natural gas is the only real alternative to diesel in all types of transport and use
• CNG is the **recommended urban fuel** (taxis, delivery vehicles, urban services, buses, auxiliary marine engines). When in port, ship’s auxiliary engines should be considered as urban polluters
• LNG with much higher energy density, is going to be the **future professional fuel**.
2. Background
   2.1 Are people aware of the natural gas as an alternative to oil derived fuels?
   2.2 What is natural gas?
   2.3 Natural gas across the world
   2.4 LNG availability
   2.5 Air pollution problems
   2.6 Regional overview of Standards and Regulations

3. LNG in maritime section
   3.1 Emissions in maritime transport
   3.2 Barriers. LNG as maritime fuel
   3.3 Infrastructure of LNG bunkering in sea ports and inland waters
   3.4 Need for a European and world standard of LNG bunkering
• Natural gas and bio-methane represent the easiest, most practical, and most realistic way to reduce pollution coming from road transportation.

• Natural gas—with its environmental, economic and availability advantages—will remain the only alternative to oil and diesel in the short and medium terms, and is the only primary fuel that is fully technically and economically applicable in any mode of transportation: on-road vehicles, scooters, heavy duty vehicles, ships, aircrafts, locomotives and others.

• Using natural gas as a transportation fuel is a critical area for natural gas demand growth, with specific relevant benefits such as improving environmental impacts (CO2, SO2, and NOx).

• This activity explores removing barriers to the use of natural gas as a transportation fuel in the ECE region.
Are people aware of the natural gas as an alternative to the oil derived fuels?

No, they are not. There is a big problem with the confusion of NG and LPG because both are “gases”, but they are very different and with different origins.

What is natural gas?

Natural gas (NG) – methane – is of fossil origin, but not derived from oil. Due to its composition, CH4 is an extremely light gas, optimum to be used as a fuel in internal combustion engines. Its RON (octane number) of 110/120 allows much better engine efficiency.

Natural gas over all the world

The identified gas reserves in the world guarantee the supply of gas for more than 500 years.
### Forecast 2013-2035

#### World Energy Mix 2035 (EIA Data)

- **Nuclear:** 6.7%
- **Renewables and Other Sources:** 14.2%
- **Coal:** 22.7%
- **Natural Gas:** 27.2%
- **Petroleum:** 29.3%

#### World Energy Consumption by Fuel (%)

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<th>Fuel</th>
<th>2013</th>
<th>2035</th>
<th>Trend</th>
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<tr>
<td>Coal</td>
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<tr>
<td>Oil</td>
<td>32%</td>
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<tr>
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<tr>
<td>Renewables</td>
<td>9%</td>
<td>14%</td>
<td>↑</td>
</tr>
<tr>
<td>Nuclear</td>
<td>4.5%</td>
<td>7%</td>
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</table>
LNG availability
The number of countries offering NG in the world market is increasing, particularly due to the construction of new LNG liquefaction plants. LNG is giving huge flexibility and competitiveness to the gas trade and supply.

Air pollution problems
Air pollution has a very negative impact on human health and well-being, entailing also substantial economic consequences. The use of NG as fuel for their urban buses will heavily reduce emissions and improve the air quality (NO2) in cities.

Regional overview of Standards and Regulations
The regulatory situation in the world of NG as a fuel is still very uneven
Emissions in maritime transport
Shipping has not had any emission control to half of the twentieth century. Sulphur Emission Control Areas (SECAs) are sea areas in which stricter controls were established to minimize airborne emissions, starting with SOx, already not existing in land fuels.

Barriers - LNG as maritime fuel
The relatively high capital cost of the system installation can be a barrier in some cases. It is highly recommended to facilitate procurement by public administrations to retrofits or build new ships with fuel GNL

Infrastructure of bunkering LNG in sea ports and inland waterways
Need for construction of pipes and bunkering vessels. Truck-to-ship, Port-to-ship and Ship-to-ship schemes to be developed and implemented

GASNAM has prepared a first Recommendation for LNG bunkering, already shared with a number of organisations across the world
Fuel consumption of different vehicles. Equivalences

A private car, doing 20.000-25.000 km per year uses **1.100 kg of fuel per year**.

An urban bus of 280 CV, doing 50.000 km per year in very severe traffic conditions, uses **28.000 kg of fuel per year (equivalent to 25 cars)**.

A long distance truck, with 420 CV and 125.000 km per year, uses **38.000 kg of fuel per year (1,5 buses, 35 cars)**

A long distance coach with 400 CV and a yearly mileage of 400.000 km, uses **112.000 kg of fuel (3 heavy trucks, 4 urban buses, 100 cars)**.

A diesel locomotive with 4.000 CV and 120.000 km of annual mileage uses **190.000 kg of fuel per year (5 trucks, 7 buses, 173 cars)**

A ferry uses **28.000.000 kg of fuel per year (370 trucks, 1.000 buses, 25.500 cars)**
GASNAM
Avenida Pío XII 61 Portal 7
28016 Madrid
Teléfono: +34 910 180 875 y +34 618 742 931
secretaria@gasnam.es
manuel.lage@gasnam.es
www.gasnam.es

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