



# NG/Biomethane Fuel Specification in Europe

UNECE GFV Informal Group

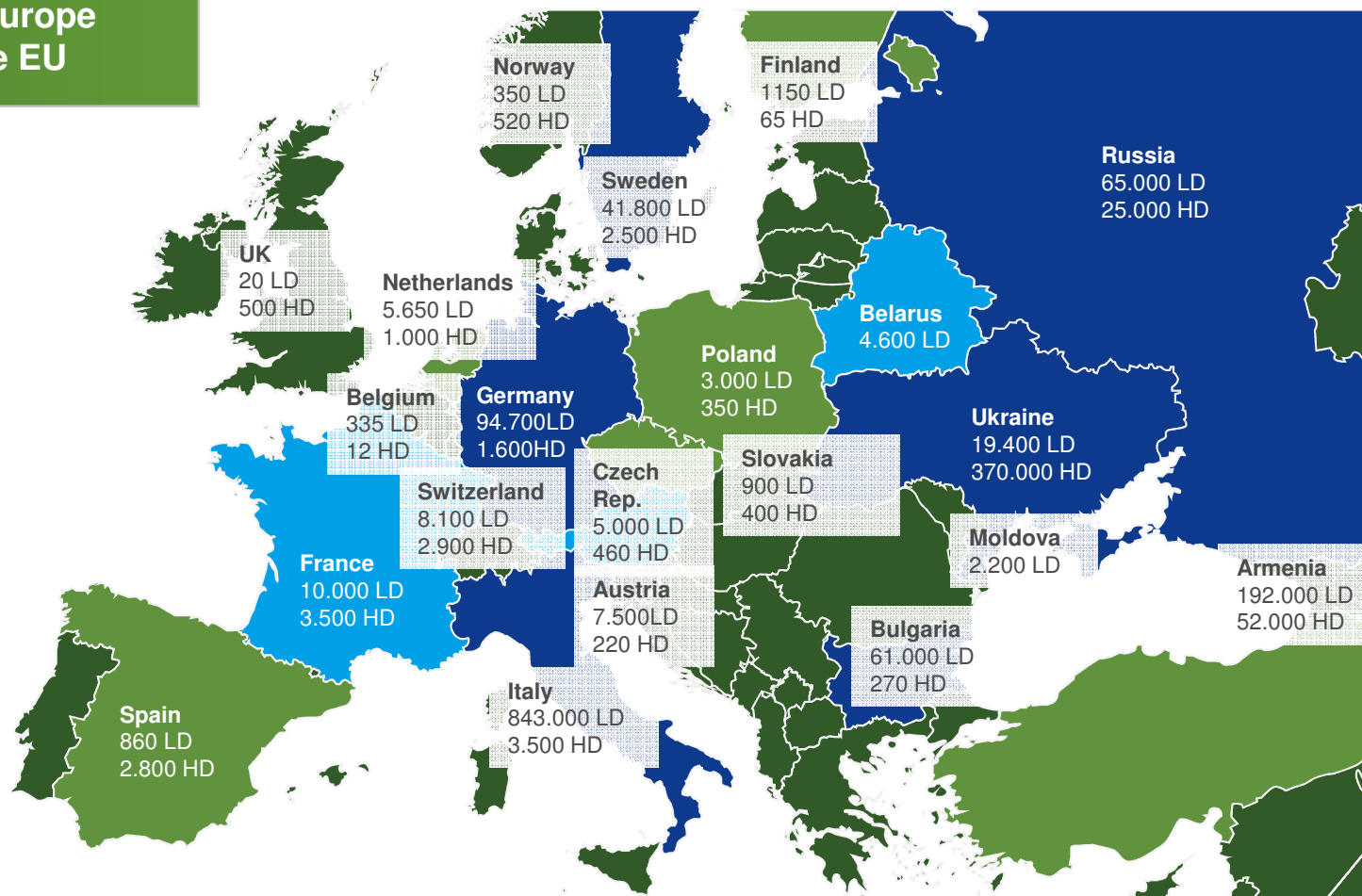
Brussels, 12<sup>th</sup> September 2013

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# Current European NGV Market

**1,85 M NGVs in Europe**  
**1,1 M NGVs in the EU**



- > 20.000
- 5.000 – 20.000
- 1.000 – 5.000
- < 1.000

Source: NGVA Europe, 01.06.2012

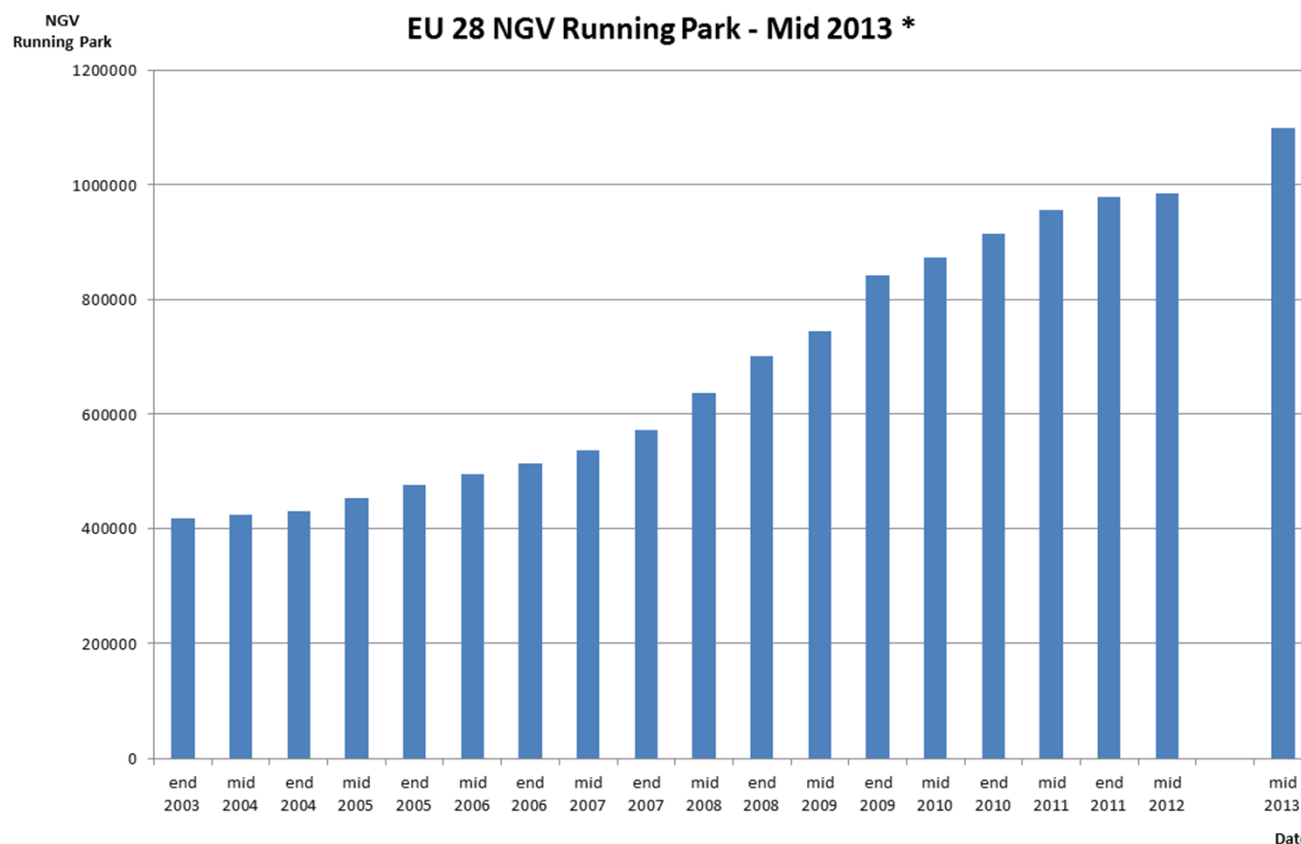
# Current European NGV Market

## Market Characteristics

- Growing market
- Scattered running park
- Scattered refuelling inf
- Strong industry commitment
- Good political landscape

## Main Associated Benefits

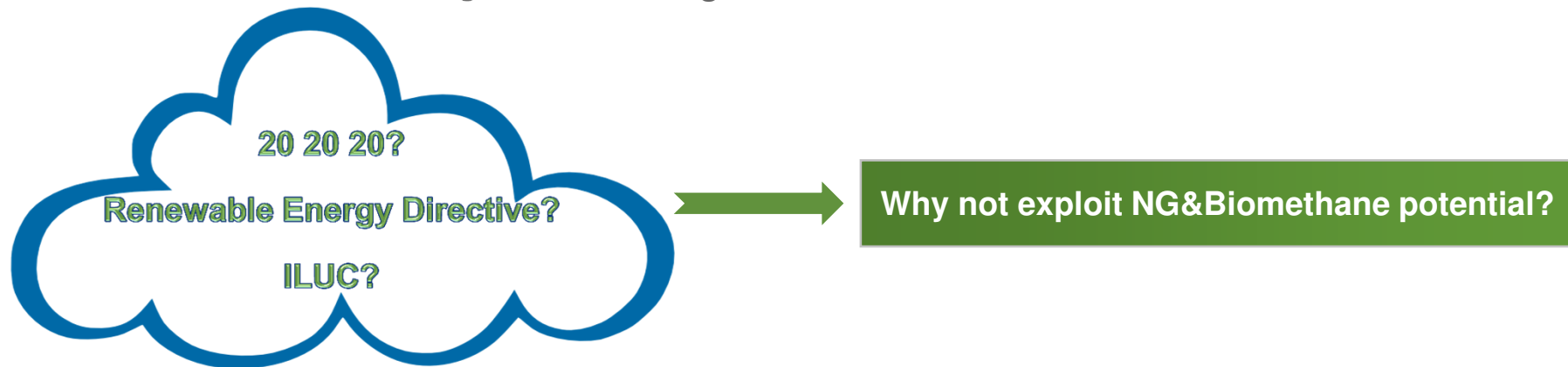
- Strategic energy carrier
- Reduced emissions
- Mature & economic technology



# The role of the European Commission

## Origin of the standardization work:

- The EU will to reduce oil dependency and increase security of energy supply
- The difficulties in achieving committed targets such as those for the RED



**Specific mandate to CEN:** it was not until late 2010 that the EC addressed a specific Mandate (M475) for the development of:

- A European standard for a quality specification for biomethane to be used as a fuel for vehicle engines;
- A Technical Specification or European Norm for a quality specification for biomethane to be injected into natural gas pipelines

Later widened  
to also cover  
fossil NG



## CEN/TC 408 in charge of the job:

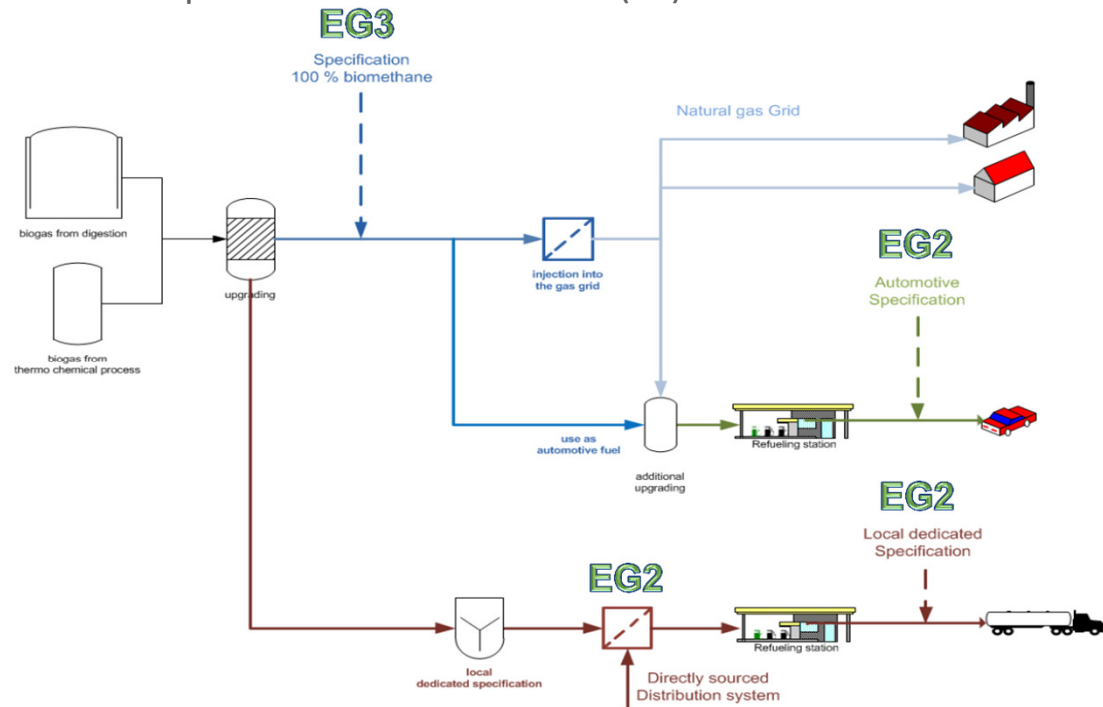
- ➔ 9 meetings to date
- ➔ First two versions of the working draft voted twice by NSBs
- ➔ First official WD will be out for CEN enquiry next October
- ➔ Next meeting will be held between 19<sup>th</sup> – 20<sup>th</sup> September 2013 in Madrid (ES)

## Committee structure:

- Chairman: Erik Buthker – NL
- Secretariat: AFNOR
- EG2 coordination: NGVA Europe
- EG3 coordination: GDF Suez

## Three internal expert groups

- EG1: bio-content determination
- EG2: NG/Biomethane as a fuel
- EG3: Biomethane grid injection



## Key parameters under discussion (or already discussed):

Wide variety of experts: Volkswagen, Volvo, Scania, Bosch, Swedish Gas Technology Centre, E-ON Ruhrgas, ENI, RWE, Swiss Gas and Water Association, HERA-AMASA, PSA Group, NGVA Europe...

## Remarkable characteristics:

- ➔ Parallel mandate (M400) for the pipeline NG specification. Work dealt with via CEN/TC 234/WG 11
- ➔ Liaison with ISO/TC 252 on NG filling stations
- ➔ Main encountered positions/interests: between the gas industry and the vehicle manufacturers

## First draft:

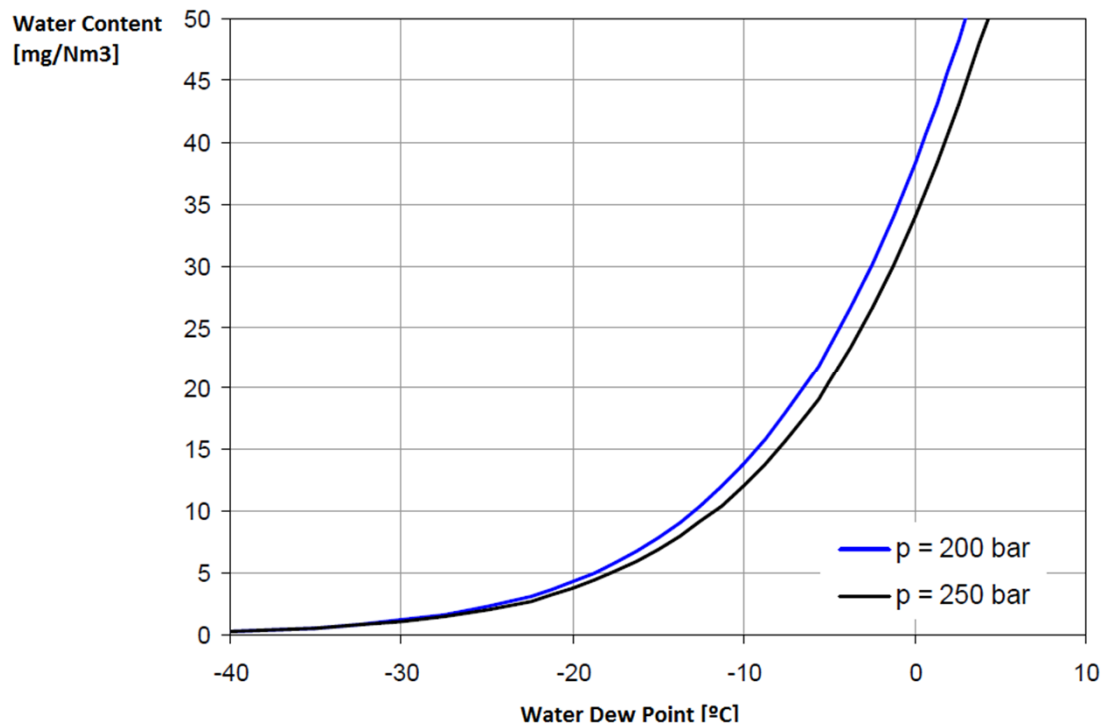
CEN/TC 408  
 Date: 2013-04  
 TC 408 WI 00408001  
 CEN/TC 408  
 Secretariat: AFNOR

Parameter	Unit	Limit values		Test method See normative references
		Injection	Fuel	

**To what extent can the grid and fuel specifications can differ from each other? In the next slides an overview of the main open topics will be offered**

## Key parameters under discussion (or already discussed):

➔ Water content/ dew point: both parameters are important for safety (corrosion) and driveability (potential water condensation). As these two parameters are correlated (ISO 18453), limiting one of those should be enough:



ECE Regulation 110 sets a 32 mg/m<sup>3</sup> limit just for safety. It has proven to not be enough for cold climates. Thus a variable limit for different climatic zones is being proposed:

**Zone A: -10 °C at 200 bar**  
**Zone B: -20 °C at 200 bar**  
**Zone C: -30 °C at 200 bar**

This implies that, for many stations, there will have to be a drying equipment



## Key parameters under discussion (or already discussed):

- ➔ Hydrogen Sulphide + Carbonyl Sulphide: associated corrosive issues and combustion by-products sticking engine valves.

ECE Regulation 110 sets a limit of 23 mg/m<sup>3</sup> for safety/ corrosion. Several documents have been shared by different experts. A proposed limitation of 5 mg/Nm<sup>3</sup> is currently being proposed, which is in line with the gas grid requirement being developed by CEN/TC 234/WG 11



**$H_2S \leq 5 \text{ mg/Nm}^3$**   
**The same as for pipeline spec!**



## Key parameters under discussion (or already discussed):

➔ Oxygen: associated potential corrosion in connection to other components.

ECE Regulation 110 sets a limit of 1% v/v. The discussion for the grid specification/injection is not yet finished, but it seems to be leading to a variable limitation depending on the proximity to i.e. grid cross-border points or underground NG storages.

	Austria	France	Germany	Netherlands	Sweden	Switzerland	
O <sub>2</sub>	< 0,5 %	<0,01%	<0,5%	<0,5%	<1%	<0,5%	<0,5%

NCS Injection Requirements in Different European Countries. Source: Marcogaz

For biomethane, some problems might occur, especially when the biogas is sourced from landfill

**O<sub>2</sub> ≤ 1% v/v**  
**It seems this will be less strict than for the grid/injection spec**

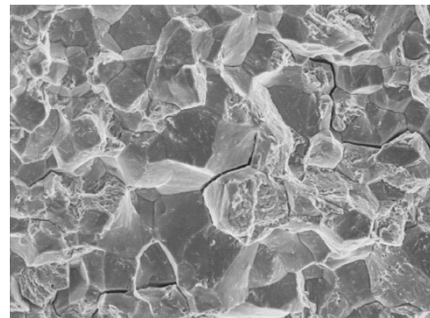
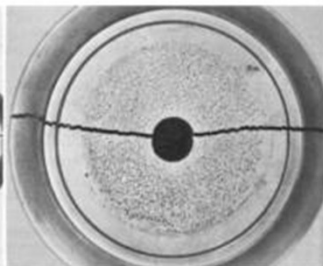
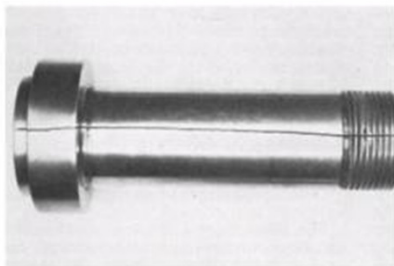
## Key parameters under discussion (or already discussed):

➔ Hydrogen: associated fragility (embrittlement) issues due to the high solubility of hydrogen molecules when in touch with metallic structures, especially at high pressures.

ECE Regulation 110 set a limit of 2% v/v to prevent this aspect. The discussion for the grid specification is not yet finished as GERG is working on it, but will probably aim to a similar level. Some examples:

	Austria	France	Germany	Netherlands	Sweden	Switzerland
H <sub>2</sub>	< 4 %	<6%	#5 %	/	<0,5%	<5% <5%

NCS Injection Requirements in Different European Countries. Source: Marcogaz



**H<sub>2</sub> ≤ 2 % v/v**  
**Pipeline requirement to be still to be decided, but current discussions are in the same line!**

## Key parameters under discussion (or already discussed):

- ➔ Siloxanes/Silicon: its combustion by-products create problems for ICEs like accumulation (leading to engine knocking), abrasion of internal parts, causes malfunction of critical components such as lambda sensors, etc

Available documentation: several documents have been prepared, documenting different technological requirements (NGVA Europe in charge of gathering input on this). Most strict requirements seem to be for automotive ICEs and microturbines: values ranging from 0,05 mg/Nm<sup>3</sup>

Current barriers: no agreed sampling and test methods, making existing measurement programs and requirements difficult to compare. DNV KEMA and GERG will work on this

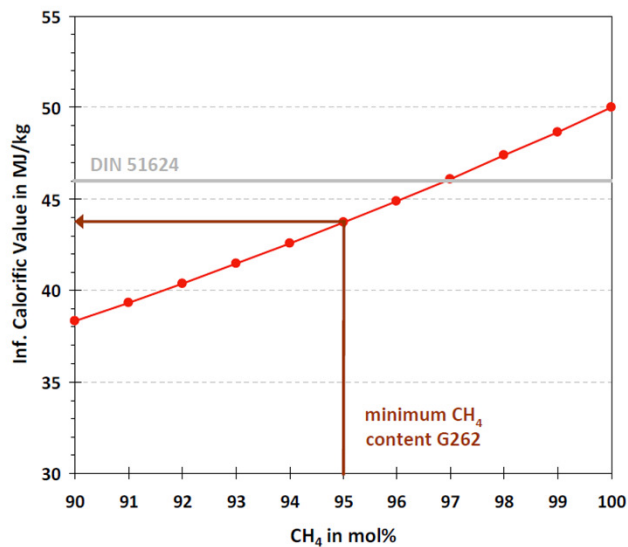
**Siloxanes/Silicon is seems to be an issue only for some types of biogas, mainly from landfill and waste-water treatment. Thus, the preliminary/indicative limitation to be proposed (initially of 0,1 mg/Nm<sup>3</sup>) should be properly assessed by national fuel quality programs layed down in the future (no need to control if no biomethane from those sources, and taking into consideration potential dilution effects)**



## Key parameters under discussion (or already discussed):

➔ Calorific Value and Methane Number: critical parameters affecting the combustion behaviour of the fuel

Initially, after the first period of discussions, the group agreed upon fixing a minimum low heating value of some 44 MJ/kg (the German DIN 51624 sets 46 MJ/kg) in order not to have problems with biomethane as:



### Calorific Value:

Afterwards Volvo proposed to have WI range limited in addition of LCV

### Methane Number:

It is impossible to adjust the whole NG grid to the needs of the vehicles. Solution found and agreed is the creation of two different grades: 65 (typical minimum MN for grid) and 80 (high grade or typical for non-blended biomethane and some LNGs)

## Key parameters under discussion (or already discussed):

➔ Sulphur: poisoning effect on after-treatment systems. Problem is:

Vehicle manufacturers request 10 mg/m<sup>3</sup>, value that can't be assured nowadays by the gas industry. The main reason lays on the current odourisation practices, which are typically based on the addition of sulphur-based components to the pipeline, like THT and mercaptanes.

Different requests can be found between different manufacturers as the engine technology and thus the after-treatment used have a great impact on the sulphur sensitivity.

At the same time, reports from the NG industry reflect that typical levels are generally below 30 mg/Nm<sup>3</sup>, so the limitation they are proposing is:

- 20 mg/Nm<sup>3</sup> for non-odorised NG
- 30 mg/Nm<sup>3</sup> for odorised NG

**Main problem: this decoupling has a strong impact in the cost of most refuelling stations, as those are connected to the NG grid (additional CAPEX for desulphurisation between 20.000 – 70.000 €/filling station)**

# Thank you for your attention



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