

# NGVs in Europe need a strong voice !



... for sustainable mobility

## NGVs IN EUROPE NEED A STRONG VOICE!



NGVA Europe wants to explain who we are and particularly what we are doing in favour of the European NGV industry, i.e. vehicle and equipment manufacturers, gas distributors and in particular the final customer who is using a NGV with satisfaction, economy and environmental respect.

The advantages of the Natural Gas in road transport are clear, but we have to be aware of the difficulties in making this understood to European politicians,

municipal leaders, opinion makers and potential customers. On the other hand, the development of NGVs in Europe varies depending on each country. Globally we have many success stories that can be used as references for other country's developments, but in many cases these experiences have remained untold.

NGVA Europe is there to put together experiences and voices; we want to be the single and strong voice of this European industry to talk with European Union politicians. We are developing proposals for new regulations that recognize the public interest of this alternative energy. We want to offer all the possibilities of cross information among countries, companies and customers. We think that an Association like ours is only justified if we produce deliverables: experiences, political actions of support, regulations' proposals, useful data, etc...

In the following pages we offer you some examples.

With my best regards,

M. Lage  
General Manager

## INTRODUCING THE NEW NGVA EUROPE:

NGVA Europe (Natural Gas Vehicle Association) is a new association that takes over the activities and membership body of the old ENGVA, which is not active anymore.

NGVA Europe is a very lean organisation with only three people as permanent staff, and is supported by external services, in some cases provided free of charge by some of the members.

### MISSION:

- To stimulate the use of natural gas and biomethane as fuels used in the transportation sector.
- NGVA Europe will endeavour to promote sound standards, regulations and directives that will support an expanded use of NGVs.
- Networking: NGVA Europe intends to be a platform for dialogue between suppliers and distributors of natural gas and biomethane, manufacturers of components used in NGVs and in NG filling stations, OEM NGV manufacturers and subsystem suppliers, and other interested parties (end users, other NGOs, and interested national and EU government representatives).
- The Association will, supported by its members and ad hoc working groups, provide a lobbying platform for all NGV related industries, and also via its web based information portal provide a reference database.
- Activities and actions of the Association will be focused on the pan European geographical area.

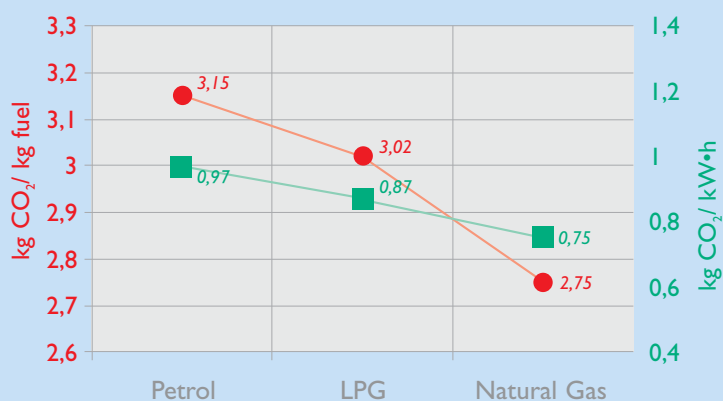
## FACT SHEET. NATURAL GAS AND CO<sub>2</sub>

Carbon dioxide, or CO<sub>2</sub>, is a gas produced in the process of combustion (oxidation) of any kind of hydrocarbon: petrol, LPG, kerosene, diesel oil, methane, etc. A chemically perfect and complete combustion of a hydrocarbon would produce just CO<sub>2</sub> and H<sub>2</sub>O (water vapour).

As a consequence, it is clear that the amount of CO<sub>2</sub> produced in the combustion of a hydrocarbon is going to be proportional to the amount of carbon molecules (C) contained in the molecule of the fuel considered.

Natural gas is composed mainly of methane (CH<sub>4</sub>) that happens to be the hydrocarbon with less content of carbon in its molecule. This is the reason why the CO<sub>2</sub> emissions of the NG engines are far lower than any other fuel used in a spark ignited engine: petrol, LPG, ethanol, etc.

CO<sub>2</sub> emission vs fuel used in spark ignited engines



## CASE STUDIES: BIOMETHANE POTENTIAL IN CITIES

Natural gas and biomethane are chemically speaking the same thing: a methane rich gas. Raw biogas produced in AD (anaerobic digestion plants normally contains 50-55% of methane (CH<sub>4</sub>), the balance mainly carbon dioxide (CO<sub>2</sub>).

The upgrading of raw biogas, or landfill gas, means the removal of CO<sub>2</sub> and various impurities like hydrogen sulphide and siloxanes, and providing gas of a quality which is fit for injection into the natural gas grid.

Pure biomethane will usually have a methane content above 95%. In terms of use in vehicles, the advantages of natural gas are increased with a much better balance of total CO<sub>2</sub> due to the renewable origin of biomethane.

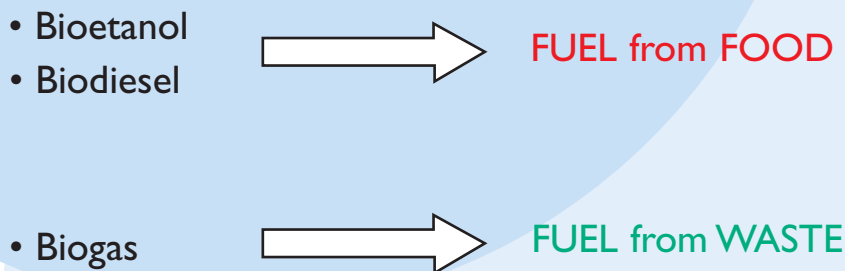
The potential raw biogas production in a landfill receiving all the garbage produced in a city of 4 to 5 million inhabitants, will typically reach a volume of nearly 40 million cubic meters per year.

This volume of biogas, once treated and purified, would become some 20-22 million cubic meter of a high quality biomethane, equivalent to a very high quality natural gas.

Considering the two main uses of natural gas in the urban vehicles: buses and garbage collection trucks, and their average gas consumption, we will find a fantastic conclusion:

**The purified biomethane, obtained yearly from a 4 to 5 million inhabitants city landfill is enough to fuel some 1.000 urban heavy vehicles, buses or garbage trucks, running on CNG.**

The conclusion is really significant, because we are approaching an almost perfect recycling loop: CNG trucks collect the city garbage, this garbage in the landfill produces biogas, that once purified is used to fuel all the garbage trucks, and also a significant part of the urban buses.



## CASE STUDIES: AERGAS PROJECT

The Project AERGAS was established in 2005, following the requirements of **AENA**, the Spanish Public Authority for Airports and Air Navigation, with the fundamental aim of reducing the level of emissions, both acoustic and gaseous, of the vehicles and equipment working inside the airport. The proposed solution was the design and development of a new range of handling material, all working on CNG.

The project was presented to the PROFIT 2005 program, obtaining the approval of the Ministerio de Industria, Comercio y Turismo of Spain, and being given a loan of 800.000 € as refundable funds, a 75% of the total budget.

The partners in the project have been:

- AENA
- AVIA Ingeniería y Diseño, a vehicle and aeronautical engineering company, in charge of the design and development of all the CNG special airport equipment
- IDAE, a Public Entity reporting to the Ministerio de Industria, Turismo y Comercio, having the objectives of promoting the energetic efficiency and alternative fuels
- Gas Natural, the major Spanish natural gas company, that has built a temporary CNG filling station in Barajas to give service to the prototypes
- IVECO, first European brand in CNG commercial vehicles, which carried out the development of the different CNG engines (all of them homologated E. E.V.) for this specific application
- TEM Gorris, a Spanish company specialised in airport handling equipment, responsible for the industrial development and production of the new vehicles

On November 7<sup>th</sup> 2007, the three new vehicles were officially presented: a Ground Power Unit, a Luggage Tractor and an Aircraft Tractor, which appeared on stage towing a full size aircraft for more than one kilometre.



## POSITION PAPER: NGVA EUROPE ACTIONS NEAR EU INSTITUTIONS



NGVA Europe and its members are currently contributing to make the Institutions aware about the importance of natural gas and biomethane for the environmental and transport policies of the European Union. The main results achieved during the last 2 years mirroring this new attitude of the EU Institutions are reflected in:

- European Parliament: E. Morgan Report – “Green Paper on secure, competitive and sustainable energy for the future” (inclusion of natural gas for transport)
- European Commission Initiative: CARS21 - “Competitive Automotive Regulatory System for the 21<sup>st</sup> Century”
- Council of the European Union: Conclusion on the Commission strategy on biofuels and renewable energies
- European Parliament: Various Reports on the Commission Proposal to reduce CO<sub>2</sub> emissions from passenger cars and light duty commercial vehicles (LCVs)
- ESSC (European Economic and Social Committee): Opinion on the EU Commission on the Community Strategy to reduce CO<sub>2</sub> emissions from cars and LCVs
- European Commission: Commission proposal on renewables
- European Commission / European Parliament / Council: Proposal for type-approval of hydrogen powered motor vehicles
- European Commission / European Parliament / Council: Proposal on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6)

Regarding biomethane used as a transportation fuel, a very significant step forward was taken by the Commission in, January 2008, via the Proposal for a Directive on Renewables. In the proposed Directive there was a new emphasis on biofuels produced from organic waste resources. The Parliament review of the proposed new Directive is still not completed, but it is quite clear that there, concerning biofuels, will be a new focus on fuels made from various organic waste resources. This development, of course, provides strong support for production and use of biomethane as a vehicle fuel.

## FACT SHEET. NATURAL GAS RESERVES IN THE WORLD.

During 2007 gas reserves remained fairly stable compared to 2006, totalling 181.9 thousand billion cubic metres (Tcm). In spite of constantly increasing consumption, gas reserves have grown over time. From 2000 to now, they have increased from 156.8 Tcm to 181.9 Tcm. This means that, on average, more than double the quantity that has been extracted has been added to the reserves every year.

- The top ten countries hold 76% of the total. Russia leads in first place with 26.3%, followed by Iran and Qatar with 14.8% and 14% respectively.
- Natural gas reserves have also increased in the USA, one of the production areas that has been known and exploited for a longer period of time. Here production climbed from 4.7 Tcm as of January 1<sup>st</sup> 2000 to 6.2 Tcm on January 1<sup>st</sup> 2008.

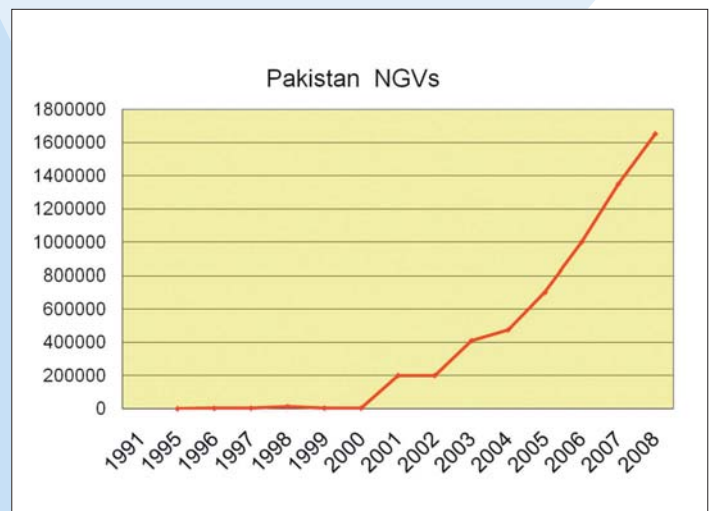
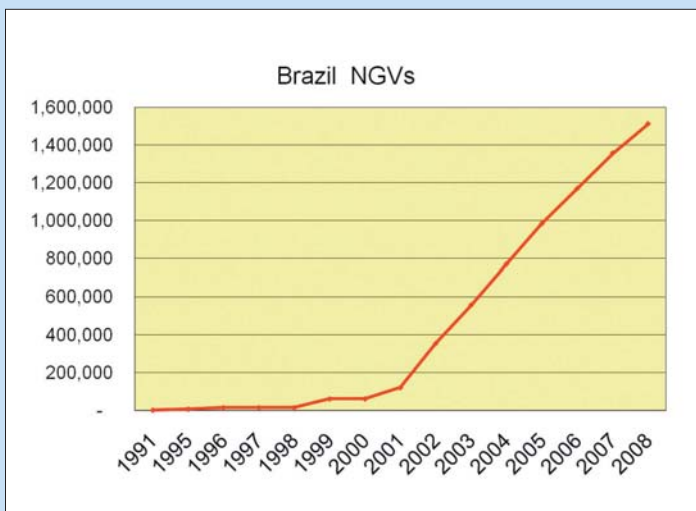
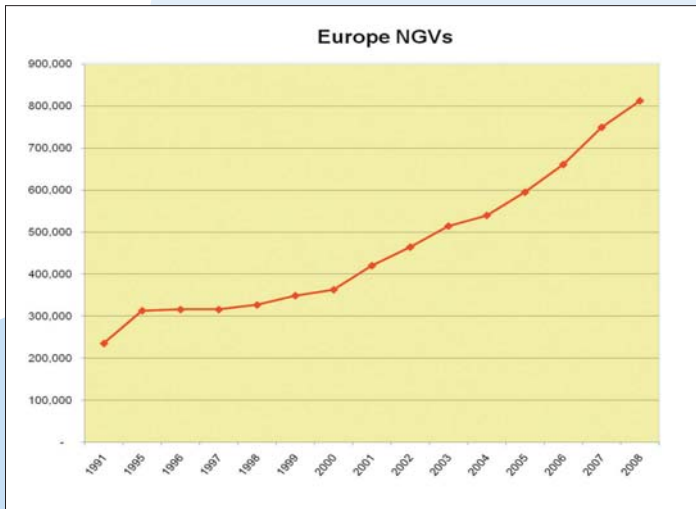
Source: World Oil & Gas revue 2008.

### The first ten countries in the world

(billion cubic metres as at 1<sup>st</sup> January)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>First 10 countries</b>	<b>115,410</b>	<b>120,352</b>	<b>132,837</b>	<b>134,358</b>	<b>136,496</b>	<b>136,570</b>	<b>136,896</b>	<b>138,256</b>	<b>138,415</b>
Russia	46,900	46,700	46,800	47,000	48,000	47,800	47,820	47,814	47,814
Iran	25,000	26,000	26,100	26,690	27,570	27,500	27,495	27,575	26,845
Qatar	11,157	14,443	25,783	25,783	25,783	25,783	25,636	25,636	25,490
Saudi Arabia	6,146	6,301	6,456	6,646	6,754	6,834	6,900	7,154	7,546
United States	4,740	5,024	5,195	5,294	5,353	5,451	5,787	5,977	6,173
United Arab Emirates	5,995	5,994	6,058	6,054	6,047	6,083	6,115	6,111	6,111
Venezuela	4,155	4,152	4,180	4,181	4,219	4,287	4,315	5,100	5,565
Nigeria	3,512	4,106	4,633	4,997	5,055	5,117	5,154	5,215	5,275
Algeria	4,520	4,523	4,523	4,523	4,545	4,545	4,504	4,504	4,428
Iraq	3,285	3,109	3,109	3,190	3,170	3,170	3,170	3,170	3,170
Rest of the World	41,370	42,053	42,963	42,659	42,220	41,973	42,743	43,558	43,531
<b>World</b>	<b>156,780</b>	<b>162,405</b>	<b>175,800</b>	<b>177,017</b>	<b>178,716</b>	<b>178,543</b>	<b>179,639</b>	<b>181,814</b>	<b>181,945</b>

## MARKET DEVELOPMENT OF NGVs IN THE WORLD



The market of NGVs is growing rapidly in Europe and worldwide.

## POSITION PAPER. NGVs EXHAUST EMISSIONS. THE NMHC vs THC DEBATE

### Composition of THC (total hydrocarbons) and health effect

The THC in the exhaust emissions from gasoline engines mainly consist of NMHC (more than 90%), and the rest is made up of  $\text{CH}_4$ . In contrast, the THC contained in the exhaust emissions of an NGV are mostly made up of  $\text{CH}_4$  (roughly 90%), and less than 10% of NMHC. The NMHC are toxic pollutants which also via a high reactivity contribute to the formation of ozone. Methane, on the other hand, has a high molecule stability, which results in low reactivity. And it is not considered as an ozone precursor.

### Buoyancy

Asking for almost non achievable limits for  $\text{CH}_4$  emissions from automotive engines, would be like worrying about the salt content of water used to extinguish a fire. It is necessary to consider as something that has always been left behind. Methane is far lighter than air; thus its buoyancy makes it rise very quickly up into the stratosphere.

### GHG (greenhouse gas) performance of bio-methane

When processing manure to produce bio-methane, which is subsequently burnt in an engine, producing  $\text{CO}_2$ , the net overall GHG emissions are, on a well-to-wheels basis, not only eliminated, but actually far below zero. Hence, by setting a too tough limit on methane in the tailpipe emissions of a car, regulators may defeat the purpose of reducing greenhouse gas emissions.

### Natural and anthropogenic sources of $\text{CH}_4$

The global world emissions of  $\text{CH}_4$  from natural origin (wetlands, rice fields, termites, ocean, hydrates), and from anthropogenic origin (energy, landfills, ruminants, waste, biomass burning), is calculated to be 600 million tons/year. The global emission of methane that could be reasonably expected from the NGV sector are in comparison negligible.

These reports are available as full documents to the NGVA Europe members.

Other position papers, case studies, etc, like:

- Natural gas and Euro VI
- Natural gas and  $\text{CO}_2$
- NGVs in Italy, a success story
- The quick development of a public CNG network distribution in Germany
- The choice of CNG for public transportation in Athens for the 2004 Olympics
- Garbage collection in Madrid. The biggest European truck fleet running on CNG
- ... and many others, are now being prepared.

## CURRENT NGVA EUROPE MEMBERS AFTER THE OFFICIAL REGISTRATION OF THE ASSOCIATION ON MAY 14<sup>TH</sup>, 2008:

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- Aardgas Mobiel (Netherlands)
- AGAS 21 (Spain)
- AFGNV, Association Française du Gaz Naturel pour Véhicules (France)
- AVIA, S.L. (Spain)
- Avtometan LTD (Bulgaria)
- Bohlen & Dohlen (Germany)
- Boisen, Peter (Sweden) **Chairman of the Board of Directors**
- CHANGE Group Co. (Austria)
- Clean Air Power Ltd. (UK)
- CNG Services Ltd. (UK)
- Czech Gas Association (Czech Republic)
- EPM Gas Technology (Spain)
- Energy Institute Hrvoje Pozar (Croatia)
- Eni SpA (Italy) **Board of Directors Member**
- Fiat Group Automobiles S.p.A. (Italy) **Board of Directors Member**
- Fuelmaker (Canada)
- Gas Natural SDG, S.A. (Spain) **Board of Directors Member**
- Gasrec Ltd. (UK)
- Gasmobil AG (Switzerland) **Board of Directors Member**
- Gasum Paikallisjakelu Oy (Finland)
- Greenfield AG (Switzerland)
- Greenlane Biogas (Sweden)
- Hope Home International (Ivory Coast)
- IDIADA Automotive Technology S.A. (Spain)
- IDIMA, Fundacion (Spain)
- Idro Meccanica s.r.l. (Italy)
- Ingenieurbüro van Schoonhoven (Germany)
- IVECO España, S.L. (Spain) **Board of Directors Member**
- Jyväskylä Innovation Ltd (Finland)
- Luxfer Gas Cylinders (UK)
- Metan Ltd. (Iceland)
- Methaneva (France)
- NGVA UK (UK)
- NGV Communications Group (Korea, Italy, Brazil, Argentina)
- NGV System Italia (Italy)
- Norsk Gassforum (Norway)
- Raufoss Fuel Systems AS (Norway)
- Rolande LNG B.V. (Netherlands)
- ROS ROCA INDOX Cryo Energy S.L. (Spain)
- Schandl GmbH (Germany)
- SVGW, Schweizerischer Verein des Gas- und Wasserfaches (Switzerland)
- Schwelm Anlagentechnik GmbH (Germany)
- Stavers, John (South Africa)
- Swagelok Company (USA) **Board of Directors Member**
- Swedish Biogas International AB (Sweden)
- Swedish Gas Association (Sweden) **Board of Directors Member**
- TEC TransEnergy Consulting Ltd. (Finland)
- TeleflexGFI Europe (Netherlands)
- TÜV Saarland automobil GmbH (Germany)
- The Hardstaff group (UK) **Board of Directors Member**
- Gas Association of Ukraine (Ukraine)
- Vanzetti Engineering S.r.l. (Italy)
- Ventrex (Austria)

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