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# NGVA Europe contribution to the Commission Working Document: Consultation on the Future Trans-European Transport Network Policy

**NGVA Europe is the only association representing the interests of the European NGV (Natural Gas Vehicles) industry in relation to the use of natural gas (both gaseous and liquid) and biomethane in transport. Information on our organization and its activities can be found at** www.ngvaeurope.eu

First of all, NGVA Europe would like to thank the Commission for opening a consultation procedure that will allow once again the different stakeholders to exchange and contribute with their opinions to the development of this important transport policy document.

Prior to start answering the different questions proposed by the Commission, we would like to stress some important aspects and benefits related to the use of Natural Gas and Biomethane as a transport fuel for different types of vehicles (light and heavy duty vehicles).

## Benefits when using NG/Biomethane as a vehicle fuel

The composition of the fuel burnt in a natural gas engine mainly consists on methane, regardless of whether it comes from fossil or renewable resources. Since the chemical composition is the same, natural gas gets a very important advantage from other biofuels, because the engines will obtain the same efficiency when using natural gas or biomethane. Basically, we can say that the biomethane is methane gas of renewable origin with the same characteristics as natural gas. There are three main sources to produce biomethane:

- Purification and upgrading of landfill gas.
- Purification and upgrading of biogas produced in anaerobic digestion plants, processing all kinds of organic waste, grass, algae, sea weeds and crops.
- Gasification of forest industry waste, followed by a processing step.

State-of-the-art technologies can provide a 25% reduction of tailpipe $CO_2$ emissions when replacing petrol by NG/biomethane and up to 12% in the case of diesel. Obviously, from a well to wheels perspective an increase in the biomethane share would significantly improve that figure.

In a duel-fuel vehicle with a compression ignition engine running on methane, but supported via pilot injection of diesel, the reduction of $CO_2$ emissions compared to a standard diesel vehicle will depend upon the diesel substitution ratio (80% substitution ratio would reduce around 20% of $CO_2$ emissions).

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In respect to other pollutants, we would like to remark that NG engines can achieve very low emissions of toxic and carcinogenic substances, almost zero particulate emissions, no emissions of reactive hydrocarbons, reduced NOx emissions compared to compression ignition diesel engines, and reduced noise compared to compression ignition engines. Amongst all the previous characteristics of NG as an automotive fuel, we would like to stress that **NG technology is mature and totally available nowadays (also LNG technology), which offers the best immediate alternative to help decarbonising the transport sector**, and achieve the stringent environment goals proposed by the Commission itself.

## Questions raised by the Commission:

***First Question: Are the principles and criteria for designing the core network, adequate and practicable? What are their strengths and weaknesses, and what else could be taken into account?***

Talking about the principles considered in this paper, NGVA Europe would like to ask the Commission to take into account the numerous and empiric benefits (economic, environmental, etc) that NG/biomethane can achieve. We truly believe in the idea that in the future we will have to deal with a situation where many fuel types will have to coexist, and we hope that NG will get the same opportunities and promotion from the European Union than, for example, electric technology is receiving nowadays, or fuel cell technologies received in the past.

A German biomethane injection study (*Thrän et al. 2007*) shows that the biomethane potential of anaerobic digestion and thermal gasification from residual products and a sustainable production of energy crops in the vicinity of the European gas grid (EU-28) may in 2020 be in the range of 2.000-3.500TWh (~173-302Mtoe). If including the potential of the CIS countries, the potential increase to 4.000-6.000TWh (~346-518Mtoe), **large enough to cover the current EU-27 natural gas utilization.**

Due to all the reasons above, we are fully convinced that NG/biomethane will gradually become the recommended fuel for heavy urban vehicles. We will present here some simple calculations demonstrating the huge potential of reducing oil dependence through the possibility of declaring natural gas/biomethane as the European **recommended urban fuel**. A big improvement of the air quality, and significant reductions of oil dependence, can be achieved without first having to provide a wide gas distribution infrastructure, by the simple reason that both urban buses and garbage trucks always belong to large fleets with own filling stations.

The NGV fleet development within the EU is very different from country to country: Italy, Germany, Austria, the Czech Republic, Slovakia, the Netherlands, and Sweden have a reasonably good coverage of their territories with public CNG filling stations allowing the development of the private use of light duty vehicles powered by natural gas and biomethane. Sweden is the champion in the use of **biomethane, which is now accounting for 65 % of all the methane gas used in some 28.000 NGVs**. Monthly sales of NGV's have reached in Italy up to 7 % of all new passenger cars sold, and up to 5% share in Sweden. France and Spain, on the other hand, have practically no public network of NG filling stations, but both countries have pushed the use of this fuel in urban trucks and buses, obtaining a very important improvement of the air in the cities. An interesting comparison between an average private car and an urban truck or bus could be: the power of a bus/truck is about 3 times the power of a car (270-300 hp against 90-110 hp). On the other hand a private car is on average used about 2 hours per day, while an urban truck or bus runs between 2 and 3 working shifts, 16 to 20 hours, that is 8 to 10 times higher use. **The consequence is that an urban heavy duty vehicle uses as much fuel as 25 to 30 private cars.**

This simple comparison has to be considered when thinking of the quickest and most effective way of replacing oil derived fuels, without having to build an adequate public CNG refuelling infrastructure. The number of urban buses and refuse trucks running on CNG is already significant in different cities in Europe, with some European Champions like Madrid where the whole refuse fleet (650 trucks) are running on CNG from 2004. The Madrid bus company, EMT, will in parallel by the end of 2011 have 35% of their fleet (700 urban buses, out of 2.000) also running on CNG, having by now 411 units already in service. Once again, we would like to highlight that NG/biomethane technology is mature, economic feasible, and totally available nowadays, with the obvious benefits that these characteristics will bring to the transport sector. **Presently, the 27 EU countries have a total running park of 70.000 urban buses** (Source UITP). From this figure, and without dedicated statistics for urban refuse trucks, we estimate an additional number of 20.000 refuse trucks (30% of total buses number). All this, makes a total **90.000 heavy duty vehicles permanently working in an urban environment**. The total diesel fuel consumption of this urban park would be around 2.000.000 ton per year (assuming 50.000 Km/year and 55 litre/100Km).

**If we now assume that all these heavy urban vehicles would tomorrow run on natural gas, we would have an immediate and very important replacement of diesel oil, independently of any public infrastructure for gas distribution, considering that all those vehicles belong to big fleets with their own filling stations.** This is the reason why we strongly support natural gas as what should be the **European Recommended Urban Fuel.**

***Second Question: To what extent do the supplementary infrastructure measures contribute to the objectives of a future-oriented transport system, and are there ways to strengthen their contribution?***

In respect to the supplementary infrastructure measures (we will only refer to the NG/biomethane infrastructure in this paper), we would like the Commission to consider a possible future situation relating to the need of boosting some fuel infrastructures that will allow the so needed reduction of oil dependency. In that case, it may be logical to think about the need of creation of two NG/biomethane types of infrastructures:

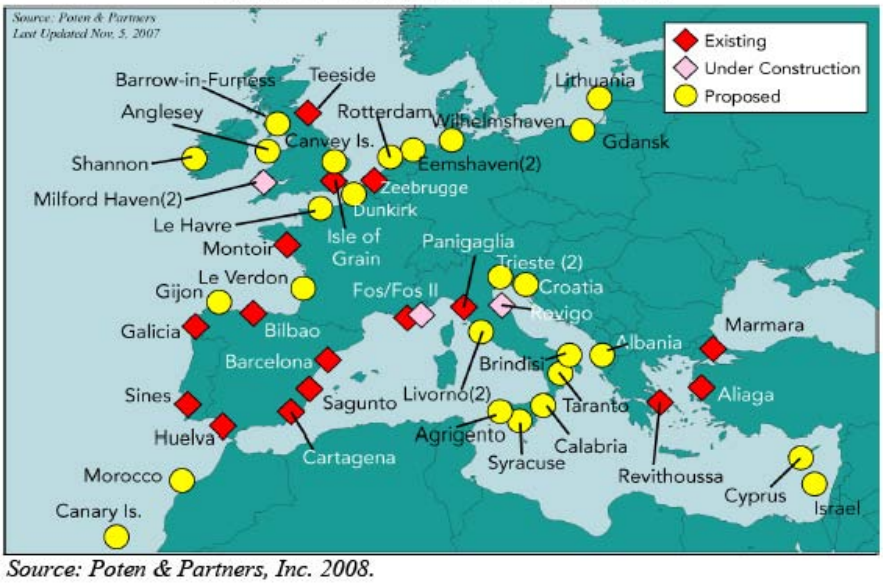
**European mobility**: the European public CNG refuelling infrastructure is today good in Italy, Switzerland, Lichtenstein, Austria, Bulgaria, the Czech Republic, Luxembourg, Germany and Sweden. Most other European countries are taking steps to establish an adequate refuelling infrastructure. The sales of CNG passenger cars for mass market use depend on conveniently located refuelling stations along all major highways and also in the urban areas. The absence of refuelling possibilities in a particular European country will, of course, present a problem for the transit traffic. Denmark, yet without one single CNG refuelling station, is thus a real headache for CNG car drivers travelling between Germany and Sweden. This illustrates the need for a European infrastructure development plan. Until the problem has been solved the cars must be built as bi-fuel vehicles able to run on petrol when no gas refuelling is possible.
In countries yet without significant fleets of NGVs the logical sequence of the introduction of NGV fleets is to start with municipal buses and garbage collection vehicles refuelled at non public fuelling stations at the overnight parking locations. The next step would be to build an adjoining public refuelling station supporting local fleets of taxi cabs and urban delivery vehicles. The dimensioning of the required fuelling stations is a fairly simple matter as we are dealing with known vehicle volumes. It would also be necessary to develop some new legislative acts that cover the standardization of different issues, like the so needed European regulation that would allow for biomethane to be

injected into the gas grid, in the same way that local electricity production is already being put into the grid.

**Medium and long distance road transport**: concerning trucks used in long distance goods haulage there is also a potential for the introduction of vehicles using gas stored in the form of LNG which has a three times higher energy density than CNG (becoming roughly on par with petrol and diesel) and with the possibility to offer an adequate operating range on a full tank. LNG filling stations already exist in the UK, Spain, The Netherlands and Italy, and new stations are already being planned in Sweden and Germany. LNG should be interpreted both as liquefied natural gas and liquefied biomethane. The Swedish City of Lidköping is right now building a large plant for production of liquefied biomethane which will be delivered to L-CNG filling stations.
The supply of LNG for refuelling of heavy duty vehicles running along the main European highways also opens the possibility to introduce so called L-CNG stations where gas is stored as LNG, but where the gas can be distributed both as LNG (pumped from storage to vehicle) or CNG. These stations (see picture) would be supplied via LNG tank trailers and thus need not be located close to a natural gas pipeline.


The use of the L-CNG station concept may in the future help to provide good NG refuelling opportunities at suitable locations along the main European highways, providing fuel both for light and heavy duty vehicles. The illustration below shows some information about existing, under construction, and proposed LNG terminals in Europe. The map also shows the possibility of creating the so called Mediterranean and Atlantic Corridors. This idea would go hand by hand with the so called Blue Corridor Project included in the working programs of UNECE Working Party on Gas and Inland Transport Committee. We therefore believe that a possible TEN-T first step relating this matter could be to establish some initial corridors. This would encourage the use of NG/biomethane technology as a pilot project, and would help solve some of the EU associated traffic problems.

**Figure 2 - European LNG Terminals**




*Source: Poten & Partners, Inc. 2008.*

In addition to the large oil substitution potentials in road traffic there are also huge potentials in shipping and some potential to use methane instead of diesel in rail traffic. To realize these potentials it is, however, crucial to develop the required refuelling infrastructure. The availability of LNG/LBG (liquefied natural gas or liquefied biomethane) refuelling right across Europe in major seaports, along inland waterways, is also essential in order to realize these potentials.

***Third Question: What specific role could TEN-T planning in general play in boosting the transport sector's contribution to the "Europe 2020" strategic objectives?***

NGVA Europe considers that a proper design of the TEN-T planning relating all aspects, but in particular to the need of reducing oil dependence, will help to achieve the stringent and so needed environmental and social goals agreed for 2020 by the European Council in 2007. We believe that there have been deployed too many efforts in the past to permit a gradual introduction of liquid biofuels into the market (mainly as blends of bioethanol with petrol and biodiesel with mineral diesel) but we really need a boost and the introduction of more types of biofuels if we really want to achieve the share of renewable fuels target that we agreed in the past.

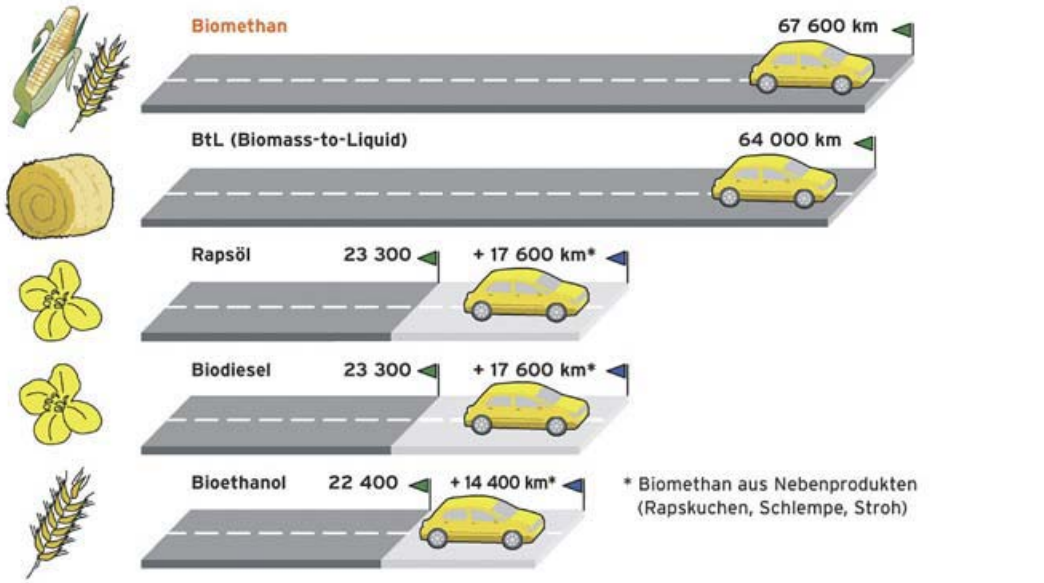
| Fuel / Year | 2005 | 2010 | 2015 | 2020 |
|---|---|---|---|---|
| **Biofuel** | 2% | 6% | 7% | 8% |
| **Natural gas** | | 2% | 5% | 10% |
| **Hydrogen** | | | 2% | 5% |
| **Total** | 2% | 8% | 14% | 23% |

This table shows that the estimations made in 2001 by the Commission for NG are far from being accomplished, because the current share for NG is only 0,4%.

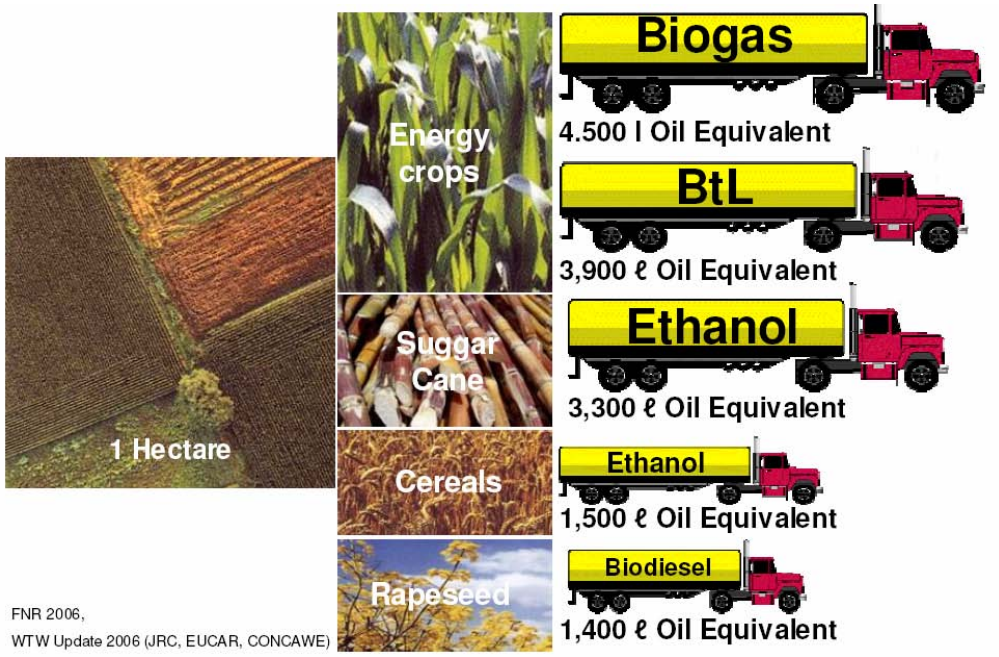
In a recent NGVA Europe study sent to the DG MOVE, we can see that a coarse estimate for the 500 million inhabitants of EU-27 indicates a biogas potential of 68TWh (0,24EJ) from wastewater sludge. Estimates for EU-27 show a theoretical potential of 205TWh (0,72EJ) (*Holm-Nielsen 2008*). Summing up, as much as 453TWh (1,6EJ), not including landfills, could come annually from waste streams. **Energy crops could optimistically add to that figure up to 1.500TWh (5,4EJ)** depending on share of arable land and crop yields.

Moreover, the efficiency of biomethane production has been proved to exceed the efficiency of its competitors (see illustrations below). The production of other (liquid) biofuels is based only on crops, and its land surface efficiency is clearly lower than in the case of biogas. The efficiency of the land devoted to ethanol production, as an average of cereals and sugar cane crops would be 2.400 litre of oil equivalent per hectare. In the same conditions the biogas production reaches 4.500 litre of oil equivalent, which is roughly double. If we apply this 53% land efficiency of bioethanol against biogas production, both coming from crops, the total 1.500 TWh (5,4EJ= 130Mtoe) estimated potential for biogas, would be reduced to some 800 TWh (2,9EJ= 70Mtoe) in the case of ethanol.

If we now take the global estimation of 2.750 TWh (9,9EJ= 238Mtoe) (as an average between 2.000 and 3.500 TWh) for the case of biogas, this quantity is made out of 1.500 TWh (5,4 EJ= 130Mtoe) coming from crops plus another 1.250TWh (4,5EJ= 1.108Mtoe) coming from other sources: sewage, manure, landfills, etc.



If we choose bioethanol instead of biogas we would loose the potential of the waste, sewages, etc and we would also reduce the efficiency of the crops by 47%. **In other words we would obtain 800TWh (2,9EJ= 70Mtoe) instead of 2.750TWh (9,9EJ= 238Mtoe).**




Relating to the questions about promotion, funding and taxation, NGVA Europe would like to stress the very positive influence that public investment will have in fostering private investment, especially in relation to the NG/biomethane technology where the lack of infrastructures is obvious. Just to give an example, we are fully convinced (because of many conversations with the industry itself) that both, the offer and demand of LNG heavy duty vehicles got serious constraints because of the lack of filling infrastructures. Another financing tool that would help the development of the NG technology would be to give incentives to the customers that buy a NGV.

Addressing the issue that most oil companies are not providing CNG/CBG refueling facilities at their retail franchising outlets, another way of promoting future cleaner options for the transport sector, could be to grant permits for building new refueling stations at attractive locations, linked to the condition that the station will offer CNG/CBG refueling.

In this context, it would also be important to consider a maximum EU tax for CNG/CBG to ensure that this fuel option is not taxed out of existence (fuel tax on CNG/CBG in Denmark is far above the EU minimum tax levels and in practise blocking sales of CNG/CBG, thus eliminating Danish refuelling stations, and creating a zone where refuelling is not possible).