



## EUROPEAN NATURAL GAS VEHICLE RESPONSE 15 JULY 2007

### Public consultation on the implementation of the renewed strategy to reduce CO<sub>2</sub> emissions from passenger cars and light-commercial vehicles

The European Natural Gas Vehicle Association (ENGVA) is pleased to present some brief remarks in response to the public consultation on the strategy to reduce CO<sub>2</sub> emissions from passenger cars and light-commercial vehicles.

#### SUMMARY

The natural gas vehicle (NGV) option – both the fuel and the technologies – continues to be relegated as either secondary or insignificant in the potential contribution to reduce global warming emissions and provide increased energy security. This is more-or-less the case in the CO<sub>2</sub> emissions strategy as it is in a number of other recent and current European Commission policy papers and communications on energy, energy security, and the environment.

- The CO<sub>2</sub> emissions strategy says, “LPG and CNG (compressed natural gas) are not considered separately in the Policy Options, which does not prevent their use as a technical solution under the instrument to promote technical progress in M1/N1 vehicles, nor member states from promoting them through fiscal incentives for fuels.”<sup>1</sup>
- A similar view also has been taken in the biofuels strategy of the European Commission where it sets the tone of the attitude toward natural gas (and LPG) in the preamble to the Biofuels Directive by relegating it to a secondary status in comparison to the other alternative fuels. It states: “Increased use of biofuels for transport, *without ruling out other possible alternative fuels, including automotive LPG and CNG*, is one of the tools by which the Community can reduce its dependence on imported energy and influence the fuel market for transport and hence the security of supply in the medium and long term.”

While not excluded, there are few ‘ringing endorsements’ by European Commission policy makers about one of the only potential fuels and technologies that today can

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<sup>1</sup> Section 3.3.9: Commission Staff Working Document accompanying document to the Communication from the Commission to the European Parliament and Council on the review of the Community strategy to reduce CO<sub>2</sub> emissions and improve fuel efficiency from passenger cars and light duty commercial vehicles: Impact Assessment, [COM (2007) 19 final SEC (2007) 61]

achieve lower CO<sub>2</sub> emissions limits in vehicles than any petrol or diesel vehicles on the market. The following series of comments provides background information on natural gas and biomethane as a vehicle fuel as well as addressing ENGVA's principle concerns regarding the development of energy and environment policy of the European Union.

A principle concern of ENGVA and the stakeholders it represents is that European policy is balanced in its approach to being fuel and technology neutral, and in so doing endorses the widest potential ranges of considerations without pre-determining market solutions through generally neutral or negative comments in policy statements such as are illustrated above. The comments below are made with these objectives in mind.

## **OVERVIEW OF NATURAL GAS AS A VEHICLE FUEL**

### **A word about terminology: natural gas and biomethane.**

Methane (CH<sub>4</sub>) is the principle element contained in fossil-derived natural gas. Renewable-derived biogas also is primarily methane. The NGV industry worldwide is adopting the term biomethane to mean raw biogas upgraded for vehicle applications as opposed to much lower energy biogas that is used in large commercial applications or to generate electricity. The term natural gas vehicle (NGV) is used generally to represent methane-powered vehicles and generally includes fossil natural gas and biomethane under the same umbrella.

### **NGV facts**

- Worldwide there are about 6.7 million NGVs supported by a network of 11,500 fuelling stations.<sup>2</sup>
- In Europe there are 820,400 NGVs (548,850 in the EU-27). 82.7 % are passenger cars; 6.8 % are buses; and 10.5 % are trucks. Just over 432,900 of the European NGVs are in Italy.<sup>3</sup>
- Today there are some 65 manufacturers worldwide that produce nearly 300 vehicle models and engines that run on natural gas. In Europe, Citroën, DaimlerChrysler, Fiat, Opel, Peugeot, Renault, and Volkswagen produce a total of 13 different category M1 factory built passenger cars running on NG/biomethane. A similar number of LD/MD commercial vehicles are offered by the same manufacturers, and by Iveco. HD engines and vehicles (buses and/or trucks) are offered by Daimler Chrysler, Ekobus, Iveco, MAN, Scania, Tedom, and Volvo. The branding of these products differs by country, and includes other well-known names such as Evobus, Heuliez, Irisbus, Neoplan, RVI, and Setra. In addition there are so called QVM (qualified vehicle modifier) options available from Ford and Volkswagen.
- Natural gas is one of the cleanest low polluting fuels available today. Used in cars natural gas reduces CO<sub>2</sub> by 20-25% over similar gasoline vehicles. Heavy-duty natural gas vehicles with spark ignition engines reach about the same or slightly lower CO<sub>2</sub> emissions and reduce other harmful pollutants compared to diesel vehicles. Heavy-duty dual fuel vehicles (running on a mixture of methane

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<sup>2</sup> Source: the Gas Vehicles Report (GVR), [www.thegvr.com](http://www.thegvr.com).

<sup>3</sup> Source: the Gas Vehicles Report (GVR), [www.thegvr.com](http://www.thegvr.com); adaptations and calculations by ENGVA.

and diesel) have a CO<sub>2</sub> advantage of around 20% compared to normal diesel vehicles.<sup>4</sup> By 2010, given technology changes in both diesels and NGVs, it is anticipated that spark ignited NGVs will on average produce about 13% less CO<sub>2</sub> than heavy-duty diesel vehicles.<sup>5</sup> NGVs emit almost no particulate matter.

- Natural gas is economical. As a vehicle fuel it is about 30-50% cheaper than petrol or diesel. This is due to a combination of: 1) the cost of natural gas on an energy equivalent basis relative to petroleum fuels; and 2) fuel taxes. The current pre-tax price of Russian H-gas (the assumed marginal source for NG used in Europe) delivered in the form of CNG is, per lower heating value energy unit, only 63 % of the current price of petrol.
- Renewable biogas upgraded to biomethane represents an outstanding opportunity to reduce as much as 100% CO<sub>2</sub> on a well-to-wheel basis.
- Many countries in Europe provide a variety of incentives to support clean fuel vehicles, including NGVs. These range from tax incentives, purchase incentives, special access at train stations and airports for clean fuel taxis, exemption from congestion charges, and many others.

Light duty natural gas vehicles (including light duty commercial vehicles that functionally are made from similar chassis and engines as passenger cars) are among the lowest emission car technologies available today. These vehicles mostly are bi-fuel, running *either* on natural gas *or* petrol. A vast majority of the light duty NGVs worldwide are petrol vehicles that have been converted/adapted to run as well on natural gas. Most of the worldwide vehicle conversions are done by companies specialising in such technology but some (in Europe and the U.S.) are considered as Qualified Vehicle Modifiers (QVM) that convert vehicles with the full support of the original equipment manufacturer (OEM) vehicle, thus are delivering them to the customer as a factory-built vehicle. At this time light duty diesel engines generally are not converted to run on natural gas.

Heavy duty trucks and buses generally are produced by OEMs as dedicated, 100 percent natural gas vehicles. Diesel engines are re-configured as Otto cycle engines to run on natural gas, however, a source of ignition is needed to ignite the natural gas.

There also is *dual fuel* NGV technology available that runs on a variable mixture of diesel fuel and natural gas. At idle these vehicle operate on diesel. As the vehicle accelerates increasingly more natural gas is injected into the engine – in some cases as much as 90% -- while the remaining diesel fuel acts as the source of ignition under the heat of compression, thus retaining the diesel cycle.. The advantage of these vehicles are that their CO<sub>2</sub> output can be some 80% lower than the diesel counterpart over the full drive cycle while there is only a minimal loss of power (6-8%) compared to the original diesel engine.

OEM NGVs are among the best examples of low polluting, reliable vehicles that are transparent with their petroleum-fuelled counterpart. OEMs do not yet produce or sell the quantity of NGVs as they do petroleum-fuelled vehicles so a broad economy of scale is still to develop for NGVs. As such, light and heavy duty NGVs have a cost premium over traditional liquid-fuelled vehicles. However, the price of natural gas generally is 30-

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<sup>4</sup> Taken from various auto-manufacturing sources.

<sup>5</sup> Market Development of Alternative Fuels: Report of the Alternative Fuels Contact Group, December 2003

50% lower than petrol and diesel, offering a decent payback for customers, particularly those driving higher-than-average mileage per year.

## **LOW CO2 ALTERNATIVE FUEL VEHICLES ARE AVAILABLE TODAY AND SHOULD BE 'INCENTIVIZED'**

As indicated above, the average natural gas passenger car can reduce CO2 emissions over a similar gasoline vehicle by 20-25%. Heavy duty NGVs with stoichiometric engines are today at least equal to, or slightly better, in terms of CO2 emissions than their diesel counterparts. This is anticipated to change in favor of NGVs in the near future as more diesel vehicles are equipped with various emissions equipment such as particulate traps, continuous regenerating traps (CRTs) and Selective Catalytic Reduction (SCR) technology. The dual fuel engines, as mentioned above provide a CO2 advantage of some 20 % in comparison with diesel fuelled vehicles (up to 80% on a well-to-wheel basis if fuelled by biomethane).

The European car industry has engaged in a voluntary agreement to reduce CO2 emissions to 140 grams/kilometer by 2008 and to 120 g/km by 2012. Though progress has been made by the OEMs to reduce CO2 emissions it has not been fast enough to suit European policy makers who now have mandated CO2 reductions to 130 g/km by 2012.

The auto industry has responded indicating that such progress will not likely be possible and that achieving 130 g/km for their average fleet of production model vehicles would be possible only by 2015. Meanwhile, many of the major auto manufacturers can achieve the newly mandated limits in one way: by making natural gas vehicles. Mainstream market vehicles running on natural gas are available today that achieve 114 to 119 g/km CO2. Manufacturers of larger luxury vehicles are today achieving 138-140 g/km CO2. (see Annex 1). ENGVA believes that one strategy that should be pursued by the European Commission is to reward manufacturers of NGVs with special dispensation or 'credits' toward their overall CO2 targets for building and selling vehicles running on natural gas. This would help mainstream NGVs and build a stronger market base to achieve economies of scale that would dramatically reduce the price differential between NGVs and their petrol counterparts. Complimented by a stronger developing fuelling infrastructure for compressed natural gas (CNG) throughout Europe, this development would clearly be a strong incentive for vehicle manufacturers to add more NGVs to their product mix and to more rapidly achieve the mandated CO2 reductions.

It is important that EU policy makers, along with vehicle manufacturers and the petroleum industry, move away from the traditional status quo thinking about liquid fuels dominating the transportation market. Coupled with increasing influence from the agricultural sector's interest in promoting bio-liquids, EU policy makers should focus on a more flexible approach to replacing petroleum fuels in the market by using low-CO2 fuels and technology such as NGVs. Policy mechanisms to reward vehicle manufacturers for building and selling NGVs into the market would clearly help break the existing cycle of higher CO2 emitting vehicles dominated by liquid fuels.

An interesting option is the introduction of so called 'hythane', a mixture where some hydrogen is added to the NG/biomethane supplied at the fuelling stations. 'Hythane' could be seen as a premium grade gas with improved burning characteristics that will further reduce the already very low emissions and at the same time would

enhance the engine performance. The supply of 'hythane' could be arranged via small reformers installed at the forecourts.

## **REGULATORY BALANCE AND EQUITY RELATED TO CO2 AND GLOBAL WARMING POTENTIAL IS ESSENTIAL**

Methane has been under consistent disadvantage compared to other fuels and emissions since it is a global warming gas. Certain regulations and policies have been skewed against natural gas in favour of traditional fuels, and this policy imbalance must be corrected so that all fuels and emissions are viewed on a level playing field.

### **Methane as a Gaseous *Pollutant***

The original European Council Directive 96/62EC on Ambient Air Quality Assessment and Management lists 13 pollutants, but not methane. Then in 1999 methane was defined as a *pollutant* by the European Commission (88/77/EEC amended by 1999/96/EC). Since then methane has become a legally regulated emission since it is considered as a green house gas. On the other hand, CO<sub>2</sub> as well as nitrous oxide (N<sub>2</sub>O), which are both global warming gases, are not identified as pollutants. As such, they currently are not among the regulated emissions for motor vehicles.

Methane is an inert, naturally occurring substance that is one of the fossil fuels created over the millennium from deterioration of organic substances. It also can be manufactured as a renewable energy source from a variety of materials including agricultural waste products, sewage or biodegradable urban garbage. Methane is not a product of combustion nor is it a product of a chemical reaction. Methane is not reactive in the atmosphere to create smog. It is, however, an *emission* from the tailpipe of an NGV yet it is relatively infinitesimal compared to naturally occurring methane emissions from rice fields, termites, cows, swamps, etc.).

A study presented by the TNO on October 31, 2006, states that N<sub>2</sub>O emissions from LD petrol vehicles converted to CO<sub>2</sub> equivalents are around 0.5 g/km and for diesel vehicles about 1.5 g/km. As a comparison tailpipe methane emissions, expressed as CO<sub>2</sub> equivalents, from a LD NGV is legislated to be below 2 g/km. Thus the GHG effect of the small methane emissions is not larger than the effect of N<sub>2</sub>O emissions from a diesel vehicle.

In the U.S., the Clean Air Act Amendments of 1990 (Public Law 101-549) includes a list of *190 hazardous pollutants* but methane is not on the list. According to the definition of a pollutant, "a poisonous chemical harmful to the health of living creatures and plants," methane is not a pollutant.

Both CO<sub>2</sub> and methane are, however, due to their *physical* characteristics, considered as greenhouse gases. Legislating methane as a pollutant has led to the establishment of methane emissions limits for vehicles. (I realize that you are writing this to please the retrofit people, but I think it would be better to avoid this statement). Ironically, vehicle manufacturers do not want CO<sub>2</sub> listed as a pollutant or otherwise treated as a regulated emission. Yet CO<sub>2</sub> is a serious global warming pollutant that, unlike methane, is a product of human activity such as driving petroleum-fuelled vehicles, generating electricity, etc. Since NGVs emit 20-25% less global warming gases than the state-of-the-art petrol vehicles, it is a policy paradox that the EC identifies only methane

emissions from NGVs in regulations as a global warming pollutant. This imbalance needs to be corrected so that the regulations are more consistent.

### **Regulating Emissions by their Global Warming Potential**

The best alternative in this regard would be to regulate emissions as to their Global Warming Potential (GWP) in a 'bundle' of emissions, similar to what is done with volatile organic compounds (VOCs) or hydrocarbons. This would provide regulators with a fuel-neutral, technology-neutral mechanism to quantify the total GWP and still recognize each individual emission's contribution to global warming (i.e. methane is 21 times more potent a greenhouse gas than CO<sub>2</sub>).

## **DEVELOPMENT OF ENVIRONMENTALLY ENHANCED VEHICLE (EEV) LABELLING FOR CONSUMERS AND POLICY MAKERS**

### **Support for a Process/Standard to Identify Environmentally Friendly Vehicles (EFVs)**

Since 1995 ENGVA, has been promoting the concept of an Environmentally Enhanced Vehicle (EEV) standard as a 'fuel neutral', ***non-mandatory target*** emission standard that can be used to label vehicles as environmentally friendly or 'clean.' The concept was based upon the need to have a 'clean vehicle label' so that policy makers developing incentives would have a quantifiable method of determining what a 'clean vehicle' was in comparison to all available vehicles. Additionally, it was seen as an opportunity for vehicle manufacturers to advertise the fact that they were able to achieve lower levels of emissions reductions than the existing regulated levels. The emissions levels would be difficult to achieve with the current petroleum or diesel vehicles but are achievable for cleaner alternative fuels such as natural gas and LPG. ENGVA considered this to be a way to motivate increased interest in non-petroleum, environmentally advantageous fuels.

ENGVA introduced this concept and EEV limit values to the Motor Vehicle Emissions Group in 1996. After a lengthy consensus-building process at the European Commission involving a variety of fuel and vehicle stakeholders, the Heavy Duty Emissions directive (1999/96/EC) was amended in 1999 to include EEV limit values (which also included the introduction of a Non-Methane Hydrocarbon Standard –NMHC), but only as a target standard and not as a regulatory requirement. At the time the target standard was based upon the next level down (i.e. Euro 5/6) emissions levels. There were concerns among vehicle manufacturers that proposing such an EEV would be the cause of lower levels of emissions regulations. ENGVA argued that the lower levels eventually would come, with or without an EEV. Setting a target earlier would have a beneficial effect on vehicle manufacturers who could achieve the targets and for consumers who could purchase EEV vehicles. Indeed, manufacturers such as IVECO and MAN to advertise their natural gas engines as 'low emission' technology used the heavy duty EEV target standard. So the concept has proven effective.

From a policy maker perspective vehicles labeled as EEVs can be offered *exemptions* from congestion charges (as is done in the UK and Sweden) or be provided with access to downtown areas during days when gasoline and diesel vehicles have

limited access in downtown areas on certain due to high pollution levels (as is done in over 14 cities in Italy).

ENGVA also advocated the development of an EEV standard for light duty vehicles. In 1999 Sweden wanted to include a standard for CO<sub>2</sub>. Ultimately the light duty EEV was stalled due to industry concerns about the regulation of global warming gases, and particularly CO<sub>2</sub>. The auto industry argued that the voluntary agreement to reduce CO<sub>2</sub> would be effective in motivating industry to take action in the absence of regulations or mandates.

ENGVA has again advocated the use of target standards for Euro 5 and Euro 6. Currently ENGVA is not advocating specific limit values until a thorough investigation of vehicle manufacturers and technology options can be made to determine the next lower level of challenging but achievable emissions to be attained. From the perspective of energy security, these levels should challenge petroleum-based fuels and technologies in favor of alternative fuels and renewable fuels.

The European Commission does not show itself to be enthusiastic toward, the notion of an EEV in either light or heavy-duty vehicles. There is no EEV concept in the Euro 5 regulations and, to ENGVA's knowledge, there are no plans to introduce EEV standards as targets within the developing Euro 6 regulations. ENGVA fears that the concept is likely to die with the current generation of heavy duty standards/regulations unless new wisdom is brought to the table that can advocate a *target standard* (not a regulation) that does not threaten to vehicle manufacturers and would not motivate for future reductions in emissions regulations.

### **Other EEV Concepts**

There are a number of other publicly available, unofficial schemes that are used to rate a 'green' vehicle. Most are used to assist consumers in their decision to purchase a new, environmentally sensitive car. None of them have been legislated but remain *de facto* measures. As in the creation and support for appliance labelling, a technically sound, practical environmental label or rating of vehicles can be legislated into practice or, alternatively, can be established as a *standard* to be codified by countries wanting to have a mechanism to determine the environmental 'quality' of different vehicles.

The European Commission funded project Cleaner Drive identified some of the existing 'clean car labeling schemes.' It also created a vehicle-labeling scheme for consumers that could be as a public policy instrument in 2004. The result of this project was, however, not adopted. It should be re-visited to determine if it could be an effective tool as a consumer-labeling scheme and/or to help identify what vehicles are low-emission vehicles. The European Commission should take stock of past investments in such projects rather than relegate them to the shelf or, worse, recreate them because the initial projects have been forgotten.

The need to have an EEV is clear. Many countries throughout Europe are developing incentive schemes to help motivate cleaner more efficient transportation technologies. These include, for example:

- Free parking in municipal parking lots and special access lanes at airports and train stations for clean fuel vehicles, as has become popular in many cities in Sweden to help promote low-emission vehicles.
- Reduced taxation (registration fees, fuel taxes, or vehicle use charges) in Germany, Italy, Austria, etc. for 'clean fuel vehicles' such as NGVs.
- Subsidies for early adopters/purchasers of clean fuel vehicles (German 1000 vehicle taxi program)

## CO2 REDUCTION AND BIOFUELS: LIQUIDS AND GASEOUS

Biogas from renewable sources such as urban waste, agricultural waste and sewage presents an opportunity and potential to replace as much as 20% of the fuel from the transportation sector by 2030. Unfortunately, the current view of biogas by European policy makers does not recognize the combined benefits of this renewable fuels strategy that also addresses other severe problems within the EU related to water quality management and urban/agricultural waste management. The current EU strategy regarding biofuels for the transportation sector focuses almost exclusively on liquids, and a variety of recent (2007) communications has caused confusion as to whether the EU policy is actually balanced for all biofuels or remains a liquids-only policy.

In addition to biomethane produced via anaerobic digestion of waste (or crops) yet another option is now attracting large interest. It is possible to gasify cellulosic forest industry waste, producing hydrogen, carbon monoxide and methane, and in a second step to convert all of this synthetic gas to methane. A pilot plant in Güssing, Austria, has already demonstrated superior efficiencies, and the ongoing Swedish 'Gobigas' project aims to introduce in 2011/2012 a large scale (80 million Nm<sup>3</sup>/year) plant for production of biomethane from forest industry waste. The target is that 70 % of the energy content in the waste will be recovered as biomethane, 20 % as heat used for district heating or warm water supply, and only 10 % consumed in the process. The efficiency numbers for other currently suggested so called second generation biofuels – either ethanol or synthetic diesel - are far below this level.

The EU is supporting binding targets to replace 10% of liquid biofuels in gasoline and diesel by 2020, but the clear emphasis has been on *blending* biofuels in petroleum fuels. The Biofuels Directive for Renewable Fuels in Transport – 2003/03/EC – 'does not rule out other alternative such as compressed natural gas [CNG]' but *emphasizes* ethanol and biodiesel blending. ENGINA wants to ensure that the EU approach, as stated in the 2003 Market Development of Alternative Fuels report, is to *replace* 10% of the petroleum fuel in the transport sector with natural gas and even more if renewable biomethane were included. If the Commission supports and promotes a broad, renewable biofuels *replacement* policy treating biomethane equitably, 25 million or more NGVs supported by a fuelling network delivering compressed methane gas could be traveling throughout the EU by 2020. If the Commission continues on what now appears to be binding targets to *blend* biofuels in gasoline it could thwart the further development of biomethane as a vehicle fuel. Such a development could have unintended results on the future of food crops, land use, fuel prices and other impacts.



## **Biogas Is Not Just For Electricity Generation**

The EU view of biogas as a fuel for electricity generation has been consistent and somewhat single-minded. Biogas for vehicles has not been advocated by the European Commission because biogas must be upgraded to pipeline quality and, therefore, it has been said that this requires too much effort to be used as a vehicle fuel. Indeed the Commission has promoted the use of biogas for electricity generation and this has resulted in some Member States following this lead to the detriment of communities wanting to use biogas as a vehicle fuel. This approach sets a precedent that already is causing market disruption for biogas as a vehicle fuel, further hampering the attainment of targets set by the EU for the use of biofuels in vehicles.

The same factors that provide an opportunity for liquid biofuels also provide the main obstacles to the development of, in particular, non-liquid biofuels, and specifically biogas/bio-methane as well as liquid petroleum gas (LPG). Coupled with the view that biogas should be used as an electric generation fuel and not in vehicles is among the largest obstacles faced by supporters of biomethane for vehicles. It is unfortunate that two European directives, the Biofuels Directive and the directive concerning RES electric power, compete to some extent for the use of the same resource. The outcome often is that any production of biogas is used for power, due to heavy subsidies. Ironically, less efficient production of liquid biofuels is simultaneously supported via obligations and various subsidies.

Many countries now offer subsidies for production of renewable electric power using biogas-to-biomethane. The most recent policy in the Netherlands illustrates how the subsidisation of biogas as an electric generation fuel but not as a transportation fuel can grossly distort the potential to achieve the EU targets for renewable energy.

The Dutch government has, in recent years, subsidised electric power generation from renewable resources at a rate of €0.10 per kWh. 1.5 Nm<sup>3</sup> of biogas with 67 % methane content has a lower heating value of 10 kWh. If used to generate electricity at (approximately) a 30 % efficiency rate, yields 3 kWh electric power. At €0.10 per kWh this yields €0.30. The same 1.5 Nm<sup>3</sup> of biogas, purified into biomethane, has an energy content of 10 kWh. One Nm<sup>3</sup> of biomethane supplied as a vehicle fuel does not, however, receive a corresponding incentive of €0.30 although providing superior environmental performance. Hence, in this example, the functional result of the Dutch policy would be to destroy the market for biogas-to-biomethane as a vehicle fuel because its use is subsidized for electricity generation and not equally for transportation applications.

The City of Haarlem was part of the European Commission-funded BiogasMax project but was forced to cancel their plans to produce biogas for vehicles and drop out of the project due to an unanticipated result of the Dutch government policy. This is because the company that would have received financial support to upgrade the biogas to biomethane now found it more economically attractive due to the subsidy to instead just provide the biogas for the electricity-generating sector. Thus Haarlem lost an opportunity to receive over €400,000 to promote cleaner energy for the transportation sector.

Confronted with the imbalance caused by their policy, NGV stakeholders approached the Dutch government to amend the policy by also including biogas as a

transportation fuel within their subsidy program. The Dutch government responded instead by removing the subsidy for biogas as an electricity generation fuel, thus returning the 'balance' in its policy and leaving biogas without further subsidy for either electricity or transportation purposes.

In Sweden, without heavy subsidies of biogas used for power generation, biomethane today accounts for more than 50 % of all methane gas used by a fleet of NGVs, which now exceeds 13,000 vehicles.

### **Consider the Integrated Solution to Multi-faceted Problems: Biomethane**

The analyses supporting the CO<sub>2</sub> and emissions reduction policy has not considered the multiple benefits of using biomethane as a vehicle fuel. It is the larger picture that makes biomethane an attractive option. Biomethane in vehicles is an 'environmentally-closed-loop' solution to a number of existing problems associated with urban and agricultural waste management, clean water (using the sewage from the water purification process) and cleaner air. Even the residual materials that are left over from the gasification process can be used to replace chemical based fertilizers for the agricultural industry and a variety of other purposes. The EC should recognize the benefits of upgrading biogas into biomethane for use in vehicles and broaden the view that biogas should be used predominantly for applications such as electricity generation. Further research into the range of potential feedstocks and improvements in the energy yield of these sources should be explored. The cost/benefit strategy of building an urban waste management infrastructure for biogas/biomethane has not been given adequate attention compared to efforts supporting liquid biofuels.

### **BALANCING EUROPEAN ENVIRONMENTAL AND ENERGY POLICIES**

The European environment and energy goals – energy security, emissions reduction, and economical, competitive solutions – must be balanced to take advantage of the widest variety of energy supply options available for the energy consuming sectors. Since the transport sector is one of the largest energy consuming sectors, and the one responsible for some of the highest percentages of air pollutants including global warming gases, drivers – both commercial sector and private commuters – need to have realistic, economical options. European policy makers must think in broader terms than just a liquid fuel paradigm, particularly if they believe that the ultimate 'energy end-game' will rely on a so-called hydrogen economy. Methane fuel – natural gas or renewable methane – is a key factor in diversifying the transportation fuel mix. Methane-fuelled vehicles are an opportunity for traditional fuel suppliers to offer an environmental-friendly alternative at the fuel station and still make a profit. Natural gas and biomethane as a transportation fuel provide a logical pathway to the future and should not be considered more seriously by European policy makers.

It is possible to achieve energy diversity without sacrificing the environment. Developing environmental and energy security policies need to be done in a wise and balanced manner to avoid the elimination of high potential options such as methane – renewable or fossil – in the transportation sector.

**ANNEX I**  
**LOW CO2 VEHICLE AVAILABILITY USING NGVs**

	<b>OVERVIEW NGVs</b>					
	<b>Fiat Panda Natural Power</b>	<b>Fiat Punto 1.2 8V Natural Power</b>	<b>Mercedes E200 NGT</b>	<b>Peugeot Partner Premium Bivalent 75</b>	<b>Renault Kangoo</b>	<b>Volvo V70</b>
<b>Power train</b>	Monovalent	Monovalent	Monovalent	Bivalent	Bivalent	Bivalent
<b>Engine</b>						
<b>Cylinder volume</b>	1.242 cm <sup>3</sup>	1.242 cm <sup>3</sup>	1.796 cm <sup>3</sup>	1.360 cm <sup>3</sup>	1.598 cm <sup>3</sup>	2.435 cm <sup>3</sup>
<b>Max. power output EU</b>	Natural gas 38kW (52PS)	Natural gas 38kW (52PS)	Natural gas 120kW (163PS)	Natural gas 50kW (68PS)	Natural gas 60kW (82PS)	Natural gas 103kW (140PS)
<b>Fuel consumption</b>						
<b>Natural gas</b>	4.1kg/100km 6.4m <sup>3</sup> /100km	4.4kg/100km 6.7m <sup>3</sup> /100km	6.3kg/100km	5.2kg/100km 8.7m <sup>3</sup> /100km	5.8kg/100km	7.2kg/100km
<b>Range in natural gas</b>	300 km	250km	300km	190km	220km	270km
<b>Emission</b>						
<b>CO<sub>2</sub> emissions</b>	<b>114g/km</b>	<b>119g/km</b>	<b>140g/km</b>	<b>119g/km</b>	<b>119g/km</b>	<b>138g/km</b>
<b>Pollutant class</b>	Euro 4	Euro 4	Euro 4	Euro 4	Euro 4	Euro 4
<b>Dimensions</b>						
<b>Luggage boot</b>	190 l	Max. 1590 l	NA <sup>6</sup>	NA	NA	Max. 1820 l
<b>Natural gas tank fuel capacity</b>	13kg	11kg	18.5kg	12kg	13kg	21kg
<b>Available from</b>	€13.340,-	€13.400,-	€42.688,-	€14.670	€14.670,-	€24.902,80

For further questions or information please contact:

Dr. Jeffrey M. Seisler  
Executive Director  
European Natural Gas Vehicle Association  
813A Kruisweg

<sup>6</sup> NA = information is not available.

Hoofddorp 2132NG  
The Netherlands  
Tele: 31.23.554.3050  
Fax: 31.23.557.9065