

Working paper No. GFV-04-08

GRPE Informal Group on Gas-Fuelled Vehicles,
4th meeting, 13 January 2009, Agenda Item 7.

RATIONALE FOR THE DEVELOPMENT OF A NON-METHANE HYDROCARBON REGULATION FOR NATURAL GAS VEHICLES

Informal Group on Gaseous Fuel Vehicles (GFV)

United Nations

Palais Nations, Geneva

13 January 2009

Presented by:

Jeffrey Seisler

on behalf of:



NGVs have an undisputed role in reducing vehicle emissions (over petrol and diesel)

- 85% reduction in ozone forming hydrocarbons
- 20-25% reduction in CO₂ over petrol; less for diesel today but improving as diesel exhaust strategies become more complex
- No (measurable) PM-10
- Significantly reduced NO_x
- Very low CO
- Much lower (generally) unregulated emissions
- (OEMs often 'benchmark' their clean vehicles "as clean or cleaner than an NGV!")

Total Hydrocarbons (THCs) Remain an Issue

- NGVs tend to have higher THCs than petrol vehicles (up to 150 mg/km vs ≥ 100 mg/km)
- Hydrocarbon ozone precursors are ~15% of the THC (i.e. the non-methane fraction)
- Methane catalysts add about €200- €300 to the vehicle costs but for only a marginal improvement in reducing HC ozone precursors
- An NMHC alleviates the additional cost and does not result in significantly higher atmospheric pollution

Impact on NGV Development

- UN adoption in Reg.115 of THC presents major barrier to aftermarket NGV systems manufacturers and installers since they cannot easily (or at all) achieve the THC limit value.
- Methane catalysts are not practical for non-OEMs (cost/technology, etc.).
- Without NMHC, aftermarket NGV systems are no longer possible.
- Since 90-95% of world NGVs (~9.4 mil) are retrofit, the THC can effectively kill the NGV market.

Regulatory Background

World View

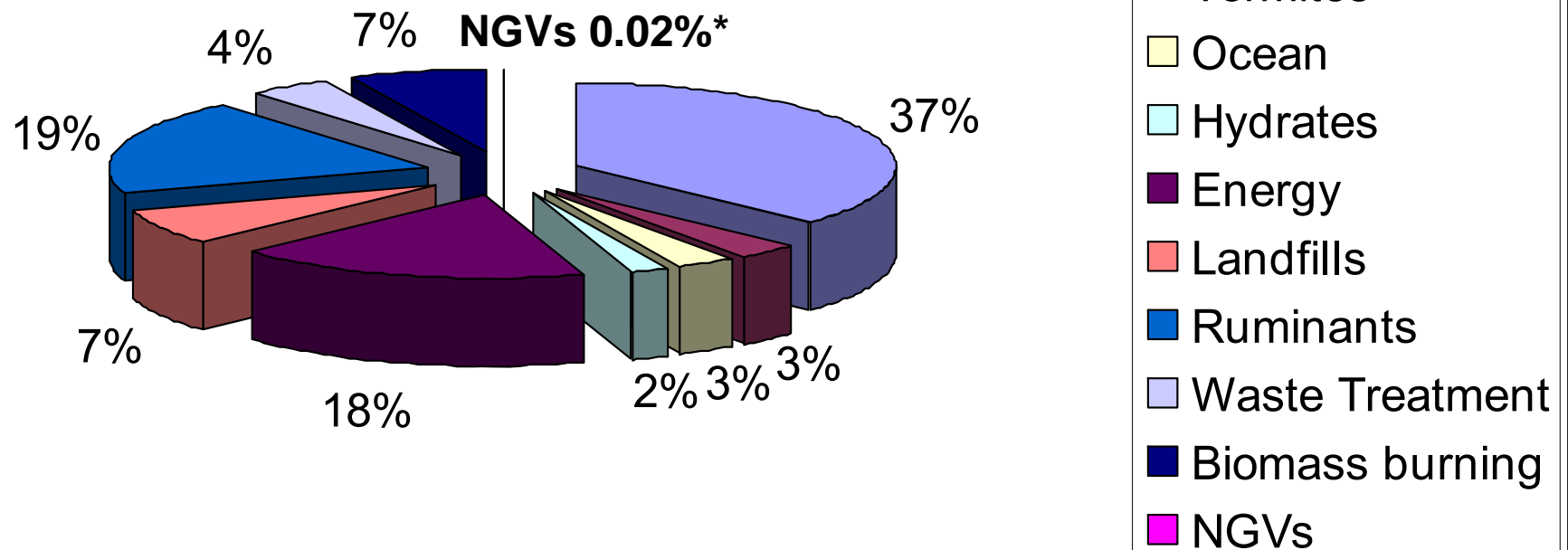
- US Clean Air Act Amendments 1990 includes NMHC
- California shortly thereafter adopts Non-methane Organic Gas regulation (NMOG)
- Japan measures HC as NMHC
- Europe in 1999 adopted an NMHC for HDVs as part of the Environmentally Enhanced Vehicle (EEV) target standard (not regulation) but failed to do so for LDVs

Policy makers point to NGV methane emissions as a significant greenhouse gas contributor

Methane Sources & its Impact on the Environment

- The global world emissions of CH₄ 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** (TgCH₄/year). (Wuebbles 2002/IPCC 1995/US EPA)

Sources of Total Annual Global Methane Emissions**



**Based upon 60 mil. NGVs in 2020; Jan. 2009 = 9.4 mil*

Methane Sources & its Impact on the Environment

- Hydroxyl radicals (OH), a sink for atmospheric methane, accounts for absorbing/destroying approximately 500 TgCH₄/year, about 85%-90% of worldwide methane emissions in the troposphere.
- About 30 TgCH₄/year, or about 5% is removed through dry soil oxidation.
- About 7% of global methane is transported to the stratosphere (IPCC 1996/Wuebbles).
- Only about 10% of the total ozone exists in the troposphere.

One US Study Claims CH₄ contributes to tropospheric ozone and causes death*

- European Commission, 30 March 2006 produces a *Science for Environmental Policy* briefing paper using the study title and directly quotes:
- “A recent research has explored the impact of methane mitigation on the atmospheric levels of ozone, an air pollutant associated with premature mortality. The results show that a 20% reduction of current methane emissions that could be achieved by 2010 could prevent up to 30,000 premature mortalities globally in 2030.”

*West, Jason, J, Arlene M. Fiore, Larry W. Horowitz, and Denise L. Mauzerall, “*Global Health Benefits of Mitigating Ozone Pollution with Methane Emissions Controls*,” communication by James E. Hansen, Goddard Institute for Space Studies, New York, NY, January 11, 2006.

What the study says, but the Commission does not

- The authors state, “Important uncertainties in this study lie in the relationship between O₃ and mortality, and between CH₄ emissions and global surface O₃ concentrations.”
- Since 2006, Commission officials have pointed to this single study as one reason to be sceptical about creating an NMHC.

Other authoritative studies of atmospheric chemistry draw some similar conclusions but caveat their results as not being a rationale for developing policy*

*“The atmospheric concentration of methane has increased dramatically over the last century and continues to increase. While budget and isotopic analyses have confirmed the important role being played by human activities in largely causing this increase, there remain significant uncertainties in understanding the emissions from various sources and their changes over time. **The uncertainties in the changes occurring in the sources and sinks of methane limit the ability to determine meaningful policy relating to methane with respect to concerns about climate change.**”*

* Wuebbles, Donald, J. and Katharine Hayhoe, “Atmospheric Methane: Trends and Impacts,” Department of Atmospheric Sciences, University of Illinois, Urbana, IL, 2006.

Some Perspective on Methane Emissions

In 1989 the U.S. EPA noted the methane contribution of livestock, and were considering ways to regulate their “emissions”



Methane Emissions: Cows versus Cars - Germany

15 million
German Cows =
788,000 tons/year
methane



=

42.8 million* German
Natural Gas
Passenger Cars
Driving for 8.9 years
0.2 g/km methane output

*(2000; 2007 = 41.2 mil)



Opel Zafira



Volvo S80



Fiat Marea



Fiat Multipla

Methane Emissions: Cows versus Cars - Netherlands

4 million
Dutch Cows =
214,000 tons/year
methane



=

5.2 million* Dutch
Natural Gas
Passenger Cars
Driving for 15 years
0.2 g/km methane output

*(2000; 2007= 7.6 mil)



Opel Astra



Renault
Twingo



Honda Civic



BMW

Summary & Conclusions

- Methane is an ozone precursor but generally in the stratosphere, where it has some benefits.
- Methane from cars is an infinitesimal fraction of what is emitted from natural and man-made sources.
- Europe should harmonize its emissions regulations with other leading countries (especially the US & Japan).
- Technology forcing regulations can help reduce pollution. Regulations should not, however, force proven clean fuel technologies out of the market.
- Regulation 115, current and future versions, should include an NMHC (which requires rethinking of Euro 5/6)



International Association for Natural Gas Vehicles – IANGV

Representing and in consultation with

ALGNV (Latin America)

ANGVA (Asia-Pacific)

NGVA Europe

and

national NGV associations worldwide

www.iangv.org

Brett Jarman

Executive Director

bjarman@iangv.org

Martin Siefert

Vice President – Govt and International Affairs

m.siefert@svgw.ch