The European Association of Internal Combustion Engine Manufacturers

EUROMOT

EUROMOT POSITION

23 September 2013

20 YEARS Promoting Engine in Society

Large Combustion Plants BREF D1 (DRAFT) – BAT AELs for GAS Engines

1. Introduction

The first draft of the revised Large Combustion Plant BREF draft (LCP BREF) was released by the EIPPC Bureau in Seville end of June 2013 for commenting by the Technical Working Group members.

EUROMOT welcomes the opportunity to provide comments into the process. However, the issues are complex and the draft D1 is very extensive making it difficult to meet the deadline.

A BREF revision based on a single draft procedure is only possible if the information provided for the first draft is complete, correct and unambiguous. In the case of gas fired internal combustion engines we are confronted not only with a revision but with proposals for new BAT associated emission levels (BAT AELs) which do not exist in the LCP BREF from 2006.

EUROMOT has identified a number of fundamental issues in the draft LCP (D1) regarding the data and the derived BAT conclusions which need addressing. Furthermore, many important parameters such as engine loading, operational profiles, annual operating hours/year and availability of necessary abatement technology as well as the necessary space for retrofitting have so far not been adequately taken into account, further complicating the work.

EUROMOT urges EIPPCB to adopt a procedure based on two drafts for the LCP BREF in order to take in to account the complexity of the LCP BREF and to ensure a sufficient quality of the final LCP BREF.

2. BAT Conclusions – Chapter 10

In chapter 10 of the draft LCP BREF document, BAT associated emission levels stated to be **generally applicable to the combustion** gas in reciprocating internal combustion engines (RICE) are given. In the following we will comment the individual sections.

<u>NMVOC BAT AELs (LCP BREF D1 Table 10.29)</u>

EUROMOT is very concerned that BAT AELs for NMVOC (**N**on**M**ethaneVolatile Organic Compounds) are set too low and do not constitute BAT for lean burn type gas engine (spark ignition and dual fuel). Furthermore, EUROMOT questions the logic of setting BAT AELs for NMVOC for following reasons:

1. NMHC emission from a lean burn gas engine without oxidation catalyst is related to the natural gas composition (i.e. a "**fuel related emission";** see reference /1/). Calculated NMVOC emission values (see Annex 2) indicate strongly that the reported NMVOC (NMHC) values are erroneous.
2. Light hydrocarbons such as ethane and propane are very difficult to reduce with commercially available oxidation catalysts /2/ (UNECE Guidance paper page 261 footnote 21).
3. The underlying data for the NMVOC emission values listed in table 7.7 are not of sufficient quality for setting universally applicable BAT AELs which will later be used for permitting: Some measurement data is only partly verified or no information of the measurement methods used are given (for further details see Annex 1).

In our opinion, a fuel gas composition dependent emission component such as NMVOC (NMHC), for which no viable durable secondary abatement technique exists yet on the market for its main constituents ethane and propane /2/ should not be regulated within a strict range. Especially, as the gas industry under mandate from the European Commission is working on allowing large variations in the gas composition in future. This policy will affect engine performance including emissions (as well as the CH4/HC ratio of the gas; see reference /7/, /8/). The emission data collected is based on today's pipeline natural gas qualities but this may change considerably in the future !

With formaldehyde (HCHO) a good surrogate exists to achieve the aim of the NMVOC BAT AEL in an improved way. According to the current BREF LCP (2006), a BAT AEL of 23 mg/Nm3 HCHO at 15%O2 is achievable. Using formaldehyde as a surrogate is also current regulatory practice. For example, TA Luft uses Formaldehyde; alternatively, the U.S. SI NESHAP RICE ruling uses CO as a surrogate for formaldehyde in what is arguably the simplest/most practical should be to regulate only the CO component)

EUROMOT therefore urges the EIPPC Bureau to replace the draft BAT AEL for NMVOC with a BAT AEL for formaldehyde (HCHO). The current proposed NMVOC range is too low and not achievable for lean burn type gas engines. Note also above text about future changing natural gas qualities and impact on NMVOC emissions.

CH4 BAT AELs (LCP BREF D1 Table 10.29)

The CH4 BAT AEL range appears to be based mainly on a flawed study from the Netherlands from 2009 (see reference /3/) and the drawn conclusions are too optimistic and not correct. The measured emission span in the field is much broader (see reference /5/) and e.g. in paper /6/ it is shown that no viable abatement technique exist today on the market despite intensive R&D work conducted by the engine and catalyst manufacturing industry for many years.

As is explained in Annex 3 in more detail, an updated version of the Dutch study with new data exists as well as a Danish study. From this data we conclude that for a **modern new standard lean burn gas SG-type** engine the BAT CH4 range is for a bigger engine unit up to 600 mg/Nm3 (15 % O2) calculated as C at full engine load (MCR) when operating on current Dutch pipeline gas quality. However, this BAT AEL does not apply to dual fuel engines (DF), as DF type gas fired lean burn engine type hydrocarbon measurement data is NOT included in the Dutch nor in the Danish field measurement reports, thus for the DF a separate approach should be applied than for the SG.

EUROMOT strongly recommends setting a BAT AEL for CH4 of 600 mg/Nm3 (at 15% O2, calculated as C at maximum continuous rating) for new SG engine types. The current proposed CH4 values are set too low and are not achievable for lean burn type gas engines.

For the existing SG-fleet a BAT AEL of 560 mg/Nm3 at 15% O2, calculated as C at maximum continuous rating (MCR) with efficiency correction upwards/downwards starting from 30 % electrical efficiency should be used when operating on pipeline gas quality. We propose a similar limit as for the existing SG fleet above for new and existing DF type gas engines. To be remembered is that above stated CH4 emission limits are with good quality pipeline gas delivered today to the plants, if future gas qualities (EASEE gas) will have big negative impact on the engine performance emission limits have to be revised.

NOx and CO BAT AELs and NH3 measurements (LCP BREF D1 Table 10.28)

In table 10.28, NOx draft BAT AELs for new and existing gas engines are given. These seem to be similar to those in current LCP BREF (2006; /9/ chapter 7.5.4) for lean burn gas engines. The gas engine industry expressed **strong deviating split views** to these BAT ranges which can be seen below table 7.36 /9/. The NOx, CO limits in the IED 2010/75/EU are based on the upper BAT range of CO, NOx figures in current LCP BREF for lean burn gas engines. **Upper value of NOx BAT AEL range (75 mg/Nm3 (15 % O2)) is challenging and in practice achievable only by utilizing SCR aftertreatment and not by primary methods as indicated in section 7.5.4 /9/ where lean burn approach alone is also deemed as BAT !**

Note that the EASEE GAS Directive impact on emissions (more information in below texts), see e.g. possible impact on DF engine NOx in source /11/. Text in header of table 10.29. of the BREF D1 shall be corrected to "of natural gas in SG and DF type engines" for consistency. Gas Diesel Type Engines (GD type) shall have own BAT limits. In text above table 10.28 an ammonium slip figure of < 3 mg/Nm3 is stated, this is a too low figure in the long run from a SCR, shall be raised to at least 10 mg/Nm3 (15 % O2) for long term compliance (see e.g. limit in Germany).

Note ! NH3 measurement are difficult and a single small cold spot may absorb all NH3 and lead to too low NH3 results. Actual NH3 level depends on tuning of SCR at the moment of measurement, so the results have no value if they are not paired with the actual NOx emission at the moment.

EUROMOT strongly recommends clarifying that the BAT AELs for NOx and CO apply only to lean burn gas engines and do not cover Gas Diesel Type Engines.

3. High Pressure Gas Diesel Engine

No BAT ranges are proposed for the high pressure gas fired Gas Diesel (GD) engine type. GD is a different technique compared to DF and SG type gas engines and thus own technique specific limits are to be introduced in the BREF. See e.g. table 7.6 (section 7.1.3.3 of LCP BREF D1) and measurement data possibly provided by UK for EON plant (not available on BATIS). See also section 7.1.3.3 of BREF 2006 /9/ and UNECE document /2/.

4. Emission Measurements

Draft D1 asks for periodic measurements of NMVOC and CH4 4 times a year (see Table 10.29; section 10.4.1.2). This is too frequent with no additional benefit for the environment. A measurement specialist is needed as the measuring NMVOC and CH4 is difficult and surveillance is necessary. EUROMOT therefore recommends biannual measurements which is sufficient for the compounds NMVOC and CH4

Draft D1 asks for CEMS of CO and NOx emissions (see Table 10.28). According to the IED (2010/75/EU), plants < 100 MWth might deviate from this and conduct measurements biannually. EUROMOT recommends keeping this option in the revised BREF LCP.

For CH_4 and formaldehyde measurements we propose in absence of CEN and ISO standards US EPA Method 320 (FTIR). Alternatively for formaldehyde US EPA Method 323 (wet chemical method) can also be applied.

5. General Conclusion

In above chapters has been shown after studying carefully the source material used when determining NMVOC (= NMHC based on the field measurement data, see text in Annex 1) and CH4 BAT range limits in the BREF D1 that these are too low. We have made counterproposals for the fuel gas composition related NMVOC (NMHC) (shall be substituted by a surrogate such as formaldehyde) emission and CH4 emission limits which are based on generally applicable BAT (see above). We have also highlighted that DF type gas fired engines shall have own separate CH_4-limits compared to the new standard tuned SG-type. Also the existing SG engine fleet need own emission limits. **To be remembered is that above stated CH4 emission limits are with good quality pipeline gas delivered today to the plants,**

In general the high pressure gas fired engine (third main type !) shall have own technique specific emission limits which is not seen in current BREF D1 version.

Emission measurement frequencies stipulated are too frequent: biannual measurements should be allowed in general for < 100 MWth plants and for all plant sizes for CH4 and formaldehyde (surrogate for NMVOC) emissions.

EUROMOT – 2013-09-23

For more information please contact:

European Association of Internal Combustion
Engine Manufacturers – EUROMOT
Paul Zepf, (+49 69) 6603-1752, paul.zepf@euromot.eu
EU Transparency Register ID number: 6284937371-73

ANNEX 1

Gathered field hydrocarbon emission data and discussion

In chapter 7.1.3.3 table 7.7 (see also below) of the BREF draft D1, some HC field emission data gathered in the EIPPCB process are shown. EUROMOT has analysed and assessed the data and has identified following issues:

Table 7.7: Example emissions of NMVOC, CO and CH_4 from European gas-fired engines

Data to be fiabilised and completed by other information to be provided by the TWG			
Plant number	**Emission levels (mg/Nm^3)**		
	CH_4	**CO**	**NMVOC**
40		42	4.2
186	212	100	
353	280	37	44
354	471	39	25
504		116	

[EIPPCB collected data – 2012]

References plants 353, 354

Plants 353 and 354,are two stroke spark ignition lean burn type gas engines. Each of the gas engines is equipped with a SCR unit for NOx abatement. The natural gas composition is reported as: 93.76 % CH_4, 3,473 vol-% C_2H_6, 0.595 vol-% CO_2, 0.823 vol-% N_2.

The underlying data has following shortcomings:

- The engine load for emission measurements is not specified. We therefore assume that full load (MCR of engine) was applied as is the common approach.
- The reference molecule used for the hydrocarbon measurements has not been specified. Is the reference molecule C or something else ?
- The HC measurement methods used (DPCM 20/08/1983, DPR 24/05/1988) in this case is actually a method applying FID with gas chromatograph separation for methane. As the FID has quite a poor response for formaldehyde, so actually NMHC seems to have been measurement.”

In spring 2013, EUROMOT, et. Al. sent emails /10/, /12/ questioning the measurement data.

Reference plant186

Reference plant 186 is a four stroke gas fired engine equipped with a oxidation catalyst for CO compliance burning natural gas.

The underlying data has following issues:

- The reference plant information has not been fully validated and is listed in the "partially validated questionnaires/subfolder not validated questionnaires file of BATIS. Which leads to the question: How reliable is the obtained data ?
- The hydrocarbon measurement method is not specified !
- The reference molecule used for the hydrocarbon measurements data is not specified either – is the reference molecule C?
- The engine load for emission measurements is not specified, so we assume full load,
- The measurement data for CH4 is just based on **one** sample which leads to big uncertainty!
- No NMVOC measurement figures are given
- No natural gas composition is given

Reference plant 40

Reference plant 30 is a four stroke spark ignited gas fired engine equipped with an oxidation catalyst for CO abatement. Natural gas composition is reported as: 97.524 % CH4, 1,131 vol-% C2H6, 0.053 vol-% CO2, 0.855 vol-% N2.

The underlying data has following issues:

- The reference plant information has not been fully validated and is listed in the "partially validated questionnaires/subfolder not validated quistionnaires file of BATIS. Which leads to the question: How reliable is the obtained data ?
- No measurement method has been specified
- The reference molecule used for the hydrocarbon measurements data is not specified either – is the reference molecule C?
- NO CH4 measurements are given.
- Engine load for emission measurements is not specified so we assume full load,
- No data of number of samples for the measurement data is given !

Data from Dutch Study (2009)

In chapter 7.1.4.3.5 following is stated: "

A study performed by the Netherlands competent authority between 2007 (10 engines monitored) and 2009 (30 engines monitored) on small engines (< 5 MW_{el}) reported an average unburnt hydrocarbon emissions (average of at least three 30-minute measurements under full load) of about 400 mg/Nm^3 at 15% O_2.

[NL KEMA 2009 Overview report of follow-up study into methane emissions from gas engines at continuous full load]

”

Thus in section 10.4.1.2 in table 10.29 NMVOC (NMHC) and CH4 BAT emissions ranges from natural gas fired SG and DF engines are given as:

Table 10.29: BAT-associated emission levels for NMVOC and CH_4 emissions to air from the combustion of natural gas in SG or DF engines

Note to the TWG: based on data to be fiabilised / completed

Pollutant	BAT-AEL (average of samples obtained during one year - mg/Nm^3)	Monitoring frequency
NMVOC	4 - 40	Periodic measurements: 4 times/yr
CH_4	200 - 400	Periodic measurements: 4 times/yr

{This BAT conclusion is based on information given in Section 7.1.4.3}

From above can be seen that drawn CH4 BAT conclusion is based on

- Very limited data from four reference plants note many of the used references are not fully validated either !) and
- A Dutch report from 2009 which only covers small and medium-sized engines (< 15 MWth unit sizes !) not regulated covered in the LCP BREF. Furthermore it should be noted that in the meantime the Dutch study was updated using further data from the year 2011 following input and suggestions for improvements from the engine industry. This follow-up study should be taken into account in the BREF report.

In Annex 2 and 3 we show that above BAT conclusions in table 10.29 are not sound and propose BAT conclusions based on available/viable abatement technology.

ANNEX 2

Discussion of NMVOC emissions

EUROMOT is very concerned that the quality of the measurement data is not sufficient to set BAT AELs for NMVOC.

As numerous field measurements have shown in the past, it is possible to calculate the NMVOC emissions out of the engine if the gas composition is known or as de Wit et al. (Reference /1/) put it:
"*The ratio of methane and ethane are calculated based on the gaseous fuel analysis. The ratio of methane and ethane to THC in the fuel gas is considered to remain constant in the flue gas"*

As stated in text above for NMVOC no viable durable secondary abatement technique exists yet on the market for its main constituents ethane and propane /2/.

For three reference plants, the Estonian plant (40) and Italian reference plants (353, 354) the natural gas compositions were given as:

Gas composition	Estonia reference plant	Italian reference plants
vol-% CH4	97.524	93.76
vol-%C2H6	1.131	3.473
vol-% CO2	0,595	0,053
vol-% N2	0,823	0,855

These gas compositions allow us to calculate the NMVOC (NMHC) emission value:

- In the Estonian case, the calculated NMVOC emission **at full engine load (MCR) of a latest design high compression emission optimized SG type big gas engine** would be approximately 50 mg/Nm^3 (15 % O_2) calculated **as C.** which is **more than 10 times higher** than in above table 7.7 reported value !
- For the Italian reference plants, the calculated NMVOC emission **at full engine load (MCR) of a latest design high compression emission optimized SG type big gas engine** would be approximately 80 mg/Nm^3 (15 % O_2) calculated **as C** which is **2 - 3 times higher than in above table 7.7** !

The measured emission values today are based on pipeline natural gas qualities but this might change considerably in the future (see reference /8/)! In Annex 4, the natural gas compositions covering the full EASEE-gas range are shown, starting from Russian gas with almost pure methane to Libyan gas with much higher hydrocarbon shares. When comparing to the Estonian and Italian gas qualities (containing about 1 - 3 vol-% ethane) one can conclude that NMHC emission (ethane and propane main compounds) will vary a lot in the future and increase steeply in some cases from the gathered field measurement data of the LCP BREF D1 !

With formaldehyde (HCHO) a good surrogate exists to achieve the aim of the NMVOC BAT AEL in an improved way. According to the current BREF LCP (2006), a BAT AEL of 23 mg/Nm3 HCHO at 15%O2 is achievable. Using formaledehyde as a surrogate is also current regulatory practice. For example, TA Luft uses Formaldehyde; alternatively, the U.S. SI NESHAP RICE ruling uses CO as a surrogate for formaldehyde in what is arguably the simplest/most practical should be to regulate only the CO component)

The current proposed NMVOC value is too low and not achievable for lean burn type gas engines. This emission is also fuel related ! EUROMOT therefore urges the EIPPC Bureau to replace the draft BAT AEL for NMVOC with a BAT AEL for formaldehyde (HCHO).

ANNEX 3

Discussion of Methane slip

The Dutch report from 2009 (see reference /3/) has been used as basis for setting CH4 BAT AEL although this study is flawed and only covers smaller engines not covered by the IED and the LCP BREF.

Industry was not originally involved in this measurement campaign (April, May and June 2009), but received the opportunity to comment on the results. In its feedback industry noted that:

> *"The reproducibility of the emissions in the repeat measurements in 2009 was very poor (scatter sometimnes afactor by two) so use of the results as the base for the legislation is very tricky. I.e. at a closer inspection it was* ***not scientifically correct to arrive in any conclusions*** *of the hydrocarbon emission for natural gas fired engines."*
> *[excerpt from January 2010 stakeholder meeting]*

The shortcomings of the 2009 study have been acknowledged and an updated report covering additional measurements from 2011 was published (reference /4/) and should have been submitted to the BREF process as can be seen from following excerpt:

> *"The programs did reveal substantial variation in the hydrocarbon emisssions of the gas engine tested. This variation and ... was felt to hamper further policy development. I&M therefore commissioned KEMA to perform follow-up measurements on ten gas engine CHP-units in 2011 ..". Excerpts of report conclusions: " Eight of ten CHP-units tested met the BEMS emission limit value target of 1500 mg C/m3 at 3 % O2. ... The hydrocarbon emissions of the natural-gas-fuelled CHP-units meeting the BEMS target roughly ranged between 1000 and 1500 mg C/m3 at 3 % O2."*
> *[Excerpts from Summary part /4/]*

To be noted is that only units > 15 MWth are included in the BREF D1 review, biggest gas engine unit in the Dutch studies was about 5.1 MWe (corresponds to about 11 MWth), see unit 6. When taking a closer look on the emissions from this biggest engine unit (unit 6) the emissions (see below figure) varied typically (in measurements during 2009 – 2011) 1250 - 1750 mg/Nm3 (3 % O2) = 420 - 580 mg/Nm3 (15 % O2) calculated as C at MCR of the engine. Note unit 9 in the figure is a small biogas fired engine. Furthermore, no DF engines were included in the study.

Note: The current THC limit in Dutch BEMS ruling is 1500 mg/Nm^3 (3 % O_2) = 500 mg/Nm^3 (15 % O_2) calculated as C at engine **at Maximum Continuous rating (MCR**).

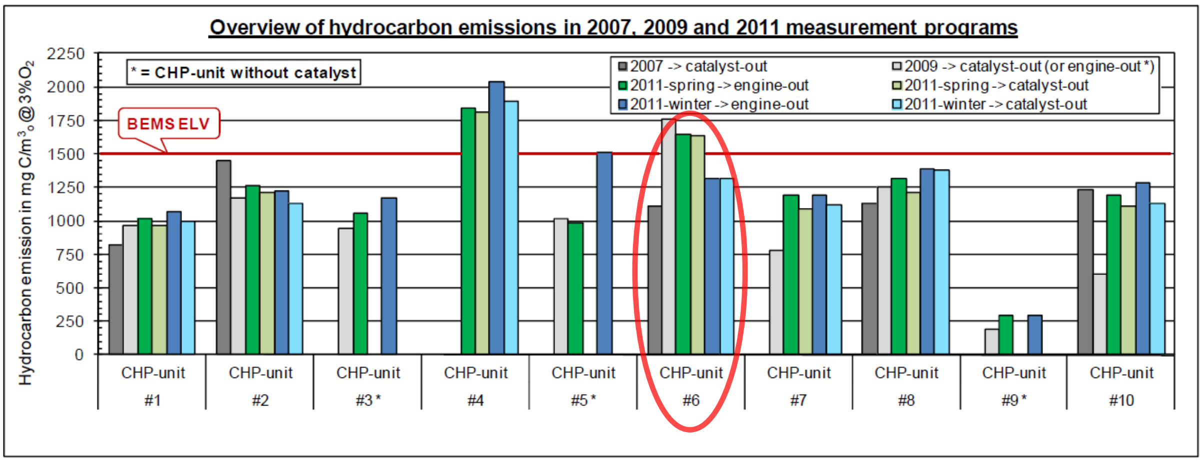
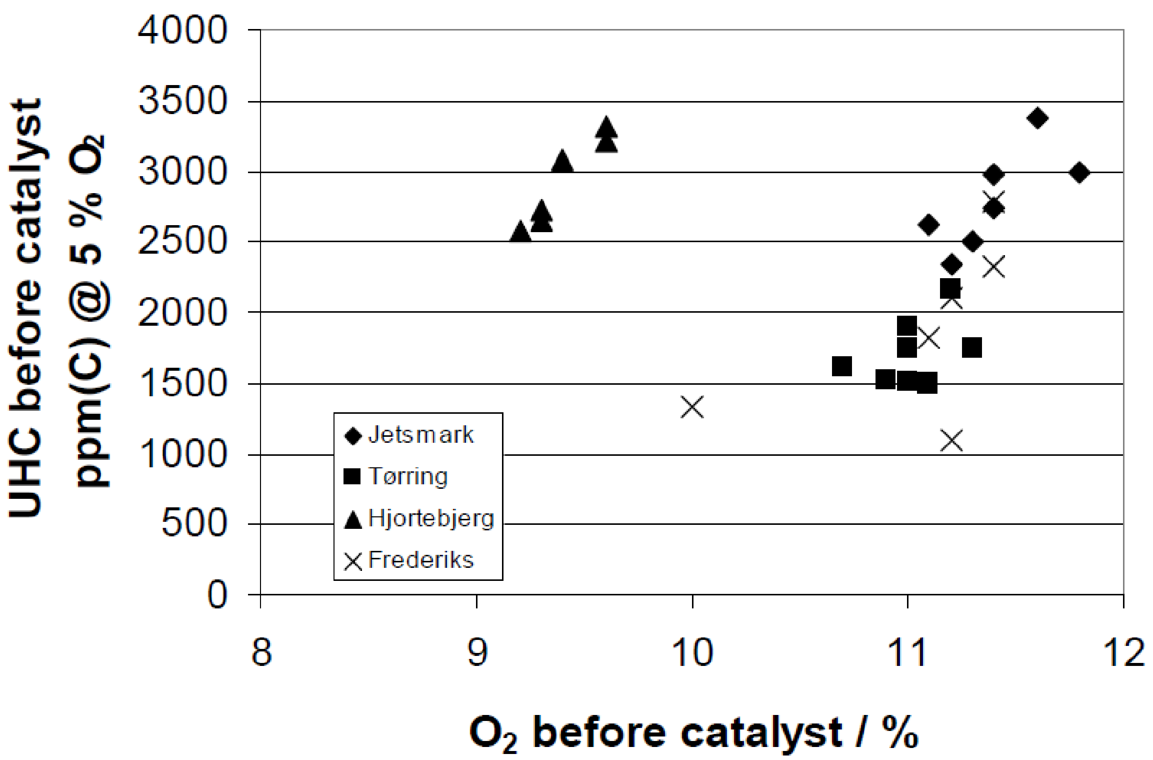


Figure 1 Overview of the hydrocarbon emissions of the ten CHP-units as found in the 2011 program, including those of the 2007 and 2009 programs (based on measurements with FID analyzers using propane for span calibration).

In Denmark, a many year field measurement campaign was going on, in this campaign THC measured see graph 17 of /5/ below. However, no DF engines were measured.



The Danish measurement results /5/ differ (are **HIGHER** !) considerably from the Dutch results. Multiply the ppm-v (at 5 % O2) value with factor 0.536 in order to get unit mg/Nm^3 calculated as C and then by factor 0.375 to get emission at 15 % O_2. In Denmark

(Luftvejledningen) the THC limit for bigger gas engines is 1500 mg/Nm^3 5 % O_2 (= about 560 mg/Nm^3 15 % O_2) calculated as C <u>with efficiency correction</u> upwards/downwards starting from 30 % electrical efficiency.

Short chain alkenes such as methane, ethane and propane are stable molecules and difficult to oxidize (methane most difficult, next ethane and then propane). Today despite intensive R&D work no viable secondary abatement technology exist thus for CH_4 ! Engine industry has been working hard and reduced methane slip from the lean burn engine considerably since 1990's by primary measures /6/.

To note also is that pipeline operators in Europe (upcoming EASEE Gas Directive) are planning to allow large variations in gas composition in the near future, That **will affect engine performance** including the emissions as well as the CH_4/HC ratio. This is a real concern for the manufacturers and owners. Therefore BAT range should take this basic fundamental aspect into consideration also. Measured values are now based on todays´ pipeline natural gas qualities in some countries only ! Future gas quality might differ considerably !

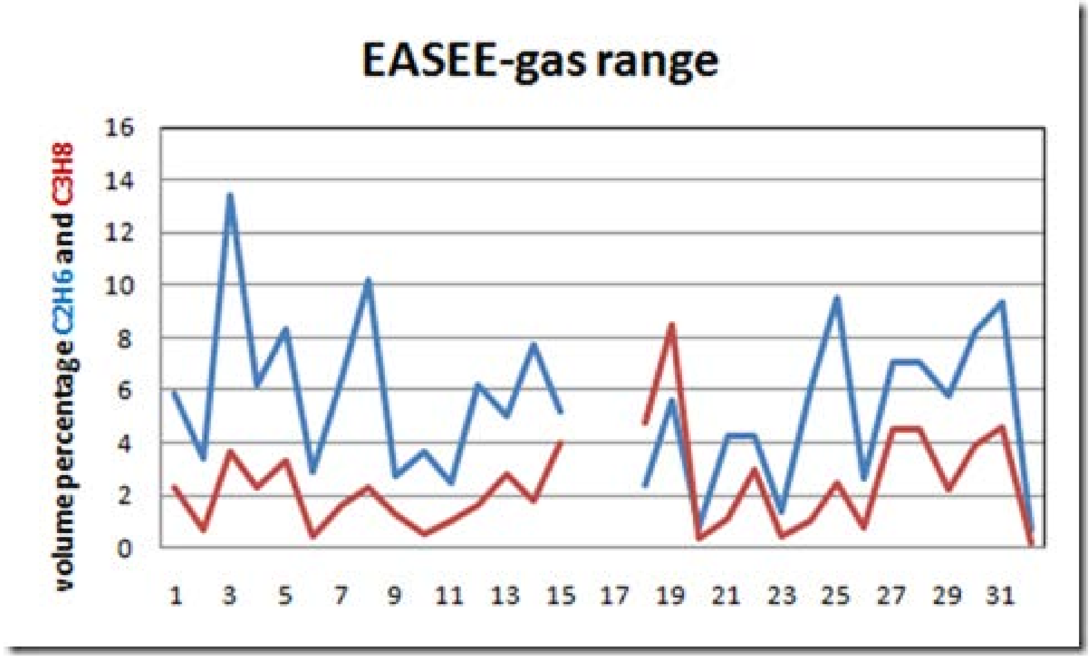
From this data we conclude that for a modern new lean burn gas SG-type engine the BAT CH4 range is for a bigger engine unit up to 600 mg/Nm3 (15 % O2) calculated as C at full engine load (MCR) when operating on current Dutch pipeline gas quality. However, this does not apply to dual fuel engines (DF), as DF type gas fired lean burn engine type hydrocarbon measurement data is NOT included in the Dutch nor in the Danish field measurement reports, thus for the DF a separate approach should be applied than for the new standard lean burn tuned SG. For the existing SG-fleet the Danish emission limit of 560 mg/Nm3 (15 % O2) calculated as C with efficiency correction upwards/downwards starting from 30 % electrical efficiency should be used when operating on pipeline gas quality, limit for MCR of engine. We propose a similar limit as for the existing SG fleet above for new and existing DF type gas engines.

The current proposed CH4 values are set too low and are not achievable for lean burn type gas engines. Please see EUROMOT proposals in section 2.

ANNEX 4

EASEE gas range

Starting from Russian gas with almost pure methane to Libyan gas with much higher hydrocarbons



SOURCES

/1/ "Emission and Reduction of Organic Flue Gas Components from a Lean-burn Gas Engine", J. de Wit, B. Karl.M. Nielsen, P.G. Christensen Danish Gas Technology Center (DGC), International Gas Conference 1998, San Diego, California, USA, 8 - 11 November 1998.

/2/ UNECE Guidance Document on control techniques for emissions of sulphur, NOx, VOC, dust ... from stationary sources at http://www.unece.org/fileadmin/DAM/env/documents/2012/air/Guidance_document_on_control_techniques_for_emissions_of_sulphur__NOx....pdf

/3/ Submitted Dutch paper to EIPPCB (available in BATIS): 50964183-TOS/TCM 09-6715 revision 1 “Overview report of follow-up study into methane emissions from gas engines at continuous full load – spring 2009” .

/4/ “Hydrocarbon emissions from gas engine CHP-units 2011 measurement program”; June 28, 2012 , ; KEMA available at http://www.rwsleefomgeving.nl/publish/pages/90792/hydrocarbon_emissions_from_gas_engine_def.pdf

/5/ Danish Gas Technology Centre 2007, report at http://www.dgc.eu/sites/default/files/filarkiv/documents/R0703_formaldehyd_reduction.pdf

/6/ Submitted Euromot paper to EIPPCB in May 2012: “ Methane Slip from Internal Combustion Gas Engines”; available at BATIS

/7/ http://www.euromot.org/download/bfa1d894-73d0-4b01-a3a0-90735b608fe2/GAS%20QUALITY%20euromot%20position%202011_05.pdf

/8/ http://www.euromot.org/download/30e10106-5cca-4349-a337-91d1a9b804cf/GAS%20QUALITY_sulphur%20levels%20in%20natural%20gas%202012-04-04.pdf

/9/ LCP BREF 2006 at http://eippcb.jrc.ec.europa.eu/reference/BREF/lcp_bref_0706.pdf

/10/ Euromot e-mail dated 17.05 – 13 to EIPPCB by Paul Zepf

/11/ Euromot “Dual Fuel Engine” paper at http://www.unece.org/fileadmin/DAM/env/documents/2011/eb/wg5/WGSR49/Informal%20doc

/12/ UNECE_WGSR49_EUROMOT_Dual_Fuel_Engine_2011-08-15.pdf

/13/ E-mail from TWG member Johan Boij to EIPPCB dated 25.03 – 13 to EIPPCB

EUROMOT is the European Association of Internal Combustion Engine Manufacturers. It is committed to promoting the central role of the IC engine in modern society, reflects the importance of advanced technologies to sustain economic growth without endangering the global environment and communicates the assets of IC engine power to regulators worldwide. For more than 20 years we have been supporting our members - the leading manufacturers of internal combustion engines in Europe, USA and Japan - by providing expertise and up-to-date information and by campaigning on their behalf for internationally aligned legislation. The EUROMOT member companies employ all over the world about 200,000 highly skilled and motivated men and women. The European market turnover for the business represented exceeds 25 bn euros. Our **EU Transparency Register** identification number is **6284937371-73.**

http://www.euromot.eu – your bookmark for IC engine power worldwide

Our members are:

DIESEL AND GAS ENGINE MANUFACTURERS

AGCO POWER
CASE NEW HOLLAND
CATERPILLAR POWER SYSTEMS GROUP
CUMMINS ENGINES
DAIMLER
DEUTZ
DOOSAN
FPT INDUSTRIAL
GE POWER & TRANSPORTATION
HATZ
JCB POWER SYSTEMS
JOHN DEERE
KOMATSU ENGINES
LIEBHERR
LOMBARDINI
MAN GROUP
MITSUBISHI TURBOCHARGER & ENGINE EUROPE
MOTEURS BAUDOUIN
MWM
SAME DEUTZ-FAHR
SCANIA
STEYR MOTORS
TOGNUM
VOLKSWAGEN INDUSTRIAL ENGINES
VOLVO CONSTRUCTION EQUIPMENT
VOLVO PENTA
WÄRTSILÄ
YANMAR GROUP
ZETOR

SMALL SI ENGINE MANUFACTURERS

BRIGGS & STRATTON
DOLMAR
EMAK
GLOBAL GARDEN PRODUCTS
HONDA EUROPE
HUSQVARNA GROUP
KAWASAKI EUROPE
KOHLER GLOBAL POWER GROUP
SOLO
STIHL
TORO EUROPE
WACKER NEUSON
YAMABIKO GROUP