The European Association of Internal Combustion Engine Manufacturers

EUROMOT

EUROMOT POSITION

13 February 2015

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Amendment proposals on emission limit values for gas fuelled engines in the "*Proposal for a Directive of the European Parliament and of the Council on the limitation of emissions of certain pollutants into the air from medium combustion plants*" (COM(2013)919 final) as of 18 Dec 2013

1. Summary of the Euromot position

- Different engine types have substantially different technological designs and therefore need their "own" specific emission limit values.
- It is **not logical** that small or medium sized gas engine plants should have to meet stricter emission limits than large (≥ 50 MW) gas engine plants. Large combustion plants are regulated by IED (Industrial Emissions Directive) 2010/75/EU, which represents BAT (Best Available Technique) for the large gas fired stationary engine plants. This should be considered in ANNEX III limits of the proposal /10/.
- There is a trade-off between set NOx and unburned (such as CO, HC, etc.) emission limits from engines. A lower NOx emission tuning of the engine will result in higher unburned gaseous emissions and increased fuel consumption and vice versa. **Furthermore, the different natural gas qualities available in Europe impact output and emissions from gas engines**. Recognising this, the amended Gothenburg protocol gives parties to the convention the option between differing emission limit values. EU member states should be given the possibility to take the trade-offs mentioned above into consideration when setting national emission limits in accordance with the Gothenburg Protocol.

- The gas fuel quality is in the proposal /10/ divided into “natural gas” and “gaseous fuels other than natural gas” with different emission limits. EUROMOT supports this as impurities in the gas fuel will limit the available emission abatement technologies.
- The Annex III limit values proposed for engines can only be achieved by a bulky and expensive secondary abatement technique, note also that for engines operating on gaseous fuels other than natural gas cannot be achieved as the necessary aftertreatment systems cannot withstand the impurities contained in such fuels
- According to the Commission: “*The favoured policy option is emission reduction consistent with the Gothenburg Protocol...”* in Commission document /1/. However, **many important aspects of the newly amended Gothenburg Protocol /6/ are missing e.g. the adopted crucial flexibility mechanisms are absent** and interpretation of emission limits is different. Consequences are explained in detail below. It should be noted that UNECE Gothenburg emission limits in Annex V are only for **new stationary engines**. Existing plant limits shall not be set stricter than for new plants.

(Amendment proposals on both options in detail provided on the next pages)

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2. Annex II amendment proposal for emission limit values for new gaseous fuelled engines (15 vol-% O_2 reference) <u>in gaseous mode</u>

a) <u>Annex II, Part 2: Emission limit values for new medium size combustion plants (text proposed by the Commission)</u>

2. Emission limit values (mg/Nm^3) for engines and gas turbines

Pollutant	Type of installation	Liquid fuels	Natural gas	Gaseous fuels other than natural gas
SO_2	Engines and gas turbines	60	---	15
NO_X	Engines	190(1)	95 (2)	190
	Gas turbines(3)	75	50	75
Particulate matter	Engines and gas turbines	10	---	---

(1) 225 mg/Nm^3 for dual fuel engines in liquid mode

(2) 190 mg/Nm3 for dual fuel engines in liquid mode

(3) …

b) <u>Annex II, Part 2: Emission limit values for new medium size combustion plants (amendment proposed by Euromot)</u>

Emission limit values (mg/Nm^3) for <u>new</u> engines and gas turbines

Pollutant	Type of **combustion plant**	Gas Oil	Liquid fuels other than Gas Oil	Natural gas	Gaseous fuels other than natural gas
SO_2	Engines and gas turbines	-	120(4)(11)	-	**No limit** *or* **120**
NO_X	Engines **(3a) (5)**	190(1)	190(1)(2a)	**190(12)**	190(12)
	Gas turbines	75	75	50	75
Particulate Matter	Engines and gas turbines	-	50(7)	-	-

([1]) 225 mg/Nm^3 for dual fuel engines in liquid mode

([2])

([2a]) 225 mg/Nm³ for diesel engines with a total rated thermal input equal to or below 20 MW with ≤ 1200 rpm.

([3])

([3a]) Engines running up to 1500 hours per year may be exempted from compliance with these emission limit values in case they are applying primary measures to limit NOx emissions and meet the emission limit values set out in footnote ([5]).

([4]) Until 01/01/2025, 590 mg/Nm³ for diesel engines being part of SIS and MIS

([5]) Until 01/01/2025 in SIS and MIS […], 1850 mg/Nm^3 for dual fuel engine in liquid mode and 380 mg/Nm^3 in gas mode; 1300 mg/Nm³ for diesel engines with ≤ 1200 rpm equal to or below 20 MW and 1850 mg/Nm³ for diesel engines above 20 MW; 750 mg/Nm³ for diesel engines with > 1200 rpm.

([6])

([7]) Until 01/01/2025, 75 mg/Nm³ for diesel engines being part of SIS and MIS

([8])

([9])

([10])

([11]) After 01/01/2025, 295 mg/Nm^3 for diesel and dual fuel engines being part of SIS and MIS

([12]) 380 mg/Nm³ for the operation of dual fuel engines if the Methane Number of the gaseous fuel is below 80

Justification

For SO2 in the column "Gaseous fuel other than natural gas"

The sulphur emission limit value for gas engines running on gaseous fuel other natural gas are too strict, much stricter than today's national laws.The sulphur level in the exhaust gas is directly dependent upon the sulphur level in the fuel, e.g. biogas has higher and varying sulphur levels compared to natural gas. Strict limits would prevent the use of biogas in certain cases.

For NOx in the column "Natural gas"

There is a trade-off between set NOx and unburned (such as CO, HC, etc.) emission limits from engines. A lower NOx emission tuning of the gas engine will result in higher unburned gaseous emissions and increased fuel consumption and vice versa. Thus, the NOx value should be increased to 190 mg/Nm3 (15 % O2) in order to have an optimal operation both in respect of emissions and fuel consumption. This should also be in line with EU 20-20-20 targets /11/. The strict value of 190 mg/Nm3 requires the application of secondary abatement techniques for a diesel engine in gas mode

For (2a, 3a, 5): NOx

In order to achieve a cost efficient balance between environment and economical aspects, additional flexibilities as included in the Gothenburg Protocol for new stationary engine need to be introduced

also into MCP. See footnotes b ("areas with restricted existing infrastructure"), c (occasional usage plants with limited yearly operation hours) d ("sudden unforeseen interruption in gas supply" case) flexibilities, see Annex 1 (below Table 4) of this document for more information

For (12): NOx

Natural gas quality has a big impact on engine performance regarding output and emissions. For Dual Fuel (DF) engines a higher NOx limit of 380 mg/Nm3 (15 % O_2) is thus a BAT associated limit value. For a DF type gas engine, the impact of natural gases with a Methane Number below 80 is explained in detail in UNECE document /12/.

3. Annex II amendment proposal for emission limit values for existing engines and gas turbines in gaseous mode

a) Annex II, Part 1: Emission limit values for existing medium size combustion plants (text proposed by Commission)

2. Emission limit values (mg/Nm^3) for engines and gas turbines

Pollutant	Type of installation	Liquid fuels	Natural gas	Gaseous fuels other than natural gas
SO_2	Engines and gas turbines	60	-	15
NO_X	Engines	190(1)	190 (2)	190 (2)
	Gas turbines (3)	200	150	200
Particulate matter	Engines and gas turbines	10	---	---

(1) 1850 mg/Nm³ in the following cases:
(i) for diesel engines the construction of which commenced before 18 May 2006;
(ii) for dual fuel engines in liquid mode

(2) 380 mg/Nm³ for dual fuel engines in gas mode.

(3) …

b) Annex II, Part 1: Emission limit values for existing medium size combustion plants (Amendment proposal by Euromot)

Emission limit values (mg/Nm^3) for engines and gas turbines

Pollutant	Type of **combustion plant**	**Gas Oil**	Liquid fuels **other than Gas Oil**	Natural gas	Gaseous fuels other than natural gas
SO_2	Engines and gas turbines	-	120**(8)**	-	**No limit or 120**
NOx	Engines**(9)(10)(11)**	**190(1)**	190(1)	190(2)	190(2)
	Gas turbines	200	200	150	200
Particulate matter	Engines and gas turbines	-	50(12)	-	-

(1) 1850 mg/Nm³ in the following cases:
(i) for diesel engines the construction of which commenced before 18 May 2006;
(ii) for dual fuel engines in liquid mode.

(1a)

(1b)

(2) 380 mg/Nm³ for dual fuel engines in gas mode

(3)

(4)

(5)

(6)

(7)

(8) After 01/01/2025 (> 5 MW plant), otherwise 2030, 295 mg/Nm^3 for diesel and dual fuel engines part of SIS and MIS

(9) Engines running up to 1500 hours per year may be exempted from compliance with these emission limit values in case they are applying primary measures to limit NOx emissions and meet the emission limit values set out in footnotes (10, 11).

(10) Engines commenced before 18 May 2006: 2000 mg/Nm^3 dual fuel engine in liquid mode; 1900 mg/Nm^3 for diesel engines with < 1200 rpm equal or below 20 MW and 2000 mg/Nm^3 for diesel engines above 20 MW; 750 mg/Nm^3 for diesel engines with > 1200 rpm.

(11) Engines commenced after 18 May 2006: 1850 mg/Nm3 for dual fuel engine in liquid mode; 1300 mg/Nm³ for diesel engines with ≤ 1200 rpm equal to or below 20 MW and 1850 mg/Nm³ for diesel engines above 20 MW; 750 mg/Nm³ for diesel engines with > 1200 rpm

(12) Until 01/01/2025, 75 mg/Nm^3 in MIS/SIS

Justification

Existing plant limits shall not be set stricter than for new plant

4. Annex III amendment proposal for benchmark values for more stringent emission limit values referred to in Article 5(4) in gaseous mode

a) Annex III, Emission limit values for medium size engine combustion plants (text proposed by Commission)

Pollutant	Type of installation	Liquid fuels	Natural Gas	Gaseous fuels other than natural gas
NOx	Engines	150	35	35
	Gas Turbines	…	…	…

b) Annex III, Emission limit values for medium size engine combustion plants (amendment proposal by Euromot)

Pollutant	Type of installation	Liquid fuels	Natural Gas	Gaseous fuels other than natural gas
NOx	Engines	190	**95(2)**	**190 [or delete column for "other gaseous fuel" entirely]**
	Gas Turbines	…	…	…

…

(2)190 for combined heat and power

Justification

For NOx in the column "Natural Gas":

Proposed NOx limits are very tight for zones with degraded ambient air quality. Gas engines running on natural gas can achieve such low emission limits ***only by application of efficient secondary abatement technique.*** *The* ***strict*** *Gothenburg Protocol option (95 mg/Nm³ (15%O2) offers a cost-effective solution for medium combustion equipped with "gas engines" where application of SCR is not commercially viable. The strict value of 95 mg/Nm^3 already requires the application of secondary abatement techniques for dual fuel (DF) and diesel engines in gas mode.*

For 2: CHP

Setting a value of 35 mg/Nm^3 (15 % O_2) substantially increases the total investment and operating cost for CHP plant, to the extent that these plants may no longer be attractive to operators. CHP plant can have very high overall efficiency and are a powerful tool in reducing greenhouse gas emissions. A higher more cost-effective NOx limit of 190 mg/Nm3 (15 % O2) is proposed for this application.

Engines running on "other gaseous fuels" (e.g. biogas):

Due to impurities in the gas, gas engines running on "other gases" cannot apply secondary abatement as the SCR will be destroyed. Therefore, the proposed limit value is technically not achievable for such engines.
It is recommended deleting the column for gaseous fuel other than natural gas so that the same limit value applies as in Annex II.
It is recommended applying the strict Gothenburg Protocol option of 95 mg/Nm³ (15% O_2) for zones with degraded ambient air quality while retaining the Annex II emission limit value of 190 mg/Nm³ (15 % O_2) for CHP plants.
Alternatively, the ANNEX III should be removed from the Directive Proposal entirely.

5. Amendment proposal for a derogation for sudden interruption of supply of gas

Article 5, Emission Limit Values

Text proposed by the Commission	*Amendment*
7. The competent authority may grant a derogation from the obligation to comply with the emission limit values provided for in paragraphs 2 and 3 in cases where a medium combustion plant using only gaseous fuel has to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas and for this reason would need to be equipped with a secondary abatement equipment. The period for which such a derogation is granted shall not exceed 10 days except where the operator demonstrates to the competent authority that a longer period is justified.	7. The competent authority may grant a derogation from the obligation to comply with the emission limit values provided for in paragraphs 2 and 3 in cases where a medium combustion plant **using gaseous fuel** has to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas and for this reason would need to be equipped with a secondary abatement equipment. The period for which such a derogation is granted shall not exceed 10 days except where the operator demonstrates to the competent authority that a longer period is justified.
Member States shall […] inform the Commission of any derogation granted under the first subparagraph within one month.	Member States shall […] inform the Commission of any derogation granted under the first subparagraph within one month.

Justification

The Gothenburg Protocol includes such a derogation ("d" under emission table 4 of the Annex). In situations where gas supplies are interrupted some engine plants can operate on other fuels in order to ensure energy supplies. Requiring such plants to install expensive aftertreatment systems which under normal circumstances will never be used is not cost-effective and commercially not viable.

References

/1/ “Commission Staff Working Document. Executive summary of the Impact Assessment”; Brussels 18.12.2013, SWD(2013) 532 Final

/2/ “Proposal for a Directive of the European parliament and of the Council on the limitation of emissions of certain pollutants into the air from medium combustion plants”; Brussels 18.12.2013 COM(2013) 919 Final, 2013/0442 (COD)

/3/ EGTEI SCR Cost Stationary engines at http://www.unece.org/fileadmin/DAM/env/documents/2011/eb/wg5/WGSR49/Informal%20docs/17_EGTEI-Cost-stationary-engines-UNECE-06-04-2011.pdf

/4/ EMSA “The 0.1 % sulphur in fuel requirement as from 1 January 2015 in SECAs”: http://ec.europa.eu/environment/air/transport/pdf/Report_Sulphur_Requirement.pdf

/5/ http://www.airclim.org/directive-national-emission-ceilings-nec

/6/ http://www.unece.org/fileadmin/DAM/env/lrtap/full%20text/ECE_EB.AIR_111_Add1_2_E.pdf

/7/ Emissions from diesel generation in Small Island Power Systems – Recommendations for the revision of the Gothenburg Protocol; Eurelectric July 2011; at http://www.unece.org/fileadmin/DAM/env/documents/2011/eb/wg5/WGSR49/Informal%20docs/EURELECTRIC-disel_engines_and_Gothenburg_protocol-July_2011.pdf

/8/ EU LCP BREF 2006 at http://eippcb.jrc.ec.europa.eu/reference/BREF/lcp_bref_0706.pdf

/9/ IPPC Reference Document on Economics and Cross-Media Effects. July 2006 at http://eippcb.jrc.ec.europa.eu/reference/BREF/ecm_bref_0706.pdf

/10/ “ANNEXES to the Proposal for a Directive of the European Parliament and the Council on the limitation of emissions of certain pollutants into the air from medium combustion plants”; Brussels, 18.12.2013 COM(2013) 919 Final ANNEXES 1 to 4

/11/ http://ec.europa.eu/clima/policies/package/index_en.htm

/12/ Gothenburg Protocol - Euromot Position available under http://www.unece.org/fileadmin/DAM/env/documents/2011/eb/wg5/WGSR49/Informal%20docs/10_UNECE_WGSR49_EUROMOT_Dual_Fuel_Engine_2011-08-15.pdf

ANNEX: UNECE Gothenburg Protocol amended May 2012, Annex V, from /6/

9. Stationary engines:

Table 4
Limit values for NO_x emissions released from new stationary engines

Engine type, power, fuel specification	*ELV[a,b,c] (mg/m³)*
Gas engines > 1 MWth	
Spark ignited (= Otto) engines	95 (enhanced lean burn)
all gaseous fuels	190 (Standard lean burn or rich burn with catalyst)
Dual fuel engines > 1 MWth	
In gas mode (all gaseous fuels)	190
In liquid mode (all liquid fuels)[d]	
1 MWth–20 MWth	225
>20 MWth	225
Diesel engines > 5 MWth (compression ignition)	
Slow (< 300 rpm)/medium (300 rpm–1,200 rpm)/ speed	
5 MWth–20 MWth	
Heavy Fuel Oil (HFO) and bio-oils	225
Light Fuel Oil (LFO) and Natural Gas (NG)	190
>20 MWth	
HFO and bio-oils	190
LFO and NG	190
High speed (>1,200 rpm)	190

Note: The reference oxygen content is 15%.[3]

[a] These ELVs do not apply to engines running less than 500 hours a year.

[b] Where Selective Catalytic Reduction (SCR) cannot currently be applied for technical and logistical reasons like on remote islands or where the availability of sufficient amounts of high quality fuel cannot be guaranteed, a transition period of 10 years after the entry into force of the present Protocol for a Party may be applied for diesel engines and dual fuel engines during which the following ELVs apply:

- Dual fuel engines: 1,850 mg/m³ in liquid mode; 380 mg/m³ in gas mode.
- Diesel engines — Slow (< 300 rpm) and medium (300 rpm–1,200 rpm)/speed: 1,300 mg/m³ for engines between 5 MWth and 20 MWth and 1,850 mg/m³ for engines > 20 MWth.
- Diesel engines — High speed (> 1,200 rpm): 750 mg/m³.

[c] Engines running between 500 and 1,500 operational hours per year may be exempted from compliance with these ELVs in case they are applying primary measures to limit NO_x emissions and meet the ELVs set out in footnote b.

[d] A Party may derogate from the obligation to comply with the emission limit values for combustion plants using gaseous fuel which have to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas and for this reason would need to be equipped with a waste gas purification facility. The exception time period shall not exceed 10 days except where there it is an overriding need to maintain energy supplies.

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