

EUROMOT - Recommendations

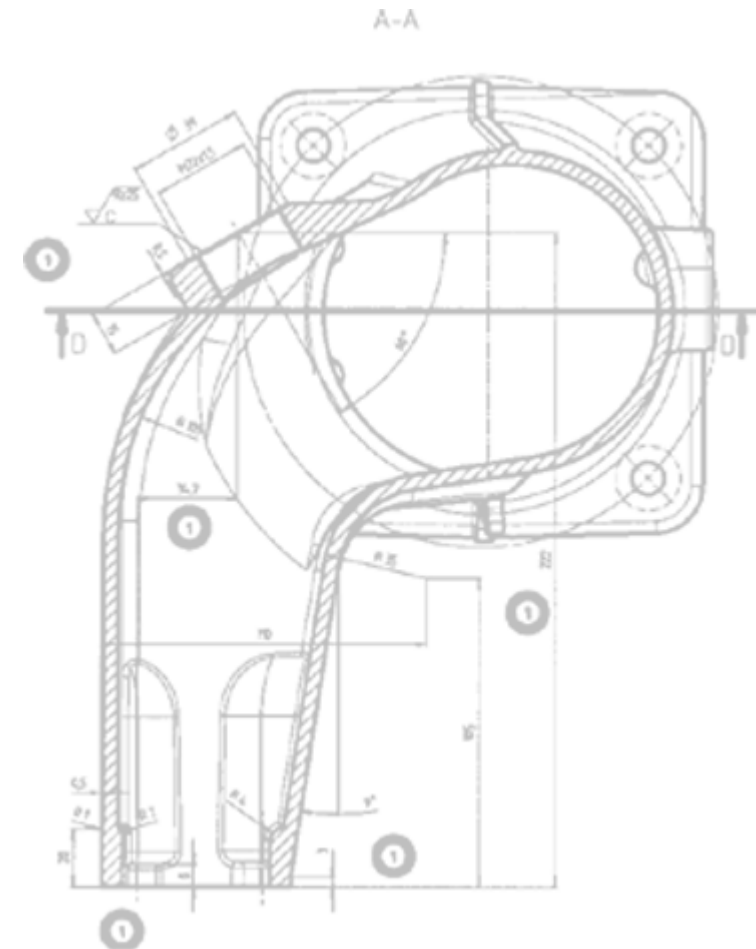
Frankfurt, 27 February 2008

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- **Diesel Engines (LFO, HFO, Gas):**

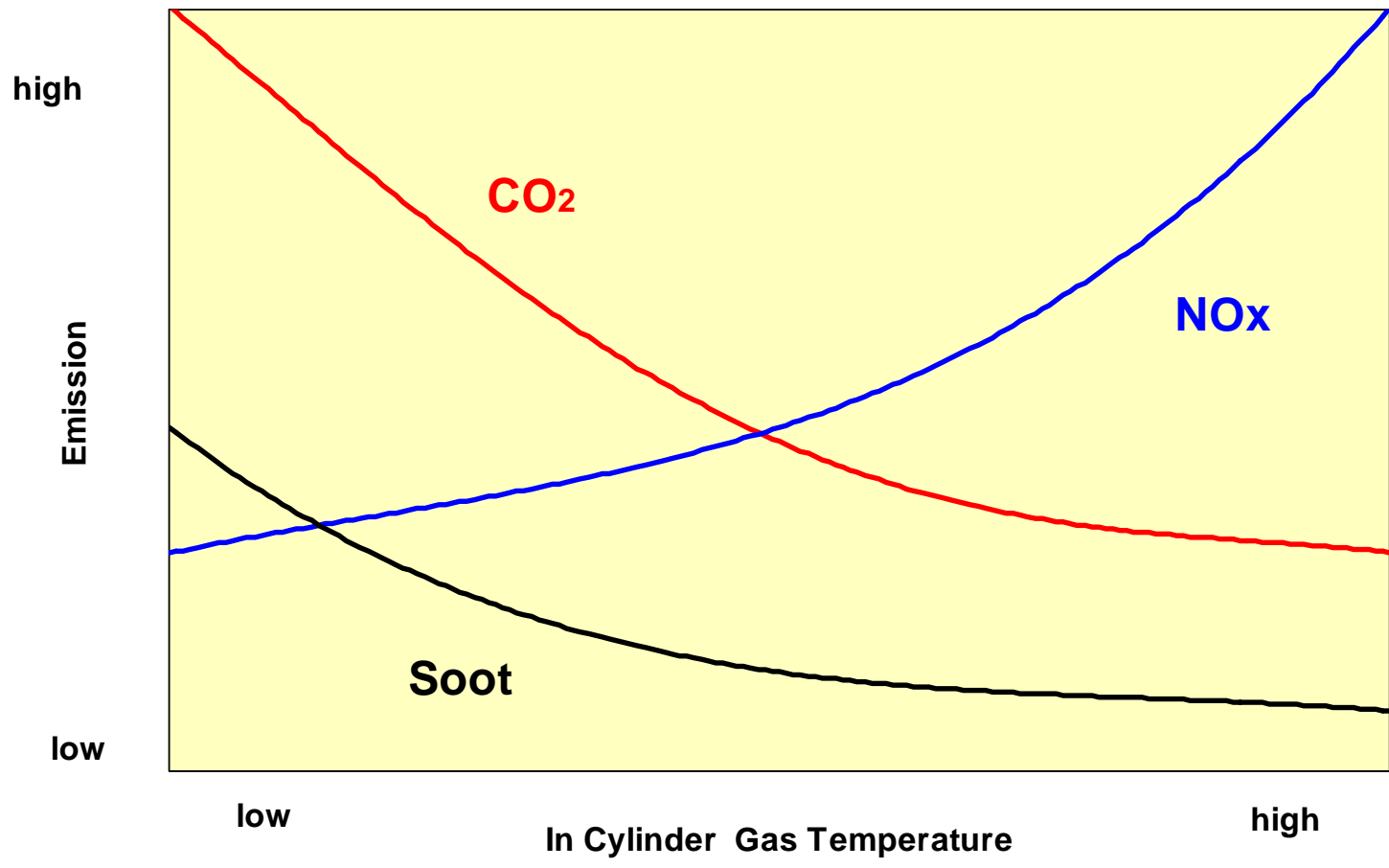
- Industry has during the last decade worked and is still working intensively on to decrease the emissions while maintaining the high efficiency of the engines.
- Fuel Quality will impact greatly on available primary techniques available and generated emission.
- Fuel composition, flue gas temperature have a big impact on the SCR performance → SCR **NOT** always BAT-choice (EU BREF-document)
- Very strict NO_x-limit → SCR **only** technical option, regardless of cost or zone where plant will be situated !

- **BAT** approach ?

- In this environmental, economical and technique availability aspects shall be taken into account !

- **Gas Engines (Gas):**

- Some biogases might create deposits in the combustion chambers of the engine, "poison" catalysts (if used) ! → Affects achievable emission levels
- Some bigger unit size gas engines (in natural gas mode) can fulfill the stipulated NO_x-level, **BUT** with an increased heat rate, higher emissions of unburned gases such as CO, NMHC, etc. and a lower flue gas temperature (detrimental for CHP) !
- Following targets will be **difficult** to achieve:
 - Efficient fuel consumption → lower CO₂ emissions !
 - Usage of renewable sources leads to an increased security of fuel supply, reduced greenhouse gas emissions, promotion of local employment and usage of local & decentralised energy sources.
- **IPPC approach ?**



- **In Brief:**
 - **A. Stipulated limits are not according to the new trend to improve energy efficiency and usage of renewable energy in the spirit of the Kyoto Protocol.**
 - **B. Stipulated limits are beyond the BAT (Best Available Technique) approach.**
 - **C. The emission values for new stationary engines are technically and economically not sound.**
 - **See Euromot position Papers**

General:

→ *Prime mover specific*: (boiler, gas turbine, stationary engine) emission concentration limits with own oxygen reference point; - e.g.

World Bank/IFC Guidelines ("General EHS Guidelines") 2007:

- Solid fuel fired boiler plants 6 vol-% O₂
- Liquid/Gas fired boiler plants 3 vol-% O₂
- Liquid/Gas fired gas turbines 15 vol-% O₂
- Liquid/gas fired stationary engine 15 vol-% O₂

→ Emission reference point to be close to "actual conditions", by this the real performance of the secondary abatement equipment is best described, see e.g. boilers and gas turbines above. This means for the stationary engine that the emission concentration point shall be 15 vol-% O₂. See also

http://www.euromot.org/download/news/positions/stationary_engines/O2_Refpoint_oct02.pdf

- For the stationary engine 15 vol-% O₂ is used in e.g. USA, India, Ecuador, IFC/WB Guidelines, EU IPPC BREF, UK, Finland
- *Standards (prime mover specific ones)*:
 - World Bank/IFC Guidelines is the most well-known international standard.
 - National standards/guidelines (outside Europe) for stationary engine plants are in: India, Japan, US, Philippines, Taiwan, Ecuador, etc.

EU Ruling/Guidelines for Stationary Engine Plants:

- **Fuel Directive 1999/32/EC**
- **IPPC 96/61/EC**
- **IPPC LCP BREF July 2006 (Guideline)**
- **UNECE Gothenburgh Protocol**
- **National Legislations:**
 - France
 - UK
 - Finland
 - Germany
 - Denmark
 - Portugal
 - Italy
 - Etc.

- - *Efficiency bonus*: In some legislations/norms granted:
 - Britain: (The environmental Protection Act 1990 Part 1 (1995 Revision) Engine of 20 ..50 MWth: Corrected emission limit = emission limit*ISO Net Base Efficiency/40
 - French: Cogeneration "bonus" for bigger CHP plants
 - Turkey: Efficiency bonuses: mechanical and cogeneration yield coefficients
- *Area dependence*: "**Environmental quality need driven standards**" are e.g:
 - - India ("big urban", "other areas")
 - - Japan ("nation wide general limits", "city standards")
 - - Finland ("city area", normal area)
 - - World Bank "Thermal Power" Guidelines for New Plants" 1998
- *Plant Size*: Bigger power plants have often stricter limits and smaller leaner limits, e.g.:
 - Indian 75/150 MWe triggers
 - French, Portuguese legislation
 - EU 96/61/EC IPPC Directive: Combustion Plant > 50 MWth to use BAT

- **Conclusions:**

- Each prime mover own specific emission limits
- For stationary engines 15 vol-% O₂ is used internationally as the emission concentration reference
- Plant size dependent limits seen in some ruling
- Location (Rural, urban) effect seen in some ruling. This is a cost-effective *Environmental Quality Need Driven Approach* !
- Efficiency correction (Kyoto Protocol impact) seen in some legislation. “Non-regulated” emission such as CO₂ focus.

Recommendation – counterproposal for emission limit values for stationary engines

- based on cost-effective, environmental quality needs aspects
- emission bonuses should be granted for power plants with high efficiency, in mechanical drive applications and/or engines fired with biofuels
- Almost equal limits have been already adopted by Worldbank and OECD 2007

Technology	NO _x mg/Nm ³ (at 15% O ₂)	
	Special area (e.g. city)	Rural area
Oil fired diesel engine (CI)		
< 400 mm bore	750	1600
>= 400 mm bore	750	1850
Spark Ignition 4-stroke natural gas lean burn engine	190	190
High Pressure gas diesel engine natural gas mode	750	1600
Low pressure Dual fuel engine - natural gas mode	400	400
Dual fuel engine - liquid mode	750	1850