

## Continuous Emission Monitoring System (CEMS) seems to be a general requirement in the 2. BREF for large combustion plants Draft

- To note is:
  - There exists **no** specific European Union Directive for stationary engines in respect of CEMS. According to the EU Directive 2001/80/EC, Annex VIII is CEMS (of NO<sub>x</sub>, SO<sub>2</sub> and dust concentrations) required for **big > 100 MW thermal input** boiler and gas turbine power plants.
    - CEMS is not required for particulate and SO<sub>2</sub> measurements from natural gas fired boilers and gas turbines
    - CEMS for SO<sub>2</sub> is not required for gas turbines and boilers (with no FGD) firing oil with a known sulphur content
    - Where continuous measurements are not required, discontinuous measurements shall be required at least every sixth months.
  - Continuous monitoring is a legal requirement in several EU member states for processes whose emissions exceed a certain threshold.

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- World Bank 1998 “Thermal Power - Guidelines for New Plants” (page 419 - 420 in PPAH):
  - Surrogate performance monitoring performed on basis of initial calibration is accepted as an alternative. Direct measurements of the concentrations of emissions in samples of flue gases should be performed regularly e.g. on an annual basis to validate surrogate monitoring results.
- IPPC Reference Document on the General Principles of Monitoring, November 2002:
  - “Consider the use of continuous monitoring, when it provides the requested information at a lower overall monitoring cost than discontinuous monitoring”. (page 65)
  - “Consider, where possible replacing expensive parameters that are more economical and simpler to monitor”. (page 65)
  - “There must be a balance between the availability of the method, reliability, level of confidence, costs and the environmental benefits.” (page 7)

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- Continuous measurements of parameters may be waived if these from experience show only slight deviations which are negligible for emission assessment or if they can be determined by other methods with sufficient certainty. (page 37)
- Continuous monitoring techniques may also have some drawbacks (page 42):
  - They may not be of much use for very stable processes
  - costs
  - etc.
- Continuous monitoring good practise (page 43):
  - availability of continuous measurement equipment
  - reliability of continuous measurement equipment
  - extent of the environmental risk associated to the emission
  - etc.
- Monitoring frequency can be decided on a risk-based approach (pages 8, 9): A stable process --> level 1, with a low frequency need e.g. once a year.

## **A diesel engine is a rather stable process**

- Surrogate parameters (proposal):
  - SO<sub>2</sub> (in a plant with no FGD), calculation with help of fuel consumption and fuel oil sulphur content (e.g. acc. to ISO/CD 8178-1, chapter 7.4.3.7). Monitor fuel oil sulphur content per batch.
  - Particulate, fuel oil ash main contributor, monitor fuel oil ash content per batch.
  - With an unchanged injection retard setting of the engine, NO<sub>x</sub>-value is relative stable. Air humidity has an effect on NO<sub>x</sub> emission. Unchanged injection timing (NO<sub>x</sub> measured for this setting) and humidity registration towards correction curves from supplier gives good estimates.
  - In use with SCR: NO<sub>x</sub> is mapped at different engine loads at plant commissioning phase. Injection amount of reagent (to the SCR) is controlled from a signal based on engine load. This feed forward signal is enough for NO<sub>x</sub> control in context with SCR:s operating with moderate reduction rates.

## CEMS in engine plant versus boiler plant, typical condition comparison

Stationary engine plant	Boiler plant
<ul style="list-style-type: none"> <li>• Overpressure and pressure fluctuations in exhaust gas</li> <li>• Temperature 200 - 400 °C</li> <li>• Fuel oil or gas: particle spectre small</li> <li>• Sticky and oily particulate</li> <li>• CEMS new in this application</li> </ul>	<ul style="list-style-type: none"> <li>• Under-pressure &amp; stable pressure in flue gas</li> <li>• Temperature 130 - 170 °C</li> <li>• Fuel coal: coarser particles</li> <li>• CEMS standard in this sector</li> </ul>

- Experience shows technical challenges with existing CEMS systems in engine power plants.
- CEMS needs trained personnel for maintenance, calibration gas, etc.

## Conclusion

Engine parameters affecting emissions are fixed at the time of certification as supported by the technical file. This is in line with e.g. the IMO NO<sub>x</sub>-onboard monitoring concept. Use of surrogate parameters with discontinuous concentration measurements of the exhaust gas should be acceptable for a stationary engine plant. **Note**, in the stationary engine plant same emission measurement methods are used as in the rest of the power industry.

**CEMS shall not be put as a unilateral requirement, the need shall be judged case by case (on cost, benefit, risk, etc.). It shall be up to the individual member state to do the judgement of the CEMS need or not, based on the environmental risk, etc.**