VGB Initiative „Hg$^{cap(ture)}$“

Further reduction of mercury emissions from coal-fired power plants

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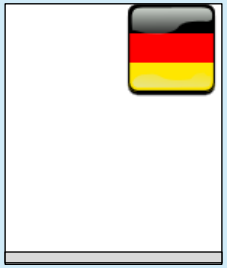
1 – Mercury imissions

❖ Mercury air pollution considerably below legal limits.

50 nanograms per standard cubic metre (Scm)

Recommended
by German
Federal state committee

1 to 2 nanograms per standard cubic metre (Scm)



Actual concentration
in air (also near power plants)

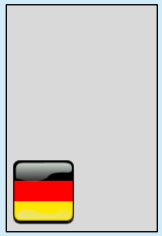
❖ No threat of the food chain nor the air by mercury emissions from coal fired power plants.

2 – Mercury emissions

- Germany: - Current emission limit: 30 µg/Scm
  - 2019, new limit: 10 µg/Scm
  > Germany one pioneer for limits in Europe.
- EU: - BREF LCP, 2017: below 2019-German limits
- US-limits: - below BREF LCP

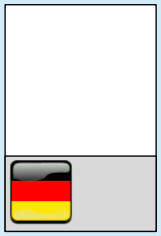
Overview: Current and future emission limits for mercury

30 µg / Scm



Today: Limit
acc. 13. BImSchV

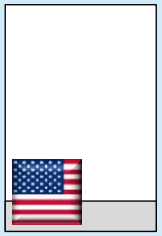
10 µg / Scm



2019: Limit
Acc. 13. BImSchV

Today: Limits
announced

< 5.4 µg/Scm (1); < 2.3 µg/Scm³ (2)



Today: US-limits for new lignite (1) and hard coal (2)

➢ Prof. Kather: „The range for the new BAT-AEL for Hg emissions of existing lignite-fired power plants with PC boilers should be set between 5 and 9 µg/Scm!“

3 – Mercury emissions – Power Plants - Technology

➢ No unique technology for mercury capture is available for power plants.

- Reduction technologies have to meet individual operation regimes.
- The application of results from research facilities is not unrestricted possible at large-power plant level.
- Undesired side-effects have to be avoided. No shift of emissions into other media.
- Research and development of reliable techniques needs time.
  This fact has to be taken into account when applying the results of BREF-LCP.
  Emission bandwidths of installed flue gas cleaning installations are a reliable indication.

➢ Research activities of VGB members take into account a reliable fulfilment of the emission limits.

➢ The results should pave the way for a reliable fulfilment of the upper emission limit bandwidth of the BREF-LCP results in 2021.

4/5 – Research and development – Time frame

❖ The power plant operators are actively involved in research & development of mercury reduction technologies.

- Validation of continuos mercury detectors (Mehrum: 2015 -2017)
- Influence of mercury precipitant in scrubbers (Mehrum: 2015 – 2017)
- Survey and amount of mercury reduction rates(EnBW: 2016)
- Comparison measurement technology with US-Methode Sorbent Trap (EnBW: 2016)
- Activated carbon addition prior to electrostatic precipitator (Vattenfall: 2016 – 2017)
- Dosing of bromides prior to scrubber (Vattenfall: 2016 – 2017)
- Dosing of various chemical on the coal conveyor belt (MIBRAG: 2016 – 2018)
- Optimisation of the operation regime (Vattenfall Moorburg: since 2016 ongoing)
- Concepts for mercury emission reduction (GKM, RWE, EnBW: 2016 – 2019)
- Online mercury determination in open pit mines (MIBRAG: 2017 – 2018)
- Addition of HOK (Herdofenkoks/coking coal) prior to electrostatic precipitator; Development of a pilot plant (RWE: 2015 – 2020)
- Research on oxidising catalysts (Uniper: ongoing)
- Optimisation of the current flue gas cleaning installations (STEAG: ongoing)

VGB-Initiative „Hg$^{cap(ture)}$“

Further reduction of mercury emissions
from coal-fired power plants

The VGB Initiative Hg$^{cap(ture)}$ pools know-how and ensures transparency:

- **Objectify the debate.**
- **Public relation and transfer of information.**
- **Development of further reduction technologies for mercury emissions.**
- **Joint activities for the research and testing of new and existing removal technologies.**
- **Ensure knowledge and experience exchange with science and politics.**
- **Professional support of the legal implementation for setting future limits on the basis of BREF-LCP with reasonable period for the implementation of appropriate and effective procedures.**

*Hg^{cap}: Hg: Mercury| cap: Capture

Mercury: Power plants and the environment – Results (1/2)

- Emissions of mercury have been reduced by more than 50 % since 1990.
  The application and development of new flue gas cleaning technologies contributed to this effort.
- Mercury emissions from coal-fired power plants are no urgent matter for environmental protection actions.
- Hard-coal and lignite fired power plants in Germany meet all emission limits.
  The real values are in part 90 % lower than the permitted limits.
  Many power plants also meet the future legal requirements (2019, D, BImSchV).
- Mercury emissions below 1 µg/Scm do not reflect todays best available technology (BAT).
  There is no standard technology to allow for compliance with such guarantee emission values so far.
- No reliable measurement techniques are available for mercury concentrations in the range of 1 µg/Scm (deviations of 2 µg/Scm possible).
- There is no unique technology for mercury emission reduction.
- Research is necessary for fundamental questions, application and measurement technologies.
- A structured action is needed for a successful development.

Mercury: Power plants and the environment – Results (2/2)

- The VGB Initiative Hg$^{cap(ture)}$ pools know-how and ensures transparency.

- Future legal requirements should take into account the research and development needed as also the technological and economical framework of our energy supply.
- The upper bandwidth of BREF-LCP seems to be a reliable approach.
- Emission limits should be based on reliable technologies.
- Emission limits are not an arbitrary, politically item.

- **All members of VGB PowerTech are kindly invited to participate in Hg^{cap}! Please refer to our Position Paper available in English and German language.**