



**United Nations
Environment
Programme**

Distr.: General
8 November 2010

Original: English



**Intergovernmental negotiating committee
to prepare a global legally binding instrument
on mercury
Second session**

Chiba, Japan, 24–28 January 2011
Item 3 of the provisional agenda*

**Preparation of a global legally binding instrument
on mercury**

Process optimization guidance for reducing mercury emissions from coal combustion in power plants

Note by the secretariat

1. The coal combustion partnership area of the United Nations Environment Programme Global Mercury Partnership has developed a guidance document that may serve as a tool to help determine the most appropriate options to meet country-specific needs regarding the reduction of mercury emissions in individual coal-fired electricity-generating plants.
2. The document summarizes practices capable of reducing mercury emissions from coal-fired power plants and focuses on information needed to formulate optimal approaches to reducing mercury emissions from large-source countries.
3. The annex to the present note contains the executive summary of the guidance document. The document has been reproduced as received, without formal editing. The full document is available, in English only, as document UNEP(DTIE)/Hg/INC.2/INF/5. The committee may wish to take the guidance into account, particularly when discussing the reduction of atmospheric emissions of mercury.

* UNEP(DTIE)/Hg/INC.2/1.

Annex

Process optimization guidance document

Executive summary

1. The Process optimization guidance document summarizes mercury emission reduction practices applicable to coal-fired power plants. Mercury emissions from combustion of coal in power plants and industrial boilers constituted about 26 per cent of the global anthropogenic emissions of mercury in 2005. Therefore, it is important to decrease the amount of mercury emissions from this sector.
2. The Guidance document is a tool to help determine the approaches to control mercury emissions, in many cases a co-benefit of reducing emissions of other pollutants. It is a tool for individual coal-fired power plants. The Guidance document allows for a preliminary selection of a mercury control strategy for a given power plant.
3. The practices and technologies capable of reducing mercury emissions include energy efficiencies improvement measures, pre-combustion control measures (e.g. coal blending, coal cleaning), optimizing other (single) air pollutant control technologies to maximize mercury removal, mercury-specific control technologies and multipollutant control technologies. The control strategies are given below:
 - Activated carbon injection has been demonstrated on a number of full-scale systems and is now a commercial technology. Active carbon injection must be used in conjunction with a particulate matter control device, e.g. electrostatic precipitator or fabric filter. Reduction of mercury emissions of more than 90 per cent has been seen. Chemically treated activated carbons allow for lower carbon injection rates for the same amount of mercury removal than un-treated activated carbons.
 - Improving various areas of operation within an older boiler can reduce mercury emissions by up to about 7 per cent. Many existing plants could be overhauled to improve both efficiency and output while reducing mercury emissions. Conventional coal cleaning may, on the average, remove 30 per cent of mercury; data shows a wide range in mercury removal rates, depending on coal origin. Chemical treatment of coal is capable of mercury emission reduction of up to 70 per cent. Coal selection and blending has the potential to reduce mercury emissions by approximately 80 per cent. Use of halogen additives, especially bromine, has the potential to reduce mercury emissions by over 80 per cent.
 - Improvement of operational efficiency of electrostatic precipitator or fabric filter systems can increase their mercury capture up to about 30 per cent and up to about 80 per cent, respectively. Mercury removal of up to about 90 per cent can be expected in wet flue gas desulfurization systems. Selective catalytic reduction may increase the amount of oxidized mercury up to about 85 per cent and thus improve capture by wet flue gas desulfurization.
 - Multipollutant control technologies offer the cost advantage of delivering a system capable of controlling several pollutants simultaneously, including mercury. However, these technologies generally require more demonstration experience for full commercial readiness.
4. The methodology for the selection process of mercury control strategy is introduced in the guidance document as a “decision tree”. This is a tool to assist the user in a preliminary selection of an optimum mercury control strategy by analyzing other pollutants’ (SO_x, NO_x, particulate matter) control equipment configuration as well as its operation. Based on the results of this analysis, the user may make a preliminary selection of mercury control technology, including mercury-specific technology. Final selection can be confirmed with one of a number of complex predictive models. However, the decision tree only considers the types of controls mentioned above. In addition, one would need to consider plant operation and pre-combustion measures as described in the second point in paragraph 3 above.
5. The residues of a mercury control system must be carefully managed to mitigate environmental risks. Mercury captured in flue gas desulfurization (FGD) remains bound to fly ash particles and FGD gypsum. Some leaching tests for wet FGD sludge and fixated wet FGD sludge tests have demonstrated excessive leaching of mercury.

6. General cost trends for controlling mercury from coal-fired power plants are given in the guidance document. There is a good understanding of the cost of activated carbon injection and actual numbers derived from operations in the United States of America. The cost of co-benefit mercury control is difficult to assess since it is dependent on multiple variables such as coal origin and quality, the extent of refurbishment required for the existing particulate matter controls, or site-specific operating regime of wet flue gas desulfurization. For these reasons, only relative costs are presented in the guidance document. They should be treated as cost trend indicators. In addition, locally prevalent economic conditions should always be considered when selecting a mercury control option.
