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Options for mercury reduction from coal combustion

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Abstract. The UNEP coal combustion partnership area has been established to contribute to significantly reduce global mercury emissions mainly though existing multi-pollutant reduction approaches. As part of this, the partnership area has been assisting participating governments in developing mercury inventories and providing technically sound information on cost effective approaches for enhancing reductions of mercury emissions. Guidance material has been produced for developing nations and countries with economies in transition. Activities are ongoing in China, India, Russia and South Africa, and new projects are being planned in Southeast Asia.

Key words: Mercury, coal combustion, air emissions, control technologies, UNEP

Introduction

Burning of coal is the largest single anthropogenic source of mercury air emissions, having more than tripled since 1970. Coal burning for power generation is increasing alongside economic growth. The releases from power plants and industrial boilers represent today roughly a quarter of the mercury releases to the atmosphere. Household burning of coal is also a significant source of mercury emissions and a human health hazard.

Although coal contains only small concentrations of mercury, it is burnt in very large volumes.

Up to 95% of mercury releases from power plants can be reduced. This can be achieved by improving coal and plant performance, and optimizing control systems for other pollutants.

Materials and Methods

The Mercury releases from coal combustion partnership area was formed under the auspices of the UNEP to supplement existing programs and activities in key, strategically selected ways, and provides free and unbiased information on the clean use of coal.

The partnership has been leveraging available funds and has continued to develop knowledge and provide technology transfer to target countries. The US EPA Mercury Monitoring Toolkit, a simple sorbent-based measurement tool for measuring mercury emissions at source, has been demonstrated at full-scale plants in Russia and South Africa. This has helped to produce country specific emission factors and thus to the creation of the most accurate emission inventories for these regions. Similar work is currently underway in India.

The partnership has created materials to assist in the determination of the most cost-effective methods of mercury reduction on a plant-by-plant basis. The POG (Process optimization Document) is a detailed summary of all options available for mercury control. The POG covers everything from coal switching, cleaning and blending, through plant performance optimization, to co-benefitting end-of-pipe technologies such as flue gas desulphurization (FGD) and selective catalytic reduction (SCR). FGD and SCR are commonly installed to control emissions of SO_2 and NOx respectively, but can result in significant mercury reductions as a co-benefit effect. The POG also covers mercury-specific control options such as activated carbon and oxidant injection.

The most appropriate control option for mercury reduction will vary from plant to plant. The POG includes a flow chart (Figure 1) to help readers determine the most cost-effective approach for a specific plant based on known plant characteristics. The POG flow chart has been further developed into a computer program, the iPOG,. The iPOG can use specific data on coal characteristics and plant type to predict the most suitable options for mercury control.

Based on results from the use of the POG and iPOG, two demonstration projects have been carried out at full-scale plants in Russia – one based on sorbent

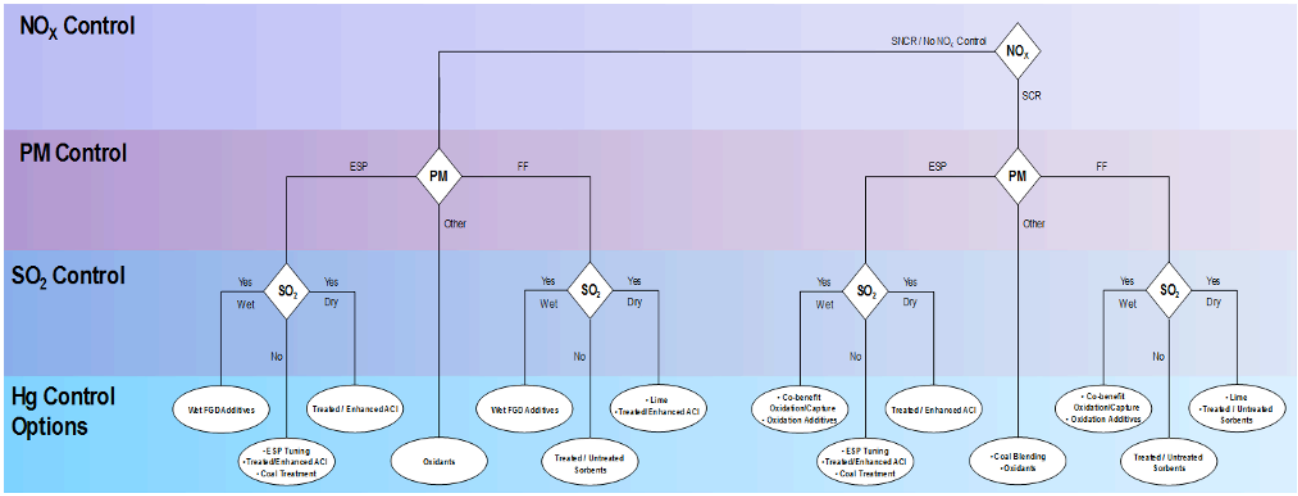

Fig. 1. The POG flow-chart – a tool to help identify options for mercury control at coal-fired power plants

injection and the other on the use of oxidant in the wet scrubbing system. Further demonstration projects are planned for South Africa and India.

The partnership provides the POG and iPOG free of charge on its website. The partnership works to promote the dissemination of information as widely as possible. The authors would be happy to discuss the potential for future project work in target areas.

Conclusion

Reduction of mercury from coal combustion poses a significant challenge. However, there are established technologies available which can reduce mercury emissions from coal combustion by over 95%. The Coal Partnership aims, through information dissemination, workshops and demonstration projects, to provide the knowledge and information on the most economic options for mercury control to those regions who would benefit most.

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