Evaluation of the effect of multiple air pollutants control in China's coal combustion units and future reduction recommendations

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Abstract. With the rapid development of China's economy, large amount of coal was consumed during 2005-2015. Without air pollution control measures, the overall accumulative emissions of $PM_{2.5}$, SO_2, and NO_X in China's coal combustion units would reach as large as 212, 430, and 177 Mt in this period, respectively. However, a series of strict measures have accumulatively removed 183, 232, and 63 Mt of $PM_{2.5}$, SO_2, and NO_X in this period, respectively. Benefit from the traditional air pollutants control, approximately 2542 t of mercury in the flue gas was removed simutanously, accounting for 50% of the mercury input as impurity during the decade. The identification of Hg removal efficiencies in different coal combustion sectors will highlight their reduction potential and measures in the future. At the end of 2015, the $PM_{2.5}$, SO_2, NO_X, mercury removal efficiency in coal-fired power plants reached as high as 98%, 90%, 84%, and 74%, which are expected to increase to 99.95%, 98%, 85%, and 95% after the application of "ultra-low emission" technological path before 2020, respectively. Therefore, the application of multiple pollution control technologies will be the main measure to reduce air pollution in power plants. As to industrial coal combustion units, large amount of small combustion boiler and relatively backward control technologies have led to overall lower removal efficiencies of air pollutants. The situation can be improved by eliminating small boilers and gradually improving pollution control technologies in the middle and large boilers. For the residential coal combustions, energy replacement will dominate future pollution control in this sector.