Mercury Control Technology

Regulations designed to reduce mercury emissions from coal-fired power plants must take into account the limitations of current control technology, the inherent range and variability of mercury in coals and in mercury emissions. The compliance schedule must accommodate the time that it will take to develop mercury-specific technologies that are able to achieve required reductions, which, based on EPA's regulatory proposals, are beyond the capability of current technology. This can only be accomplished through a phased approach to reducing mercury emissions through the implementation of the Clean Air Interstate Rule (CAIR), and a realistic assessment of the availability of mercury-specific control technology in the future.

Current Technology – Co-benefits

Currently, mercury is removed from power plant emissions as a "co-benefit" of technologies designed for NOx, SO2 and particulate matter control. Co-benefit technology for mercury removal can be considered to be commercial, to the extent the equipment itself (principally SCR, scrubber, ESP, and fabric filter technologies) is in widespread commercial use. However, because these technologies were not designed and operated specifically for mercury capture, it is impossible to know, with an acceptable level of certainty, what their performance is for mercury control for any specific unit, burning any specific coal.

Commercial Availability

Technology specifically designed for the control of mercury emissions from coal-fired power plants is in the early stages of development. Promising control options have been identified, but their performance in real-world power plant application remains to be determined.

While it is possible to buy dedicated mercury controls from a number of vendors, the data available on their performance is completely inadequate for the purposes of regulation. Technologies to be used as a basis for regulation, as distinguished from those that are still in development, must be able to control mercury emissions from plants burning a wide range of coals differing in mercury content, sulfur and chlorine content, ash composition, etc. For regulatory purposes commercial technologies must perform in a predictable manner when used with boilers of various designs over the range of operating conditions that the plant will encounter. Short-term field tests or demonstration projects are not sufficient to provide data for regulatory purposes and it would be irresponsible to set arbitrary emission limits based on the limited data available.

Mercury-Specific Control Technology

The Department of Energy, the Electric Power Research Institute and many in private industry are conducting research on new technologies to remove mercury from coal-fired power plants on a consistent, reliable and predictable basis. Generally, the mercury-specific technologies fall into two categories. The first category includes technologies intended to enhance the ability of existing emission control devices to capture mercury. An example is the injection of an additive into a furnace or flue gas to enhance oxidation of mercury to increase its removal in a wet scrubber. The second category includes the use of materials placed in or injected into the flue gas for the purpose of capturing mercury. The most prominent example is the injection of activated carbon (ACI) ahead of a particulate collection device. Activated carbon injection (ACI) is a promising technology that appears, in some cases, to adsorb elemental mercury and allow it to be removed from the stack exhaust through particulate collection devices.

ACI is being used to remove mercury from flue gases from municipal, medical, and hazardous waste incinerators. However, the incinerator application cannot be directly related to coal-fired power plant emissions because the mercury in the flue gas associated with power plants is much less concentrated. For example, the flue-gas from coal-fired power plants is 55 times less concentrated than permitted mercury emissions from medical waste incinerators. Given the vastly greater concentration of mercury, and other composition differences between combustion and incineration sources, the experience with carbon injection on incineration units is of little value for setting emission standards from coal-fired units. In addition to other factors, some utility systems operate at higher temperatures, which is a significant factor in the efficacy of activated carbon to remove mercury from the flue gas. For some coal-fired boilers, such as lignite units, which operate at the highest of utility stack gas temperatures, activated carbon injection is largely ineffective.

Other developing mercury removal options include: the use of fixed absorption structures; enhanced fuel processing incorporating screening and/or heat and pressure techniques to remove mercury, and even the use of high energy electric fields to oxidize mercury in flue gas. These control options are still in the bench or pilot test phases, however, with many key questions yet to be solved.

The Path Forward

Neither co-benefit nor mercury-specific control technology is commercially available for coal-fired utility boilers at a predictable level of performance. Although mercury reductions will take place by the co-benefit of technology likely to be installed under the CAIR, and promising mercury-specific technology is under development, it is premature to set a MACT or NSPS standard or emission allowance allocations because of the lack of reliable data on mercury emissions and the performance of control technology. It would be arbitrary and unreasonable to base an emissions standard on the hypothetical performance of unproven technology. The implementation of an unworkable standard could jeopardize the nation's electricity supply and the economy by forcing plant closures or fuel switching to natural gas. Currently, coal generates over 50% of the electricity supply in the US. Demand for natural gas is at historic levels - currently outstripping supply – a situation that is sending ripple effects throughout the economy because of its use as both a fuel and a feedstock for the production of everything from fertilizer to plastics to heating homes and water. An unachievable standard will exacerbate this problem by increasing demand for natural gas as a fuel for electricity generation, and will needlessly jeopardize the nation's most abundant and affordable energy resource: coal.

It is NMA's recommendation that emissions monitoring be conducted on all affected units between 2008 and 2012. EPA should then set an interim cap, under a national cap-and-trade program in 2012, for implementation in 2015. The cap should be based on an analysis of the data collected between in the 2008 – 2012 period, and an assessment of commercial availability and performance characteristics of mercury control technologies for different coal types. A final cap of 15 tons should be implemented in 2018. This phased approach will allow for an adequate understanding of the performance of co-benefit technology and for the commercialization of mercury-specific control technology that will be necessary to achieve the 2015 and 2018 caps.

For further information

Contact John Shelk (202-463-2653, jshelk@nma.org) or Todd Johnston (202-463-2668, ajohnston@nma.org).