IEA CLEAN COAL CENTRE profiles

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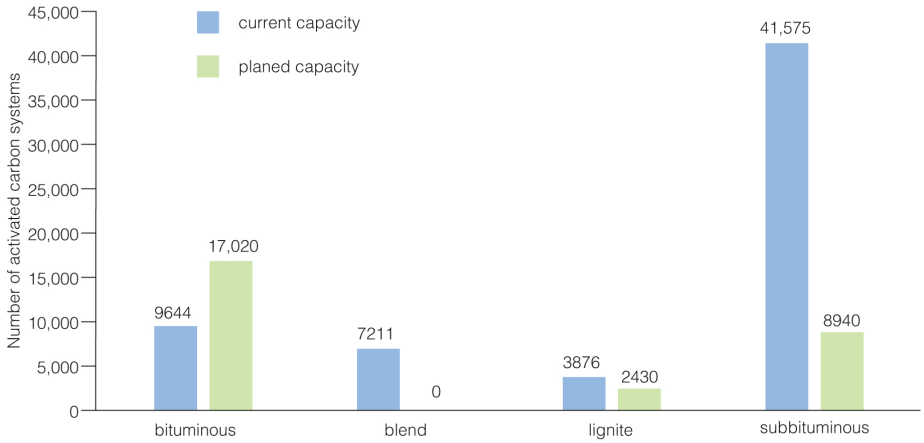
The emerging market for mercury control

Mercury legislation has been established in several countries including Canada, China and the USA and the stringency of this legislation varies. In some cases, coal-fired power plants can easily comply with existing legislation due to the co-benefit, mercury reduction effects of existing flue gas controls. These include mercury capture and reduction in ESP (electrostatic precipitators), fabric filters, SCR (selective catalytic reduction for NOx) and FGD (flue gas desulphurisation for SO_2) systems. However, a new market is emerging for specific control technologies (such as sorbents and oxidants) which can reduce mercury emissions by 90% or more.

The new UN Minamata Convention has yet to be ratified, but when it is, signatory countries will need to install BAT/BEP (best available technologies and best environmental practice) on all new coal-fired plants and establish a national action plan on how to control or reduce emissions from existing plants. The stringency of these requirements at the definition of BAT/BEP in each case will vary according to political, geographical, technological and economic limitations in each region.

And so the growth in the current mercury control market is subject to several factors:

- The impetus – legislation requiring mercury control;
- The challenge – the effectiveness and applicability of mercury controls vary with coal characteristics and may be limited by regional technological and economic restrictions;
- The market variability – markets will emerge relatively independently as countries move forward in a region-specific manner.



Activated carbon installation on coal-fired utilities in North America, MW

The figure demonstrates the capacity of plants in North America which have already installed activated carbon for mercury control or plan to do so in the near future. Activated carbons and related sorbents facilitate the capture of mercury in solid form in existing or add-on particulate control devices. In most cases, the additional solid waste is minimal and will not affect revenue from fly ash sales. New sorbents are appearing on the market which can be sold as fertiliser. The main alternatives to activated carbon and sorbents are oxidants. Any oxidant, be it chemical (such as halogens), or electrochemical (such as ozone or plasma charging) can increase the solubility of mercury to enhance its capture in either particulate control devices or, more effectively, in FGD systems.

Each issue of **Profiles** is based on a detailed study undertaken by IEA Clean Coal Centre, the full report of which is available separately. This particular issue of Profiles is based on the report:

The emerging market for mercury control

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profiles

The determination of which technology is most appropriate at each plant is site specific, varying with the coal characteristics (subbituminous and lignite coals are more challenging than bituminous and anthracite coals), the existing plant configuration (co-benefit options) and the level of mercury reduction required (as determined by the legislation)

Since legislation requiring mercury control first appeared in Canada and North America, this is where the international market is currently focused. However, since many plants in North America are now in compliance or will be within the next year or so, the market for the installation of mercury controls will be sated. The market for related consumables, such as oxidant materials and sorbents, will stabilise.

New markets may emerge in other regions. For example, China has mercury emission limits for coal-fired plants which can be met by most modern plants with standard control equipment. However, as China continues to cut pollution and tighten emission limits nationally, it is likely that requirements for more specific mercury control may appear at some plants in targeted regions. Whether this will result in a new international market for mercury controls remains to be seen – China is unlikely to purchase technologies from abroad which could be produced in a more economic fashion at home. It is therefore possible that China could end up being a net exporter of mercury control systems to other regions in the future

Although the European Union does not have emission limits for mercury, it does have annual mercury monitoring requirements. BAT reference documents are being finalised which include a summary of applicable techniques and technologies for mercury control. Mercury emissions from the coal sector in Europe have declined impressively and steadily since the 1980s and the current and impending legislation will maximise the continued co-benefit reduction of mercury with SO_2 and NOx controls. If mercury legislation does appear in the EU in the near future it is likely to do so on a case by case basis at plants which demonstrate a mercury emission issue.

India has minimal emission requirements for coal-fired plants. However, there are rumours (Hindustan Times Nov 2014) that the Indian Government intends to ratify the Minamata Convention and set emission reduction targets or controls for mercury. Considering the significant challenge faced by India in terms of growth in energy demand and with coal quality and the energy infrastructure, it is likely that any mercury reduction strategy will be less stringent than that seen in North America and Europe. For India, a multi-pollutant approach, targeting the reduction of particulates, SO_2, NOx and mercury simultaneously through maximised co-benefit effects would make the most economic sense.

This new report from the Clean Coal Centre summarises the various technologies available for mercury control, from coal cleaning and blending options through to bolt on technologies such as the patented REACT, MerControl, NeuStream™ or Skymine™ processes. Various options for mercury control are listed along with their reported efficiency, level of development and, where possible, an idea of relative cost. The potential market for such equipment is reviewed for North America, Europe and Asia.

REACT regenerable coke-based system for multipollutant control at the Isogo Plant in Japan

$100 million NeuStream™ system at the Drake Power Plant, Co, USA

Nalco MerControl oxidant addition system

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