Power station stack gas emissions, a review of control techniques: current and projected.

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While Australia seems to be focussed on carbon dioxide emissions from power stations, this gas is just one by-product of the combustion of fossil fuels. Blessed with abundant supplies of low-sulphur coals and with low population densities, pressures to reduce emissions other than particulates have been so far, fairly restrained.

But in the more densely populated regions of Europe, North America and Japan emissions of oxides of sulphur (SOx) of nitrogen (NOx) and increasingly, heavy metals in particular mercury, have been of major concern for decades, and power station owners and operators in those regions have been subject to increasingly stringent controls.

These control efforts are succeeding both technically and economically, to the point where models for their control are weakening grounds for resisting their deployment in Australia, while serving as pointers to possible initiatives to control carbon dioxide emissions.

Pressures for the reduction of emissions of the acid rain and photochemical smog precursors, the oxides of sulphur SOx and nitrogen NOx are increasing in Australia. What, then, is involved in their control, what is the state of the art, are there improved control system and equipment under development, and are there pointers in these systems for future likely requirements being imposed on combustion plant owners and operators (power stations in particular) for the control of carbon dioxide emissions?

This brief review focusses on coal-fired power stations, and on the technologies currently favoured for the control of the range of pollutants that are a byproduct:

- *Particulates: PM_{10}.* These are the familiar chimney smoke and dust, mostly particles of fly ash from mineral matter in the fuel. They are the most visible form of pollution; their health and other impacts are obvious and well known, and control efforts in Australia have tackled these aggressively, and generally successfully.
- *Oxides of sulphur.* These originate from "reduced" sulphur in coal, both organic, and also mineral, mostly pyrite (iron di-sulphide), which after combustion appear mostly as the dioxide SO_2, but around 1.5 per cent is produced as the sulphuric acid precursor sulphur trioxide SO_3. These gases are major contributors to acid

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