Opportunities for Thermal Coal Research

Introduction

A review of research supported by ACARP, NERCCDC and the coal CRCs on Australian thermal coals has revealed that the effort has slowed in recent years. In this period new technologies and novel analytical techniques for coal, its products and impacts have emerged which provide the need and opportunities for research.

In particular, the use of Australian coals of HELE (High Efficiency Low Emission) units is expanding, burners, furnaces and additional plant are based on enhancing the control of emissions, PCI into blast furnaces has become more common, and utilities now comply with more stringent regulations. ACARP has supported construction of a furnace at the University of Newcastle suited for research on HELE plant. New tools for characterising coal and volatiles include LDI-TOF-MS, for char include CGA, optical and SEM techniques and for mineral matter includes SEM-EDS.

Therefore, this year ACARP especially encourages appropriate proposals on thermal coals.

Relating coal quality to its utilisation

Thermal coal is commonly fired through burners in pulverised form with heating yielding combustible volatile matter and char. Following heat release solid and gaseous products result, heat is transferred through furnace walls to the working fluid - steam - and cleaned gas results following gas cleaning and ash collection . The schematic pictured on Fig 1 illustrates the associated processes with operational and regulatory impacts.

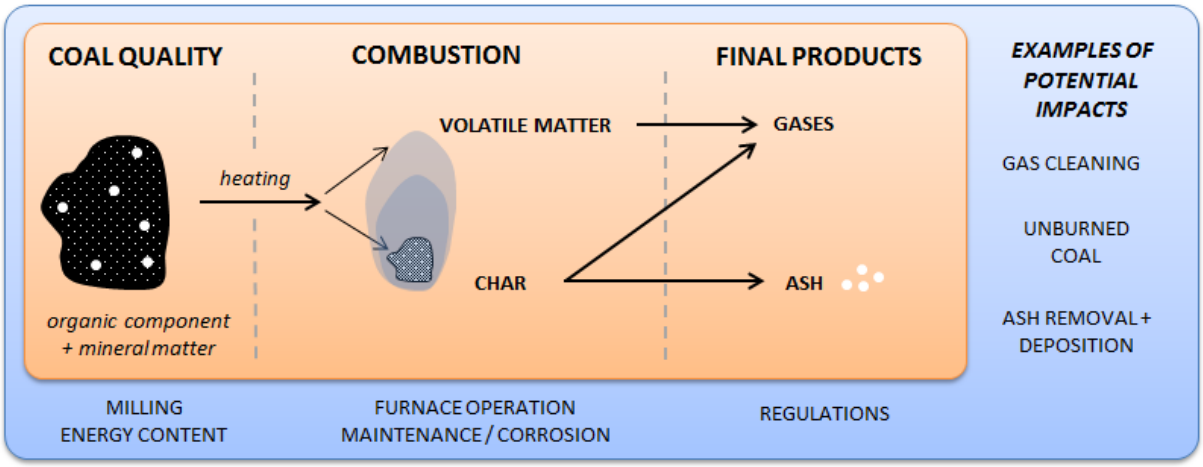

Fig 1: Combustion mechanisms linking coal quality on impacts

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Gaps and opportunities for future research

Following interviews of stakeholders involved in the export and local use of Australian thermal coals, researchers, consultants and laboratories a number of study areas have been identified which may lead to a better appreciation of the impact of coal quality on its value and use, including

- Critical review on coal quality impacts on High Efficiency Low Emission (HELE) power plants and prospects for uptake of HELE units and associated steam conditions and furnace metal requirements, and projects based on the new ACARP HELE furnace
- Assessing coal analysis techniques associated with regulations and standards for Australian thermal coal utilisation, including those determining acceptable export quality and ISO standards
- The use of advanced analytical techniques as characterisation options for coal utilisation issues
- Blending Australian thermal coals with international coals, including alleviating issues with troublesome local coals, blending with biomass, biochar and wastes, and as blending partners with Indian and Indonesian coals. What coal quality best suits the blending partners?
- Utilisation of secondary thermal products from coal preparation plants, including by-products and recovered wastes from coal washing of export coal
- Emerging competitive coals to Australian coals, by comparative studies to establish rational economic value
- Future markets for thermal coal and prospective coal reserves, particularly for low volatile coals, for coals from new basins being developed and for new potential markets
- ACARP white papers and State-of-the-art reviews similar to those existing on the ACARP TMS page at www.acarp.com.au/reports, in particular
    - Updating existing but dated white papers
    - New white papers on coal quality techniques or coal utilisation technologies

Abbreviations

CGA- coal grain analysis
CRCs- Cooperative Research Centres for Black Coal Utilisation, and for Coal in Sustainable Development
ISO- International Standards Organisation
LDI-TOF-MS - laser desorption/ionisation time of flight mass spectrometry
NERDDC- National Energy Research, Development and Demonstration
PCI- pulverised coal injection
SEM- scanning electron microscopy
TMS- Technical Market Support