



Coal — new opportunities in the 21st century

by

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The World scene

Despite a poor public image and a common perception it is a fuel from the last century, coal has numerous uses critically important to economic development and poverty alleviation worldwide. The most significant of these are electricity generation, and the production of steel, aluminium, cement, and liquid fuels (World Energy Council, 2010).

Approximately 5800 Mt of hard coal and 953 Mt of brown coal were used worldwide in 2008. From 2000, the global consumption grew faster than any other fuel at 4.9% per annum (World Energy Council, 2010). In 2008, coal generated approximately 41% of the world's electricity and almost 70% of the world's steel production was dependent on coal (World Coal Association, 2009, 2011). In 2009 coal's share of world energy consumption was 29.4%, the highest since 1970 (BP, 2010).

The International Energy Agency (IEA), using its New Policies Scenario predicts that world primary energy demand will increase by 36% between 2008 and 2035. Fossil fuels — oil, coal, and natural gas — will remain the dominant energy sources in 2035 in all of IEA's three scenarios, though their share of the primary fuel mix varies (International Energy Agency, 2010). Non-OECD (Organisation for Economic Co-operation and Development) countries account for 93% of the projected increase in world primary energy demand, with China contributing 36% to the projected growth in energy use. Predicted demand for coal rises to around 2020 and starts to decline toward 2035.

World electricity demand will continue to grow more than other final forms of energy, with a predicted growth of 2.2% per annum between 2008 and 2035, with more than 80% of the increase in non-OECD countries. China is projected to add generating capacity over the next 15 years equivalent to the current installed capacity of the United States. Despite this significant increase in electricity generation, IEA predicts that 1.2 billion people will still lack access to electricity in 2030 compared with the current estimate of 1.4 billion (over 20% of the present world population).

Globally, under the New Policies Scenario, coal will remain the main source of electricity generation in 2035, although its share is predicted to decline from 41% to 32%. A large increase in non-OECD coal-fired generation will be partially

offset by a fall in coal-fired generation in OECD countries (International Energy Agency, 2010).

In recent ABARE (now ABARES, Australian Bureau of Agriculture and Resource Economics and Sciences) energy projections that include the Renewable Energy Target and a 5% emissions reduction target, Australia's coal production increases at an average annual rate of 1.8% up to 2029–30, although its share of total energy production is expected to fall (Syed et al., 2010; Geoscience Australia and ABARE, 2010). A recent study from the University of Queensland concluded that coal would be a principal energy source for the world for the foreseeable future (Knights and Hood, 2009).

In addition to rising global energy demands, new and developing technologies will allow exploitation of coal resources that are uneconomic using current technologies. These new technologies include both mining or alternative extraction methods and coal conversion technologies, to either gas or liquids. The modernisation of electricity generation technologies along with carbon capture and storage will also add to the acceptance of coal as a fuel for the future. The application of these new and/or alternative technologies could allow the development of a number of Western Australia's known, but undeveloped, coal resources and potentially lead to new discoveries.

Western Australian opportunities

Although coal was first discovered in 1846 in Western Australia on the Irwin River, the first commercial discovery was at Collie in 1883. Mining commenced with the extension of the railway to the town in 1898 (Le Blanc Smith, 1990). Despite ongoing exploration and a number of discoveries from the 1960s to the 1980s, Collie is the only producing area in the State. The combined output from the two producing companies is approximately 6.5 Mtpa, of which the majority is for electricity generation, with lesser amounts for industrial uses and a small but expanding export component.

The hiatus in coal exploration activities during the 1990s reflected a combination of the ability of the then available resources to meet local requirements, low coal prices, and a lack of export potential. Increasing world energy demands

— and therefore coal prices — and the development of alternative technologies have led to a substantial increase in activity, particularly in the last two to three years, to the extent that exploration licences now cover most prospective areas. Current activities include both greenfields exploration and the economic evaluation of more-advanced projects. Several companies are currently targeting relatively under-explored but prospective Permian strata in the Canning Basin. Renewed exploration is also taking place in areas containing known coal deposits, including the northern Perth Basin, Vasse Shelf, Boyup and Wilga Sub-basins, and the Eucla Basin.

Advanced projects targeting traditional coal extraction methods are being considered at Osmington (underground, Vasse Shelf), Eneabba (opencut with an associated power station, northern Perth Basin), and a potential trench highwall mining operation near Camballin in the Canning Basin for the export market. A proposed coal-to-urea plant near Collie has recently received conditional environmental approvals with construction likely to commence this year. This operation will use approximately 2.5 Mtpa of opencut mined coal to produce 2.1 Mtpa of urea, largely for export through the Bunbury port.

Non-conventional coal uses are also being evaluated. East of Dongara, in the northern Perth Basin, a resource with an estimated 194 Mt (74 Mt Indicated, 119 Mt Inferred) of sub-bituminous Jurassic coal is being assessed as an underground coal gasification (UCG) project. Two separate coal-to-liquids (CTL) projects are under evaluation north of Esperance in the Eucla Basin. These two projects are based on large Eocene lignite deposits that were discovered during the 1980s. Current evaluation is concentrating on upgrading data on the resource and the application of conversion technologies.

References

- BP 2010, BP Statistical Review of World Energy June 2010: BP, viewed 23 December 2010 <http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2008/STAGING/local_assets/2010_downloads/statistical_review_of_world_energy_full_report_2010.pdf>.
- Geoscience Australia and Australian Bureau of Agricultural and Resource Economics 2010, Australian Energy Resources Assessment, Chapter 5 — Coal: Geoscience Australia and ABARE, viewed 10 May 2010, <http://www.abare.gov.au/publications_html/energy/energy_10/ch_5.pdf>.
- International Energy Agency 2010, World Energy Outlook 2010 — Executive Summary: OECD/IEA 2010, viewed 10 January 2011, <http://www.worldenergyoutlook.org/docs/weo2010/WEO2010_ES_English.pdf>.
- Knights, P and Hood, M (editors) 2009, Coal and the Commonwealth — The Greatness of an Australian Resource: The University of Queensland, Brisbane, October 2009, viewed 10 May 2010, <http://www.eait.uq.edu.au/docs/Publications/Coal%20and%20the%20Commonwealth_FINAL_lores.pdf>.
- Le Blanc Smith, G 1993, Geology and Permian coal resources of the Collie Basin, Western Australia. Geological Survey of Western Australia, Report 38, 86p.
- Syed, A, Melanie, J, Thorpe, S and Penney, K 2010, Australian energy projections to 2029–30: ABARE research report 10.02, prepared for the Department of Resources, Energy and Tourism, Canberra, March 2010, viewed 16 July 2010, <http://www.abare.gov.au/publications_html/energy/energy_10/energy_proj.pdf>.
- World Coal Association (formerly World Coal Institute) 2009, Coal Facts 2009: WCA, viewed 10 January 2011, <[http://www.worldcoal.org/bin/pdf/original_pdf_file/coal_factsnewversion09\(15_09_2010\).pdf](http://www.worldcoal.org/bin/pdf/original_pdf_file/coal_factsnewversion09(15_09_2010).pdf)>.
- World Coal Association (formerly World Coal Institute) 2011, WCA, viewed 10 January 2011, <<http://www.worldcoal.org/resources/coal-statistics/>>.
- World Energy Council 2010, 2010 Survey of Energy Resources: WEC, viewed 10 January 2011, <http://www.worldenergy.org/documents/set_2010_report.pdf>.