

Global perspective on the use of low quality coals

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Around half of the world's estimated recoverable coal reserves comprise low value coals, predominantly lignites, subbituminous coals, and high-ash bituminous coals. By rank (on a tonnage basis) anthracite and bituminous coals account for 51% of the world's reserves, subbituminous coal 32%, and lignite 18%.

For decades, many coal-producing countries have witnessed a steady decline in the quality of the coal produced. Often, this reflects the increasing exhaustion of reserves of higher grade coals and a growing reliance on reserves of lower quality. For instance, this overall downward trend in coal quality has been occurring in the USA since the 1950s although similar trends can be observed in many other parts of the world. Low quality/value coals can take several forms but are generally considered to comprise mainly lignites, plus subbituminous and bituminous coals with high ash and/or moisture contents.

Total proven global reserves of lignite are somewhere between 150 and 283 Gt. Lignites are found in many parts of the world, with particularly large deposits in Russia, the USA, Australia, Germany, Greece, the Czech Republic, and Serbia. Global production is currently around 950 Mt/y. At present, twelve individual countries each produce more than 20 Mt/y. Apart from these major producers, there are also many countries where output is less, but nevertheless important in the respective national energy mix.

Proven reserves of subbituminous coal are around 267 Gt, with the biggest individual reserves located in the USA (at more than 100 Gt, the biggest), Russian, China, Ukraine, and Brazil. The bulk of these reserves are located predominantly in the first two which, together, represent nearly three quarters of the total. Subbituminous coals are of particular importance in the USA and parts of South East Asia. Although the majority are used for power and/or cogeneration, on a more localised basis, they are also important for a number of residential, commercial and industrial applications.

In several major economies, the use of lower quality bituminous coals is of major significance. High-ash bituminous coals are particularly important to the dynamic Indian economy. The very high ash content of most

indigenous reserves can create various problems. Nevertheless, coal's strategic importance outweighs its drawbacks and the country's economy relies heavily on its use for power generation and a range of industrial applications. Here, strategic considerations outweigh operational problems and the level of consumption continues to rise.

Globally, various reasons for using either low rank or low quality coals are cited. Many are self-evident and focus predominantly on access to an affordable, secure source of energy for power generation and other industrial and commercial uses. They include:

- security of supply. There is only limited international trade in most low rank/quality coals, hence most is sourced from indigenous deposits and used locally. Compared with oil and natural gas, the cost of production remains relatively unaffected by market and other outside forces. This helps keep the cost of electricity generation low and imparts a stabilising effect on its price;
- in many countries, such coals represent the only major indigenous resource – there may be few, if any, economically-viable alternatives. The utilisation of indigenous resources helps reduce the need for imported sources of energy. This minimises reliance on outside sources and has a positive impact on national trade balance;
- as a consequence of using large scale surface mining techniques, extraction costs are often low. Some lignites and subbituminous coals represent the cheapest fossil fuel-based sources of energy; and
- the maintenance of a national mining industry and attendant power generation sector may be an important local factor as they may provide many long-term jobs.

However, there may be some less positive aspects to consider. In the future, as the more accessible reserves are depleted, the (currently low) extraction cost may increase. Furthermore, the general decline in coal CV being experienced effectively means that a greater volume of lower quality coal (and probably overburden) will need to be mined in order to supply the equivalent amount of energy provided by a smaller quantity of higher quality



Great Plains Synfuels Plant, North Dakota, USA. A major lignite consumer, since 1984, the plant has been using Lurgi gasifiers to produce SNG and other products. Since 2000, CO₂ from the plant has been captured and piped to Canada for enhanced oil recovery purposes. Around 18,000 tonnes of local lignite is gasified daily (photograph courtesy of Basin electric Power Cooperative)

coal. More ash may be produced and there may be other environmental consequences associated with increased mining activity. The lower CV of many of these coals makes long distance transport difficult and/or expensive. Although some types can be upgraded to improve their properties and increase their value via drying, cleaning and briquetting, these steps increase costs. However, a number of novel upgrading processes are being developed and trialled.

Despite the possible drawbacks associated with their use, many countries are turning increasingly to the use of indigenous reserves of lower quality coals. In some cases, these comprise the only significant energy resource available. Often, such coals are mined relatively inexpensively via opencast techniques. Their use provides a secure source of energy and helps reduce dependence on imported supplies. Industry observers are convinced that

the long-term future of coal-derived energy supplies will include the greater use of such coals, a trend that is already discernible in many parts of the world.

Even where a country's main source is, at present, imported hard coal, the situation may change as a combination of logistical and production constraints is tightening the global supply and it is clear that the international market is beginning to accept coals with lower heating value. Increasingly, lower quality coals are being traded and marketed around the world and their use is expected to continue growing for the foreseeable future.

The report examines the global situation with regard to the scale, location and major uses of low quality coals and addresses the individual countries where they currently play, or in the future, are likely to play, an important role in energy production.

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:

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Steve Mills

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Gemini House
10-18 Putney Hill
London SW15 6AA
United Kingdom

Tel: +44 (0)20 8780 2111

Fax: +44 (0)20 8780 1746

e-mail: mail@iea-coal.org

> Internet: www.iea-coal.org