

SECTION ONE

WHAT IS COAL?

>> Coal is the altered remains of prehistoric vegetation that originally accumulated in swamps and peat bogs. >>



Peat



Brown Coal



Sub-bituminous



Bituminous

Definition

Coal is a fossil fuel. It is a combustible, sedimentary, organic rock, which is composed mainly of carbon, hydrogen and oxygen. It is formed from vegetation, which has been consolidated between other rock strata and altered by the combined effects of pressure and heat over millions of years to form coal seams.

Photographs courtesy of the Australian Coal Association

The build-up of silt and other sediments, together with movements in the earth's crust (known as tectonic movements) buried these swamps and peat bogs, often to great depths. With burial, the plant material was subjected to high temperatures and pressures. This caused physical and chemical changes in the vegetation, transforming it into peat and then into coal.

Coal formation began during the Carboniferous Period – known as the first coal age – which spanned 360 million to 290 million years ago.

The quality of each coal deposit is determined by temperature and pressure and by the length of time in formation, which is referred to as its 'organic maturity'. Initially the peat is converted into lignite or 'brown coal' – these are coal-types with low organic maturity. In comparison to other coals, lignite is quite soft and its colour can range from dark black to various shades of brown.

Over many more millions of years, the continuing effects of temperature and pressure produces further change in the lignite, progressively increasing its organic

maturity and transforming it into the range known as 'sub-bituminous' coals.

Further chemical and physical changes occur until these coals became harder and blacker, forming the 'bituminous' or 'hard coals'. Under the right conditions, the progressive increase in the organic maturity can continue, finally forming anthracite.

Types of Coal

The degree of change undergone by a coal as it matures from peat to anthracite – known as coalification – has an important bearing on its physical and chemical properties and is referred to as the 'rank' of the coal.

Low rank coals, such as lignite and sub-bituminous coals are typically softer, friable materials with a dull, earthy appearance. They are characterised by high moisture levels and low carbon content, and therefore a low energy content.

Higher rank coals are generally harder and stronger and often have a black, vitreous lustre. They contain more carbon, have lower moisture content, and produce more energy. Anthracite is at the top of the rank scale and

has a correspondingly higher carbon and energy content and a lower level of moisture (see diagram on page 4).

Where is Coal Found?

It has been estimated that there are over 984 billion tonnes of proven coal reserves worldwide (see definitions). This means that there is enough coal to last us over 190 years (see graph). Coal is located worldwide – it can be found on every continent in over 70 countries, with the biggest reserves in the USA, Russia, China and India.

Resource

The amount of coal that may be present in a deposit or coalfield. This does not take into account the feasibility of mining the coal economically. Not all resources are recoverable using current technology.

Reserves

Reserves can be defined in terms of proved (or measured) reserves and probable (or indicated) reserves. Probable reserves have been estimated with a lower degree of confidence than proved reserves.

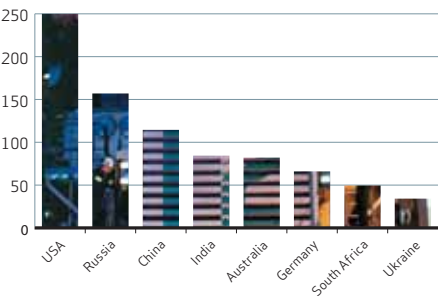
Proved Reserves

Reserves that are not only considered to be recoverable but can also be recovered economically. This means they take into account what current mining technology can achieve and the economics of recovery. Proved reserves will therefore change according to the price of coal; if the price of coal is low, proved reserves will decrease.

Source: IEA Coal Information 2004

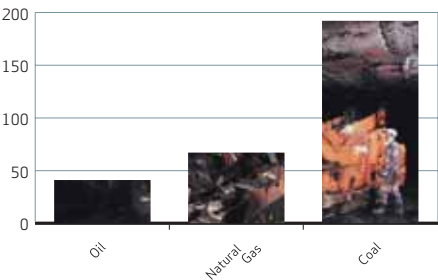
Countries with the Largest Reserves of Coal, 2003 (billion tonnes)

Source: BP 2004



Reserves-to-production Ratios, 2003 (Years)

Source: BP 2004



While it is estimated that there is enough coal to last us 190 years, this could extend still further through a number of developments, including:

- >> the discovery of new reserves through ongoing and improved exploration activities;
- >> advances in mining techniques, which will allow previously inaccessible reserves to be reached.

All fossil fuels will eventually run out and it is essential that we use them as efficiently as possible. Significant improvements continue to be made in how efficiently coal is used so that more energy can be generated from each tonne of coal produced.

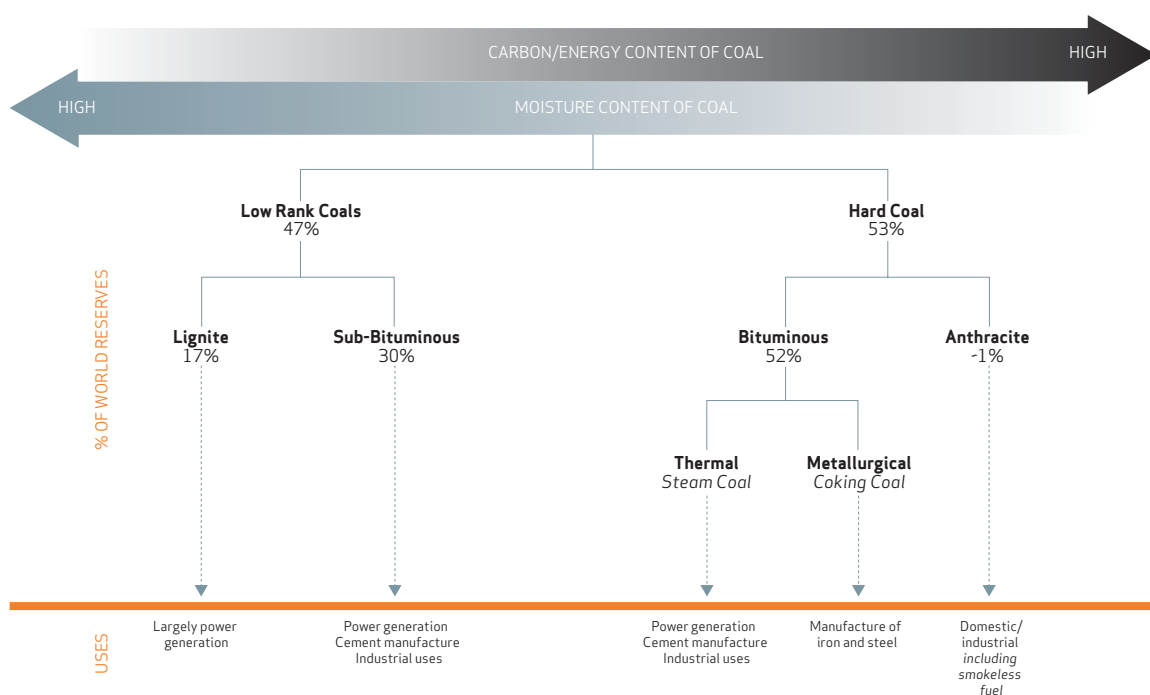
Finding Coal

Coal reserves are discovered through exploration activities. The process usually involves creating a geological map of the area, then carrying out geochemical and geophysical surveys, followed by exploration drilling. This allows an accurate picture of the area to be developed.

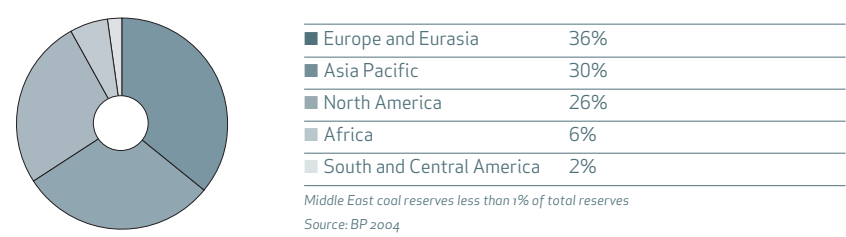
The area will only ever become a mine if it is large enough and of sufficient quality that the coal can be economically recovered. Once this has been confirmed, mining operations begin.

SECTION ONE END

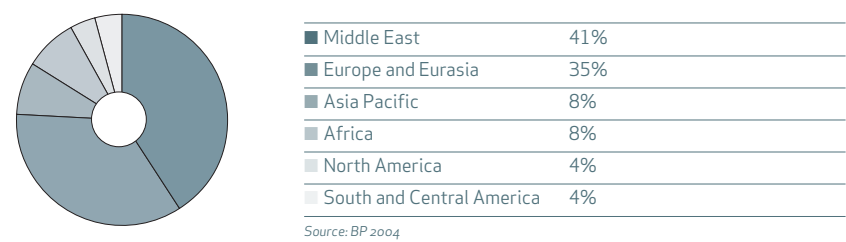
Types of Coal



Coal Reserves Showing Regional Shares (at end of 2003)



Gas Reserves Showing Regional Shares (at end of 2003)



Oil Reserves Showing Regional Shares (at end of 2003)

