



# Coal is also becoming scarce

Coal is not only the second most important fuel and the one with the strongest growth, it is also the energy source which does the most damage to the climate. But there are now initial signs that coal extraction will not be able to follow the increasing demand for much longer.

Although coal is the most important resource for global electricity generation, the world market is relatively small, as the extracting countries use the majority of the coal themselves. Photos (2): dpa

Coal is often portrayed as the energy source which will still be available in abundance for centuries. These assumptions on the availability of coal could turn out to be disastrous calculated optimism, which overlook important framework conditions. The result would be false investments in new power stations and in carbon capture and storage (CCS), i.e. the large-scale capture of carbon dioxide and its long-term storage in underground stores. In the end, such projects could endanger securities of supply more than secure them.

From today's perspective, coal is the world's second most important energy source after crude oil, with a share in world energy consumption of over a quarter. In terms of global electricity generation coal is even the most important energy source, with a share of 37 %. In this, both the extraction and consumption of coal have increased at above average rates in the last few years, as BP have been the latest to show in their 2008 report "Statistical Review of World Energy": "Coal has been the fastest growing fuel worldwide for four years in a row." It is no surprise that global carbon dioxide emissions have been

moving in the same direction, for the burning of coal generates considerably more of the greenhouse gas CO<sub>2</sub> for the same amount of energy than the burning of oil and natural gas.

## Steep price rises

The boom in demand is also resulting in rising prices. As the German Federal Office for Geosciences and Resources (BGR) writes in a report: "The spotmarket prices for steam coal, which have been rising steadily since the beginning of 2006, had almost quadrupled by the summer of 2008 and reached a new all-time high with prices of up to 210 US\$/t (monthly average). (...) Similar price rises have been seen for coking coal and coke. In 2008, coking coal saw an approximately threefold increase in prices over 2007, reaching at least 300 US\$/t. By the summer of 2008 the spotmarket prices of coke had also trebled over the previous year to over 700 US\$/t."

Although the prices have meanwhile come back down due to the financial crisis, they are still at a significantly higher level than in the past and thus con-

sistent with the general trend of the last few years. This is an unmistakable sign that coal extraction can no longer grow as fast as the rising demand of the global economy. If the hopes of a quick end to the crisis come true, then, just as for crude oil, coal could also soon openly show its scarcity.

### Availability is being over-estimated

The assumption that the majority of our coal reserves have not yet been used, and still lie in the ground for us to extract, may be true. The statistics on global reserves are often old and probably out of date, however. A lot of data has not been updated for many years. And of those that have been, most have had to be corrected downwards.

The main thing, however, true for coal as it is with crude oil, is not the extent of the reserves, but their actual availability and the question: what amounts can be extracted from the reserves, processed and transported in each case? The scientists at the Energy Watch Group have studied the real availability of coal using geologically empirical methods of analysis. They have thus determined what the maximum extractable amounts are most likely to be. According to this, the worldwide extraction of coal may still be increased by almost a third, but it will already reach its peak between 2020 and 2030. On the way to this point, however, the International Energy Agency (IEA)

### The most important countries in the worldwide coal market

Ranking	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Reserves in billion toe	USA 120	Russia 69	India 61	China 59
Extraction in million toe/year	China 1,108	USA 576	Australia 202	India 200
Net exports in million toe/year	Australia 150	Indonesia 60	South Africa 47	Columbia 36

predicts that demand will rise much faster, which should cause prices to shoot upwards. Even today, the quality of the coal being extracted in many fields is decreasing. For coal too, just as with the other fossil fuel reserves, the best fields have been exploited – in other words the ones easy to extract from with the highest quality. South Africa, for example, has had to reduce its own power generation from coal-fired power stations at times, in order to be able to fulfil the coal export obligations that it has entered into.

The huge effort of coal extraction and the high demands on infrastructure cannot simply be increased just like that. For starters, the extraction of coal is linked to massive interference with nature and the landscape. The legacy of coal mining negatively burdens inhabitants, the taxpayer and customers with costs far into the future. In some mining regions the ground above the coal mines has subsided so much that they are now living below the water table and can only be kept dry through the use of pumps and drainage systems. To pay for the damage energy suppliers

The largest extracting countries, China and the USA, use all of their extraction themselves and import more in addition. The largest exporter, Australia, is not even among the top four countries in terms of reserves.

*(toe = tons of oil equivalent)*

Data: LBST 2005



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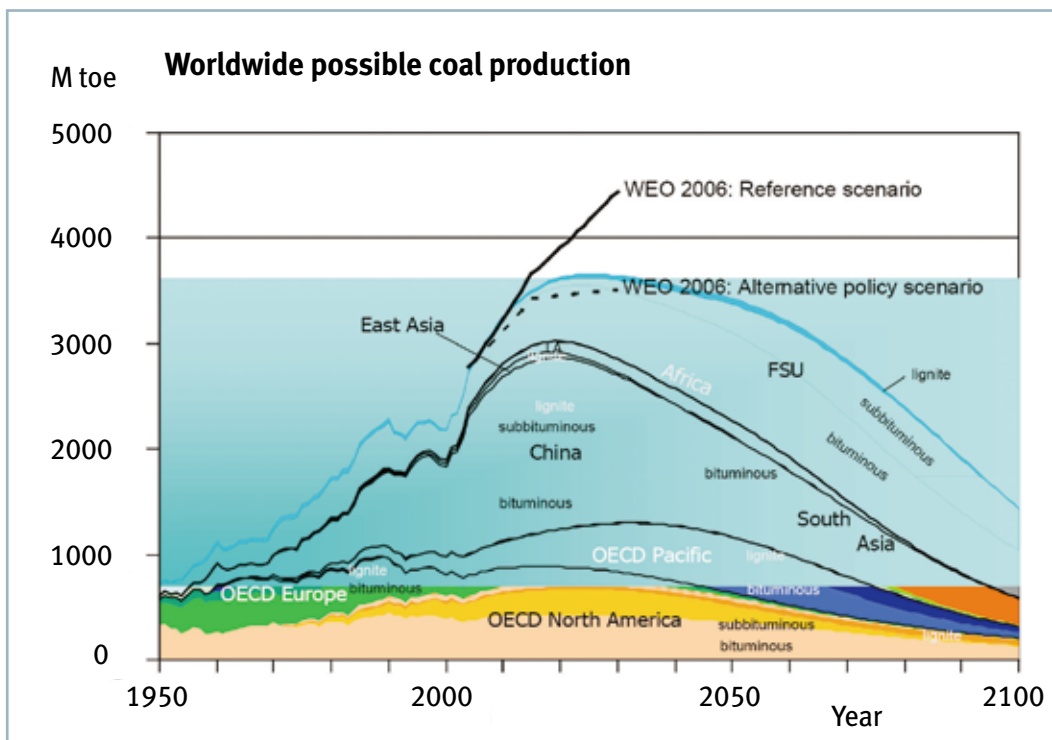


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The black line shows the demand forecast by the IEA from the World Energy Outlook, published in 2006. The coloured areas beneath stand for the availability of coal in the various regions of the world, as determined by the scientists of the Energy Watch Group. (toe = tons of oil equivalent)

Diagram: LBST / EWG



pay out millions each year, and yet these costs and follow-on costs in the future hardly show up in their economic calculations.

### The world coal market is not a market

For coal, it is mainly the dependence on a few exporting countries which is underestimated. Approx. 85 % of remaining reserves are concentrated in just six countries: the USA, Russia, India, China, Australia and South Africa. Almost a third lie just in the USA. A mere four countries supply the world market with four fifths of demand: Australia (40 % alone), Indonesia, South Africa and Columbia.

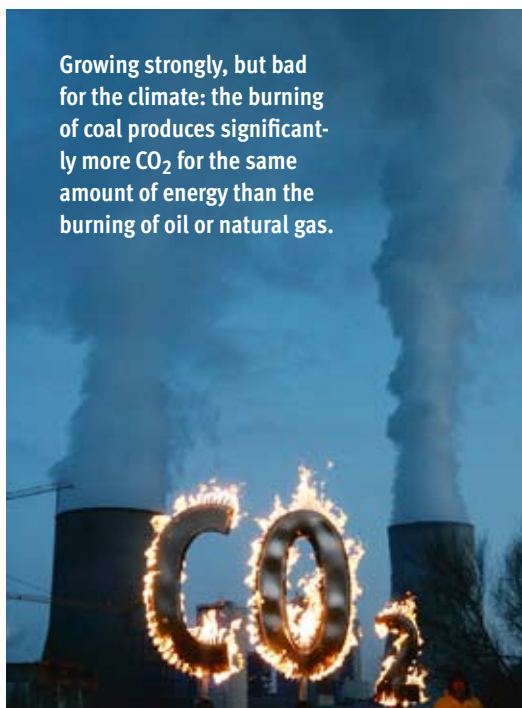
In this the world coal market is relatively small. Only a seventh of coal extracted is exported, because the extracting countries mostly use it themselves. The country with the highest rate of coal extraction is China. It extracts double the volume of the second-placed USA. Despite this, China has already gone from being an exporter to being an importer. Three of the four largest mining countries, China, the USA and India, use their entire extraction volumes themselves and import additional coal. Compared to the world coal market, which isn't really one at all, the world crude oil market experiences almost completely free-market conditions.

It is foreseeable that the tendency towards concentration of the exporting countries will continue to strengthen. Expansion in further potentially important supplier countries such as Russia and Columbia is being hindered by high logistical demands. Australia is thus developing to become the ultimate global coal supplier, while other traditionally key exporters such as Indonesia or – even more importantly for the EU – South Africa, are facing big problems with developing their coal reserves and export capacities.

In light of these facts, the scepticism towards the so-called “clean coal” technologies is also receiving new vitality. These technologies are planned for, and will most likely mainly be used in, new power plants. But if these methods really are ready for use in ten to fifteen years' time, with suitable sites for storing the CO<sub>2</sub> gas having been found, then who is going to build new power stations which use a source of energy whose availability is diminishing? The rising prices of coal will then make all of today's plans and calculations look absurd.

Thomas Seltmann

**Further information:**  
All the studies, supplementary material and press information are available for free download at [www.energywatchgroup.org](http://www.energywatchgroup.org)  
Author's website: [www.thomas-seltmann.de](http://www.thomas-seltmann.de)



Growing strongly, but bad for the climate: the burning of coal produces significantly more CO<sub>2</sub> for the same amount of energy than the burning of oil or natural gas.

S&WE is presenting the results of the Energy Watch Group study on all forms of energy supply worldwide in a five-part series. Following on from oil and coal, S&WE 11/2009 will report on nuclear power.

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