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The return of coal?

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Topic: Supply/Production
Tags: coal, electricity [list all tags]

It is often said that peak oil (and gas) will usher in a new coal era, coal to replace gas for electricity generation, coal to meet increased electricity demand as direct consumption of oil and gas shifts towards electricity and the possible revival of coal to gas and coal to liquid projects.

The justification for such predictions is the `vast' quantity of coal in the UK yet the fear is what such a transition will mean for CO2 emissions.

Last week The Times newspaper ran a story with the following quote from Gerry Spindler, UK Coal's chief executive:

> "Coal is the rich, drunken uncle at the family party. No one wants it there, but no one is going to ask it to leave because it is going to pay for the party."

It would appear there is already evidence for increased coal burn in the UK. Energy Trends - Internet only (ETI) Table 5.4 shows that electricity generated from coal in the three months Nov05, Dec05 & Jan06 **increased 21.1%** (8.2 TWh) compared with the same three months a year ago whilst electricity from gas **fell 18.9%** (6.5 TWh) over the same period. Electricity import increased by 39% (0.76 TWh).

The driver for this switch to coal, increasing coal's contribution from 39% to 46% year on year is the rapidly increasing price of gas. Whilst the price of coal has also risen the rate of increase has not be as fast as for gas.

The phenomena isn't just limited to the UK though. Earlier this year the Financial Times reported that Alstom, Siemens and General Electric, the three biggest power equipment makers were all expecting a big switch from gas to coal.

> Independent forecasts from France`s Alstom and Germany`s Siemens, made available to the Financial Times, show that about 40 per cent of the orders for electricity turbines in the next decade will be for coal-powered units, with the share of gas-fired plants falling to between 25 per cent and 30 per cent.
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> Philippe Joubert, president of Alstom`s power division, said: "The structure of the power market is seeing a radical shift away from gas and towards coal." Siemens` figures point to a similar conclusion, while GE said it expected to see a "more balanced picture" in terms of equipment orders, with gas being far less dominant than recently.
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> The shift to coal has been evident in the past year. Of the 120GW of new power orders, 20-30 per cent were for gas-powered plants while 30-40 per cent were for coal-fuelled generators.
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> The shift is being triggered by technological changes that reduce the amount of pollution

> created by coal-fired stations and by rising disenchantment with gas as a fuel. There are concerns over rising prices for the fuel and worries about security of supply, underlined by the recent row between Russia and the Ukraine over gas pricing. Many countries in Asia, which is expected to provide half of all new power station orders in the next 10 years, lack ready access to gas reserves.
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> Coal`s re-emergence as a primary fuel for power generation is a reversal of recent trends. The dash for gas in power equipment was most evident between 1997 and 2001, when gas was the preferred fuel for 60-70 per cent of new power stations and coal for 20-30 per cent.
>
> All three companies believe the switch is likely to be particularly marked in the UK, where coal is expected to be the most popular fuel source for the 20GW of power equipment due to be installed over the coming decade.

Interesting that they say 20GW of new equipment is needed within 10 years and that coal is likely to be the most popular - that's a position that isn't commonly covered in the media.

This has to be bad news for CO2 emissions, not only are coal power stations not as efficient as combined cycle gas power stations (~35% compared to over 50% for CCGT) but coal also has a far higher carbon content 24kg of CO2 per GJ of heat compared with just 14kg per GJ of heat from gas. Combining these figures results in CO2 emissions per kWh from coal being more than double those of electricity generated from gas (360g/kWh for gas & 910g/kWh for coal. Source).

Perhaps CO2 can be captured at source and sequestered? The immediate difficulty here is that the technology is immature, very expensive and it decreases the efficiency of the coal power station increasing the amount of coal burnt for a given electrical output. There are also questions regarding the stability of long term CO2 sequestration although the depleted North Sea gas fields should be suitable.

The other difficulty of turning to coal is the limited indigenous resource available. In 2004 the DTI published a report prepared by Mott MacDonald, UK Coal Production Outlook: 2004-16

This report considered a high and low scenario:

> The low scenario projects that coal generation will decline from about 125 TWh in 2003 to just 80 TWh in 2010 and 70 TWh in 2015 and 50 TWh in 2016. This scenario represents a rapid shift to a low carbon world, where energy demand falls and carbon-free generation grows strongly. It assumes a huge build of CCGT to replace low merit coal stations.
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> The higher scenario projects that coal generation will increase in the medium term rising to 150 TWh before being brought down to 125 TWh in 2010 to ensure compliance with the NECD. Under this scenario carbon has low price, coal remains very competitive and electricity demand continues to grow, albeit at a decelerating rate.

Two years on the low scenario of “huge build of CCGT” is looking unlikely to say the least. The 2005 coal generated electricity increased to supply 126TWh and appears to be rising sharply.

Even under this high scenario indigenous coal production is projected to fall, the conclusion of the report states:

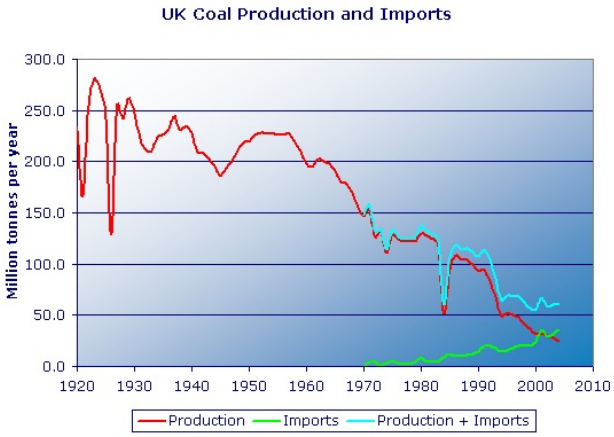
> We project that UK’s total coal production from deep and surface mines could be

> sustained within a band of 21-29 mt in 2010 and 15-21 mt in 2016.

That compares with production of 26.6 mt in 2004. Any increased coal use would lead to inports increasing at an even faster rate than they are now.

Given what we know about North Sea gas depletion, the nuclear decommission schedule and the time it would take to build any more nuclear plant perhaps Spindler's drunken uncle quote has some truth to it, will coal end up paying for the party?

Here's a graph of UK coal production over the last century.



Click to enlarge. Source.