



More Coal Equals More CO2

Posted by [Chris Vernon](#) on October 22, 2006 - 12:01pm in [The Oil Drum: Europe](#)

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As the indigenous extraction rate of natural gas has declined, tipping the UK from net exporter to net importer, prices have unsurprisingly risen. This gas price rise, coupled with the lower than expected cost of carbon emission under the EU carbon trading scheme, caused a dramatic shift away from gas and towards coal for electricity generation last winter.

The office of John Hemming MP has [recently considered](#) the impact this increased coal burn has had on UK carbon dioxide emissions.

"It is not surprising", said John Hemming "that more carbon was emitted by burning pure carbon rather than a mixture of carbon and hydrogen. The government's failures in the gas market do not only hit people's gas bills, but they also hit the environment."

Just looking at the primary evidence it is clear that CO2 emissions would rise. From the DTI's DUKES publication table 5C ([pdf available here](#)) we have this estimated data for electricity generation in 2005:

Fuel	Tonnes of carbon per GWh
Coal	238
Oil	207
Gas	99
All fossil fuels	167
All fuels (inc nuclear and renewables)	124

Remembering that 12 tonnes of C is equivalent to 44 tonnes of CO2.

The same publication also states:

It is estimated that carbon dioxide emissions from power stations accounted for 29½ per cent of the UK's total carbon dioxide emissions in 2005.

Considering the total amount of electricity generated from both coal and gas:

- Winter 2004/05 Coal generated 77.84TWh
- Winter 2004/05 Gas generated 75.74 TWh
- Winter 2005/06 Coal generated 89.62TWh (+15.1%)
- Winter 2005/06 Gas generated 64.60 TWh (-14.7%)

Source: [DTI Energy Trends 5.1](#)

The 15.1% increase in coal generated electricity represents an additional 2.8 million tonnes of carbon emitted into the atmosphere. The reduced gas burn mitigated just 1.1 million tonnes to produce a **net increase of 1.7 million tonnes of carbon**. A further 0.3 million tonnes were added by a 65% increased oil burn with oil fired generation up from 2.55 to 4.22TWh.

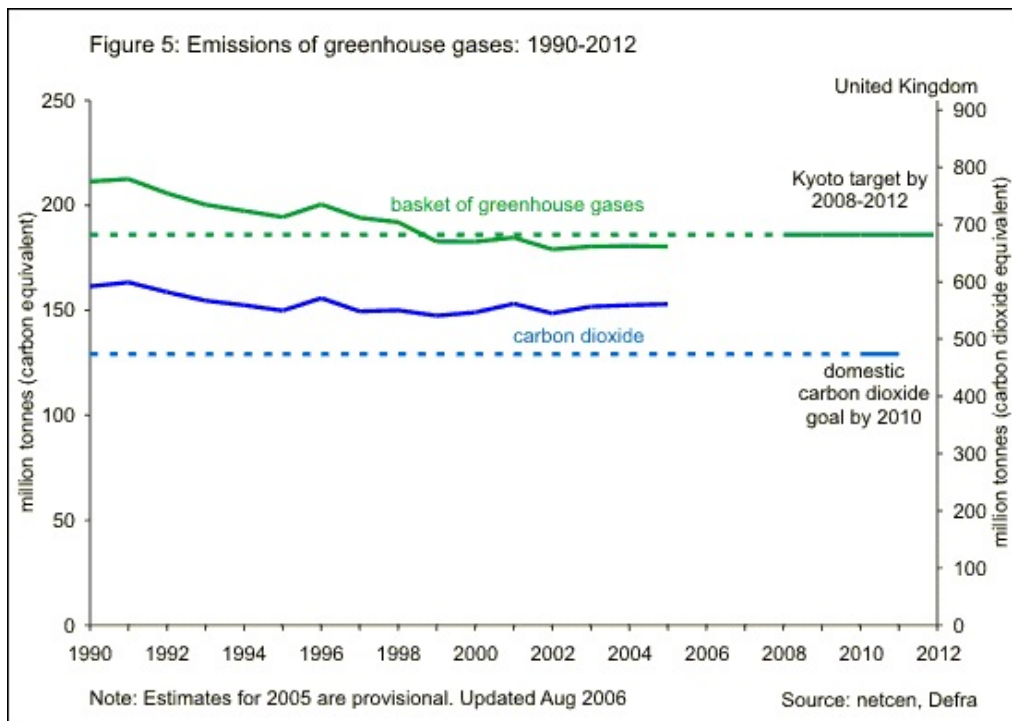
Although this oil burn is quite small compared to the coal and gas the fact that we burnt so much, especially given the price illustrates how tight things were last winter. Also, just last week an oil fired power station at Fawley in Hampshire was reopened after being mothballed for 12 years ([BBC News report](#)). You know things aren't great when we increase oil burn for electricity.

We can calculate the total carbon (and also CO2) emissions of electricity generation from coal, gas and oil during both winters:

- Winter 2004/05 fossil fuel electricity generation 26.6 million tonnes of carbon or 97.5 million tonnes of CO2.
- Winter 2005/06 fossil fuel electricity generation 28.6 million tonnes of carbon or 104.9 million tonnes of CO2 (+7.7%)

Perhaps it is unfair to blame this increase entirely on the structural shift from gas to coal. After all, more electricity was generated in 2005/06 compared with 2004/05. After adjusting for the additional 2.8TWh generated by assuming the increase is borne proportionately by each generating source the CO2 emission percentage increase directly attributed to the fuel switch reduces to 6.3%, still a significant increase.

We had an extra 2 million tonnes of carbon (7.3MT of CO2). How significant is that? This chart from the Department for Environment, Food and Rural Affairs ([DEFRA](#)) illustrates UK CO2 emissions:



In 2004 net CO2 emissions were 559.1 million tonnes. In 2005 the emissions have been provisionally given as 561.0 (+1.9, +0.34%) million tonnes. I expect this will turn out to be a slight underestimation when the data is firmed up.

Commenting on this data DEFRA say:

Carbon dioxide emissions in 2005 are provisionally estimated to have been about ¼ of one per cent higher than in 2004, resulting from an overall increase in energy consumption combined with increased use of coal in electricity generation at the expense of gas. The change between 2004 and 2005 however is smaller than the range of uncertainty associated with the provisional estimate.

It's hard to be critical when such small differences are involved though it's not fair to describe 0.34% increase as "about ¼ of one per cent higher".

The additional 7.3MT of CO2 emitted last winter due primarily to coal substitution for gas is equivalent to 1.3% increase over the provisional 2005 figure.

With further indigenous gas depletion guaranteed and the gradual decommission of the nuclear fleet it seems impossible for the CO2 emissions from electricity generation to do anything other than rise. Add to this the dramatic rise in CO2 emissions from aviation and it is hard to see how the UK domestic goal will be met and although the Kyoto target is currently being met it isn't unrealistic to suggest that by the turn of the decade the UK could also miss the international target.



Tony Blair, UK Prime Minister

Speaking for the last time as Prime Minister at the Labour Party conference last month (26th Sept) Tony Blair said this on carbon dioxide:

We will meet our Kyoto targets by double the amount; and we will take the necessary measures, step by step by step, to meet one of the most ambitious targets on the environment set anywhere in the world - a 60% reduction in emissions by 2050.

Full text of the speech available here: labour.org.uk

With the trend of coal substitution for gas, decommissioned nuclear likely replaced with fossil fuel at least in the short term and growth in aviation I fail to see how Blair can justify his Kyoto optimism.

Whilst the lights did stay on last winter in the face of tight gas supplies the pain of indigenous gas depletion was felt in other ways, customers (domestic and commercial/industrial) experienced dramatic price rises and the atmosphere received additional CO2.

Peak Oil and Climate Change

This brings me to a related point about the environmental impacts of potential peak oil solutions. Whilst there is considerable overlap between sensible actions in the face of the twin challenges of

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peak oil and climate change (in the broadest sense both would be benefited by reduced energy consumption) there are some actions which clearly benefit just one of these problems.

Burning more coal (without CO2 sequestration) is one such action, whilst coal is relatively abundant and capable of making a meaningful contribution to energy security as oil and gas supplies decline the CO2 impact would be unacceptable.

It is wise to consider peak oil and climate change as two sides of the same problematic coin, not only to recognise the broad correlation of useful actions but also to flag up any actions which serve one challenge to the detriment of the other.



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