The Oil Drum: Europe
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

UK Energy Gap

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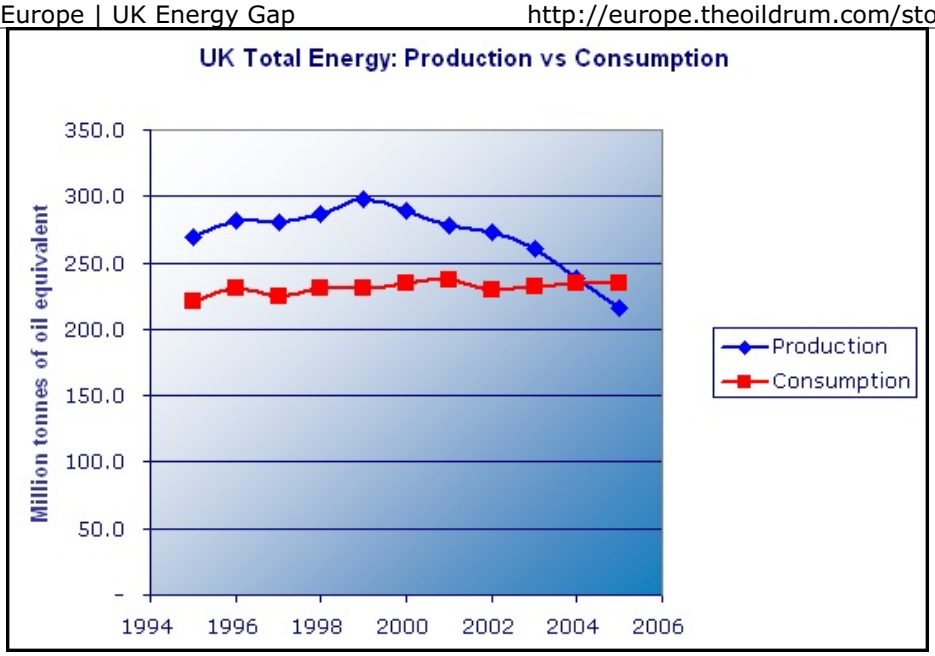
As an introductory piece we should look at the overall energy landscape in the UK. The media are regularly talking about the prospect of an energy gap but the analysis is often no more than pointing out the gap left by the nuclear decommission programme. The situation is more serious that that. The most recent DTI (Department of Trade and Industry) Energy Trends publication states that:

> Provisional figures for 2005 show total production to be 216.2 million tonnes of oil equivalent, 9.3 per cent lower than in 2004. Within this production of petroleum fell by 11.2 per cent, production of Natural Gas fell by 8.2 per cent and production of coal fell by 16.0 per cent.
>
> For the three months October 2005 to December 2005 compared to the same period a year earlier:
>
> - production of petroleum fell by 12.1 per cent;
> - production of natural gas fell by 8.8 per cent;
> - production of coal and other solid fuels fell by 11.7 per cent;
> - electricity produced from nuclear sources fell by 1.6 per cent;
> - electricity produced from wind and natural flow hydro fell by 10.4 per cent.
>
> (Source: Energy Trends 1.1)

The graph illustrates the total primary energy production and consumption of the UK

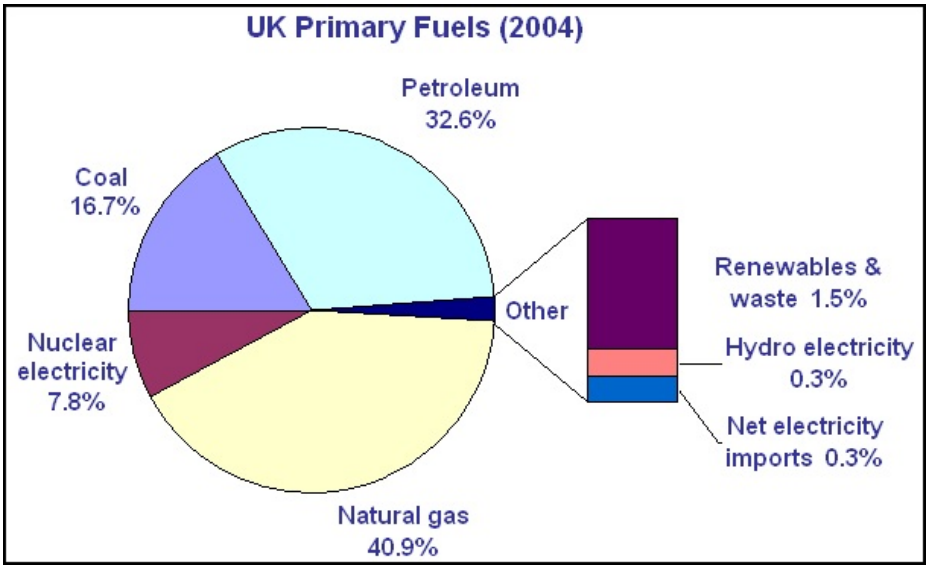


Click to enlarge. (Source Energy Trends 1.1 & 1.2)

Let's take a look at what's driving this...

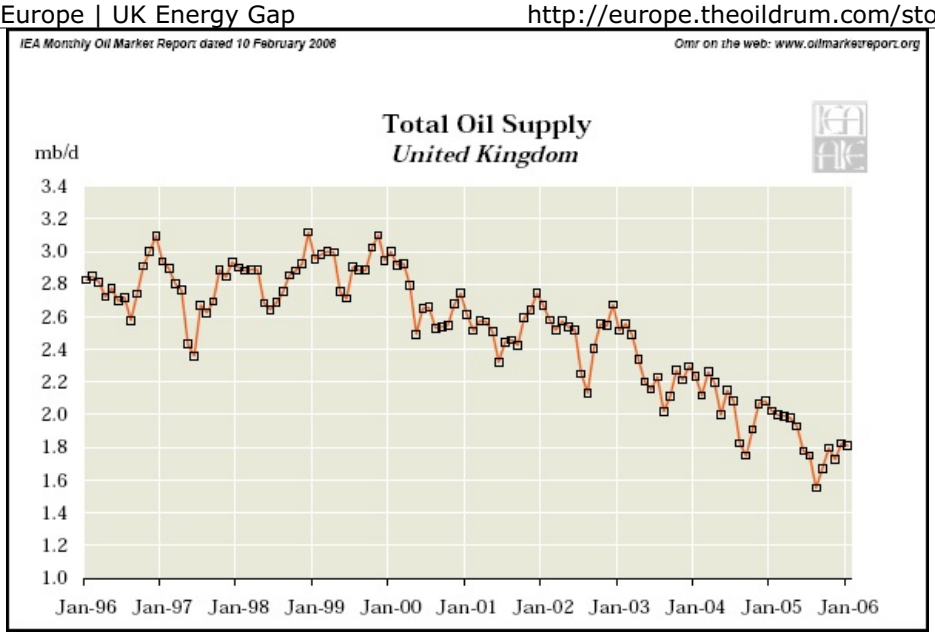
The three points that can be taken from the total energy graph is that peak energy production occurred in 1999 (corresponding with the oil peak of the North Sea), that primary energy production has been falling at just over 5% per year since then and that 2005 was the first year of net energy deficit.

The breakdown of primary by fuel looks like this



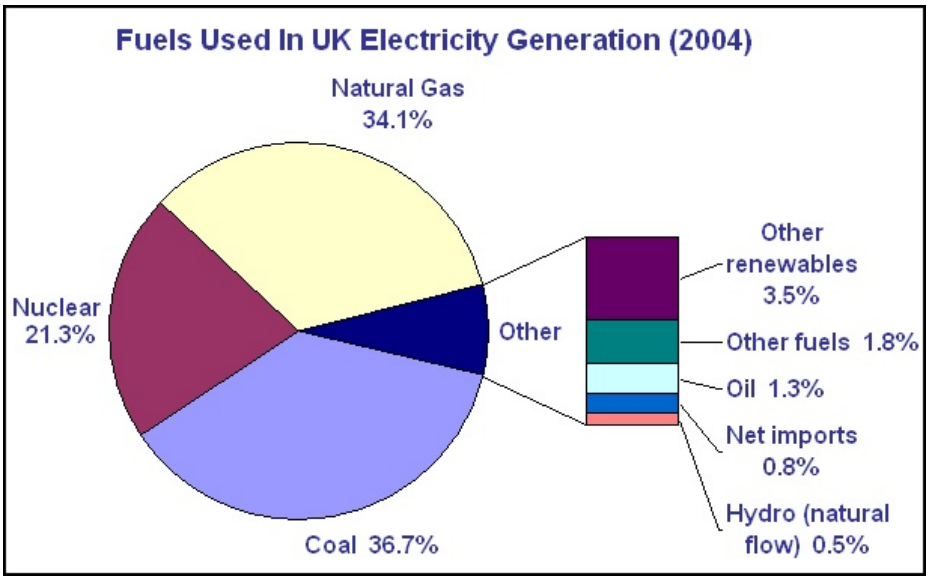
Click to enlarge. (Source: DUKES 1.1.1)

The 1999 peak in North Sea oil extraction and its subsequent collapse of 42% to 1.8mbpd from 3.1mbpd is the largest contributor to fall in total energy production. Interestingly the fall so far has merely reduced net exports to zero - only now some 6 years after peak is the UK becoming a net oil importer.



Click to enlarge. (Source: IEA Supply)

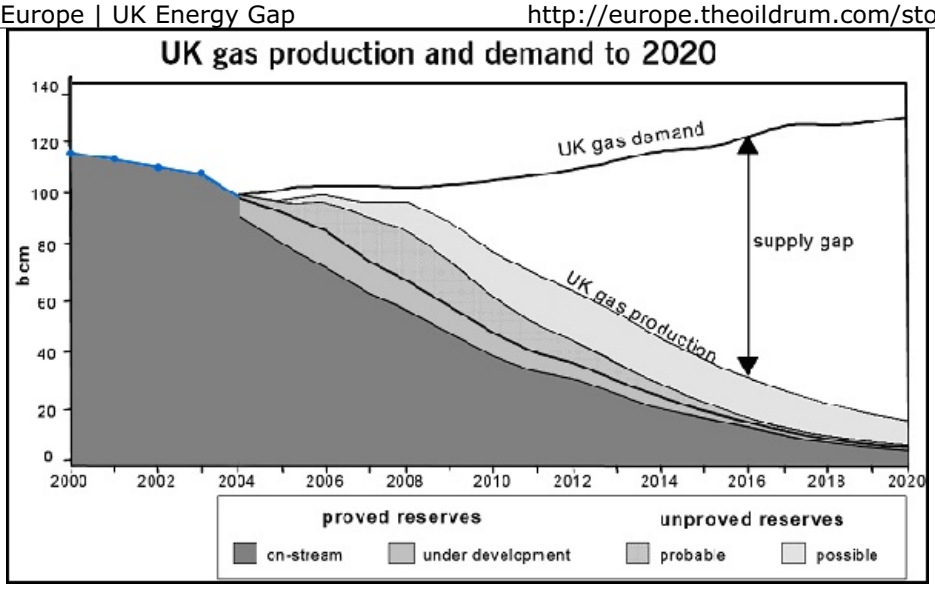
Perhaps of more concern though is the electricity primary fuel consumption, approximately 37% of total energy is used for electricity generation.



Click to enlarge. (Source: DUKES 5.4)

It is that electricity supply which is most threatened. Considering each fuel in turn we can see where the problem lies.

UK gas extraction from the North Sea peaked in 2000, the UK remained a net exporter of gas until 2005. This graph from WoodMackenzie's report "From Surplus to Shortage" and reproduced in "The Future of UK Gas Supplies" (.pdf) from Parliamentary Office of Science and Technology illustrates the disconnect between indigenous gas supply and demand.



Click to enlarge.

I have altered the graph to include historic extraction back to 2000. The UK appetite for gas at approximately 100 billion cubic meters per year (similar to Germany) is the largest in Europe, replacing this indigenous production with imports as is currently planed will place immense strain on the regional market – there is no guarantee this gas will be available at prices we can afford with the security we require. The UK is at the end of the pipeline across Europe.

The current aging fleet of nuclear power stations are due for decommission with many already operating beyond their original design lives.

BNFL Magnox	Capacity MW	Closure
Sizewell A	420	2006
Dungeness A	450	2006
Oldbury	434	2008
Wylfa	980	2010

British Energy	Capacity MW	Closure
Dungeness B	1110	2008 (+10, 2018)
Hinkley Point B	1220	2011
Hunterston B	1190	2011
Hartlepool	1210	2014
Heysham 1	1150	2014
Heysham 2	1250	2023
Torness	1250	2023
Sizewell B	1188	2035

	Decommissioned Capacity	
By 2011 (+5yrs)	4,694 MW	-40%
By 2014 (+8yrs)	7,054 MW	-60%
By 2023 (+17yrs)	10,664 MW	-90%

(Source: DTI, Nuclear power generation development and the UK industry)

The decision whether to commission any new nuclear build is yet to be made, a report is due in the summer. It is believed likely that this report will green light new nuclear build, the give away is that the Energy White Paper in 2003 concluded nuclear was not feasible – why commission another report unless you are looking for a different answer?

Coal burn is also due to reduce. Not only does the UK import approximately 60% of the coal after the deep mines were closed for economic reasons but approximately a third of the coal power stations set to close due to their emission profile. The EU Large Combustion Plant Directive places strict limits on emission which the aging UK plant can't meet.

The contribution from renewables is set to grow. Whilst it is widely accepted that the 20% by 2020 target (now downgraded to an aspiration) will be missed at least 10% of supply should be met by 2020.

The government's energy review consultation (launched Jan 06) states:

> By 2020 we are likely to be importing around three quarters of our primary energy.

And the Deloitte report (Feb 06) states:

> By 2020, over 50GW of new or refurbished generation capacity will be required which represents circa two-thirds of current capacity – equivalent to either 55 new CCGT's, 30 new nuclear power stations, 95,000 on-shore – or 40,000 off-shore wind turbines.

The questions we are left with are:

- How much will this energy cost?
- How secure will the supplies be?
- And will the energy even be available on the market?

A rough estimation of costs reveals that importing 100 billion cubic metres of gas at 2pence/kWh would cost £22bn at today's prices and importing 680 million barrels of oil at $60 per barrel and $1.75=£1 would cost £23bn at today's prices.

Replacing North Sea extraction with imports would add £45bn to trade deficit and all that does is maintain transport and the existing gas use. Further expenditure will be needed if nuclear and coal are also to be replaced.

Trade deficit in 2005 was: £47.6bn. (Source)

Oil and gas are likely to be significantly more expensive in real terms in 2020 than they are now.

It seems to me very unlikely that existing energy supply will be available in 2020 - the challenge then is to maintain as much utility as our energy supply falls.