



Lies, Damned Lies and Government Oil Production Forecasts?

Posted by [Euan Mearns](#) on October 17, 2006 - 10:31am in [The Oil Drum: Europe](#)

Topic: [Supply/Production](#)

Tags: [eu](#), [norway](#), [oil](#), [oil prices](#), [peak oil](#), [united kingdom](#) [[list all tags](#)]

The UK Department of Trade and Industry (Oil and Gas) and the Norwegian Petroleum Directorate have both published production forecasts showing increased oil production in the years 2007 and 2008. Oil production in the UK and Norway has been falling steadily in recent years following peak production in 1999 and 2001 respectively.

These forecasts have a significant impact upon forecast trade balance, particularly in the UK which has just turned net oil importer. So lets see how the UK and Norway are going to pull off this gravity defying, Hubbert denying stunt.

This post was initially inspired by [an exchange of views](#) with the Norwegian Energimann who pointed out that the Norwegian Petroleum Directorate (NPD) was forecasting Norwegian oil production to rise in the coming years. Around the same time, [a news item on Drumbeat](#) attributed to a UK Department of Trade and Industry (DTI) spokesman suggested that UK oil production was also set to rise, and that the UK was to remain self sufficient in oil until 2010. This was somewhat contradictory to my prognosis of [UK oil production decline](#) that showed oil imports rising steadily from 2006 to 2012 resulting in a major hole in the UK trade balance. It was brought to my attention that the UK DTI also had an [oil production forecast](#) that was worthy of scrutiny.

I wrote to named contacts at both the NPD and DTI asking if they would like to explain their optimism. The NPD responded in a timely manner, whilst the DTI have been guarded in their response.

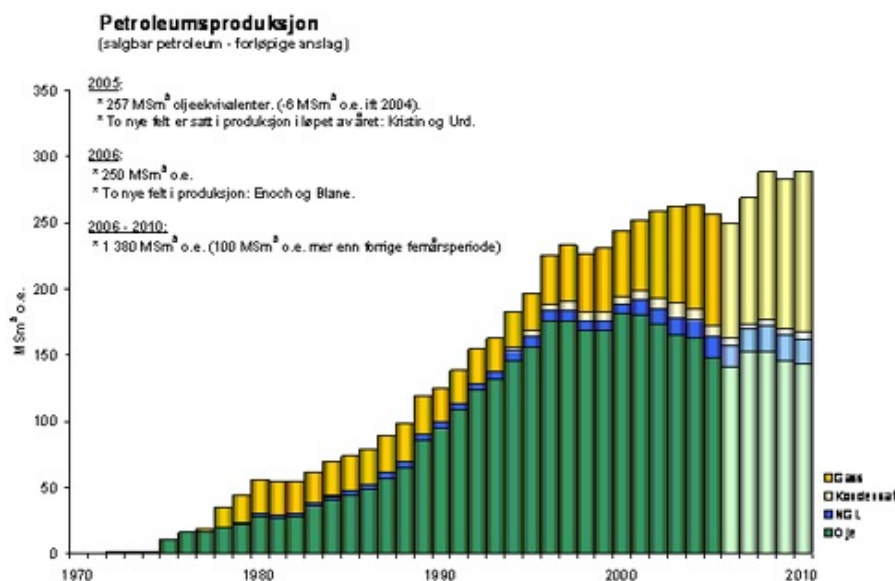
At the outset I should like to point out that the title of this post is a play on the saying "Lies, damned lies and statistics" and it is up to the individual reader to decide where the truth lies.

NORWAY

Norwegian oil production has been examined by [Khebab](#), the [Energimann](#) and by myself, [Cry Wolf](#) in recent months. Norwegian oil production peaked in 2001 at an average daily rate of 3.418 mm bpd, and when production started to fall in the [World's third largest oil export land](#), the whole world should take note. Norway, Saudi Arabia and Russia account for > 50% of the global oil export market. Norwegian oil production forecasts are therefore significant to both world export capacity and to [EU energy security](#). Throughout this post when I refer to oil production I am doing so in the BP context of crude+condensate+NGL.

The Norwegian Petroleum Directorate (NPD) has responsibility for managing Norwegian oil and gas resources and report on a regular basis to the Norwegian Parliament. Part of this reporting responsibility includes forecasts for future oil and gas production and in 2005, the [NPD forecast](#) (in Norwegian) that Norwegian oil production was set to rise in 2007 - 2008.

It seems that the NPD also accepts that Norwegian peak oil production has passed and it is the



The upper gold band charts Norwegian gas production which is set to grow. The blue band charts NGL which together with oil (green) are forecast to rise in volume in coming years.
Chart from the [NPD](#) (in Norwegian)

The NPD forecast from 2006 to 2010 is as follows:

	2006	2007	2008	2009	2010
Oil (million Sm ³)	140.8	152.7	152.6	145.8	143.6
NGL (million tonnes)	8.7	9.4	10.4	10.1	9.8
Condensate (million Sm ³)	5.6	3.4	5.1	5.1	5.6
Total mm bpd	2.73	2.91	2.97	2.84	2.80

Conversion factors given by [BP](#) have been used to normalise to mm bpd.

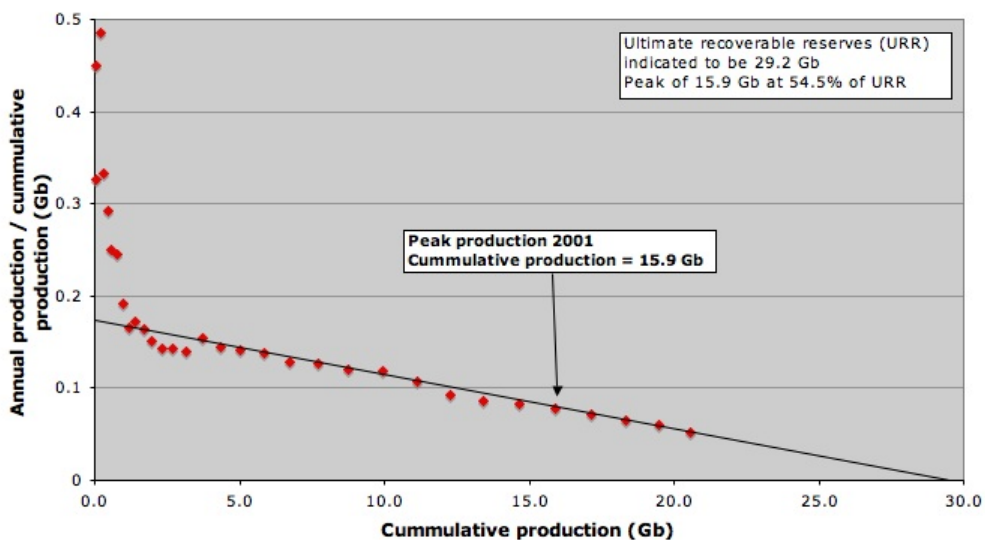
Norwegian average daily production since 2001 (source [BP statistical review](#)) was as follows:

	Mm bpd	Decline%
2001	3.42	
2002	3.33	-2
2003	3.26	-2
2004	3.19	-2
2005	2.97	-7
2006*	2.82	-5

*average January to July 2006

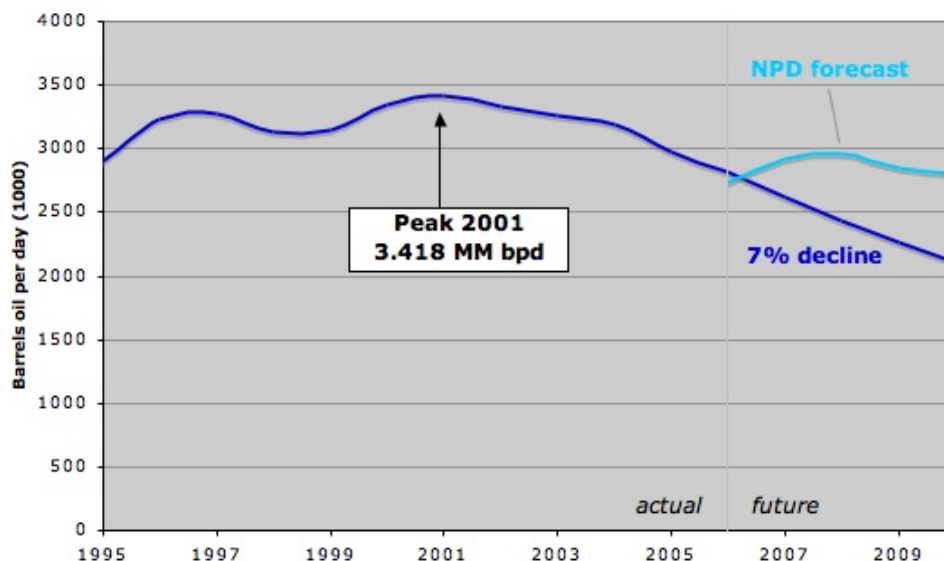
The simple, top down approach (Hubbert) to forecasting future Norwegian production is to presume that the established decline rate of around 7% will continue. The NPD approach is more complex and this produces a very different outcome for forecast Norwegian production by the year 2010, less than 5 years from now.

Norway, all liquids, Hubbert Linearisation



Hubbert linearisation for Norway using BP data (crude+condensate+NGL). It will require a super-human effort to modify the decline curve established since 2001. NB - this is my first HL - but not my last. Thanks to Khebab for assistance.

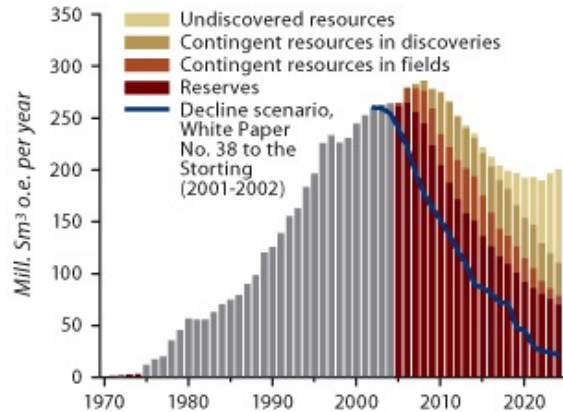
Norway, production forecast



Two very different forecasts for future oil production in Norway. The difference between the 7% decline model and the NPD forecast is 700,000 bpd by 2010 - the equivalent of two giant fields.

By the year 2010, the NPD are forecasting 2.8 mmbpd while the 7% decline model implies daily production of 2.1 mmbpd. The difference of 700,000 bpd is equivalent to the production from two giant oil fields and is therefore both hugely significant, and difficult to explain away by different forecasting philosophies. Where does the truth lie?

In a [White Paper](#) (pdf warning - in English), presented to the Norwegian Parliament in 2002 the NPD recognised that left unchecked, natural decline will lead to Norwegian oil production close to zero by 2020. This was called the decline scenario. The NPD looked to a more optimistic future



The blue line approximates a Hubbert style decline scenario. In their long term scenario the NPD envisaged greater exploitation of existing reserves, development of discovered but undeveloped resources and new discoveries, all leading to future production growth that would compensate for their dying giant fields.

[The 2002 White Paper](#) gives some insight to the thinking (or is it actually hoping) behind the Norwegian view of future production:

The lower of these involves production declining towards 2020, when oil output virtually ceases. This covers anticipated output from fields in production or covered by a development decision, and is termed the decline scenario. In the other scenario, production is maintained at a substantially higher level. This long-term scenario involves the realisation of profitable projects which ensure production of oil for at least 50 years and gas in a century-long perspective. The government's clear objective is to achieve the long-term scenario.

The long-term scenario can be achieved if a commitment is made to efficient exploitation of the resource base. As the curve in figure 1.1 shows, the resources exist to sustain substantial oil and gas production towards and beyond 2050. This perspective is conditional on oil prices staying at a reasonable level and on a commitment by the oil and gas industry and the authorities to developing petroleum resources in a cost-effective manner. The aim is to secure the best possible resource utilisation and the highest possible value creation for the Norwegian community.

The NPD forecast for the period 2006 to 2010 embraces this ambition for a long term future for the Norwegian oil industry based on ever increasing recovery factors, new field developments and new discoveries. But is any of this likely to happen?

In their response to my query about the production forecast, the NPD made the following points:

- 1) 50 discoveries already made are likely to be developed in future
- 2) There are more than 200 active projects for increased oil recovery (IOR)
- 3) A tight rig market may result in delays that may undermine the forecast
- 4) Several large fields experiencing decline
- 5) In June, actual production was just 0.2% below the NPD forecast

Let us look at these points in order:

Discovered undeveloped

Whilst the NPD may have 50 discovered undeveloped fields on their books, near term the cupboard is nearly bare. One of the most important points here is the fact that the Kristin gas condensate field came on stream in November 2005. So far in 2006, [Kristin has produced:](#)

1.777 million Sm³ of condensate

0.653 million Sm³ of NGL

Over a 243 day period this translates to about 63,000 bpd of liquids. This substantial new production is included in production data that shows a 5% decline January to July 2006 and this illustrates the point amply that even substantial new fields, like Kristin, are not enough to arrest the decline from dying giants (see below).

In 2006, [Blane and Enoch](#), two fields that straddle the UK - Norway median line, are due to come on stream but these relatively small fields will unlikely be able to arrest production decline in 2006 - 2007.

Increased oil recovery

No details are given about the 200 active IOR projects but one has to presume these will include water injection, gas injection, infill drilling, 4D seismic and well work overs. The main point I would make here is that this type of activity was going on last year, and the year before that and the results are included in the production figures to date. Only if there is a great acceleration in IOR activity or some new technology is introduced will the decline pattern be modified.

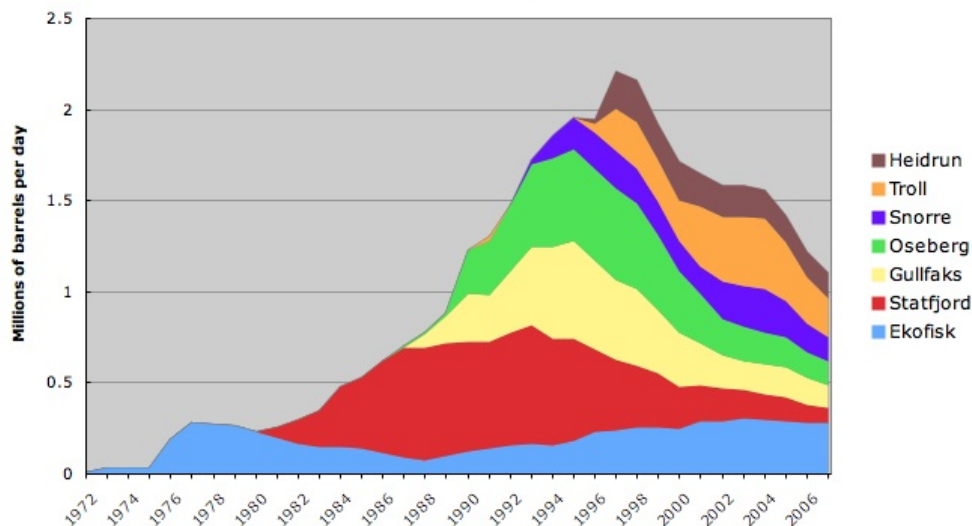
Tight rig market

For Norwegian production to make a dramatic U-turn, as forecast by the NPD, would require a dramatic upturn in development, and IOR related drilling. For the last 5 years there have been around [18 rigs working offshore Norway](#) (plus platform drilling units) and unless this number were to increase substantially, it is difficult to see where additional drilling related production increases will come from.

The decline of large fields

The decline of Giant Fields is the slippery pole that Norwegian oil production needs to climb.

Death of Norwegian Giants



Production from 7 giant fields is the power behind Norwegian oil production. These fields have performed beyond expectation, and now it is time for them to die.

Decline in these 7 Giant fields was 193,000 bpd in 2005 (13.6% of their combined production). It will take a lot of IOR and new field developments to compensate for this lost production from the dying Norwegian giants. New production from substantial fields such as Kristin is simply swamped by lost production from these 7 fields.

The NPD forecast made in 2005 is accurate for 2006 production

In 2004, the NPD overestimated 2005 oil production by 7.5% and they were at pains to argue that their forecast had statistical uncertainty and that there was a 20% chance of it being wrong - which it was. So in 2005, they have been more cautious and forecast a realistic drop in production during 2006, and the 2006 forecast is indeed aligned with the current production. Herein lies a cause for concern because this may raise the predictive credibility of the NPD in the eyes of policy makers who may now be more inclined to believe the fabulous U-turn in oil production that the NPD forecast for 2007, 2008 and beyond.

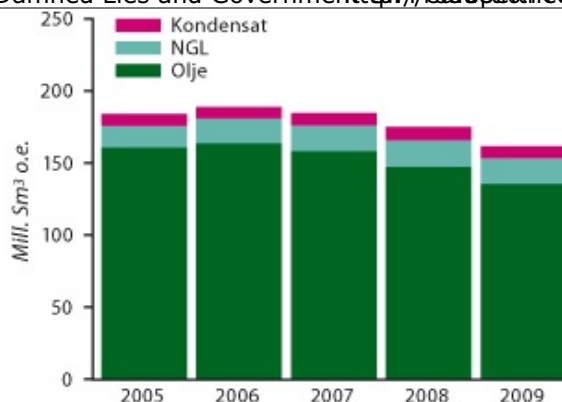
This is no trivial matter. Norway is the World's third largest oil exporter and [EU energy security](#) is linked to how future Norwegian oil production unfolds.

NPD past forecast performance

In 2004, the [NPD](#) published a report (in Norwegian) with a forecast for oil production in the period 2005 - 2009.

A translation from Norwegian:

Liquids production has been between 185-195 million Sm³ o.e. per year (3.2 mmbpd) since 1996 and is expected to stay at this level until 2006/2007. The gas condensate Kristin Field will provide strong support to maintain this level. Decline in liquids production thereafter is estimated at 5% per annum. This forecast assumes that 15 new fields will contribute to maintaining production whilst two fields will be decommissioned.



The NPD production forecast for 2005 - 2009 made in the 2004 report

Whilst a detailed table is not given, from this Figure it appears that the following forecast is made:

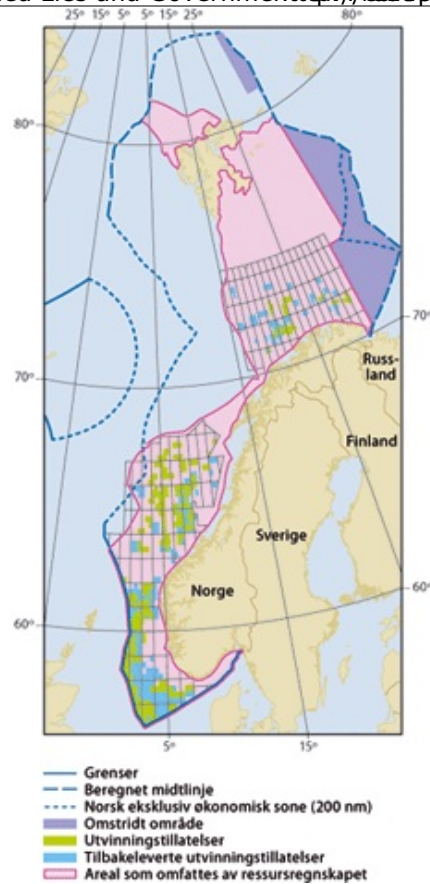
2005 185 mmSm3 3.19 mmbpd actual=2.97 mmbpd overestimate = 7.4%

2006 195 mmSm3 3.36 mmbpd actual=2.82 mmbpd overestimate = 19%

As already discussed, in the 2005 report, the 2006 estimate was revised down from 3.36 mmbpd (estimated in 2004) to 2.73 mmbd (estimated in 2005) - a downwards revision of 23% in the course of one year. At \$60 / bbl this amounts to \$13.8 billion worth of miscalculation.

A glimmer of hope for Norway

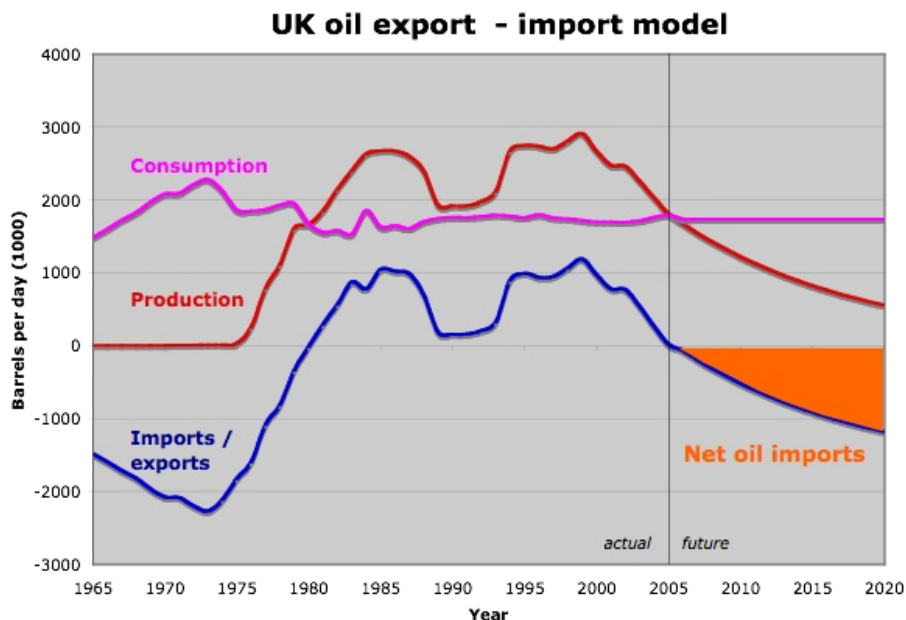
One advantage that Norway has over many other oil exporting countries is that it controls a vast area of continental shelf. The North Sea, and small parts of the Norwegian Sea (mid-Norway) have been explored in some detail, but vast tracts remain unexplored, in deep water and the Barents Sea. Not all these areas are prospective, but there is a real prospect that giant fields remain to be found in Norwegian waters. This, however, is unlikely to affect oil production within the next decade.



Norway controls a vast area of the North Atlantic continental shelf and future giant oil discoveries cannot be discounted

THE UNITED KINGDOM

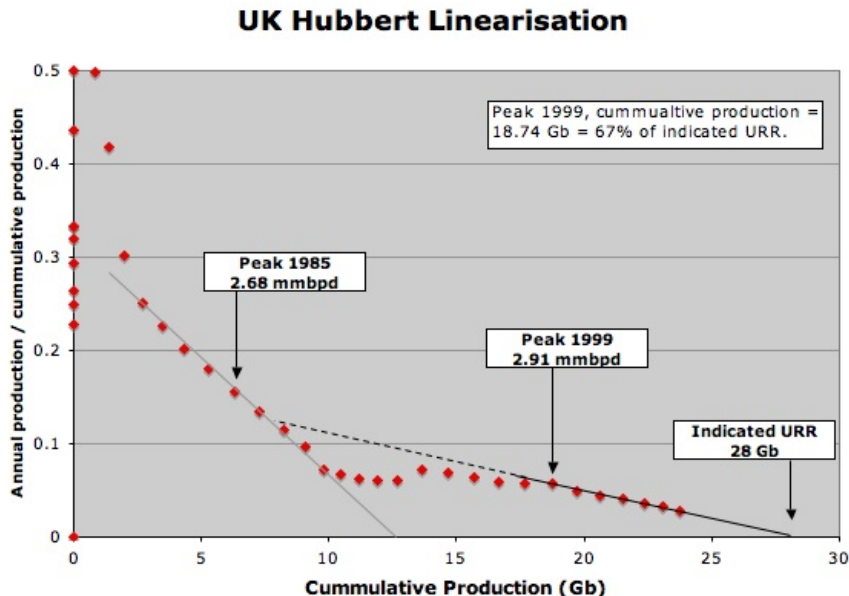
[The oil production history of the UK](#) is non-Gaussian. A production peak in 1985 was the result of scaling back of investment following the oil price crash of 1986. This led to the postponement of several new field developments and the Piper Alpha oilrig explosion in 1988 exacerbated this situation. [Stuart Staniford](#) provided further explanation by way of bi-modal discovery pattern.



The twin peaks of UK oil production, brought about by a combination of oil price crash in 1986, an oil rig explosion in 1988 and a bi-modal distribution in UK oil discoveries.

Renewed investment during the early 1990s, reinstatement of postponed projects combined with a number of large new field developments (Nelson, Miller and Bruce in the North Sea and Foinaven and Schiehallion on the Atlantic margin to name but a few) resulted in a second production peak in 1999.

This gives rise to two major trends in Hubbert linearization. One can speculate production may have progressed along the dashed line, had projects not been postponed following the oil price crash of 1986.

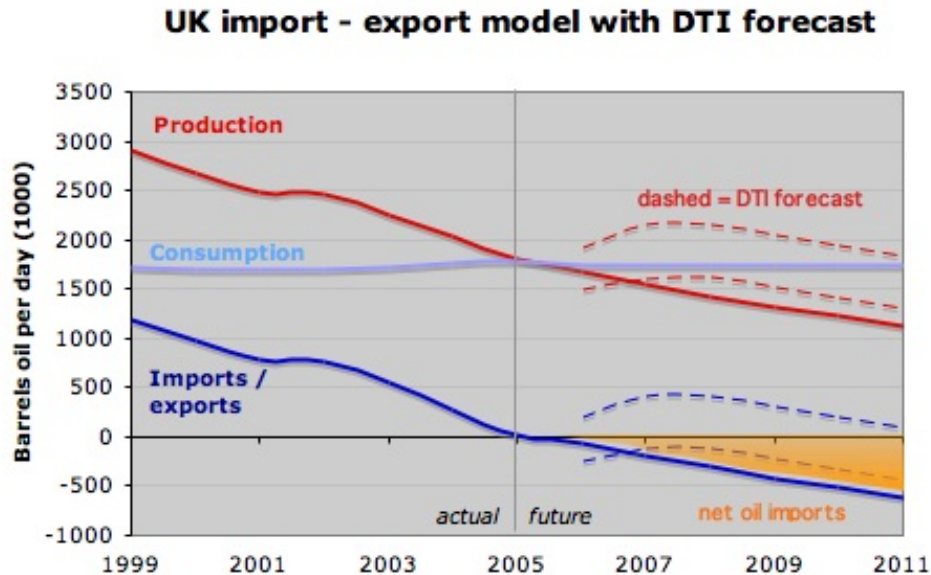


Two linear decline trends in UK oil production are related to the twin production peaks described above.

The dogleg trend in the HL that starts in 1990, eventually leads to a linear decline trend that

points to a URR of 28Gb, more than double that of the pre 1990 linear decline. The relevance of this type of production evolution for countries like Saudi Arabia needs to be carefully considered and may be discussed at a later date.

[The UK DTI oil production forecast](#) is based on a field-by-field analysis of data provided to the DTI by the field operators - so this is a comprehensive bottom up approach. These data are then adjusted by the DTI to history match previous deviations from company expectations and an allowance is made for development of new discoveries made in the forecast period (2006 - 2011).



The solid red line charts a 7.5% annual decline from 2005 onwards. The dashed lines are based on the UK DTI production forecast. Crude oil 1 tonne = 7.5 bbls. NGL 1 tonne = 11.5 bbls.

The DTI provide a forecast range (see dashed lines on Figure above) that at face value is a reasonable approach. However, the range between the high and low estimate for 2006 is 28% (of the lower forecast value) and this range grows to 41% in 2011 and this huge uncertainty simply serves to obfuscate what the DTI believes is actually going to happen.

Other aspects of the DTI forecast are reasonable. The lower forecast range for 2006 is around 1.5 mmbpd and this is close to current production levels for 2006. And from 2008 and beyond, the decline rate is similar to that used in my 7.5% annual decline model.

The uplift in production between 2006 and 2008 is attributable to the [Buzzard Field](#) that is due on stream soon at an estimated maximum flow rate of 200,000 bpd - and it is here that the DTI forecast and [comments made by a DTI press spokesman](#) begin to diverge from reality - in my opinion. The UK North Sea has been declining at a rate of over 200,000 bpd for the last three years and if this were to continue then production from Buzzard would be sufficient to arrest decline for one year only. This would give rise to a shoulder on the decline curve like that seen in 2002 when the Elgin - Franklin fields came on stream. It is wishful thinking to believe that Buzzard alone will have the reservoir potential to reverse the production decline of the whole UK North Sea basin. A new field like Buzzard would be required every year to arrest production decline - let alone reverse it.

In a press statement attributed to Nick Turton of the DTI, which appeared on the unlikely named [cattlenetwork.com](#), it is claimed that the Buzzard Field will offset production decline from the whole of the UK North Sea for the period 2007 - 2010. This would be a truly amazing stunt and smacks more of desperation than informed comment - but unfortunately this seems to be the official view of UK production given to the international financial press. (Note that the DTI did not

Turton, whilst acknowledging that the UK has become a net importer of oil in 2006, sees this as a temporary set back and it is claimed that the UK will remain self sufficient in oil until 2010.

So why does this matter? Well first of all it is worth noting that the \$ value difference between the upper and lower DTI forecasts amount to \$68 billion between now and 2011 (at \$60 / bbl). I am reliably informed that the DTI report to HM Treasury on production forecasts on a regular basis and it makes a vast difference to the UK trade balance whether reality lies closer to the upper or lower forecast limits. The lower forecast limit is in my opinion much closer to reality, but even it may prove to be over-optimistic.



Gordon Brown, UK Chancellor in charge of national finance facing a \$68 billion uncertainty in oil revenues / imports.

Secondly, if the UK were to be more objective in their appreciation of declining oil (and gas) production then measures to mitigate the effect of decline could be put in place. In particular, I believe the UK should set a target to remain self sufficient in oil for another decade. This aim to be accomplished by a combination of a significant reduction in the consumption of liquid fuel combined with stimulating off shore production and exploration. The primary targets for reduced consumption must be automobiles, trucks and air transportation.



The Range Rover - off road luxury. A popular choice for the safe delivery of children to school in Aberdeen. 13 mpg urban cycle.

As an initial step, placing limits on the engine size of new cars and reducing speed limits would make significant fuel savings. The reward for this would be lower CO₂ emissions, fewer accidents and enhanced energy security. These are all government objectives - so maybe it is time to turn these vote-winning words into actions? I believe that the UK public would be more receptive to fuel conserving measures if the reality about our indigenous fuel resources was more widely known.

THE PSYCHOLOGY OF DECLINE

In these production forecasts Norwegian and UK civil servants seem unwilling to acknowledge that the North Sea oil production bonanza may be approaching twilight. These forecasts seem to

draw on the most optimistic of scenarios and in so doing they lose sight of objectivity and reality. Of course only time will tell if these official forecasts do actually prove to be over optimistic and I will revisit this subject in 6 to 12 months time to further evaluate the predictive expertise of the DTI and the NPD.

Norway, already one of the wealthiest countries in the World, and with rapidly growing gas production to compensate for falling oil production is well placed to withstand both energy and economic fallout should the NPD forecast prove to be over optimistic.

The UK and the EU are in much more vulnerable circumstances. The EU is already recording [rising energy imports](#) (pdf). I suspect that it will only be a matter of time before news of oil imports giving rise to a deteriorating UK trade balance hits the news headlines in the UK. It is difficult to tell whether UK and EU parliaments are aware of the energy peril that faces them. The official pictures painted by UK and Norwegian energy authorities are optimistic whilst the reality for the EU is increasing competition for oil in a [shrinking international oil export market](#).

Finally, I would like to acknowledge the cooperation of the NPD and DTI in providing some background information for this post.



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