



A Debate on the Substance and Timing of the Peak of Oil Production and Consumption, Part I

Posted by [Prof. Goose](#) on December 4, 2006 - 11:56am

Topic: [Supply/Production](#)

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This is a guest post by [westexas](#).

Resolved: World Net Oil Export Capacity is Now Declining Because of Involuntary Reductions in Production and/or Because of Increases in Domestic Consumption in Major Oil Exporting Countries

Robert Rapier suggested that we debate this topic, and I agreed. In reality, there are only shades of gray difference between us regarding the timing of Peak Oil and Peak Exports. I believe that the crisis has hit, while Robert believes that the worst won't be upon us until some time shortly after 2010. Robert will file his rejoinder about a week from today.

In any case, in a [guest post on The Oil Drum \(TOD\) in January 2006](#), I predicted, based on graphs primarily done by Khebab that the world would see declining net oil exports this year.

I focused on the top three net oil exporters--Saudi Arabia (KSA); Russia and Norway--which together accounted for 48% of the (total liquids) exports by the top net oil exporters in 2004 (all production data based on EIA numbers, unless noted otherwise). Top exporters are defined as those exporting one mbpd or more.

In his most recent book, "Beyond Oil: The View from Hubbert's Peak," Kenneth Deffeyes outlined a simplified version of the mathematical techniques that M. King Hubbert used to accurately pick the time frame for the peak of Lower 48 oil production. The method, named "Hubbert Linearization" (HL) by Stuart Staniford on TOD, is outlined in the article "[Texas and US Lower 48 oil production as a model for Saudi Arabia and the World](#)".

Deffeyes defines Q_t as a mathematical estimate of the ultimate recoverable reserves for a region. Regions tend to peak, and start declining when they are about 50% depleted, i.e., the 50% of Q_t mark.

The following regions have now shown lower production after crossing the 50% of Q_t mark: Texas; Lower 48; Total US (which had a secondary, but still lower peak, after the North Slope production came on line); Russia; North Sea; KSA and Mexico.

In the January article, I outlined my "Export Land" model, which was inspired by work done earlier by Matt Simmons. I stipulated that we had a country producing 20 mbpd and consuming 10 mbpd.

I then stipulated Export Land hits the 50% of Q_t mark, and over a five year period, production declines by 25% and consumption increases by 20%. Because of these two factors--falling production and rising domestic consumption--the net oil exports from out hypothetical exporter decline by 70%, from 10 mbpd to 3 mbpd.

Note that the underlying assumption, which I think is generally true, is that domestic demand is generally satisfied before oil is exported. We have a real life example of the Export Land model in the UK, which has gone from exporting one mbpd in 1999 to being a net importer in 2005.

Also note that I expect domestic consumption in the exporting countries to go up quite rapidly, at least initially, as oil prices rise faster than their production is falling.

What I found deeply troubling in January was that the top three net oil exporters were all past their respective 50% of Q_t marks. In January, KSA was showing stable production, Russia was showing a slow rate of growth and Norway was in decline. I predicted, based on the HL method and based on the Export Land model, that we would see lower exports from these three countries in 2006.

2006 Data

The EIA has now released a table showing the estimated production and [exports from the top net exporters for 2005](#) (again all total liquids), and the data are very interesting, since we can compare the 2005 production, consumption and exports for various countries [to the 2004 numbers](#).

KSA, Russia and Norway collectively have shown a 13% increase in domestic consumption from 2004 to 2005. Even Norway, which I expected to be flat, showed an 11% increase in consumption.

It appears that the only readily available current production data are for crude + condensate (C+C), but the EIA shows that these three countries are down, in September, 2006 by 3.7% from their December, 2005 production levels (KSA and Norway are down; Russia is basically flat). These data are subject to revision, but Khebab has demonstrated that the revisions tend to be downward with time.

In any case, if we assume that Total Liquids behave similarly to C+C, and if we use the same rate of increase in domestic consumption as 2004 to 2005 (which may be conservative given the rapidly escalating demand in KSA and Russia), this suggests that the top three net oil exporters are experiencing about an 8% decline (1.5 mbpd) in net oil exports in 2006 versus 2005 (based on data through September, 2006).

The EIA tracks C+C for 11 of the other 12 largest exporters. Their combined C+C production is up just barely (by 0.6% or 0.16 mbpd) from 12/05 to 9/06, which almost certainly translates to a decline in net exports, given the increasing consumption in most exporting countries.

Saudi Arabia: Why is their production falling?

No one, as far as I know, now disputes that KSA's production is falling. The question is why.

KSA is now at about the same stage of depletion that the prior swing producer, Texas, started declining.

In the spring, the Saudis announced that they could not find buyers for all of their oil, "Even their light, sweet oil," when light, sweet oil was going for about \$70 per barrel in the US.

At the same time that the Saudis were announcing that they could not find buyers for all of their oil, and that they were "voluntarily" reducing their production, they were vastly expanding their drilling program.

Their largest field, Ghawar, which at one time accounted for more than 50% of their production, is now at about the same stage of depletion that an analogue field, Yibal, started declining. The best case for Ghawar is that they are producing one-third water, after the field was redeveloped with horizontal wells.

At the same time that the Saudis announced their "voluntary" production cutbacks in the spring, their stock market started crashing. Interesting enough, Venezuela, which has long life unconventional oil reserves, has a booming stock market.

In my opinion, Saudi Arabia, like Texas in 1973, is at the start of a long term and irreversible decline in conventional oil production, with a long-term decline rate in the 4% to 5% range, perhaps sharper at first if Ghawar is crashing.

Russia: What next?

Mathematically, Khebab has demonstrated that the recent rebound in Russian production was just making up for what was not produced following the collapse of the Soviet Union.

In my opinion, Russia will join Saudi Arabia in showing a long term and irreversible decline in conventional oil production next year.

The "Bidding Cycle" Theory

Given the reports of lower production by the top three exporters, and one can assume increased consumption, someone must be conserving.

The [Wall Street Journal recently ran a story](#), which profiled an African country, Guinea, which has been forced to conserve, "As fuel prices soar, a country unravels."

An excerpt from the article:

"The impact of today's energy crunch on the poor is plain in rich nations such as America: Expensive gasoline and soaring heating bills make a hard life harder. In impoverished countries such as Guinea, where per capita income is just \$370 a year and surging gasoline prices have helped spark bloody riots, the energy shock has become a matter of life and death."

I believe that we are going to see rounds of bidding cycles with available exports going to the winning bidders, e.g., the US so far this year, and with the losing bidders being forced to conserve, e.g., Guinea so far this year.

However, I predict that the next round of bidding (which I believe that we are currently in), against regions like Europe and China, instead of Africa, will be much tougher for the US.

The Expectation of an Infinite Exponential Growth Rate Versus The Reality of Exponential Decline

Because of a steady increase in US petroleum consumption and because of a steady decline in US oil production, total US petroleum (crude oil + product) imports have been increasing at an annual rate of about 4% per year since 2001. This is one reason that assertions that year over year US petroleum imports may be flat is not much of a comfort.

In most of the US, it is simply a given that the "American Way of Life" is non-negotiable and that we can continue to increase our petroleum imports year after year.

Unfortunately, I predict that Americans are going to realize that the reality of exponential decline is going to trump expectations of an infinite growth rate.

While there are many suggestions for alternative energy sources and for the expanded use of other fossil fuel sources and the expanded use of nuclear energy, the reality in my opinion, is that the Net Oil Export Crisis is hitting so hard and so fast that our only recourse is to effectively implement a triage operation, where large portions of American suburbia are effectively abandoned.

I do strongly support a proposal to tax energy consumption to fund Social Security and Medicare, offset by eliminating or reducing the Payroll Tax, combined with a major push to implement [Alan Drake's Proposal for Electrification of Transportation](#).

I am primarily supporting Alan's proposal because he is advocating proven technology that we essentially perfected more than 100 years ago. Furthermore, he documents how the Swiss were able to survive-- by electrifying their transportation system and by restricting oil supplies to emergency uses--an oil supply cutoff in the Second World War.

The average American today uses about as much oil as 400 Swiss citizens used in the Second World War.



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