



The future of the *world's oil* supply

With oil prices hitting ever new highs, debate continues to rage over the state of the world's oil supplies. Unfortunately, reliable information on geological data and depletion rates is lacking.

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In November 2007 the World Economic Outlook 2007 (WEO 2007) of the International Energy Agency (IEA) included an alarming statement that: 'a supply-side crunch in the period to 2015, involving an abrupt escalation in oil prices, cannot be ruled out'. Due to the short term inelasticity of oil demand and supply, a gap of about 13.5 million barrel per day could open up in the next seven years, said the IEA. Similar warnings by the ceo's of Total, Chevron and Royal Dutch Shell amplified concerns about the world oil supply.

For some, the expected supply gap is proof that oil production is on, or nearly over, its peak at approximately 86 mbd (million barrels per day). Others stress that geology is not the problem,

but rather the political and economic circumstances that impede the development of reserves. To discuss the nature of the future supply gap the Clingendael International Energy Programme (CIEP) recently invited the founder of the Association for the Study of Peak Oil (ASPO), Colin J. Campbell and the IEA's principal oil market analyst David Fyfe, to share their views on the future of oil supply. The debate that followed showed that the two sides were more in agreement than that past rhetoric would have suggested, although significant differences of opinion remain.

Geology |

The peak oil movement claims that conventional oil is running

out and that, although other oil sources are available (namely extra heavy oil, heavy oil, deep water oil, polar oil and liquids from gas), these will not be able to reverse the decline in world oil supply after 2010. Although the decline in production could go slowly and last a significant period, depending on prevalent decline rates, it will create the need for “new economics” to replace the petroleum-based “neoclassical” growth model.

The peak oil movement considers geology to be the chief determinant of future oil supply. Technological advances in exploration and production are considered to create the illusion of a “technological reserves growth”, since accelerated extraction through technology today will create increasing depletion rates in the future. The movement considers this case to be self-evident. Peak oil theorists argue that if an oil company does its job well, future rates of decline of an oil field will increase. Therefore if oil companies do their work properly with the technology available, a worldwide decline in production is imminent.

The IEA agrees that world oil supply running up to 2015 is in serious trouble, assuming that the above ground risks continue to wreak havoc on global oil production and its investment climate. Oil demand has proven to be increasingly inelastic due to subsidized consumption in developing economies, the absence of sufficient alternatives for transportation fuels, and taxes that absorb the sharp price increases for consumers in developed countries. Above-ground risks are broadly considered to be force majeure, host government policies, industry cycles, and sector maturity. These risks forced the IEA to rethink the short- to mid-term supply forecasts on the basis that: “Stuff can go wrong”. In an increasingly tight market the above ground risks serve as logjams to investment, which in turn diminishes the ability of the market to react to short term supply disruptions.

The IEA notes that real investments in the upstream sector have lagged behind the recent rise in oil prices. Although nominal investment in the upstream sector has shown double digit growth, cost inflation has absorbed most of these increases, creating real investment growth rates between 5% and 10% since 2000. Key drivers behind the general increase in costs are the increasingly difficult reserves that have to be exploited, a shortage in qualified personnel and growing resource nationalism in producer countries. The fact that the private international oil companies (IOCs) are forced to exploit resources that are more difficult to find and extract, increases the below-ground risks to oil supply, but the IEA still considers these risks of lesser importance than the above ground factors.

Common outlook |

Although the peak oil movement may have criticised the IEA for their oil supply outlooks in the past, both share a surprisingly common outlook on future oil supply. Most peak oil thinkers agree that in the short term politics and the resulting investment climate can limit oil production from what it potentially could be, while the IEA will acknowledge that you cannot reverse geology, although you can reverse taxes. The central divide between the two visions is the time frame. The IEA's warning of a supply-side crunch

represents a short to medium term assessment (until 2015), with a long term increase in production up to 2030. Peak oil theorists usually take a longer term view, with the end of the “oil age” in 2100, but with an imminent decline of hydrocarbon production to set in sometime after 2010.

Both the IEA and peak oil consider it likely that until (and probably beyond) 2015 above ground risks continue to cause tightness in oil supply. In the long term, geology will take centre stage in determining the volume of world oil production, because in the end nobody is denying that oil is a finite resource. However, in this long-term it is nearly impossible to predict how technical, economic and political factors will interact in determining world oil supply.

A meaningful debate on the future of the world's oil supply is partly hindered by the fact that the two sides use fundamental concepts and data in a different way. To begin with, there is no



*Oil barrels waiting to be shipped.
Photo: Mikael Andersson/MIRA/Nordic Photos*

agreement on what oil supply is and what it is not. ASPO excludes extra heavy oil, heavy oil, deep water oil and gas to liquids (GTL), considering that the main share of what is historically produced is “conventional oil” and that will continue to be the case in the future. Peak oil believes “non-conventional oil” will have a very limited impact on future supply.

The IEA tends to use a broader view on future oil supply, firstly by incorporating deep off-shore as conventional, but also by incorporating “non-conventional” in the supply outlook, which the IEA expects to grow by 6.7% annually up to 2030. The future share of non-conventional oil depends on an interdependent mix



Oil pumps, called "nodding donkeys", for sale in Shelby, Montana USA. Photo: Tony Waltham/Robert Harding World Imagery/Corbis

of the perceived long term oil price, stability in producing regions, government taxation (not only tax level, but also stability in the tax regime), and available technology, argues the IEA.

The discussion on the long-term oil supply will obviously be heavily affected by the perceived share of "non-conventional" oil, which will in turn be largely determined by government policies to support long term development of these resources.

Reserves |

Another fundamentally disputed issue is the variation in oil reserves estimates. There are various systems to classify oil reserves, and there is no clear separator between the categories in these systems. To clarify any discussion on world oil reserves, a flexible, consistent and comprehensive system is needed. No such a system is likely to materialise any time soon.

It is true that, as peak oil has frequently voiced, reserves estimates are closely linked to politics. Especially OPEC reserves estimates in the Gulf region can be regarded as politically determined reserves, used to settle a dispute over quota allocations in the late 1980s. As a consequence accurate figures on the Middle East's reserves potential are unavailable. Current estimates of OPEC reserves are based on the official data and information from the pre-1978 era, when most international reserves were developed by IOCs. Any of the OPEC reserves estimates continue to be reasonable guesses at best. It is therefore impossible to make an accurate assessment of the geological long term supply outlook. ASPO's argument that its projections are self-evident, even without the proper reserves estimates, is therefore just as unfounded as more positive supply outlooks.

More recently, decline rates have taken centre stage in the debate. Especially the continued and accelerated decline in the production of major oil provinces near developed economies (Alaska, North Sea and Mexico), has sparked concern whether future production will be able to offset this decline. Decline rates are exceptionally sensitive, because a small difference can make or break the ability of the oil industry to avert a gap between demand and supply in the global oil market. Although various studies have been done on the subject of decline rates, no decisive judgement can be given since there are no accurate field-to-field production data available.

The IEA currently uses a weighted average of 3.7% as the rate of decline in world oil production. At this rate supply would match

projected demand in 2012. However, an accelerated rate of decline of 0.5 percentage point higher can lead to a shortfall of about 2.6 mbd in 2015. A recent report from petroleum consultant IHS/CERA, surveying 811 fields, produced a decline rate of 4.5%, but the reports then continues to paint a far rosier picture of available future supply to offset this decline. Another study by Goldman Sachs of 154 non-OPEC fields shows a decline rate of 7% to 8%. All these figures are based on a small number of production fields. It is possible, though, that the IEA's estimates are too conservative.

Decline rates can increase if one supports the view that doing a "good" job in reserves development, will mean steeper decline rates in the future. However, one could also reason, as opposed to ASPO's suggestion (of self-evidence), that OPEC countries are actually not trying their best to develop reserves in order to preserve them for future generations.

The upcoming World Energy Outlook (2008) of the IEA will take a detailed look at depletion rates. Recently, in a preliminary statement on the conclusions of the supply analyses, the EIA all but abandoned their supply forecast of 116 mbd by 2030. The agency is now worried that the oil industry will struggle to surpass the 100 mbd mark in the next two decades. This would still imply a continued growth in global oil supply, not a decline as peak oil predicts, though not as fast as expected in the past. Clearly, the WEO2008 will be eagerly awaited by the oil industry and consuming countries, although there is a possibility that some crucial information will not be uncovered because of continued political obstacles.

The lesson is that, for the moment, there are enough reserves worldwide if you assume reserves in the broadest definition possible. However economic and political circumstances are unlikely to materialize in favour of full-scale reserves development in the short to mid-term. In the longer term (2030 – 2050) geology will truly become a limiting factor in global oil supply. The point from which geology will prevail, will continue to be discussed long after a supply-side crunch might have occurred in 2015. ■

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