Peak Oil Update
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South Lakes Action on Climate Change

Towards Transition

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Existing Oil Production

"The peaking of world oil production presents the U.S. and the world with an unprecedented risk management problem. ...the economic, social, and political costs will be unprecedented. Viable mitigation options exist on both the supply and demand sides, but to have substantial impact, they must be initiated more than a decade in advance of peaking."

Hirsch Report, 2005

The government does not feel the need to hold contingency plans specifically for the eventuality of crude-oil supplies peaking between now and 2020.

Response of the UK Government to a freedom of information request by George Monbiot in 2008.

Between 2005 and 2008 oil production ceased to grow, despite huge demand and high prices. This is unprecedented in the history of the oil industry. Conventional economics dictates that increased demand will lead to higher levels of investment stimulating further production, yet this has not been seen. In 2008 the IEA for the first time predicted that between 2005 and 2020 production of conventional crude oil from existing fields will decline by 50% - a truly mind boggling figure which has huge implications. This is a vast loss of oil production set to occur over the next 11 yrs. It begs the question of why the IEA failed to see such a looming gap before 2008, and raises strong questions over its credibility. Indeed, given its history for inflating figures, one is left to wonder whether the true picture is not considerably worse.

Up to 2008, the average post peak decline rates for current oil fields has been 6.7%. This again is an alarming figure, and since only the year before the IEA were stating a 3.7% decline one must wonder yet again whether the true figure is higher. A 6.7% decline rate equates to a *halving* of production every 10 years. Even more alarming is that this figure is set to rise as the world becomes more dependent on smaller fields with faster depletion rates.

The IEA predict a 'supply crunch' of 7mb/d by 2015 – this is about 10% of current world production. They IEA do not label peak oil as a cause, rather delays in bringing developing fields online. In fact, the IEA never use the term peak oil, rather terms like 'supply crunch' or 'plateau'.

Given that 95% of the world's transportation relies on oil, 95% of all products in shops is delivered using oil, 99% of food uses oil or gas at some stage, and that oil is essential for the production of pharmaceuticals and agrochemicals, one has cause to wonder what effect this will have on modern society.

It is also worth noting that energy return on energy invested (EROI) has fallen from 100:1 in the 1930's to around 14:1 today. Oil is now more difficult and expensive to extract, new fields are much smaller and the net energy available is considerably less, as demonstrated in the article below.

BP Makes Giant Oil Discovery in Gulf of Mexico

In 2009 BP announced a 'giant' oil discovery of 3 billion barrels of oil in the Gulf of Mexico (see e.g. http://www.bloomberg.com/apps/news?pid=20601087&sid=adF31W9._rik). The statement received world wide press coverage and may have lulled many into a false sense of security, yet the coverage seems designed with only one aim: to reassure the markets that oil is still plentiful.

In fact, the find was insignificant. Though it sounds like a lot, at current world rates of consumption, 3 billion barrels of oil would last about one month. Of more interest is the fact that the well represented the deepest ever exploration well, illustrating that we are now left with oil that is more and more difficult to find and extract.

Bridging the Gap

The world declines, and how fast the word declines is very significant. If it declines of the order of 7 or 8%, we've got big trouble soon.

James Buckee, CEO of Talisman Energy.
(World oilfields are currently declining at a - likely underestimated – rate of 6.7%. Each percentage loss of world oil production equates to a loss of 0.6-0.8% world GDP)

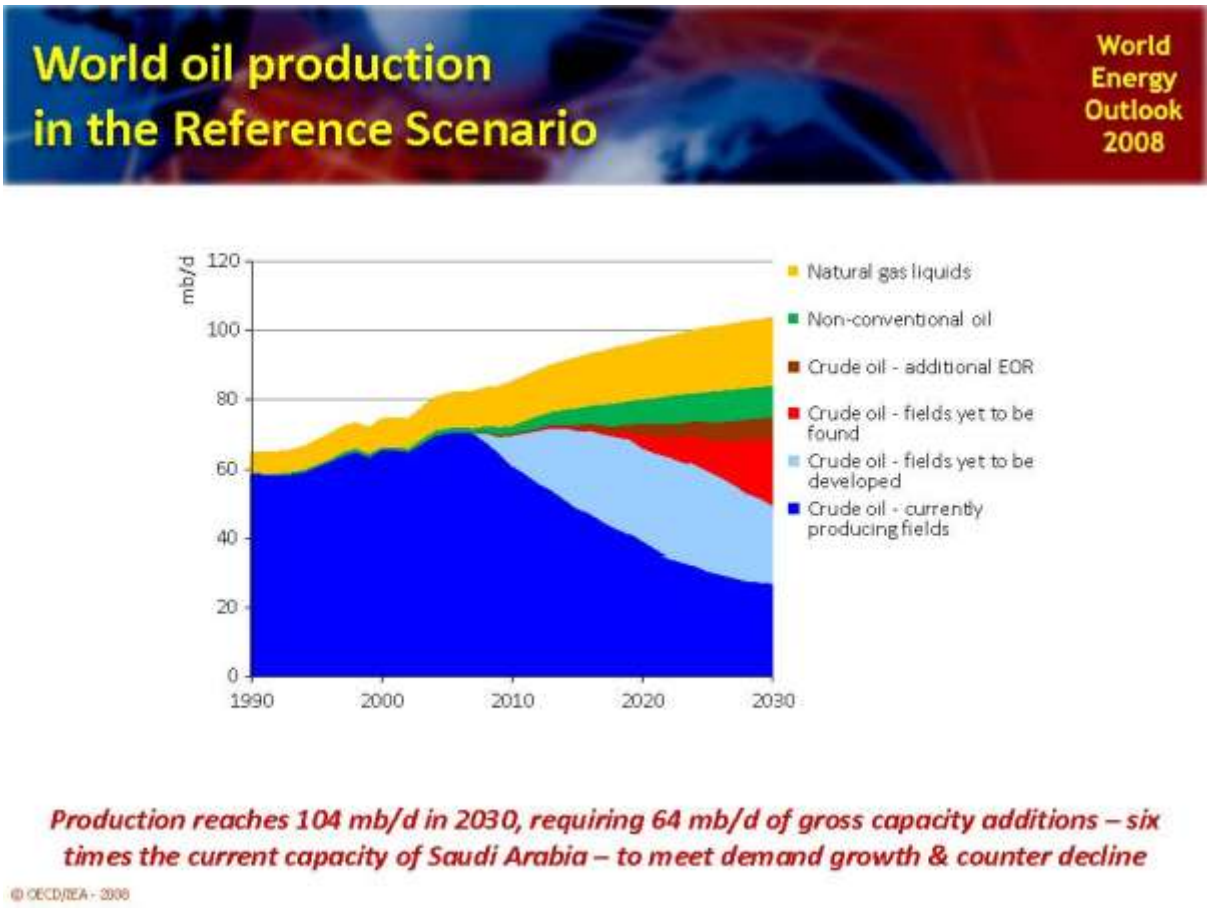
Welcome to the age of energy insecurity. Worldwide production will peak. The result will be skyrocketing prices, with a huge, sustained, economic shock. Key sectors of the economy, from agriculture to homebuilding will be hit hard. Without action, the crisis will certainly bring energy rivalries, if not energy wars. Vast wealth will be shifted, probably away from the US.

J Robinson West, former US secretary of the Interior and Deputy Assistant Secretary of Defense for International Economic Affairs.

The IEA suggests that the shortfall in world oil production that is on the horizon can be met. Indeed, according to the IEA oil production will actually rise from around 74mb/d in 2008 to 105mb/d in 2030 (which, were it to come true, would spell doom for the climate). This is in direct contradiction to many analysts, including sources at the IEA, who suggest that production will never exceed 100mb/d, and will likely peak at around 80-90mb/d.

The graph below (taken from the 2008 World Energy Outlook - the 2009 one is identical) shows how the IEA expect the shortfall in world oil production to be met. Of immediate note is that the graph

shows very clearly how fast production from existing fields is set to plummet, and that this is set to happen immediately.



The graph for future production flows seems barely credible. (six times the current capacity of Saudi Arabia required to come online!) To achieve this level of production, assuming it is theoretically possible, will require an investment of $450 billion every year up to 2030 ($1.2 billion *every day* between now and 2030), according to the IEA.

It is worth analysing how the IEA arrive at these figures for each category of oil and the assumptions they have made in doing so.

Fields yet to be developed

Production from these fields is forecast to reach 29mb/d by 2020. Factors which come into play in achieving this are cost, level of investment and timing. Between 2002 and 2008 exploration and production costs rose sharply due to a massive increase in global demand for new oil production.

Many of the new sources of conventional crude are also in areas of high development costs. E.g. Angola or Nigeria development costs are $70/80 per barrel (compared with $20 per barrel in much of the Middle East). This indicates that, even if production increased to address the shortfall, it would come at a far higher price than we have been used to paying, bringing with it all the associated problems of peak oil.

In addition there have been many delays and cancellations of new oil projects due to demand retracting (due to the global downturn), the oil price dropping, technical problems and development costs remaining high. (e.g. Kazakhstan's Kashagan oil field, at 13 billion barrels, is one of the largest finds of recent decades. However, technical difficulties have meant that after a decade of development, it has yet to pump any oil.)

The Mega Projects Database is a comprehensive listing of 258 projects due to come on stream by the end of 2016. An analysis of this database appeared in the first report of the UK Taskforce on Peak Oil and Energy Security. The report concluded:

"No net increases in oil production after 2011, even if all planned projects come on stream more or less on time, and achieve the anticipated production flows... The immediate conclusion from the analysis is that the peaking of oil supplies is imminent and will occur in the window 2011-2013."

Fields yet to be found

Between 2007 and 2008 the IEA massively downsized its predictions for future production for yet to be found conventional oilfields by 82% (880 billion barrels to 114 billion barrels). This is yet another massive shift in the IEA's figures. Given that the IEA provide policy advice to governments, it remains a mystery why questions are not asked as to the credibility of the IEA predictions when they fluctuate so wildly. Yet again, it also begs the question of whether the IEA's current figures are still overinflated.

It should also be noted that, actual discoveries of oil to date do not match IEA projections, by some considerable margin.

Even with this 82% reduction in predicted production, the IEA project production from these yet to be found fields to reach 19mb/d by 2030. In order to achieve these levels of flow rates the IEA have used an average level of production almost 50% higher than that which it suggests will come from existing known fields. This does not seem credible. Academic analysis suggests flow rates of between 10-15mb/d, the higher figure of which requires an annual discovery rate of 10-11 billion barrels up to 2030. The IEA assume an annual discovery of 5 billion barrels up to 2030 and a figure of 19mb/d production! Taking the average production rate for existing known fields one yields a rate of 13mb/d of future production from these yet to be discovered fields, which fits in well with academic analysis, but which is over 30% lower than the IEA figure.

Additional Enhanced Oil Recovery

This is primarily carbon capture and storage – where CO2 is injected into an oilfield in order to pump out the remaining oil. The IEA predict that this will add about 6.4mb/d of conventional oil by 2030.

Forgetting for now the insanity of using CCS to extract yet more oil (79% of the CO2 injected would be re-released through the burning of the oil), there are big question marks over whether this figure can be met:

- EROI is much lower for enhanced oil recovery. This means that even if 6.4mb/d were achieved it would not equate to 6.4mb/d of current easily available crude in energy terms.

- To achieve this flow rate would require 9.8Gt of CO2, 1.4 times the annual US output of burning oil, gas and coal.
- The technology is not yet proven (there are no full scale CCS equipped power stations).

Non-conventional Oil

The IEA project non-conventional oil production to reach 8.8mb/d, mostly coming from Canada's tar sands (67%). As of 2007, Canada's tar sands were producing 1.2mb/d at vast environmental cost (see, e.g. http://www.independent.co.uk/environment/the-biggest-environmental-crime-in-history-764102.html).

EROI for Canada's tar sands have been estimated at between 10:1 and 2:1 (some analysts suggest 4:1 to 2:1 as a more appropriate range). Assuming an optimistic 10:1, this means a barrel of tar sands oil would require 3.5 times as much energy input as a barrel of conventional oil. This means that even if the IEA's projection of 5.9mb/d production by 2030 from Canada's tar sands was reached, this would only be equivalent to 1.69mb/d in net energy terms. Assuming the 2:1 EROI figure gives 0.34mb/d.

In addition, extraction costs for Canada's tar sands, as of 2008, had risen to $85 per barrel. Many projects have also been cancelled indefinitely or are incurring massive delays (as much as 75% of the tar sands related work for 2009 has been shelved).

Other sources of non-conventional oil include heavy oil and oil shales. The IEA does not expect the latter to add a significant addition to new oil production by 2030. Both are much more energy intensive to produce.

Natural Gas Liquids

Whilst these projections seem feasible, natural gas liquids are not the same as conventional oil. Being short chain hydrocarbons they are not ideal for manufacturing diesel, petrol or jet fuel.

Credibility Problem

Three key figures changed radically between the 2007 and 2008 IEA World Energy Outlook reports. Their figure for the rate of decline of oilfields went from 3.7% to 6.8%, the projection for output from current fields was dramatically slashed by 50% by 2020, and their projection for production from future yet to be found conventional oil fields by 2030 was slashed by 82%. In addition, the IEA's projections for global oil production by 2030 have steadily declined over the last three years by around 12%, as the IEA have sought to 'bridge the gap' from a variety of other sources. Given that the IEA's purpose is to provide accurate data to Governments to enable the planning of economies, this radical altering of figures needs to be questioned.

Many analysts have long accused the IEA of overinflating figures. More recently (Nov 2009), senior officials (who remained nameless) at the IEA have supported this argument, suggesting that key figures on rates of decline and future production have been deliberately distorted under pressure from the US. In particular the claim that production can rise to 105mb/d by 2020:

"Many inside the organisation believe that maintaining oil supplies at even 90m to 95m barrels a day would be impossible but there are fears that panic could spread on the financial markets if the figures were brought down further. And the Americans fear the end of oil supremacy because it would threaten their power over access to oil resources."

A second official said

"We have [already] entered the 'peak oil' zone. I think that the situation is really bad."

UK MP John Hemming, Chair of the All Party Parliamentary Group on Peak Oil & Gas, has also stated that he has been contacted by IEA officials who were unhappy with its lack of independent scepticism over figures.

This scenario is backed by a paper published by researchers at Uppsala University, who also concluded that *'future world oil resources are being drastically underplayed'*:

The Organisation of Economic Cooperation and Development (OECD) gave me the task of writing the report, Peak Oil and the Evolving Strategies of Oil Importing and Exporting Countries. This report was one of those discussed at a round-table meeting that was held in the IEA's conference room in Paris. At that opportunity, in November 2007, I had a number of private conversations with officers of the IEA. The revelations now reported in the Guardian were revealed to me then under the promise that I not name the source. I had earlier heard the same thing from another officer from Norway who, at the time he spoke of the pressure being applied by the USA, was working for the IEA.

We find the production outlook made by the IEA to be problematic in the light of historical experience and production patterns. The IEA is expecting the oil to be extracted at a pace never previously seen without any justification for this assumption.

Indeed, IEA's chief economist Faith Birol, when interviewed by George Monbiot last year stated, when referring to Peak Oil:

"We still expect that it will come around 2020 to a plateau … I think time is not on our side here."

It should also be noted that, according to the Global Oil Depletion Report 2009, which reviewed 500 studies on the topic, peaking is increasingly observed at the national and regional levels. Furthermore peaking occurs at 26% of United States Geological Survey estimation of ultimately recoverable reserves. We have used between 28% and 56% of global recoverable resources.

Summary

One of the most certain factors from history is that many civilisations collapse, largely due to the destruction of the environment on which they depend. They share a sharp decline curve. Indeed the decline may begin only a decade or so after it reaches its peak population, wealth and power.

Jared Diamond, professor of geography at UCLA.

The International Energy Agency (IEA) was founded during the oil crisis of 1973-74, and is an intergovernmental organisation which acts as energy policy advisor to 28 member countries (including the UK and US). Up until 2008 it had consistently denied peak oil, even going so far as to label peak oil theorists 'doomsayers' and stating that there is 'no cause for concern' (2005). In addition, the IEA has long had a history of over-inflating oil figures.

In 2008 the IEA for the first time admitted that world production of conventional oil from existing fields is set to drop by 50% by 2020 – a truly startling figure. Despite this they continue to predict that world consumption of oil will rise to 105mb/d by 2030, a feat requiring a daily investment of $1.2 billion and the discovery of five Saudi Arabia's worth of oil, not to mention a whole host of other very dubious assumptions. This figure has been widely disputed, not least by senior sources within the IEA who have said that the figures are drastically overplayed due to pressure from the US not to frighten the markets.

Many independent sources suggest world oil has already peaked. Other suggest that it is likely to happen before 2020. Some venture beyond this date (and even beyond 2030). Given the rapid decline of existing oil, of the order of 6.7% per year according to the IEA (around 7mb/d), it seems unlikely that enough fields are going to come online to meet this shortfall, and those that do will be smaller fields with much faster depletion rates. Other sources of oil, such as tar sands or CCS driven technology, suffer from technical difficulties, high expense and low EORI as well as fundamental limits to production.

The IEA state that a 'supply crunch' is due by 2015 of the order of 7mb/d, around 10% of current world consumption. Given the IEA fondness for overplaying oil, this seems likely to be an underestimate. Every loss of 1% of world oil production equates to 06-0.8% loss in world GDP. Given the rapid decline profile, this should be an alarming fact. Banks and financial institutions lend money on the basis of tomorrow's growth, this is the basis of the world monetary system, and it is based on the availability of cheap, abundant oil.

It is simple enough to do a basic calculation to uncover the coming disparity. World production currently stands at around 84mb/d. If production from current fields is expected to drop by 50% by 2020, then we would require an extra 42mb/d from new fields. Over the course of one year this would amount to 30.7 billion barrels of oil. The last time that amount of oil was discovered in a year was 1980, and discovery rates have fallen sharply since then.

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