

We're not running out of oil ... yet (but we're running out of time to prepare for Peak Oil)

Sydney civil engineer MATT MUSHALIK takes a cool, rational, look at the world's rapidly-approaching energy crisis.

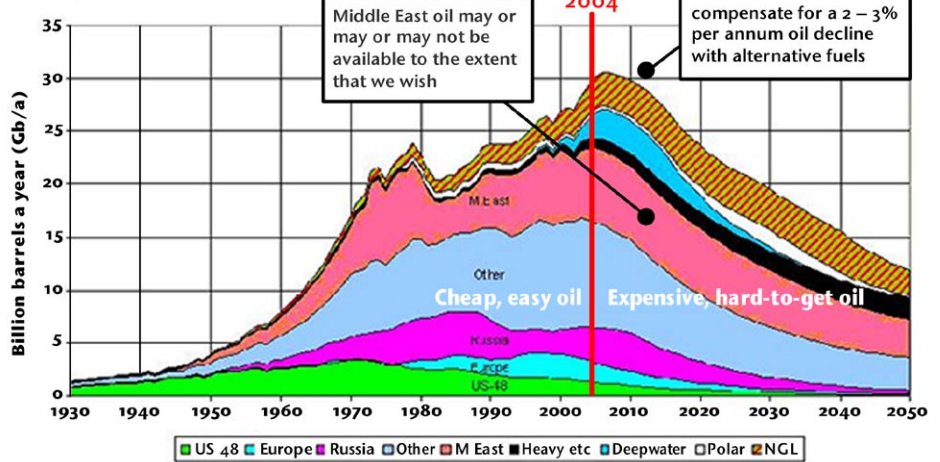
Not a week passes without media reports on rising petrol prices and tight oil supplies. Often the impression is given that we're dealing with a temporary coincidence of unrelated events and that oil prices will go back to "normal". Few of these articles analyse the situation in enough detail to explain the root cause – the successive and continuous peaking of oil production in many oil producing countries.

Oil production from any given field always follows the same life cycle: it first increases, then reaches a peak or plateau and then declines. "Peak Oil" is therefore a geological characteristic of oil production. It results from the laws of fluid mechanics which control the flow of oil through the pores and fissures of oil-bearing rock to the wells. Usually the peak happens when 50 per cent of the field's oil is produced ("Hubbert's Peak"). Advanced technology can push the peak up to 60 per cent but the decline after the peak is then steeper. Peak Oil happens in every oil field, in every oil province, in every country and finally in the whole world.

Peak Oil is a proven physical reality, not a theory which can be argued about in an endless debating competition. The first peak to happen was in the US in 1970. It allowed OPEC to impose an oil embargo in 1973 after the Yom Kippur War which triggered a world wide crisis. There was a second, lower peak from the Alaska oil in 1985 and since then US production has been falling, despite the Gulf of Mexico fields coming on-line. Future oil from the Arctic National Wildlife Reserve is the equivalent of just one and a half year's worth of US consumption. The US survives its declining oil production only by massive imports.

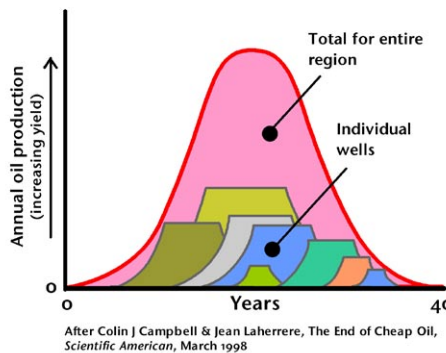
After a glut in the late 80s and early 90s, the global oil supply situation changed in the late 90s when 10 countries had entered the phase of decreasing production. The

Oil and gas liquids 2004 scenario



Idealised, bell-shaped production profile

The actual curve of each oil region differs from this theoretical graph, but more-or-less follows this pattern. There are also differences between on-shore and off-shore profiles



UK peaked in 1999 and Norway in 2003, so the whole of the North Sea production is now declining. By the end of 2003, 18 countries with a production of 22 million barrels a day were in the third year of decline, at a rate of around -5 per cent per annum (equivalent to a million barrels a day). The next candidates for the declining countries are expected to be China, India and Syria. Every percentage point of economic growth in China ends up on the world oil market.

The decline is still being offset by increasing production in other countries, running at an additional 4 million barrels a day. Global Peak Oil will happen when production volumes from growing and declining countries balance each other. Oil geologists expect this to happen

before 2010 and that it will be followed by a global 2 per cent per annum production decline.

There are hypothetical scenarios based on oil resources, not proven reserves, being released by international energy agencies that put the peak year around 2030 by assuming that OPEC will always be able to fill the gap between growing demand and declining Non-OPEC production after 2010. This, however, is very much in doubt now, as it becomes apparent that OPEC has reached capacity limits. We must also understand that these late peaks – if geologically feasible – would be followed by oil production crashes of 6-8 per cent, even 10 per cent per annum, which no economy could survive.

The latest assessment on the tipping point, when oil supply can no longer meet demand, comes from Chris Skrebowski, editor of the professional journal *Petroleum Review*. He has calculated that the world has entered a phase where new oil fields can barely compensate for the decline in 70 per cent of existing fields and that by 2008, at the latest, growing demand can no longer be met.

In Saudi Arabia, the easy pre-peak oil is almost gone, while in Iraq the depletion level is just 20 per cent, resulting from low production during the Iran-Iraq war and UN sanctions. This means there are around 30 giga-barrels (Gb) of geologically easy oil in Iraq – incidentally equivalent in size to the remaining US reserves. The difficulties in Iraq flatten and prolong the oil production plateau around the geological

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peak. This gives us more time to prepare for Peak Oil.

Australian oil production fell by a third in four years and is now just 55 per cent of our consumption. Did anyone drive less by that percentage? Of course not. All that extra oil is being now imported. BT Financial Group identified rising oil imports as one of the main contributors to the latest trade deficit blow-out in March 2005 of \$2,67 billion.

From the above it should be clear that it makes little sense to talk about oil "lasting", say, 40 years. Such a formulation implies that current production can be maintained over that period before dropping to zero in year 41.

The critical point in oil history is the year in which global production starts to decline – never to recover – and to dwindle to insignificant amounts in 70 or 80 years. We will finally run out of oil when the net energy balance between discovering, producing and supplying oil, and its use, is zero.

Peak Oil is not a cataclysmic event but rather a slowly encroaching process of both increasing oil prices and declining oil production, resulting in physical shortages compared to the underlying demand.

Doomsday scenarios aren't helpful because they unconsciously block the rational thinking urgently needed to prepare society for Peak Oil.

An untested assumption common among economists has it that rising oil prices will automatically produce more oil and/or alternative fuels in sufficient quantities. They forget that drilling for oil has become a very risky business because most of the easy fields have already been found. They also fail to understand that when it comes to energy, the laws of thermodynamics, rather than their simpler models, will prevail.

At present, demand for oil is very inelastic. Peak Oil is not just about paying 10 cents a litre more when you fill the car. Market forces, seen by many economists as a panacea, will in fact ensure that behavioral change decreases demand to supply levels – which will be painful. Two per cent per annum less oil means driving one week less every year. For example, four years after peak oil, you'll be leaving your car in the garage for the equivalent of a month. Without consumer

education to facilitate this change petrol prices will rise unnecessarily.

We can't have perpetual growth when the oil resource base is finite. Democracy can't stop Peak Oil and it will run into big problems if the electorate is energy illiterate and can't understand the unpopular decisions necessary after the peak.

Fuel tax rebate legislation will be self-defeating and we must rely on science, engineering, and our preparedness to reduce our energy consumption to levels commensurate with the availability of renewable energies.

Nor is financing oil imports from gas exports a good idea because spot market oil prices are always higher than gas prices in long term contracts. Moreover, Australia is selling the easy gas from shallow waters to countries whose energy problems we can never solve. We need our gas for our own transition from oil to gas to renewables and we must also set aside gas for manufacturing the fertilizer required by future generations for food production.

Our coal reserves are no comfort for our car dependent cities, neither can we endlessly burn coal and continue our dangerous experiment with the world's climate. In the meantime we can use our gas to generate power to run our electric trains but to be sustainable this will, in future, have to come from wind, wave, geothermal and solar sources.

We are now in overshoot mode as far as the provision of additional oil dependent infrastructure is concerned. In the last 50 years this infrastructure grew along the path of increasing oil production. Now, shortly before the peak, it would be uneconomic to provide new capacities which would be utilized for only a couple of years and would then no longer be needed.

Alternatives to oil are limited. If we turned all Australian sugarcane into ethanol, it would yield just 5 litres per car per week. If all our oil seeds were used to make biodiesel, production would just cover 6 per cent of our diesel consumption. It's been estimated that if the UK's whole car fleet were hydrogen powered cars, that country would require a hundred nuclear power plants.

Once Peak Oil is understood, there can be no more business as usual. But what do we have to do? Here is a first list:

- Australian car manufacturers must produce thrifty hybrid cars. Low fuel consumption, not generous accessory packages and other electrically powered equipment, is needed.

- Stop building tollways, road tunnels and car parks. RailCorp is so busy trying to finish the Chatswood-Epping line and their clearway program, as well as training new drivers, that we can't expect much more from heavy rail before the oil peak.

- Rescue our tollway companies. They'd have to convert car lanes to rail tracks and run light rail on them, with connecting feeder buses to the suburbs and heavy rail interchanges. The RTA will have to do the same with all major urban roads.

- Replace domestic flights up to 1,000 km with electric night trains running on improved track. Long distance truck traffic will have to be moved to rail either as containers or by using rolling highways where trucks and trailers are loaded onto special flatbed cars.

- Forget desalination plants powered by electricity from coal. Peak Oil will trigger a general energy crisis and make electricity very expensive. Rainwater harvesting, both by private home owners and by local government, should be mandatory.

- No more subdivisions in the west of Sydney, as these will just increase long distance commuting. A vigorous program of decentralisation to smaller cities along the coast and outside commuting distance from Sydney should accommodate the 30 per cent of population growth now earmarked for Greenfield sites. Town planning guidelines should favor cycling and walking to work by reducing commuting distances.

- We need to preserve good agricultural land in the Sydney basin for vegetable production because long distance transport by truck will become prohibitively expensive in the future.

In short, we need a 180 degree turnaround from what we're doing today.

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10 May 2005.