

Another 4 articles about The Big Rollover

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Oil's 'big rollover' could happen this decade

PREDICTIONS that the world is fast running out of oil are not new but in an Australian lecture series US petroleum geologist, Les Magoon, has again brought the implications into sharp focus.

Using a TransScan forum to spell out his message in Perth, he told his audience that the immediate problem was not when the oil wells dry up but when demand out-strips supply.

The effects of that change - what he termed the "Big-rollover" - could become apparent at any point during the current decade. He said oil field production had already peaked in most non-OPEC nations and it was unlikely that there would be new finds of sufficient size to alter the equation.

"It really starts blowing your mind when confronted with information revealing that 90% of the current production comes from fields found more than 20 years ago," he said.

Mr Magoon, a senior geologist with the US Geological Survey, was closely involved in the Survey's 2000 report on the state of the world's petroleum supplies. He also compiled the poster, "[Big Rollover](#)", which illustrates graphically the problems ahead.

The poster shows inter-national oil production peaking at around 26 billion barrel annually within five years. Annual world consumption has already reached that figure - and on present trends, consumption is likely to rise still further, although clearly not for long.

Of the world's 42 top oil-producing nations, production wells in 15 are already in decline, 14 will go into decline within three years, and only wells in six countries (Iraq, Brazil, Saudi Arabia, Colombia, the United Arab Emirates and Kuwait) will pass 2010 without peaking.

Of those six, Saudi Arabia is probably the only nation with a substantial level of spare production capacity - but according to Mr Magoon, there is even doubt about the real depletion status of Saudi Arabia's Guwar oil field, the world's largest.

The effect of the international decline will be that from 2007 onwards, production controlled by OPEC countries will for the first time exceed that produced in the rest of the world. Two years ago OPEC controlled only 39%.

In answer to questions, Mr Magoon admitted there had been predictions on oil shortfalls dating back to the 1970s. What is different now, is that a lot more is known about oil and

where to find it. Armed with that know-ledge, oil companies were cutting back on R&D.

"There are no surprises now," he said. For the future, the real concern was that there was still no alternative to oil. The problem with alternatives will be the sheer volume of oil coming off-line after the Big Rollover and the sheer number of consumers coming on-line," Mr Magoon said.

"What happens if everyone wants a fuel-cell car all at once?"

The fact was, capital costs, technological uncertainties, start-up lead times and especially the energy inputs needed, meant that alternatives were unlikely to be available in the volumes and prices required to replace declining cheap oil beyond the rollover.

"The transition time is expected to be very short and we will not even know the Big Rollover date until after the event," Mr Magoon said.

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Leslie B. Magoon, U.S. Geological Survey, Menlo Park, Calif.

SUBJECT: Are We Running out of Oil?

February, 2003

Abstract: As a petroleum geologist, people frequently ask me "Are we ever going to run out of oil?" To which I reply, "The better question is When is the big rollover?." The big rollover is that time when the demand for oil in the world outstrips the capacity to produce it. Rollovers or peak oil production have already occurred in different parts of the world. For example, rollovers occurred in the United States and the Former Soviet Union in 1970 and 1985, respectively. So, how is the year for the world rollover determined?

Oil is a finite resource that, once discovered, is produced at different rates for several reasons. Oil production can change because of economic cycles, political situations, or wars. These factors frequently affect the price and supply of already discovered oil. Global production rates are also affected by the rate of discovery and size of oil fields, by refinery and pipeline construction, and by geological factors and petroleum composition. The amount of economically recoverable oil in the world is determined by statistical analysis of this information. The big rollover will occur when half of the world's oil has been produced.

Investigators estimate a world total from 1,900 billion barrels of oil (Gbo) to over twice that volume, so the first half-way point is at 950 Gbo. We have already consumed 873 Gbo. Presently, the world consumes about 27 Gbo of oil a year. From 1990 and 2000, 4 - 9 Gbo per year were discovered. From 1955 to 1965, about 200 Gbo per year were found. Therefore, the size and number of new fields are getting smaller and smaller. Industry is no longer able to replace the consumed oil fast enough, which means that the big rollover could be only a few years away. However, if the world oil total is twice this number or 3,800 Gbo, the big rollover will occur farther into our future.

There are other indications that the golden years of the oil industry have passed. For example, the continual merging of oil companies has been ongoing since 1981. Large oil companies need large fields to be profitable. Thus, buying or merging with other

oil companies is a low risk way to increase their oil reserves. Research is sometimes used as an indicator of future potential. The oil company research laboratories are, for the most part, out of business and funds allocated to research have decreased over 50% since 1990. The membership of the American Association of Petroleum Geologists (AAPG) peaked in May 1986 at 44,757 members and is now under 30,000 members. British Petroleum (BP) advertises that the company logo stands for Beyond Petroleum.

Some say the big rollover will occur in this decade while others give the world more time. The growth of the world economy will be adversely impacted after the big rollover. The prudent strategy is to plan for the worst and hope for the best. Now, nothing is being done to reduce consumption of a finite resource.

Les Magoon can be contacted at lmagoon@usgs.gov or (650) 329-4916. The subject of this talk was published as an online poster by the U.S.G.S. as Open File Report 00-320. This colorful 33" x 17" poster illustrates many of the topics Les covers and can be downloaded free from the U.S.G.S. at <http://geopubs.wr.usgs.gov/open-file/of00-320/>.

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The Big Rollover": World oil production decline predictions.

Bruce Robinson, CSIRO Exploration & Mining

The world's rate of production of petroleum is predicted to start its terminal decline within the next five to 15 years, much sooner than commonly thought.

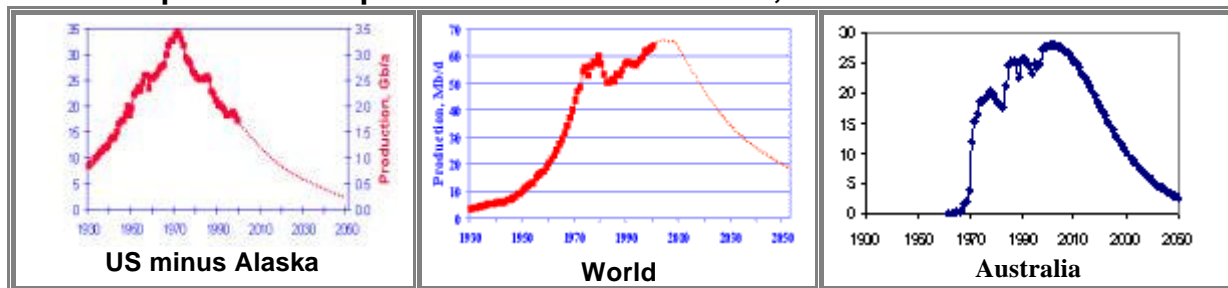
This is the assessment of respected dissenting senior oil geologists who are challenging long-accepted optimistic interpretations of oil-industry data. The group is led by Dr Colin Campbell and Dr Jean Laherrère who have both had long successful careers in exploration. Much of their data comes from a reliable worldwide oil-field reserve and production database amassed by Geneva-based Petroconsultants.

They call themselves "retired oil geologists, concerned about the future of their grandchildren" and, as such, are free of many of the substantial commercial and political constraints that severely colour much of the published data and interpretation about future oil supplies. The "Big Rollover" is one name given to the forecast change from the past buyer's market to the future seller's market, when the world demand for oil outstrips the capacity to produce it. The originator of the term is senior US Geological Survey oil geologist, Les Magoon. He says, "There is a limit to how much oil the world can produce every day. We are not running out of oil, it will just become more precious".

The Big Rollover is a global extrapolation of the prediction made in 1956 by Shell geologist Dr M. King Hubbert that the US oil production would rise only until about 1970 and then start a sharp

decline. Although widely derided at the time, the predicted decline did happen and resulted in the first of the world oil shocks as growing US dependence on imported oil became apparent. This led to the rise of OPEC, queues at petrol stations in the US and Europe in 1973, and an oil price of close to US\$100/barrel in current values after the second Iranian oil shock of 1979.

Past and predicted oil production rates for the US, the World and Australia



Production-rate rise and decline curves of similar shapes have been observed in many individual oil fields such as Prudhoe Bay in Alaska, North America's largest oil field. The curves of deliverability, the rate of production, depend upon the geology and physics of oil extraction from the pores of the reservoir rocks. Extrapolation of the annual production rate decline gives reliable predictions of remaining extractable reserves in the field.

Many world oil-provinces like Bass Strait and the North Sea are well into or are nearing their decline phases. World oil-discovery rates have been declining since the 1960s, according to a 1998 Scientific American review, *The End of Cheap Oil*. New discoveries are failing, by a factor of four on average, to keep pace with extraction, according to the article's authors, Campbell and Laherrère. Even a successful exploration spike last year, with big successes in the Caspian and Iran, failed to match the world reserves drawdown for the year. The bulk of the world's remaining oil reserves are in the Middle East, and the seller's market will increasingly provide OPEC with considerable power to control both production and prices, as non-OPEC oil becomes scarcer. The decline in the Gulf region is estimated to begin only about a decade later than that of the rest of world, so the Middle East will not be able to supply the world indefinitely, as is commonly portrayed.

The exact timeframe of the Big Rollover is uncertain, with dates from 2003 to 2020 quoted by Magoon. OPEC and oil-industry data manipulation further confuses the situation. The Oil and Gas journal, for instance, shows 81 countries reported no change whatsoever in their oil reserves for the 12 months ending 2000. This requires exploration successes in all those countries to have exactly matched exactly their production rates. Campbell describes this as "utterly implausible". "Governments variously under-report or over-report or simply fail to update their estimates," he said.

Laherrère documents severe downward revisions of previously overestimated oil reserves in the former Soviet Union after the fall of the USSR, and a 40 per cent decline in the reported reserves in Mexico once its financial crisis had been solved in 1998. Post-dating of the discovery of oil fields is another industry data flaw central to the Campbell and Laherrère hypothesis. Partially due to US regulations, oil companies systematically under-reported some oil discoveries, which were later unveiled as if recently found. This led to the false impression of "reserve growth" and to an inflated view of recent discovery rates.

If the predicted oil-production decline happens those who are better prepared for it will be at a very substantial economic advantage. Businesses and industries that are forewarned will be ideally

placed to take advantage of the opportunities and to minimise exposure to the adverse effects. There are innumerable opportunities to anticipate and ameliorate the possible effects of an oil-supply decline. Some are "no-regrets" options, those already justifiable on existing social, environmental and economic benchmarks, but even more favourable in the Rollover scenario. Improving fuel efficiencies of transport and reducing greenhouse emissions are obvious examples of "no-regrets" options.

Existing and proposed industries, developments, crops or processes could be compared using future oil-requirements as one crucial yardstick. Even if many of our industries will be competitively disadvantaged globally by ever-increasing oil prices, advance warning of the vulnerability will allow substitution, adaptation and forward-planning to minimise the problems that may well happen.

Government recognition and acknowledgment of the Big Rollover would also send valuable warning signals to the community and industry that the end of the age of cheap oil may well be fast approaching. Public consideration of the petroleum-sensitivity of industry sectors and new projects would be a useful dimension to add to forward planning.

Recent tentative moves by big companies to monitor and reduce internal greenhouse emissions and energy consumption are small but useful steps towards the fuel-frugal mindset that will be forced upon us if the Big Rollover comes. Such a scenario would lead to conservation, demand management, efficiency gains, changes in lifestyle and substitutes. If the Rollover is as swift and severe as predicted, there will almost surely also be deprivation. A low-cost, easily transportable substitute for diesel and petrol energy is most unlikely to be available in very high volumes within the Rollover timeframe of one or two decades. Hydrogen, for instance, is not a primary energy source for fuel cells. It is only an energy carrier. It needs to be produced from gas, electricity or solar energy, and can not be stored efficiently like petrol.

Perth-based researcher, Brian Fleay, author of *Decline of the Age of Oil*, says, "The common naive belief in a technological fix for the oil-depletion trend is worrying. What is needed is a serious examination of how to reduce our oil usage as soon and as painlessly as possible. There is a lot of experience available from water-supply authorities round Australia, particularly in WA, where rationing, demand management and reforms of pricing and charging have reversed upward and inequitable usage trends".

Campbell describes the coming oil peak as a turning point for mankind. He suggests the transition to oil decline will be a period of great tension, with priorities shifting to self-sufficiency and sustainability. "We need to relearn as a matter of urgency that if we produce less oil today there is more left for tomorrow". He also predicts it may be a better world. Certainly there would be some real advantages for Australian city-dwellers, with lower air-pollution, and less traffic noise and congestion. Community health levels are likely to rise, as daily physical activity, such as riding a bicycle to school, or walking for a bus to work, are reinstated as part of our lives. Corner shops will reappear, and people will meet neighbours as they walk to the local shops instead of driving to a distant supermarket.

The Big Rollover scenario is a fascinating one, with lots of opportunities for alert governments to play invaluable roles in preparing for the possibility. Government, businesses and individuals should all go exploring for "Nega-barrels" of oil; meaning petroleum that can be saved instead of produced. There is probably much more scope in Australia for saving oil by increasing efficiency and reducing current wasteful uses than for finding more of it.

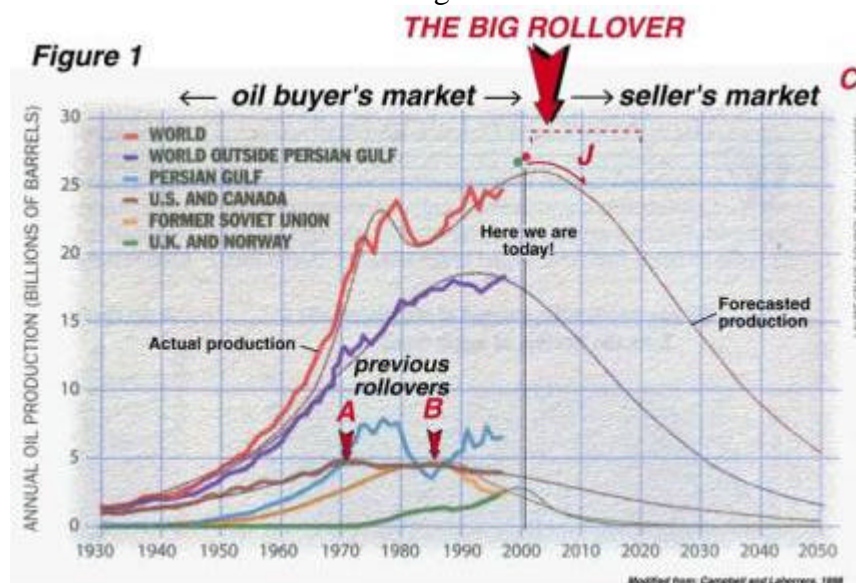
If Australia gets past the current state of denial about the Rollover, we may be able to be first on the bandwagon of serious oil-conservation and actually driving it to take advantage of the enormous opportunities, that will arise. However, if we sit complacent knowing that Australia has decades of gas, and some dwindling oil, we may miss the bandwagon completely as has happened so often before. Oil-conservation is likely to be far more productive and cost-effective in the short term than any attempts to bring on-stream the substitutes on which people are pinning their hopes. In the long run, we will need both the alternative energy sources, and a much more frugal approach to non-renewable resources. We could well benefit enormously from leading the world in preparing for the oil-shocks to come. Oil-conservation strategies could be a very big export item in future as well as saving us imports of oil on a sharply rising market.

As Les Magoon says in his US Geological Survey Big Rollover poster: *"Hang on tight, if we don't recognise the problem and deal with it, it's going to be quite a ride"*. Les Magoon will be giving luncheon seminars on The Big Rollover in capital cities as part of his Petroleum Exploration Society of Australia visiting lecturer tour from October 25 to November 19.

An edited version of this paper appeared in CoResearch, no. 387, Spring 2001, p.2 under the title: Towards a brave new oil-poor world.

References to Oil Supply Shortfall Predictions

V-05 August 2001



World oil production is expected to peak within this decade and then decline.

Campbell 1995, Magoon 2000

USGS: "Are we running out of oil ?". The most succinct authoritative description is the US Geological Survey poster by petroleum systems geologist Les Magoon

USGS Open-File Report 00-320
<http://geopubs.wr.usgs.gov/open-file/of00-320/> or <http://www.hubbartpeak.com/Magoon>

BBC-TV "They predict that from 2005, the world will face a permanent and deepening shortage of petrol and diesel..." BBC-2 TV 8th November 2000, quoting Campbell and others

http://news.bbc.co.uk/hi/english/events/the_money_programme/newsid_1014000/1014236.stm

Campbell: Clausthal "Peak oil: A turning point for Mankind". A more recent, well-illustrated lecture in Germany by Colin Campbell (December 2000). <http://www.geologie.tu-clausthal.de/Campbell/lecture.html>

Laherrère Austria "Estimates of Oil Reserves" June 2001, was presented by Dr Jean Laherrère at a joint meeting of the Energy Modeling Forum, International Energy Agency and the International Energy Workshop 19-21 June 2001 at IIASA, Laxenburg, Austria. 92 pages of data, graphs and interpretation.

<http://www.iiasa.ac.at/Research/ECS/IEW2001/pdf/Papers/Laherrere-long.pdf>

Simmons & Company International: " is the only investment banking firm specializing in the energy service industry. Founded 25 years ago, the firm has acted as financial advisor in more than \$35 billion of energy service transactions, including more than \$27 billion of mergers and acquisitions.". Papers for oil industry clients. All presented this year.

<http://www.simmonsco-intl.com/web/downloads/pareto.pdf>

<http://www.simmonsco-intl.com/web/downloads/whitepaper.pdf>

<http://www.simmonsco-intl.com/web/index.asp>

A very good summary can be found in **Scientific American, March 1998** as explained at <http://www.sciam.com/1998/0398issue/0398quicksummary.html>

PREVENTING THE NEXT OIL CRUNCH

Global production of oil from conventional sources is likely to peak and decline permanently during the next decade, according to the most thoughtful analyses. In these articles, industry experts explain why and describe technologies that could cushion against the shock of a new energy crisis.

THE END OF CHEAP OIL

Colin J. Campbell and Jean H. Laherrère

Forecasts about the abundance of oil are usually warped by inconsistent definitions of "reserves." In truth, every year for the past two decades the industry has pumped more oil than it has discovered, and production will soon be unable to keep up with rising demand.

The full text of the Scientific American paper is available at

<http://www.hubbertpeak.com/sciam983.htm>

Dr Campbell gave a presentation to the **UK House of Commons All Parliamentary Committee** in July 1999. ***"The Imminent Peak of World Oil Production"***.

"I would like to provide the evidence. It is of course a very large subject. There are colossal economic and political consequences. Indeed the very future of our subspecies - Hydrocarbon Man - is at stake. But I think that you are better qualified than I to assess these matters. I will therefore concentrate on the technical assessment"

A copy is available at <http://www.hubbertypeak.com/campbell/commons.htm>

"A NEW ENERGY CRISIS: WHEN WILL WE EVER LEARN"

By C.J.Campbell, September 12, 2000. It is archived at <http://dieoff.com/page202.htm>

Brian Fleay: Australian researcher, Brian Fleay published a book *"Decline of the Age of Oil"* in 1995, and gave an invited paper to the Australian Chartered Institute of Transport conference in 1998, entitled *"Climaxing Oil: How will transport adapt?"*

Copy of Fleay's paper is available at

<http://www.wistp.murdoch.edu.au/publications/projects/oilfleay/oil.html>

A more recent paper by Fleay, *"Oil Supply: The Crunch Has Arrived!!"*, is available from <http://www.hubbertypeak.com/fleay/crunch.htm>

The latest paper by Fleay on the Australian perspective *"Oil and Australia"* is available from the Colorado School of Mines at <http://hubbertymines.edu/> in the Hubbert Centre Newsletter, 2000, #3 *"Our self-sufficiency in oil and condensate is expected to decline from 85 percent in 1999 to 42 percent in 2010 (AGSO 1998, Fleay 1998). Net oil imports from the Middle East will rise fivefold by volume next decade based on business-as-usual consumption forecasts. The import bill will rise from AU\$1,200 million to AU\$8,000 million, depending on oil prices and the dollar exchange rate. Australian oil production will most likely cease before 2030"*.

Federal Green Paper Sustainable Energy Policy for Australia.

A Green Paper *Sustainable Energy Policy for Australia* was released on December 18th 1996 by the then Minister for Energy, Senator Parer. See

http://www.isr.gov.au/media/parer/96_102p.html for the Minister's news release.

"Release of the Green Paper is a major step forward in honouring our election commitment to produce a sustainable energy policy with a 25-year timeframe," Senator Parer said. "This is long overdue as, to now, Australia's approach to energy options has been ad hoc".

"The Government's commitment to these goals is underlined by its commitment to formulate a sustainable energy policy for Australia to be laid out in the White Paper in 1997".

... "Mitigating risk"

Australia needs to undertake measures which will reduce our exposure to energy supply difficulties, particularly any possible disruption to liquid fuel supplies. We should also remain vigilant to any other risks which may emerge in the future so that they can be addressed in a timely fashion." Dec, 1996

Magoon's Petroleum Exploration Society of Australia visit.

Leslie Magoon is PESA's Distinguished Visiting Lecturer (PVL) for 2001.

Leslie B. Magoon is a well-respected petroleum geoscientist with 35 years of global experience. After graduating from the University of Oregon (MS- Geology, 1966), Les

worked for the Shell Oil Company for 8 years before joining his present employer, the United States Geological Survey (USGS).

Luncheon lectures on the Big Rollover will be held at

Brisbane, Thursday Oct 25th

Sydney Wednesday Oct 31st

Canberra Monday Nov 5th

Melbourne Friday Nov 9th

Adelaide Wednesday Nov 14th

Perth Monday Nov 19th and public lecture at 5pm, Alexander Library

More details from PESA contacts in each state, see <http://www.pesa.com.au/>

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GLOBAL EXHAUSTION OF OIL AND GAS WELLS

The original Running on Empty and Energy Resources yahoo groups have archived tens of thousands of messages about the upcoming shortages of energy. This forum continues this discussion, with an emphasis on what, if anything, can be done about the situation.

Authoritative data from the oil industry indicates that from about 2009 on (perhaps as early as 2005), there will be a permanent 3% (or more) per year decline of output from the world's now-emptying global oil fields.

Oil is vital to our transportation and industrial energy needs.

North American natural gas is in serious trouble too: much of it is used in power generation plants. They provide the electricity we use for computers, traffic lights, street lights and industrial machinery, home heating, and businesses. Natural gas is the crucial raw material for producing fertilizers for crops (our food supply.) A chilling prediction of a North American gas/electricity grid crash, by energy specialist, Richard C. Duncan, Ph.D. is viewable at RunningOnEmpty.org.

Calculations show that alternative sources of energy are severely inadequate and inflexible. The world's 11,000 airliners cannot run on nuclear, or coal or windmills. And the alternatives would cost billions, require land, take years, and require ...fuel.

It seems that from now on, energy scarcity will bring major global recession, food shortages, fighting over resources, and (literally) billions of human deaths.

Got a local food and energy system?

Robert Waldrop

Moderator
