

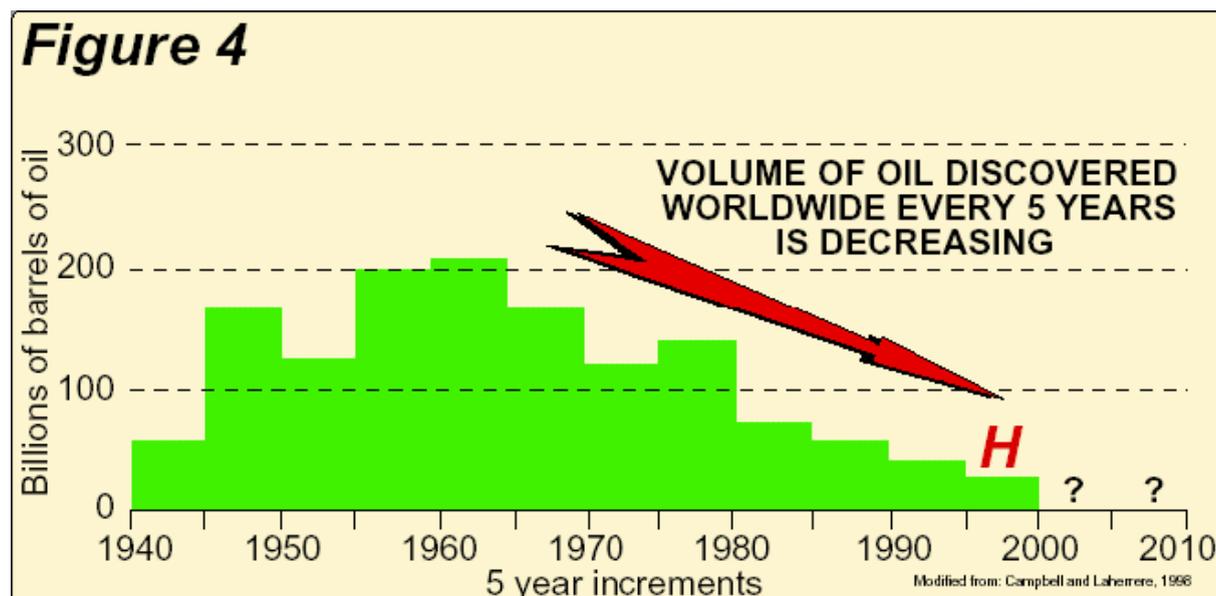
Impending world oil shortage

Our entire society and prosperity hangs on a single thread that will one day be unable to support us any longer. Practically every aspect of society is dependent upon an unlimited supply of inexpensive energy and in this respect oil plays the key role. The very body of our society would collapse without oil flowing through every one of its tiny cells. However, oil supplies must also increase, since practically all growth requires increasing oil production. Oil has special qualities, mainly that it is a liquid. This means that, even in the longer term, it makes it extremely difficult to replace oil with another form of energy that could be used, for example, for aviation, road transport, shipping, the petrochemical industry and so on.

The demand for crude oil increases by approximately 2 per cent each year and production/consumption is at present approximately 28,000 million barrels per year. When converted into a river of oil, this is almost 200 tonnes of oil per second, or one third of the largest Swedish river, the Göta Älv river, or an endless motorcade of some 20 tank lorries driving abreast at a speed of 40 kilometres per hour. This is an astronomical quantity, which also gives us a good inkling of the problems that will arise when this river starts to run dry.

It is simply a matter of time before there is a severe shortage of oil in the world. The reason for this is, first and foremost, that no new prolific oil finds are being made any longer. 90 per cent of the oil that is being pumped up today comes from major oil fields that are at least 20 years old. Back in the 1960s, some 40,000 million barrels of new oil were being discovered each year, at a time when the annual rate of consumption was far below this figure. During the late 1990s, a mere 3000 million barrels were being discovered each year – in other words, new oil production was just one ninth of consumption. The untapped oil finds in Siberia are just enough on their own to cover worldwide requirements for about two years.

Another example of the end of the oil era is that the number of employees who work in the oil prospecting business has decreased drastically in recent years from almost 50,000 employees in the 1980s to fewer than 30,000 today. No new refineries are being built nowadays and lots of oil companies are merging with other companies to gain access to those fields that are still top producing. Diagram 4 illustrates how the discovery of new oil has declined dramatically in recent years.



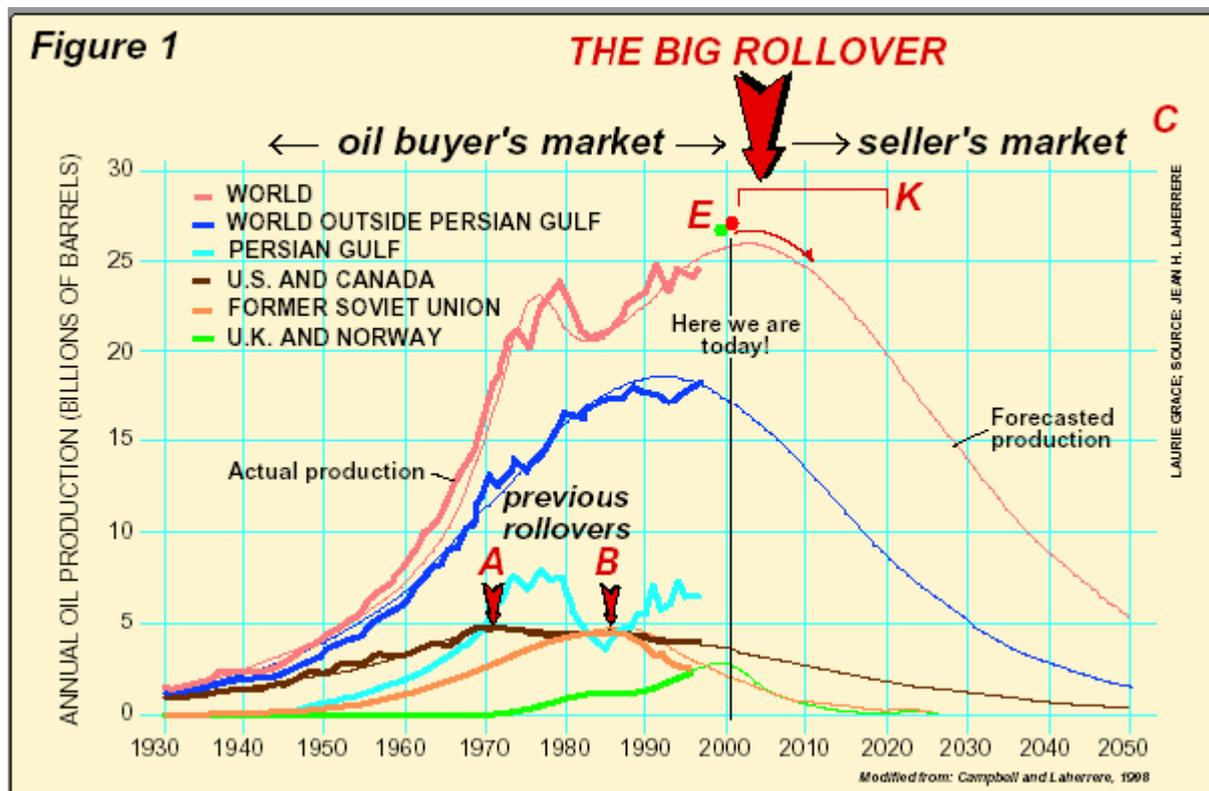
Now that we know what limited reserves of oil remain on our planet, we can foresee what the future will be like. We know that all oil extraction will first peak and then start to decline like a curve. It is a scenario we have witnessed at many old oil fields.

‘Hubbert’s Peak’ and ‘The Big Rollover’

US oil extraction reached its peak back in the 1970s and was predicted in 1956 by M. King Hubbert, a geophysicist employed at the Shell oil company. This inevitable peak in production at an oil field is known today as ‘Hubbert’s peak’. Of the world’s 42 leading oil-producing countries, oil extraction is experiencing a decline in 15 of them. Production figures in 14 more countries will start to fall within 3 years, while the sources in only 6 countries will still not have reached their peak until 2010 (Iraq, Brazil, Saudi-Arabia, Colombia, United Arab Emirates and Kuwait).

If we exclude the production of oil in the Middle East, then global production has already been on a decline since 1997. At present, the Middle East is serving as a saviour in need, replenishing the growing shortage. The Middle East will most likely become some sort of geopolitical focal point this century since the world’s energy supply becomes more and more dependent, with every day that goes by, upon that region’s production of oil and its reserves.

According to many experts, we have now reached the peak of what our planet can offer. It is simply a matter of time before global extraction starts to decline. This critical point, at which the demand for oil continues to increase, perhaps even accelerates, whilst the supply of oil starts to decline, is known in technical language as ‘The Big Rollover’. Diagram 1 illustrates this curve as well as the fact that we will probably soon be faced with a severe shortage of oil.



It is particularly important to note that in spite of all this, it will still be possible to extract oil for many more decades. However, this will be in ever decreasing quantities. Many people

have misunderstood the situation and believe that the current rate of oil extraction can continue for several decades to come.

When will this serious oil crisis occur?

When will this serious oil crisis occur? In all likelihood, within the next 10 years – possibly as soon as next year. However, it is not entirely simple to predict exactly when. For one thing, the population of our planet is increasing at a continuous rate.

Moreover, the demand for oil from the less wealthy regions of the world's population is accelerating very rapidly. Since 1985, the use of energy has risen by 30 per cent in Latin America, 40 per cent in Africa and 50 per cent in Asia.

The major concern, however, is that we do not actually know how large the 'known' oil reserves really are. There are good reasons to suspect that the OPEC countries have overstated the size of their reserves, since their production quotas are based on the size of the reserves. In 1988 and 1990, many states in the Middle East changed the reported sizes of their reserves quite dramatically upwards without any major new finds having been made. Which gives reason to expect that 'The Big Rollover' will come sooner rather than later.

Various experts have made predictions:

2003	Campbell (1998)
2004	Bartlett (2000)
2007	Duncan and Youngquist (1999)
2019	Bartlett (2000)
2020	Edwards (1997)
2010 – 2020	Internat. Energy Agency (1998)

These predictions suggest the mean year is 2012.

The difficulty with 'The Big Rollover' is that even if it were possible in the short term to survive for a period of time by rationing oil – by putting the problem into hibernation, more or less as we did during the mini oil crisis in the 1970s – this time the oil won't be coming back. Kenneth S. Deffeyes has extensive experience of global oil exploration and in his book '*Hubbert's Peak*' he pronounces that the 100-year long petroleum era has almost come to an end. Global oil production will peak some time between 2004 and 2008. Thereafter, the global production of oil will "fall and never increase again". There will then be a rapid and considerable increase in problems associated with the diminishing production of oil and the parallel demand for more. Energy planners today are using every possible means to try and delay the coming of 'The Big Rollover'.

The restrictions introduced by the West against Iraqi oil affected, in the first instance, the West itself. While Iraq has the second largest oil reserve in the world, after Saudi Arabia, the country's extraction has been modest and lies no higher than twelfth place. Faced with the threat of an impending severe shortage of oil, it became untenable to continue restrictions against Iraq – but then it doesn't matter who is getting paid for the oil, as long as it keeps on flowing and can, for a moment, hold off the imminence of this oil crisis.

Once a genuine shortage of oil (as opposed to trade policy delusions) becomes a hard fact, we can expect to see oil prices soaring. Since most oil consumers are prepared to purchase oil at extremely high prices in order to be able to continue their businesses, a shortage of less than 3 per cent would probably more than double the price. This will consequently push up all other energy prices. The rise in price will not solve any of the problems, but is rather expected to intensify them and we can anticipate a great deal of tension within and between our nations.

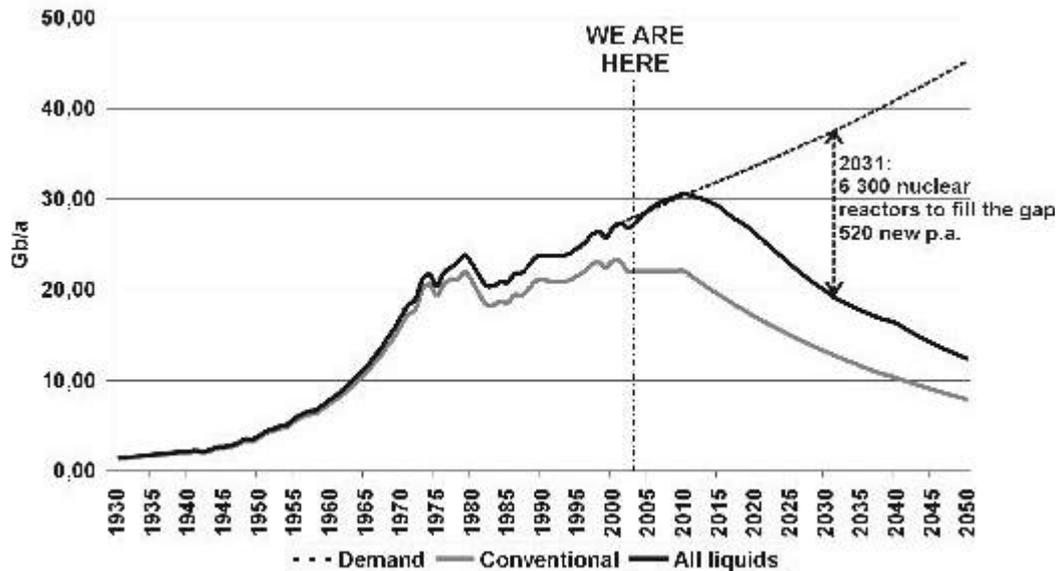
We don't even know how we will be able to replace oil

It is not possible, neither in the short nor even in the mid-to-long term, to fill the widening gap between the demand and the production of oil with any other form of energy. Purely theoretically, it would be possible to expand nuclear power production or increase coal mining. However, aircraft cannot be fuelled with electricity or coal. The conversion of our industrial society from its use of petroleum to the use of hydrogen gas is a far distant prospect. The large-scale production and transport of hydrogen gas is problematic. An explosion on board a tanker carrying hydrogen gas has been compared to a small-size atomic bomb going off.

But hydrogen gas also has to be produced by means of energy-intensive water electrolysis. Today, and in all likelihood in the future too, there are no facilities for this production of alternative energy. We do not even know how we are to produce the enormous amount of energy that could replace the dwindling river of oil. We find ourselves in a grave situation, mainly because of the magnitude of our energy requirements, but also because of the necessity for a swift change-over to something that we haven't even the faintest idea what it should be.

Merely to fill up the energy gap that will appear before long, the world needs to start up probably two nuclear power plants every day throughout the foreseeable future – a process that is debatable however. (See diagram below). After ten years – a brief moment in the age of mankind – we will then have constructed some 7000 nuclear power plants. Today, we have approximately 400 in the world. However, constructing and running all these nuclear power plants requires more oil than most of us imagine.

The extraction of uranium fuel is dependent on oil, and uranium will also become a commodity in short supply following several decades of drastically expanding nuclear power. Our atmosphere and water will be exposed to very heavy emissions of radioactive waste.



Felix Günther 2003, with data from Colin Campbell

Alternative fuels

The great difficulty with alternative fuels is that they are illusory alternatives in a sense since, in most cases, their production is dependent on a substantial energy investment in the form of oil. Trucks and lorries, forest machinery, chain saws, tractors, combine harvesters, grain driers, manufacture of fertilizers and biocides, etc. all require oil these days. This energy investment could, in some cases, be so huge that the net gain would, according to some estimates, be close to zero – in other words, almost all the extracted energy would be used up in producing it. Rapeseed oil is apparently produced with a hopelessly low efficiency ratio.

The same applies to a long-term extraction of oil from the oil sands in Canada, a project that requires tremendous amounts of energy in the form of gas. In the same way, the total energy required to make a solar cell – including mining extraction and the final process of dealing with the waste – is said to be so great, that a considerable proportion of the cell's useful period of life is spent producing equivalent amounts of energy.

The most important thing we can do

Young people today should have realistic expectations of what serious problems the future is offering in the light of these facts. However, they are also entitled to ask us adults why we did not foresee and ward off this development. Why are we delighted when Volvo 'sweeps the track clean' with its new, petrol-guzzling city jeep? Or why we sit outdoors at cafés drinking coffee under the calor gas terrace heaters?

The whole of our energy policy over the last 30 years bears witness to mankind's capacity for collective, mental repression, whereas what ought to be most important right now is to discuss the coming oil shortage. Leading oil prospectors tell us how they have approached our industrial nations to warn the political and economic leaders about the impending 'Big Rollover'. That we need to work swiftly to develop new technology, change our transport systems, reorganise food production and so on. That all of us must also be ready and willing to change the lifestyles to which we are accustomed. However, these prospectors say despondently that they are addressing a cloth-eared audience.

Sources:

The works of L B Magoon, K F Deffeyes, C J Campbell and others

Pictures from L B Magoon <http://geopubs.wr.usgs.gov/open-file/of00-320/of00-320.pdf> and from F Günther <http://www.holon.se/folke/worries/oildepl/crunch.shtml>

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