

Oil Shortages and Oil Prices – what should we do?

Governments around the world are becoming increasingly focused on the rapid rise in oil prices. They wonder if these recent price rises are simply short term responses to short term problems, or whether they signal the end of the era of cheap oil – which may spell the end of civilization as we know it.

Needless to say, special interest groups are seizing on the current price regime to promote their different agendas.

For example, Auckland is about to write another tedious chapter in its development of solutions to the transport problem. Sadly, this transport debate has been allowed to polarize between two means of transport – it's the car brigade vs the train brigade. Naturally, the train brigade is arguing that these high prices spell the end of cheap oil and hence the end of the motor car.

Hence, they argue we should invest heavily in public transport – and bicycles, asking “What is the point in building roads when the world is rapidly running out of oil?”

First, let's look at current oil prices.

One thing is certain, for the last few decades the world has enjoyed incredibly cheap oil. And at the same time our energy efficiency has effectively doubled, which means that oil would need to double in real price to have maintained its value as an economic input.

Some calculations suggest that oil would have to reach about US\$100 a barrel before it represented the same input cost as oil in the seventies. (Such calculations are dependent on which economies you include in the equation – but the principle is sound.) Certainly the US uses only half the oil per unit of production that it did in the mid seventies. The vehicle fleet is hugely more energy efficient, and grows more efficient by the day. This causes governments, including ours, problems in funding roads because the tax revenues do not rise as fast as vehicle use. Hence governments have a perverse interest in maintaining an inefficient vehicle fleet – it increases their revenue from petrol tax.

All the evidence is that energy efficiency will continue to increase, and world population collapse is just around the corner – let's say 2050. This coupling of population collapse with increased efficiency will compensate for increases in *per capita* energy use by Chinese and others who are beginning to enjoy our own standards of living.

The present high prices of oil mainly reflect short-term problems such as the political instability in the Middle East, and Nigeria. Then we have a shortage of refining plants – New Zealand is not the only country where environmental law discourages major projects. The recent hurricanes in the Central Americas seriously damaged some of the major refining plants we do have. And now the northern hemisphere is beginning to stock up for the winter. We may well be surprised that petrol prices are not higher than they are. They would be if our dollar was not so strong.

Those who claim we are facing a long-term problem point out that we have been using oil faster than we have been discovering new supplies. This may be true (there are counter arguments to all these claims) but we should not be surprised. Oil has been so cheap and plentiful (two ways of saying the same thing) that it was not worth looking for more of it.

Much of the oil in known reserves needs a higher price to make it worth extracting. Some is “taxed” by environmental restraints. Now that prices are high, and look like staying high for a reasonable time, thanks to the newly profligate Chinese, the oil companies will start extracting what they know is there and exploring for new reserves. Governments will provide the appropriate incentives. Environmental barriers might be lowered.

But surely, eventually, the oil must run out.

No – the oil will never run out.

No natural resource ever runs out. As any mineral or similar resource gets scarce the price increases until it is not worth using and substitutes step in.

Once there were only two of us. Now there are over six thousand million of us, and in all that time no mineral resource has ever “run out”. (Species go extinct – but that is because their populations can collapse before people realize it is happening. The Moa are a good example.) When shipping companies switched from wind to steam they were not driven by a shortage of wind.

None of our natural resources show any sign of running out – they are all getting cheaper.

But let's concede the era of ludicrously cheap oil may well be over and that the next round of oil will be more expensive because it will be more difficult to find and to extract.

What happens, for example, when oil hits, say, \$5 a litre? This is an interesting figure because at that point it is worth converting coal into fuel oil using present technologies.

Well before that happens, converting or modifying other oil-like reserves, and using more expensive forms of natural gas becomes worth while. A shrewd guess is that a bunch of new technologies will allow us to stabilize around a plateau of supply and demand which delivers petrol at about \$2.50 per litre.

This is twice the price the current price, but if your new hybrid motor car delivers twice as many kilometers per litre you will be no worse off.

This more expensive fuel oil will be directed to aircraft and to motor vehicles where it delivers the most benefits. Electricity generators will switch to nuclear fuel, coal and useful renewables such as solar power, geothermal energy (which is also nuclear) and biomass. Freeman Dyson predicts that genetic engineering will soon make trees and plants much more efficient at capturing solar energy. Carter Holt may grow GM forests to burn as biomass. He also predicts the development of plants which will produce fuel oils directly from their roots. Lifestylers will soon grow their own fuels in their gardens. (The Smart Growth planners will try to stop it. They specialize in dense thinking.)

Finally, we will be able to afford even higher prices for our cars if we need to.

The present government seems to have accepted a target growth rate of 4% increase in GDP per capita per year – which we must achieve to put us back into the OECD rich league. The average household income for the Auckland Region is about \$66,000 dollars a year. After one hundred years of growth at 4% this household's annual income will be **\$3.3 million per year**.

I can't help feeling that these people will be able to afford the fuel for their cars even at \$75 a litre. They will easily deal with a degree or two of global warming. They might even be able to pay for their health care. On the other hand, after a hundred years of growth at only 3% a year their income would be a miserly **\$1.3 million a year**. This family would be able to afford to pay about \$30 dollars a litre to fuel their car, and their cars will be much more efficient.

So what does all this mean for transport planning in Auckland and other small cities.

First, we have to understand that the real transport debate is between “rubber on road” and “steel on rail”.

For some reason those who believe that public transport is a moral good believe that “steel on rail” is the right solution. The Americans, bless their hearts, have done the experiment. Over the last thirty years about 25 cities in America have invested in both “rubber on road” and in “steel on rail”.

Those who focused on “rubber on road” have seen public transport gain market share while those who went for “steel on rail” have seen public transport lose market share.

Trains are inherently inefficient and deliver none of their claimed advantages. They start from way behind the eight ball and never catch up. In Auckland, even after Britomart, which was supposed to start a new era in Auckland transport, the train system carries about 2.5 million riders a year – with massive subsidies. Auckland’s taxi fleet carries about 25 million riders a year – with no subsidies, and the ARC won’t let them use the bus lanes!

Trains are powered by oil, or by electricity which is generated by oil, gas, or other fuels. We are short of electricity generation and so are unlikely to electrify our rail systems – they add to peak loads at just the wrong time.

The vehicle fleet will become more energy efficient while rail is stuck in its nineteenth century mode. Therefore higher fuel prices will actually favour “rubber on road” over “steel on rail”.

For ever.

That may seem to be a risky projection, but I will take on any bet.

After all, the Romans built roads, and we still use them today.

You can drive, and walk, and ride, and cycle, on roads.

Try riding a horse down a railway line.

Is Oil a Fossil Fuel?

For most of our lives, oil, gas and coal were all listed as fossil fuels – the result of the breakdown of ancient organic matter under extreme conditions of heat and pressure.

The evidence that coal is formed this way was powerful and remains so. The evidence that oil and gas also originated in huge swamps was the presence of organic compounds and bacteria. We also assumed that hydrocarbons were produced only by living things.

Then we began to find that hydrocarbons were common in outer space. During the 1950s, a group of Russian and Ukrainian scientists argued these hydrocarbons were trapped during the process of the earth's formation deep in the mantle. Then some gradually percolated up into the crust where they collected in underground reservoirs where they are found today. The abiotic theory of oil formation has recently received more attention in the West because of the work of retired Cornell astronomy professor Thomas Gold,¹

We now know that bacteria lived in huge numbers to depths of five or six miles below the surface of the earth and Gold suggested the bacteria found in oil wells is simple contamination. Gold also noticed that many "empty" wells in the US and the Middle east are slowly filling up again.

These ideas were not well received if only because so many lobby groups – especially the anti-car brigade – have a vested interest in a world with limited supplies of oil. However, in the forward to Gold's book "The Deep Hot Biosphere" (1999) the redoubtable Freeman Dyson writes:

Gold's theories are always original, always important, usually controversial - and usually right. It is my belief, based on 50 years of observation of Gold as a friend and colleague, that the deep hot biosphere is all of the above: original, important, controversial - and right.

The discovery that hydrocarbons are plentiful on the other planets of the solar system leads Gold to point out:

"I am sure there are no big stagnant swamps on Titan or Pluto."

New laboratory experiments now add real weight to Gold's "abiotic" theory of methane formation.

Researchers at Indiana University, South Bend tested the theory by simulating the extreme heat and pressure of Earth's upper mantle. They used a small anvil with diamond jaws to squeeze together a mixture of iron oxide, calcite and water. After increasing the pressure to 5 gigapascals—50,000 times the air pressure at sea level—the researchers heated the material to

¹ <http://mitosyfraudes.8k.com/INGLES-2/FossilFuels.html>

temperatures between 500° and 1,500°C. Spectroscopic and X-ray analyses confirmed the presence of methane in the chamber.²

The standard biotic explanation for oil and gas suggested these wells were the outcome of rare and unusual circumstances. But if hydrocarbons were formed during the accretion of the earth and continue to be formed within the mantle then they may be far more common, and more widely dispersed than we assume. Based on this theory, Russians have drilled successful wells in the Caspian Sea region, Western Siberia, and the Dneiper-Donets Basin, and more recently in Vietnam. These are all places where the standard 'organic' theory says no hydrocarbons should exist.

If more wells begin to refill we may even have to reclassify oil as a 'renewable' resource.

This comes on top of the Alberta oil sands which contain the equivalent of 1.6 trillion barrels of oil, a quantity which could be greater than all of the world oil reserves combined.

Oil will be around for a long time.

The oil-age will certainly end long before we run out of oil.

Just as the stone-age ended long before we ran out of rocks.

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² <http://www.sciencenews.org/articles/20040925/fob7.asp>