25 Questions and Answers on Peak Oil

By Lionel Orford

This document came out of a list questions given to me by Rob Simpson as talking points for his upcoming Peak Oil documentary, which has the working title "Running on Empty". I found that it was by no means easy to answer these questions and that they were really good questions that reflect the questions asked by those beginning to become familiar with Peak Oil and its consequences.

1. What is Peak Oil?

When any finite resource is extracted from the earth and not replaced, then this resource must, by simple logic, become depleted over time.

When a resource is new and abundant, the rate at which it can be produced is determined by a combination of how fast the infrastructure (mines, oil wells, etc) can be installed and how fast the market for the resource can grow. This is the growth phase.

As the resource is depleted, at a faster and faster rate due to growth, there must come a time when the easy to get stuff is mainly gone, requiring more and more infrastructure to maintain the growth of the supply from the harder to get stuff. This soon leads to an inability to grow supply, at which time Peak production has occurred. After this, as more depletion takes place and what is left is harder and harder to get, the rate of production must decline. This decline occurs when there is still a large amount of the resource in the ground, but it is the hard to get stuff.

This first happened to the production of coal in Britain in the early 20th century. In 1970, it happened to the world's largest oil producer – the USA. Since then it has happened to almost all the world's major oil producers.

Peak Oil is when overall world oil production reaches its maximum and begins its decline.

2. How do we know we are approaching the peak?

In 1956, Marion King Hubbert – a petroleum geologist for Shell – pointed out the obvious: You have to find the oil before you can produce it. Therefore, if you are finding less and less oil, there will come a time when production will peak and then decline, in line with what has been found. Hubbert correctly predicted that US production would peak around 1970 – a prediction that was laughed at by his oil industry contemporaries from 1956 until after it actually happened.

On a worldwide basis, the discovery of oil peaked long ago around 1965, despite massive leaps forward in the technology of finding oil. Since around 1980, the world has been consuming more oil than is being discovered and the shortfall has been growing steadily to the point where we are now discovering only ¼ to 1/3 of the volume of oil that we use each year.

Now of the 65 largest producers of oil, 54 are in irreversible decline. Additionally, over the last year, production from Saudi Arabia has gone into decline to the extent that Saudi Arabia is no longer the largest producer in the world. This is now Russia. The Saudis claim that they are holding back production to keep the price up, but it remains to be seen if they will ever restore, let alone increase, their production.

At present, 2005 stands as the peak year for production of conventional crude oil and the peak of All Liquids (conventional + very heavy oil, tar sands, natural gas condensate, etc) is currently

July 2006. This is a statistic, but after filtering the statistical noise in the data, All Liquids production is essentially flat. Whether or not higher prices can push production higher remains to be seen, but this has not been happening over the last few years of high prices.

No one can say for sure that the peak has been reached until significant year on year declines have been recorded.

3. What are the experts saying regarding the timing of Peak Oil?

Kenneth Deffeyes of Princeton University famously predicted that conventional oil would peak on Thanksgiving Day 2005 (24/11/05). He seems to have got it remarkably close; the highest ever recorded production was May 2005, with a slightly lower peak in November 2005.

However, by far the most learned group on the topic of Peak Oil is the Association for the Study of Peak Oil and Gas (ASPO), who have studied all the projects coming on line over the next few years and taken educated guesses as to the declines likely to occur in the post peak oil producing areas. Their prediction currently stands at around 2011, with a margin of error of a few years either way.

The International Energy Agency (IEA) has recently published a report which says oil supply will be very tight over the next few years and will probably fall short of demand by 2012. This is a landmark admission, which essentially describes Peak Oil without using that term.

In October 2007, the Energy Watch Group – a research body that provides advice to the German government – has come out and stated that which is becoming more and more obvious; that we passed the worldwide peak in 2006. Furthermore, EWG forecasts that the decline rate will be much higher than foreseen by ASPO and that crude production will halve by 2030. This is an alarming prospect.

Then you have the US Energy Information Agency and industry backed think tanks like Cambridge Energy Research Associates (CERA) and the American Petroleum Council (APC), who, after decades of denial, have accepted that the peak will occur in the 2030 to 2040 time frame. However, in my opinion, they have no credibility after having over-estimated future oil production time after time.

4. How heavily is Australia dependent on oil?

The entire developed world, which includes Australia, is totally dependent on oil as the very basis of our way of life. Our entire modern culture, based on cars to take us to work, trucks to transport our goods, machines and fertiliser to produce our food, fuel for aeroplanes, plastics for our technological goods and much more is dependent on oil. The evolution of entire apparatus of our technological society has been driven by, and dependent on, the cheap, abundant and convenient energy available from oil. It is the staple food of the world economy.

Not only are we dependent on oil, we are dependent on an ever increasing supply of *cheap* oil to maintain economic growth. I believe this dependency on economic growth to be the more fundamental problem than dependence on oil specifically.

It seems that we have no strategy or means to manage a receding economy so as to avoid a disastrous failure of the economic system.

5. Could Australia produce enough of its own oil to avoid crisis?

Well, I think we can produce enough to avoid a catastrophe, but not a crisis. At present, we produce somewhere around 70% of our own oil, but this is in decline, whereas our consumption is still increasing. So if we went into crisis management, where oil was rationed for just the essentials, and replacement fuels such as electricity from coal and natural gas were rapidly deployed, we may be able to just get by. Extreme measures would be required.

However, I think that it's just plain silly to think that we Australians can just worry about ourselves. Although we live on a geographical island, we don't live on an economic island. In the context of a depressed or collapsed world economy, we will suffer along with everybody else. Thinking that by taking appropriate actions, we can look after ourselves is like thinking that we alone can tackle Global Warming. We are completely dependent on the world economy for our way of life.

6. What will be the first noticeable effects for average Australians?

We are already seeing the first effects starting with the volatility in the oil price that we have seen over the last 2 years, with oil escalating to nearly $80/barrel in mid 2006, seemingly because of trader's nervousness about supplies and market speculation.

The price is now (27/10/07) hovering around $90/barrel, which seems to be simply due to a shortage of supply – there are no extraordinary circumstances.

Predicting what happens from here is speculation and is highly unlikely to be correct in every detail, but I expect we will see a scenario something like this:

When supply starts to really fall behind demand, it will be hard to miss - $2/L for petrol, then $3/L. Soon, economic recession will set in as people spend their disposable income on fuel and can't afford to buy goods and services. This will result in many vulnerable businesses going broke and large increases in unemployment.

Very soon, 10,000's of people will be unable to service their mortgages and there will be a liquidation sale of real estate and some very sharp corrections of property prices.

I expect that the tourist industry will be slashed in size; never to rise again to its current participation levels.

Quite quickly, the recession will cause a significant drop in oil consumption. This is known as "demand destruction", which, ironically, will cause the price to go back down and possibly allow a new cycle of economic recovery.

It now seems that the world may go into recession due to the unsustainability of the high levels of household debt that have been used to keep the economies of the rich countries growing. If a recession occurs before a major shortfall of oil, then demand for oil will decrease and so will the price. There would be no wild escalation of the oil price and Peak Oil may come and go with few people aware of it.

Demand destruction (economic recession) may also cause the oil price to slump to levels which make the development and production of hard to get oil (deep water, tar sands, heavy, arctic, oil from coal, etc) uneconomic, causing even faster reductions in production capacity. This is what happened to the oil market in the early 1980's and lasted through the 1990's – a period referred to by Matt Simmons as the 'great oil depression'.

7. What will happen to the typical petrol powered car in the coming years?

In 30 years, they will still be around – particularly small economical ones, but in much smaller numbers and used much more sparingly. We are not "out of oil" but facing a declining supply. When it becomes uneconomic to use oil as we currently do, the use of alternatives like public transport and rail freight will mean that there is enough oil for really essential things for a long time into the future. Hence there will still be a few petrol powered cars around – there are no alternatives for rural areas for example.

Depending on the actions taken during the coming energy and economic crisis, some of the fleet may be converted to run on Compressed Natural Gas. For Australia, using Natural Gas as an interim fuel makes sense as we do have quite a lot of it available, comparative to our population. However, in order to do this, major programs to build required infrastructure are needed and this cannot be done overnight.

8. How willingly will people forego private motoring?

Not willingly at all. But nature doesn't give us a choice in the matter. It's like asking "How willingly will people accept their house being blown away by a cyclone?"

It is totally infeasible to deploy alternatives to our existing car fleet as fast as this crisis will engulf us. Our entire way of life is based on convenient personal transport. I don't think that public transport will ever be seen as anything but an option of last resort, so over time I expect that various forms of alternative personal transport will be developed in time such as:

- Many more scooters on the roads
- Many more bicycles on the roads
- Light weight battery electric and/or hybrid vehicles (economic and resource limitations associated with the required batteries make this very doubtful)
- Light weight compressed air powered vehicles (these look quite feasible)
- Light weight electric vehicles that draw power from a delivery system in the roadway (this is probably several decades away – large infrastructure required)

9. Is there too much investment in finding ways to preserve the private car culture?

What investment? All I can see is denial of the obvious reality and pursuit of business as usual. There is a little dabbling in ridiculously inadequate and infeasible measures such as hybrid cars, biofuels and hydrogen fuel cells but nothing that is in any way serious about dealing with the problem.

If we had invested in preserving the private car culture we would have taken steps to dramatically reduce the use of petroleum in transport. We would have started decades ago to build the infrastructure for alternative transport systems, such as building a comprehensive electric rail network and even possibly electrifying the roads to power electric vehicles for city use.

10. What is your opinion of the continued growth and expansion of our fringe housing estates, our highways, and tunnels?

It's extremely sad. The people that have bought into the outer suburbs will be left high and dry after peak oil. Building of 'more cars' infrastructure such as tunnels and freeways is just a waste of resources, which could be dedicated to infrastructure that will be needed in the post-peak period.

This is the fundamental problem with democracy – there is no planning for the future in the political system – just the need to preserve the immediate interests of business and the electorate, so as to win the next election.

People always believe that things will continue to go on as they always have done in their experience and according to their belief system. The fact that this is impossible doesn't enter their consciousness.

11. What will shipping, containerisation and international trade look like in the future?

Following the great crisis that Peak Oil will soon bring about, international trade will resume or continue I suppose, but at a much lower volume. Shipping is a very efficient way to move goods and the technology is already fully developed to run these large vessels on coal or even nuclear power. However, this conversion will take several decades and in the mean time, the most efficient of the current fleet will continue to burn oil to deliver the goods that people need, but not those that are merely wants. There will be a large quantity of scrap steel on the market.

12. What is the future of Australia's chief exports such as wheat, wool, meat, coal and minerals?

These will continue, but only in the volumes that customers overseas can afford.

Wheat, being a basic staple need, will continue to be exported – at increasing volumes if we can grow it.

Coal will almost certainly continue to be valuable in an energy constrained world. However, we will have peaked out our coal well within 30 years and the trade will be declining.

Wool and meat are essentially luxury goods that will probably be reduced in significance as the need for food production becomes more urgent.

"Minerals" is a large group of commodities, which will have value on the basis of specific demand. However, the overall size of the trade will be greatly diminished as economic growth is extinguished.

13. How will tourism/international flights be affected in the coming years?

I don't expect that there will be a tourist industry - except for the mega-rich - within 5 -10 years.

14. How will oil depletion affect mass population of cities in terms of getting food to supermarkets and people?

As oil depletion sets in, it needs to be used more and more exclusively for the essential things – in particular for food production and delivery.

We live in cities, we don't know how to farm and there isn't enough agricultural land for us all to have little self sufficient farms anyway. We are stuck with the current system and it is impossible to change that system as fast as the effects of Peak Oil are about to set in.

We are facing a total re-evaluation of what is important in our lives. This entails a much lower standard of living as it generally understood. A much higher proportion of our income and time will be spent on feeding ourselves, much less on personal transport and consumer goods.

The world is rapidly approaching the point where every bit of agricultural land will be required just to feed us, particularly as oil becomes scarce. The massive boom in population that has happened since the beginning of the fossil fuel era, was possible because the machinery fuelled by fossil fuels, particularly oil, has enabled vastly more people to be fed. As those fuels recede, we face the prospect of mass starvation unless urgent action is taken to conserve those fuels so as to have enough to manage the transition to a much lower population.

Over time, we will be forced to reduce our population and to move back towards more localised farming communities, but this can not happen in a few years – it requires many decades of restructuring.

15. Why does this issue get so little media attention compared with Global Warming?

It has taken over 30 years for Global Warming to become an issue which is generally understood. This has happened through the determined and persistent work of 1000's of scientists worldwide.

The Peak Oil issue has also been known to a small number of learned people since Hubbert's predictions in 1956 and even more so since the publication of the Club of Rome's "Limits to Growth" in 1972. However, the number of people aware of the issue has always been much smaller and is mainly made up of high level think tanks such as those of the CIA and (I reasonably assume) the oil companies and national governments.

As with Global Warming, Peak Oil is something that is very bad news for the current system and those with a vested interest in it. The oil companies have worked vigorously to deny both Global Warming & Peak Oil. The conclusions set out in Limits to Growth have been pilloried and ridiculed throughout the capitalist system, but like Hubbert's predictions, have proven astoundingly accurate. However the scientists have been consistently speaking up about Global Warming for 30 years now and far more attention of the media has been on debating that, rather than Peak Oil.

Additionally, the absolute logical inevitability of Peak Oil has led several people to predict disaster prematurely, leading to a "boy that cried wolf" syndrome occurring. However, those who accuse the Peakers of "crying wolf" seem to forget that in the parable, the wolf was real and eventually comes and eats the sheep.

People believe what they want to believe. Hence global warming has only gained traction in the public consciousness as the effects begin to be undeniable.

Peak Oil is so contrary to what the general populace wants to believe that it is ignored altogether since it has not yet begun to have undeniable effects. When told that the current economic system and their standard of living cannot continue, most people just don't want to hear it and choose denial over logic.

16. Is there a way to continue our lifestyle as it is on another energy form?

No – certainly not in its current form. This would require a direct replacement for oil, on the same scale and at a similar price – such a replacement simply doesn't exist.

In the short term, Australia is fortunate to have significant resources of Natural Gas (NG) and coal seam methane, which is very similar to NG. Compressed Natural Gas (CNG) is an excellent fuel for both petrol and diesel engines. We could deploy a vast infrastructure of compression plants, fuelling stations and conversions of cars to run on CNG. However, this is a large engineering undertaking, which would take about a decade to roll out; it is not an immediate solution. Also, the escalation in the use of NG for transport as well as other demands, such as electricity generation and nitrogenous fertiliser manufacture, would result in the depletion of this resource in fairly short order. NG needs to be seen as a valuable transitionary fuel and one we should conserve, rather than blowing it away to get a few more decades out the current economic system and then be left with nothing.

We could build a society based on much more modest energy use from a combination of renewable and nuclear energy that would deliver us quality lifestyles, but it wouldn't be our current society of total personal freedom of movement based on oil.

In order to create this alternative quality lifestyle, the oil problem would need to be recognised and an ongoing program of appropriate technological and social change would need to be implemented. As a society, we haven't yet even recognised the problem, so there is no way we can work to solve it – a process that will take many decades.

In order just to feed ourselves, live modest lifestyles and to undertake the construction of the new infrastructure required, we need a large amount of energy. We need to replace a large part our oil use with electricity. Supplying this amount of electric power from coal would be disastrous because of the CO_2 emissions and because such an escalation of use would bring about Peak Coal very quickly. We would be replacing one limited resource with another limited resource - one that is even more polluting.

There is one source of electricity that could be deployed on the scale required and that is new technology in nuclear power. The current technology of nuclear power requires large amounts of U235 which is rare and supplies of suitable ore simply don't exist for the scale of power generation required on a worldwide basis. The technology would need to be based on either Uranium fast breeder reactors, which are currently expensive and dangerous, or Thorium breeder reactors, which are not fully developed but appear quite feasible.

Even if the required new technology has no intractable technical problems, electricity will be much more expensive due to the very large and costly infrastructure required to produce and deliver it safely. The same is true to an even greater extent for all the various renewable energy sources - very large infrastructure for a relatively small amount of energy delivered. Hence, electricity from these sources will be much more expensive and we would have to use energy much more sparingly that we currently do.

17. Will other liquid fuel sources such as ethanol and other biofuels allow us to maintain our current lifestyles?

Not a snowflake's chance on a summer day.

The contribution that can be made from biofuels is trivial, when the need to sustainably use our agricultural land to grow food is considered.

The list of reasons that biofuels are infeasible is long, including:

- Even if all the agricultural land in the world was available for fuel crops, only a very small part of the fuel we currently use could be grown. (Australia 5 - 15%)

- The world is rapidly approaching the point where all the agricultural land in the world is needed for food production.
- Low Energy Return on Energy Invested - A large amount of energy is required to make biofuels and currently a major part of this comes from oil and gas. Once the oil is scarce, much of the biofuel obtained would have to go into producing the next crop, massively reducing the net yield.
- Taking all the biomass from the crop and turning it into fuel, rather than returning most of that biomass to the soil is highly unsustainable – it is effectively mining out the fertility from the soil.
- Chopping down more forest to grow monoculture biofuels such as sugar cane or palm oil is already resulting in tragic loss of habitat and biodiversity. It is incredibly stupid to destroy most other species on the planet to pursue a course of action that is obviously unsustainable and effectively suicidal.

18. What about Hydrogen as an energy source for cars? Will we be driving Hydrogen powered cars?

The Hydrogen economy is an example of our faith that technology can solve all problems, when the evidence is clear that this is simply not so.

- Hydrogen is not a source of energy, but an energy carrier.
- As and energy carrier, it is very inefficient.
- The fuel cell technology to convert hydrogen to motive force is fundamentally flawed by the fact that the fuel cells consume platinum, which is becoming scarce even today.
- To embark on generating this hydrogen from today's coal based electricity or directly from coal would massively escalate greenhouse emissions and the depletion of coal.
- It is possible to strip hydrogen from natural gas, effectively making a low grade unusable fuel from a high grade, highly usable one, throwing away a big part of the energy value and escalating CO_2 emissions – total madness. It is like turning gold into lead.

19. Australia has large reserves of coal. Could we convert coal into liquid transport fuel?

Yes, we can do this. However:

- No where near enough could be produced to make up the difference. The world is losing millions of barrels per day of oil production each year due to depletion. As fast as the plants could be built, only a small fraction of that could be replaced.

- The process is very inefficient – only converting about ½ of the energy value of the coal to oil. This results in extreme amounts of greenhouse gas released for a relatively small amount of oil.

- If we were to escalate our consumption of coal in this way, the coal would be peaked out before any substantial industry could be built. It now appears that we are facing worldwide Peak Coal in a matter of 20 - 30 years. Oil from coal would be a very short lived stop gap measure as it would bring on Peak Coal even sooner.

20. What do you think of the optimistic view that says: "our scientists and researchers will come up with solutions – there is nothing to fear"?

This is a statement of the belief system that has been instilled in us by our education system and media; it is a central underlying belief of our culture. But it is like a religious faith; not open to question on the basis of evidence by those that believe in it.

Unfortunately, the evidence is clear that many technological problems remain unsolved despite enormous effort. Our scientists and researchers have already been working on the energy problem for many decades but still a solution is nowhere in sight. In terms of finding an alternative to oil, I have no faith in a technological solution being found.

Technology is, to most people, modern day magic; they don't know how it works, but it delivers wonders that boggle the imagination, time and time again. It seems to be able to solve any problem. What is not understood is that almost all of these magic tricks rely on consuming cheap abundant energy. No more cheap energy, no more magic.

Also consider what would happen if a magical new energy source was discovered tomorrow. It would not be able to be deployed immediately; new technologies take decades to develop technically and to build the new machinery and infrastructure required. We have a few years, if we're lucky, to deal with the issue of Peak Oil; we do not have decades.

I contend that this widely held faith in finding a technological solution is not only misplaced and foolish, it is major part of the problem because it stands in the way of the widespread recognition of the problem that is essential before any serious action can be taken. This faith is the primary reason that we are sleepwalking towards catastrophe.

21. What contingency planning is being done at the political level in Australia to alleviate this looming problem?

There is almost nothing that I am aware of.

Actually, it's worse than nothing; almost all of our politicians are engaged in active denial. When they don't like what the fortune teller says, they get another fortune teller. No politician wants to even utter the term "Peak Oil", because it spells doom for the current system. In politics, you can't raise a problem unless you have a solution.

"We are going to reduce your standard of living and curtail the growth economy" is hardly an election winning policy. So each government denies the problem and hopes to maintain the status quo for a little longer.

Again, involved here is the issue of belief systems – most people, including politicians, really believe that the market can solve all problems, that science and business will find a solution. They believe this like a religious faith – not open to question regardless of how much contradictory evidence is plain to see.

Personally, I have little doubt that at the highest levels, the government knows how serious the situation is and that this is behind their support for the invasion of Iraq to secure and develop the supply of Iraqi oil for western interests specifically and strengthen control of the Middle East in general.

The Iraq war and Afghan war are the first resource wars of the 21st century. This is the current US administration's idea of contingency planning and there is only one piece of good news in this whole catastrophe – they are losing miserably in their quest for oil supply by waging war.

22. Even if people were made aware of this crisis, what do you think will be the main obstacles to bringing about individual action on the part of the average Australian?

- The things we need to do involve us sacrificing our personal freedom of movement and standard of living. Most people will stay in denial as long as possible to avoid facing that.

- For people that would choose to do the right thing (e.g. catch public transport, ride their bike to work, buy locally produced food), the facilities to make this a practical option are simply not available to most people.

- Changes in individual actions, no matter how widespread, are insufficient to solve this problem. We are faced with the end of the growth economy due to physical constraints; individual actions will not fix the collapse of our economic system. Individual actions will not build new the infrastructure required or even change the political will of the electorate. We have to work together to change the whole way society functions and that requires the formation of a consensus of political will.

- It is well nigh impossible to create the political will to take unpopular actions until the problem is actually causing acute pain to the electorate. Unfortunately, since we are going to wait until the severe effects kick in and then in the midst of really bad times – economic, political and possibly a war – we will have to forge the political will to take prudent actions. If the 20th century is any indication, we are unlikely to make the right decisions.

- When crises hit – the populace looks for scapegoats. Just consider the current blaming of the "gouging oil companies" for the price of petrol. Even when the truth is pretty obvious, people blame the wrong party. This is the scenario that gave rise to Hitler and the Holocaust. I think the prospect of America descending into fascism and waging war against a scapegoat enemy in order to try to take 'their oil' seems more likely than not.

23. *What is the best case scenario for this country post Peak Oil?*

The oil price skyrockets as supply falls short of demand, resulting in substantial demand destruction and worldwide economic depression. The problem is recognised by the majority of the governments of the world's major economic powers as a permanent and worldwide problem.

If the US tries to undertake further wars to secure oil, the rest of the world embargoes their oil supply and snuffs out their military capability.

An overwhelming majority of the world's nations negotiate through the UN to adopt an Oil Depletion Protocol that compels all countries to progressively reduce their oil consumption in line with the available oil. Through this mechanism, the oil price is controlled to an economically viable price of around $100/barrel in today's money.

The governments of the world's developed nations implement national initiatives to begin the transition away from oil based society, which include policies to:

- reduce our personal oil consumption by means of a tradable personal quota system,

- invest in major capital works to restore the railway system to pre-eminence for transport of goods

- invest in major capital works to build an effective public transport and cycling infrastructure

- invest in developing the infrastructure for renewable energy and breeder nuclear technology,

Such government investment provides the economic stimulus to help provide employment and pull the country out of economic depression – to help fill the gap left by the loss of the growth economy.

Over time, we manage our oil consumption down to match the available supply and use our incredible problem solving abilities to move towards a sustainable society.

Global warming turns out to be less serious than it currently appears and sea level rises are moderate.

We play our part in an international effort to reduce world population over time so that by the time we have exhausted our fossil fuels, we have reduced our population to a sustainable level.

And we all live happy ever after!

24. What is the worst case scenario for this country post Peak Oil?

The world goes into recession, resulting in substantial demand destruction and the restoration of affordable oil. This may be a recession, depression or a gradual grinding to a halt of the growth of the world economy.

Governments and the electorate try to restore business as usual. The rich and those with employment are able to afford oil again, but for the large number of unemployed people who have lost everything, it is the beginning of a life of hardship. Social unrest begins to brew.

The economy begins to rebuild, but quickly it becomes apparent that oil exporting nations have far less oil for export than previously due to the combined effect of rising domestic demand, decline in supply and, feasibly, a depressed oil price that stifles investment in more expensive sources of oil. The price of oil skyrockets again.

The US Dollar is rendered almost worthless because the world is awash with them due to massive outflow of US Dollars to import oil at very high prices. The US and then world economy effectively collapses.

Social discontent, due to the effects of a collapsed world economy leads to riots, and class warfare. Nationalist movements rise up to try to take back the power of the USA and its allies by military means.

Populous nations such as China do not sit idly by and allow their people to starve; they take what they need by military means as well, which may include taking Australia.

Global Warming turns out to be as bad as it currently appears, leading to large rises in sea level, prolonged droughts and displacement of hundreds of millions of people.

Due to a breakdown of world order, oil wasted on war and a failure of society to adapt, there is no longer the means to feed the world's population leading to the arrival of Four Horsemen of the Apocalypse:

War, Famine, Pestilence and Death.

25. Is there a silver lining to Peak Oil?

There are several:

- It would seem from some very recent findings that there is insufficient oil and coal that is economically feasible to bring to market, to reach even the lowest levels of CO_2 emissions modelled by the IPCC. The people that make up the IPCC are climate scientists, not geologists and hence they have based their models on the conventional view that oil and coal consumption will continue to grow unabated, as the economists would have us believe. No one at the IPCC has questioned this assumption – but it is, in fact, ridiculous. Hence it seems that the lowest levels of CO_2 emissions modelled by the IPCC are unrealistically high. This is very good news because the world community is failing miserably in voluntarily reducing greenhouse emissions, but nature (the enforcer of reality) is about to step in and give us no choice. Reductions in CO_2 emissions are about to become mandatory.

- Even if my previous point, upon further evaluation, proves not entirely correct, the actions that we need to take to combat Global Warming are exactly the same as those required to manage Peak Oil.

- We are currently on course to destroy our planetary ecosystem and suffer a massive die off of humans as we exceed the carrying capacity of our planet due to gross mismanagement and the unsustainability of such a large population. Peak Oil is about to enforce, one way or another, a restoration of balance. The sooner the catastrophic course we are on is generally understood, the sooner we can do something about changing course. It's up to us as a global population to choose between hardship and adaptation, and hardship and catastrophe.

About the author:

Lionel Orford is a professional electrical engineer with a long standing interest in renewable energy, energy sustainability and climate change. Lionel has studied the Peak Oil issue in depth since 2004.

For further reading on Peak Oil and other energy and societal issues, go to
http://members.optusnet.com.au/~lionelorford/