



Australia and the Export Land Model

Posted by [aeldric](#) on February 22, 2008 - 11:00am in [The Oil Drum: Australia/New Zealand](#)

Topic: [Demand/Consumption](#)

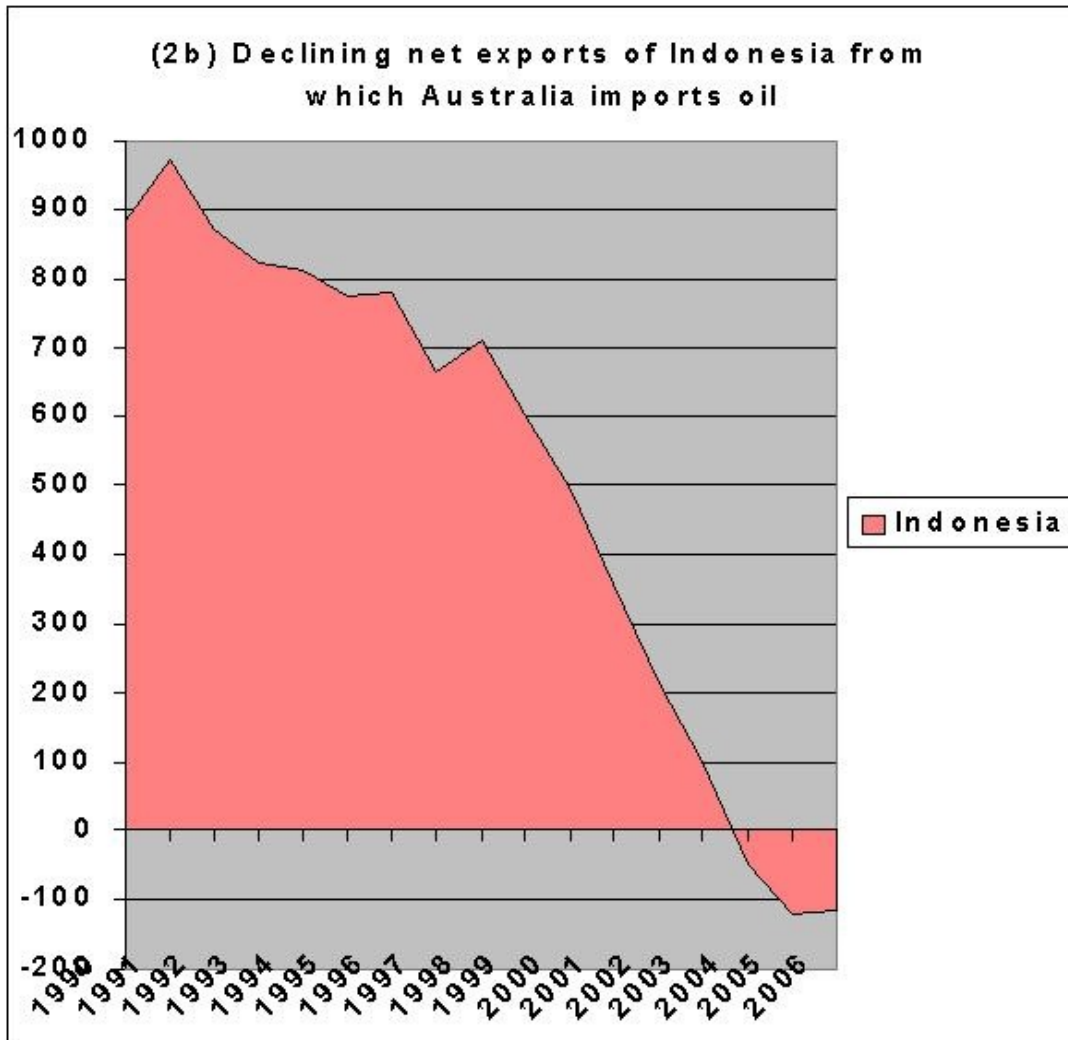
Tags: [australia](#), [export land model](#), [peak oil](#) [[list all tags](#)]

I normally try to be a “Good News” kind of guy, but today I bring bad tidings. Despite my previous claims that [Australia is The Place To Be](#), we are in for some tough times here.

TOD has featured the Export Land Model (ELM) on several occasions (<http://www.theoildrum.com/node/3018>). A summary can also be found in [Wikipedia](#).

The concept is deceptively simple:

Oil producing countries service internal markets first, and then export their surplus. Observations of oil exporting countries show that their internal markets continue to grow rapidly even after the peak. So their exports are hit by 2 factors - declining production and increasing domestic consumption. As a result, their export capacity drops with unexpected rapidity.



An Example: Precipitous Decline In Net Exports From Indonesia.

Source: Matt Mushalik, based on data from <http://tonto.eia.doe.gov/country/index.cfm>

The consequence is that the effects of Peak Oil hit importing countries disproportionately, and the effects occur very rapidly once the exporting trade partner(s) have peaked.

The “Big Player” importing nations have responded to an increasingly constrained energy future by attempting to “lock in” access to energy resources. They are employing a number of strategies:

- entering into long-term supply contracts (e.g. China’s long-term deals with Woodside for Australian LNG, and the China/Russia Long-Term oil deal <http://gr.china-embassy.org/eng/xwdt/xw2003/xw200305/t145719.htm>)
- buying a controlling interest in resource companies (e.g. China recently made an unsuccessful bid for UNOCAL in the US, but looks like having more success with its rumoured bid for Oil Search here in Australia)
- securing resources through treaties (e.g. the US’s NAFTA treaty with Canada, which commits Canada to supplying the US with oil)
- military adventure (dare I mention the US again here?).

The response of the oil exporters is more veiled, but it appears that countries like Russia are moving towards a Resource Nationalism policy, husbanding their energy resources and making less available for export.

Thus we have a three-fold problem:

1. Decreasing exports from producing countries due to declining production and increasing domestic consumption
2. Decreasing exports due to an evolving Resource Nationalism policy
3. Increased “lock-in” of available exports by the Big Player importers

The analysis of the export problems so far has largely focussed on the US and has concentrated on mitigating the problem by locking in supply (<http://www.youtube.com/watch?v=9Ed9jsKAOHU>). The analysts and strategists appear to be focussing on the fact that the big players can lock in supply and thus partially mitigate this problem, but the question "Where does this leave the small players?" has largely slipped under the radar.

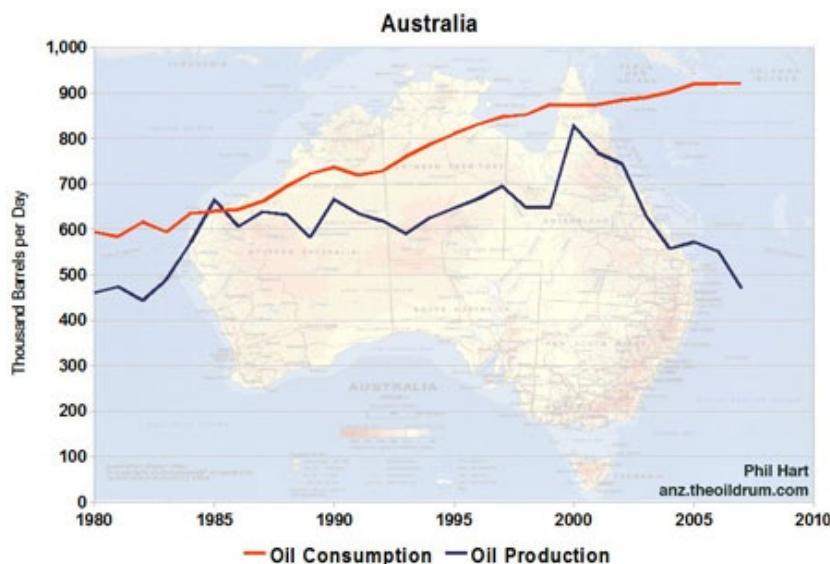
Here in Australia, it is time to ask that question. What will be the impact of decreasing oil exports on Australian markets?

There has been a flurry of recent warnings about a “supply crunch” starting in around 2010-2015. These warnings have come not just from advocate groups, but from the International Energy Agency (<http://omrpublic.iea.org/mtomr.htm>), and from several of the oil companies, with the most recent and most forceful warning coming from the Shell CEO (http://www.shell.com/home/content/aboutshell-en/our_strategy/shell_global...).

The consensus seems to be that there will be a serious supply crunch within 5 years, so we should look at how we will be positioned in 5 years.

Australia.

Australia currently produces a bit over 50% of the oil we consume. Our production peaked in 2000, and is now in decline, with occasional jumps as new production is added. We currently produce a bit over 500,000 bd and this figure is dropping:



Australian Oil Production ([Click to Enlarge](#))

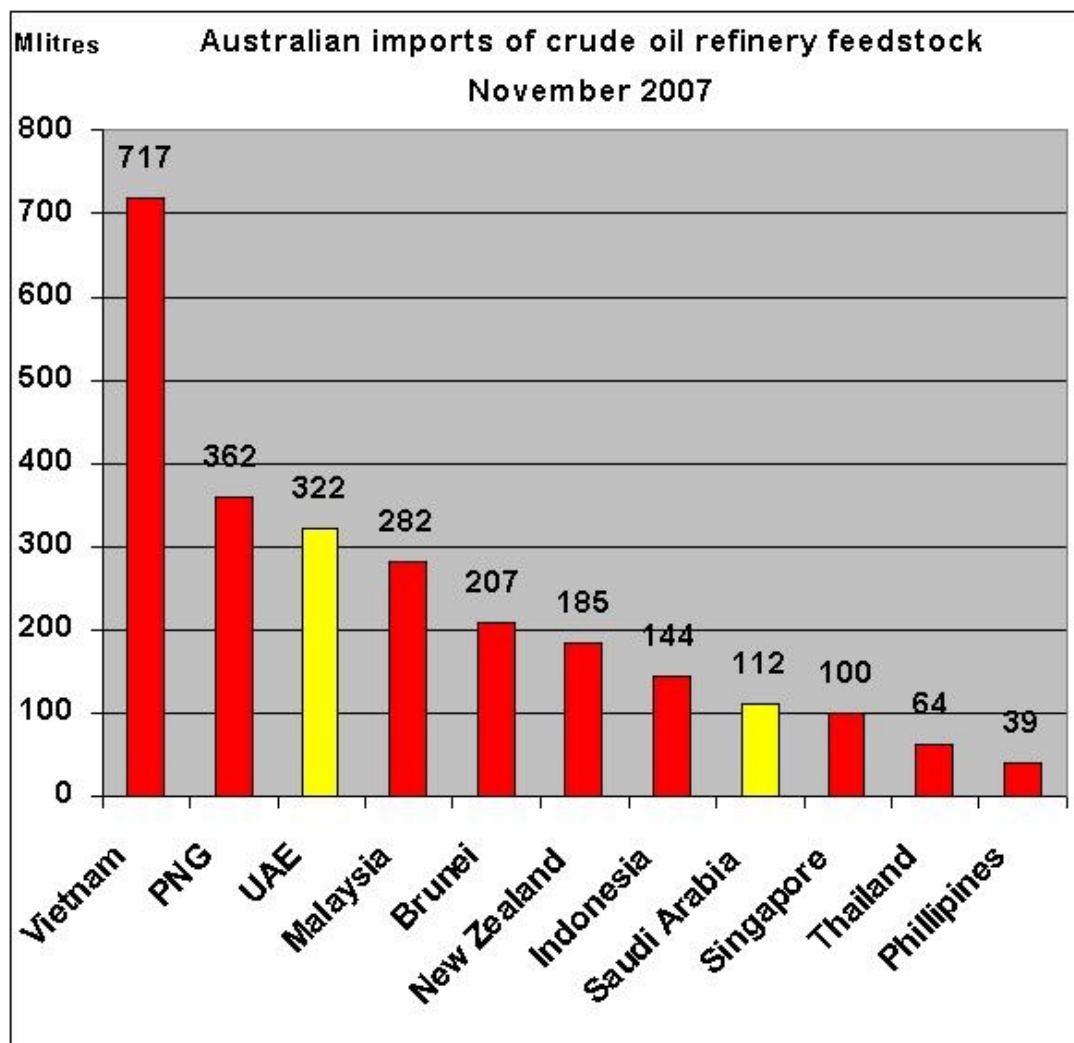
Source: EIA, <http://www.eia.doe.gov>

Our consumption has rapidly approached double our production. Consumption appears to have stabilised short of 1,000,000 barrels per day.

As we continue to grow in the years to come, our oil consumption is likely to continue to grow. However in that same period our oil fields will continue to deplete. Thus, inside of 5 years we will

be able to supply significantly less than 50% of our demand. Based on the graphs above, it will probably be less than 40%.

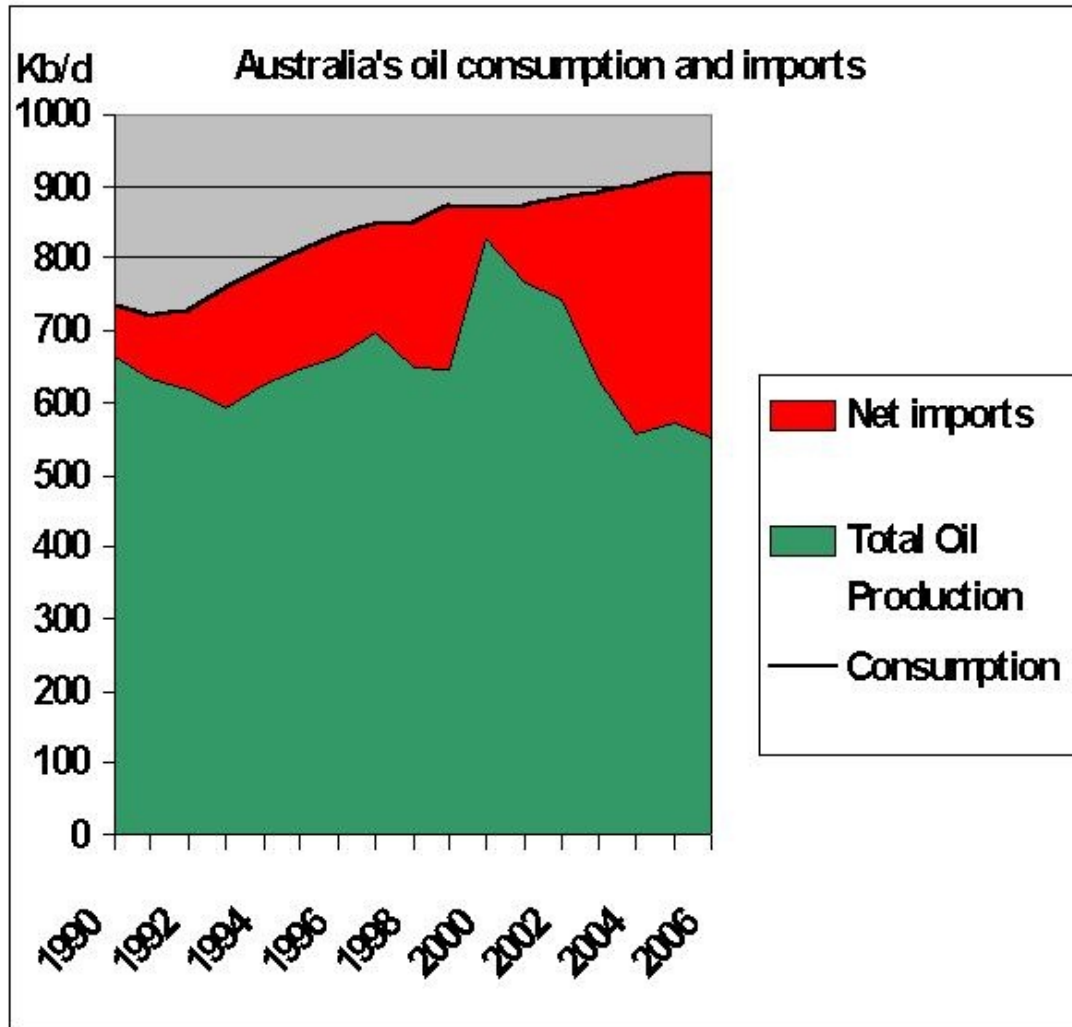
What happens to Australia 5 from now years when we are competing for the very small amount of exported oil that is not already locked in? To answer that, we need to look at where our oil comes from.



Countries Exporting Oil to Australia.

Source: Matt Mushalik, based on data from <http://tonto.eia.doe.gov/country/index.cfm>

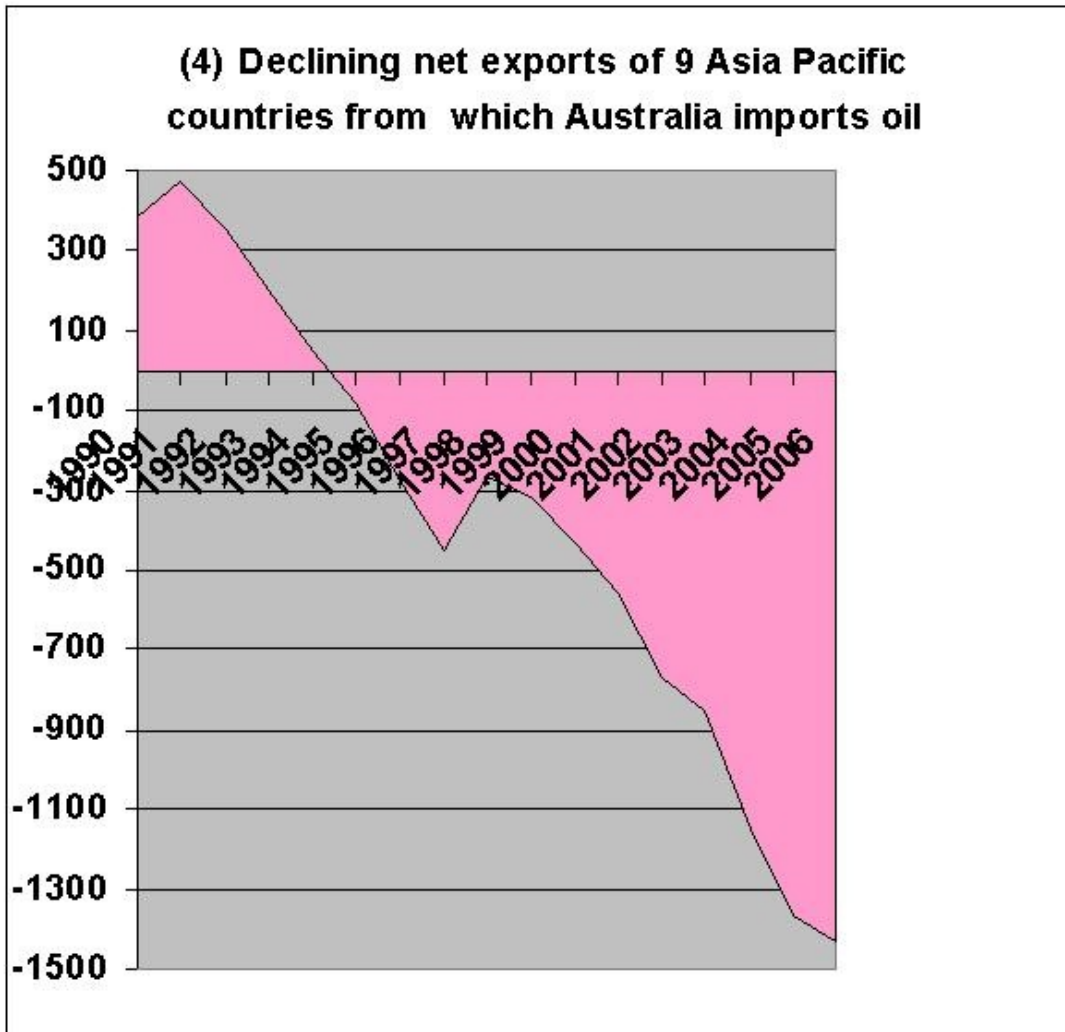
We source our oil from a number of countries, with the most important being Vietnam, PNG, UAE, and Malaysia. Our dependence on these nations is steadily increasing. Although we are bringing more capacity online, this capacity has not kept pace with our decline rate, driving the increasing dependence.



Australia's increasing dependence on imported oil.

Source: Matt Mushalik, based on data from <http://tonto.eia.doe.gov/country/index.cfm>

However the countries that we source oil from are experiencing declining exports.



Declining Exports From Countries Exporting Oil to Australia.

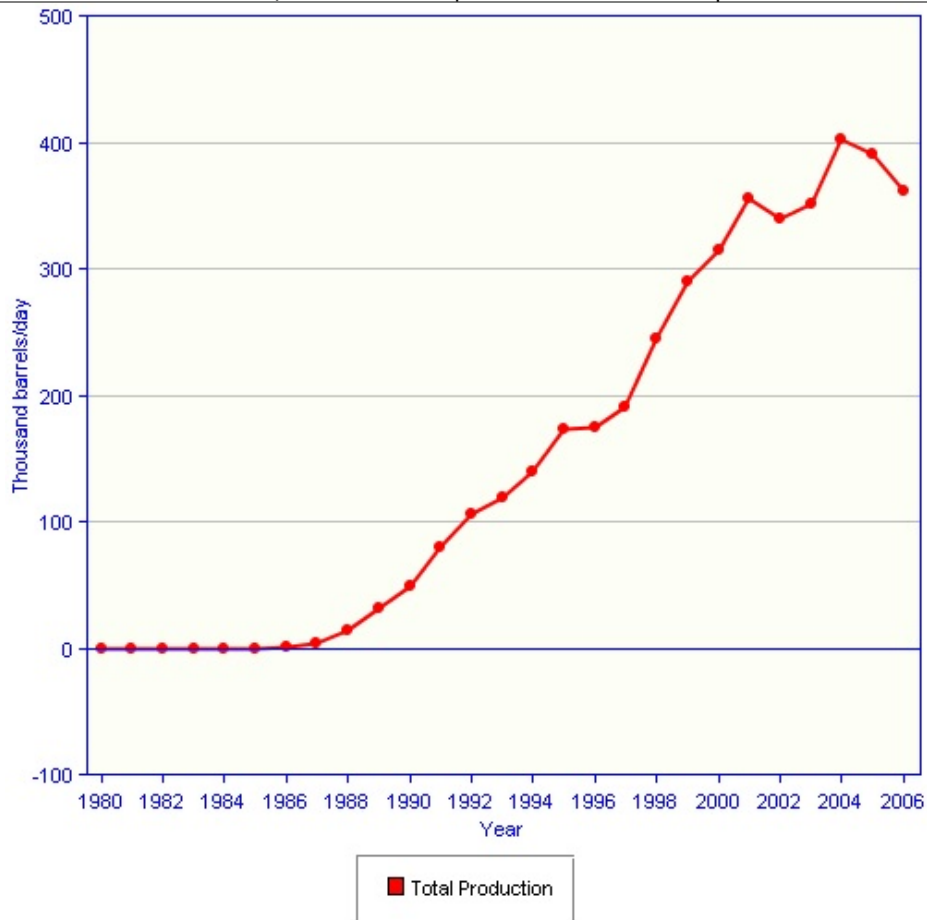
Source: Matt Mushalik, based on data from <http://tonto.eia.doe.gov/country/index.cfm>

So our oil comes from countries that are suffering from an increasing inability to supply oil. We are not the only nation that these countries supply oil to. As their capacity to export oil declines, we are not likely to be a priority customer.

So which of our suppliers will be in a position to continue supply in 5 years?

A Look At Australia's Top Four Suppliers.

Vietnam, which is by far our biggest supplier, provides an interesting case history. Vietnam's oil production peaked in 2004.



Vietnamese Oil Production.

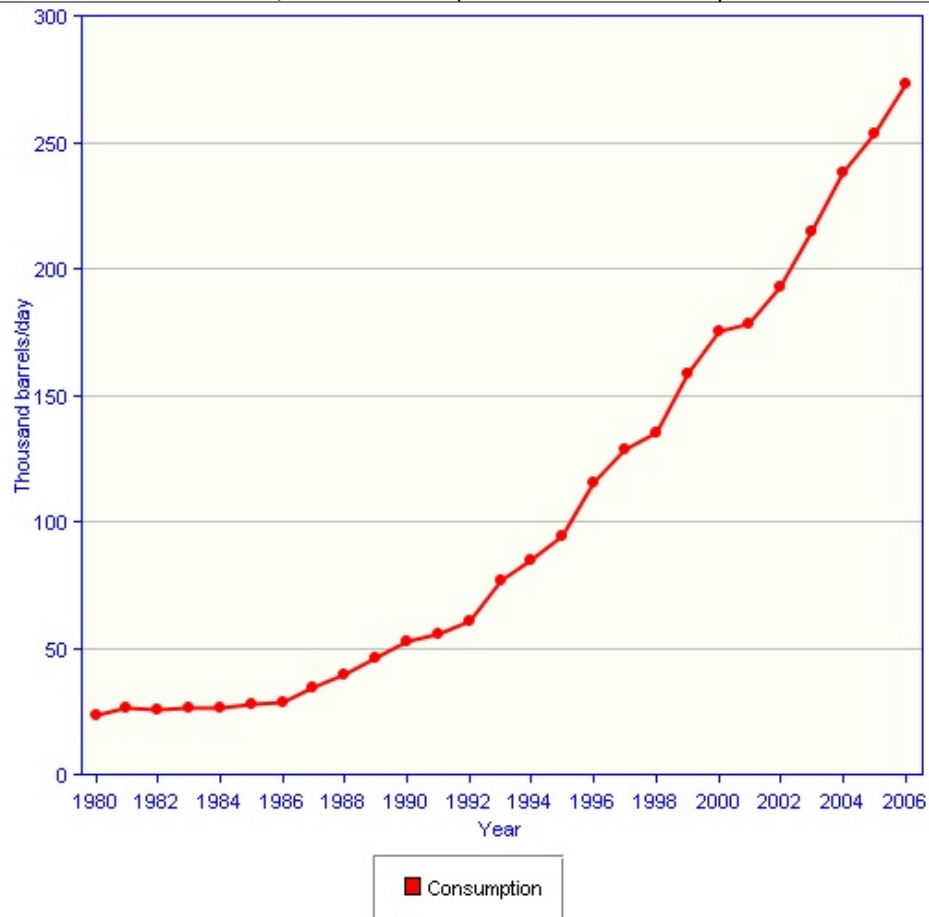
Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=VM

The decline in production since 2004 appears to be significant. When we look at exports, however, the decline is not just significant, it is precipitous.

□ Decline in Vietnamese exports.

Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=VM

Vietnam's production peak occurred in 2004, but their exports peaked earlier, in 2000. This is explained when we look at their ferocious increases in domestic consumption:



Vietnamese Domestic Consumption.

Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=VM

The charts above certainly suggest that it won't take long for Vietnam to hit exports that are effectively nil, perhaps as little as 2 years. However the graph does not tell the full story - Vietnam has a number of projects coming on line over the next few years.

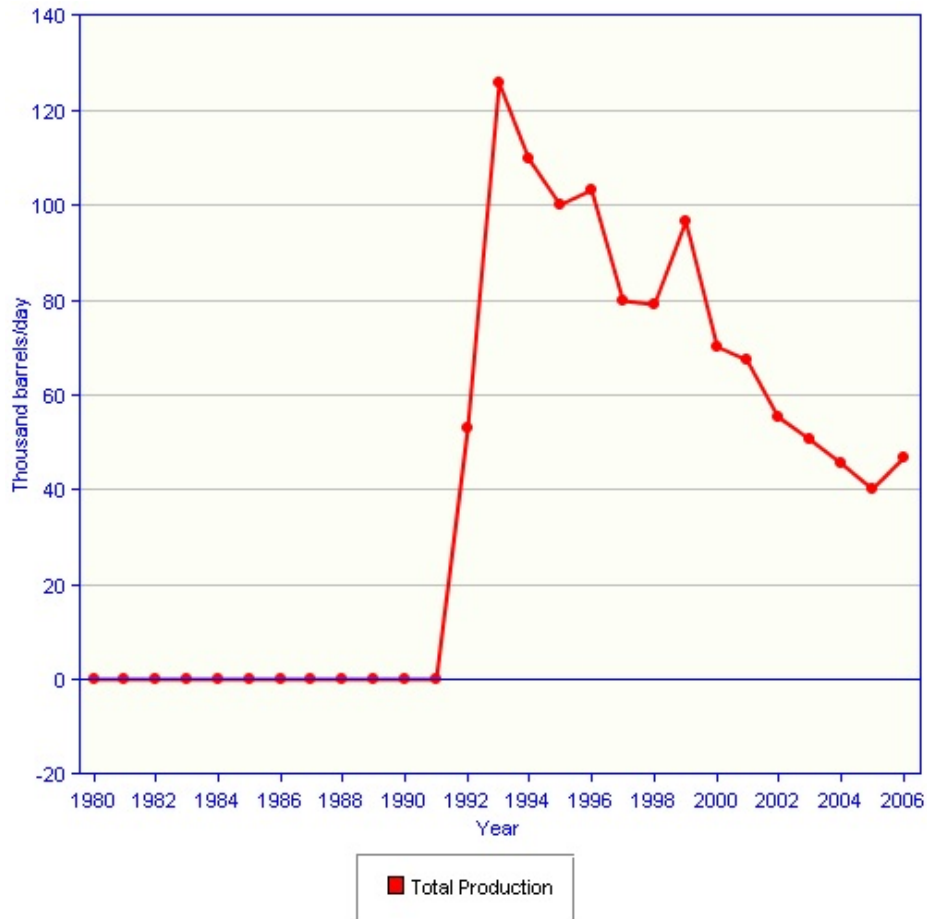
It is hard to estimate flow rates in the 5 year range based on projects that have not even been completed yet. Most recent oil projects have generally been dogged by delays, disputes and disappointments. These have been caused by the fact that modern projects are going after increasingly challenging fields, and the difficulties are exacerbated by shortages of both resources and qualified staff.

However, given the number and size of upcoming projects, it is probably reasonable to assume that while Vietnam may continue to see a drop in exports, it will not drop to zero in the near term. My prediction is that Vietnam will drop below 50 kbd within 5 years but the rate of decline will slow.

This prediction is based on nothing more than looking at the upcoming projects documented in http://en.wikipedia.org/wiki/Oil_Megaprojects, then weighing the projected peak flows (which are likely to take a few years to achieve) and the difficulty of the projects, against the recent historic evidence for delivery delays and cancellations. If there are industry insiders who can give me a better prediction for Vietnam's export capacity in 5 years, I would love to hear it.

Based on this prediction, it is highly unlikely that Vietnam's exports to Australia will keep pace with Australia's rising demand.

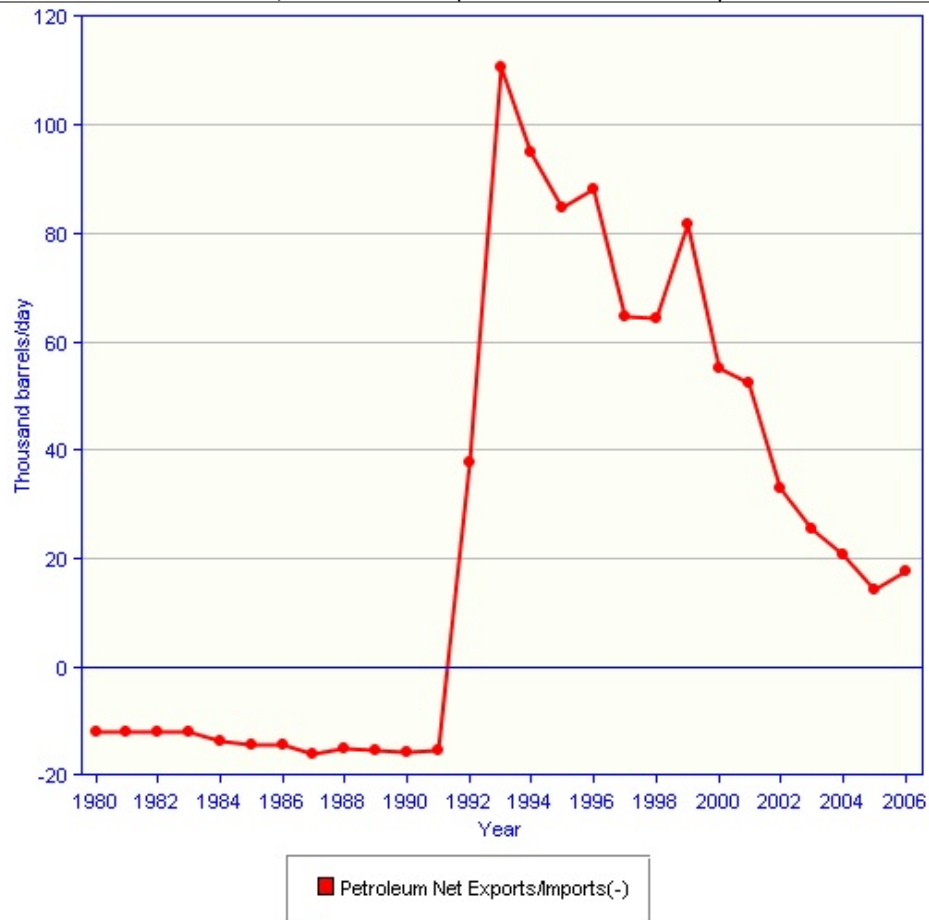
Our next largest supplier is Papua New Guinea. As with Vietnam, PNG's oil production chart also suggests that production has peaked and is now in decline:



Papua New Guinea Oil Production.

Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=PP

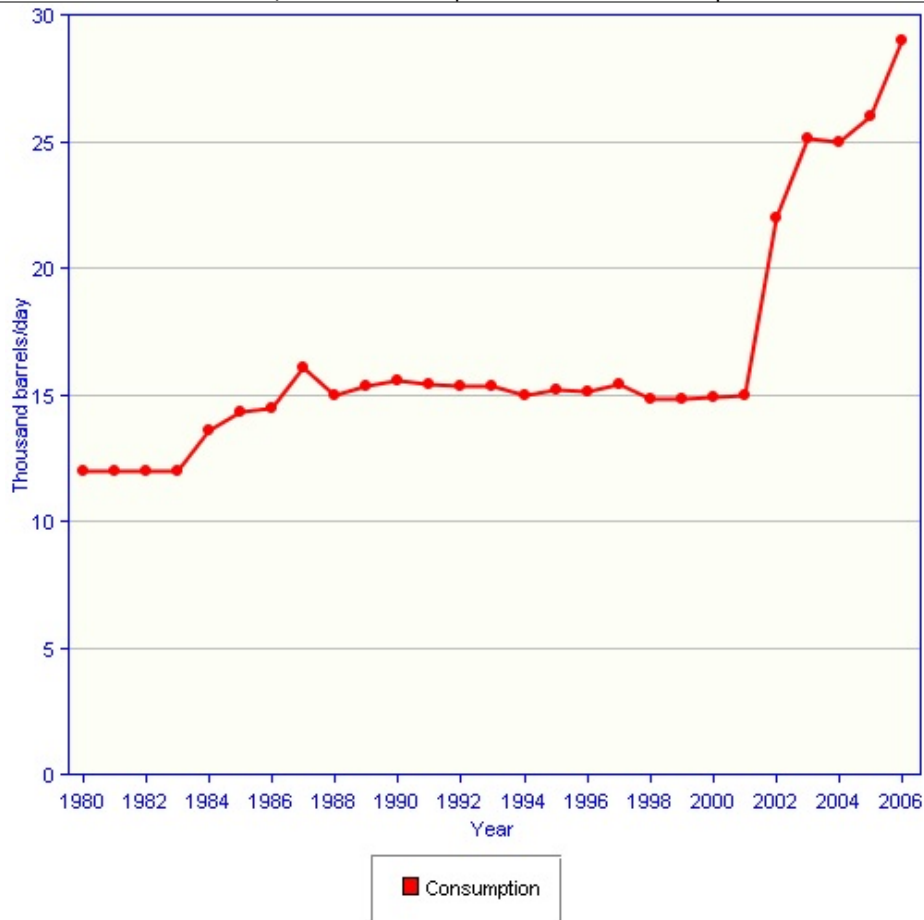
Not surprisingly, PNG's net exports also show a significant drop:



Papua New Guinea Oil Exports.

Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=PP

On the basis of this graph, it appears that PNG, is rapidly approaching nil exports. PNG's domestic consumption patterns do not suggest much hope of a recovery for exports:

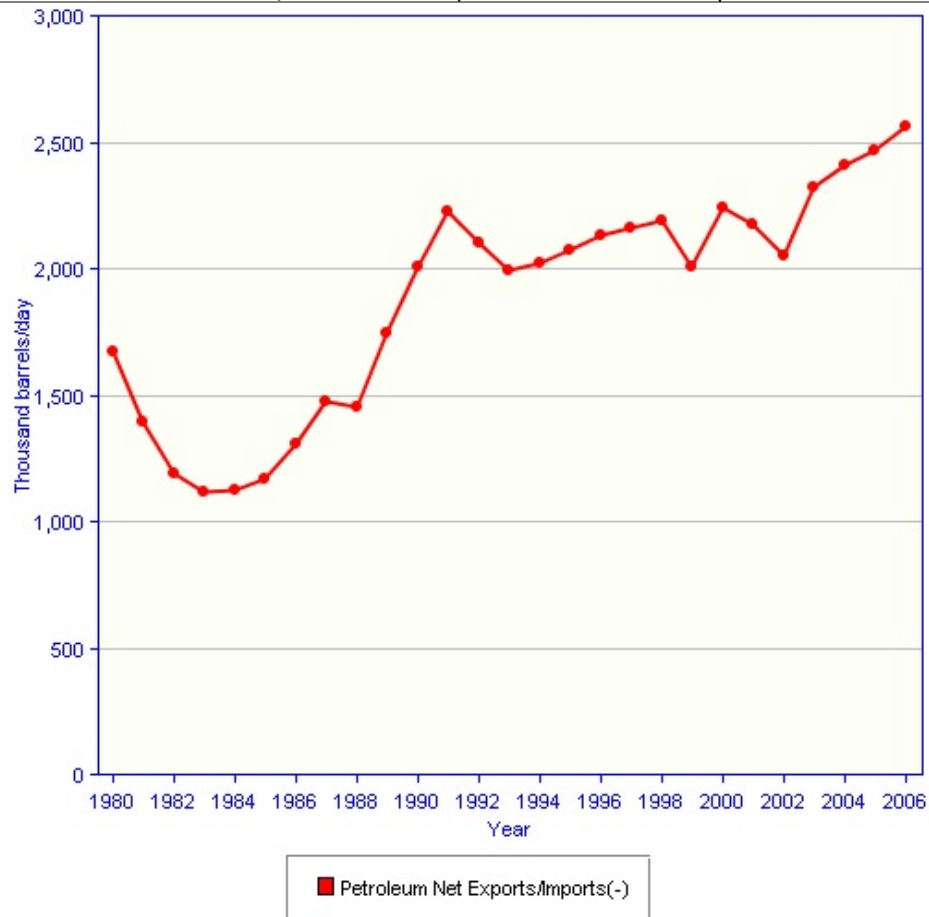


Papua New Guinea Domestic Consumption.

Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=PP

With consumption increasing at this rate, an improvement in PNG's declining exports is unlikely. There is nothing at the Megaprojects site (http://en.wikipedia.org/wiki/Oil_Megaprojects) to suggest that a major turnaround is likely. On the surface, it appears that PNG will only be a significant net exporter for a few more years. Once again, I would love to hear from anyone who can enlarge on, or contradict this view.

Australia's third largest supplier is the UAE. Here at last we have some good news, with no sign of a net export decline:

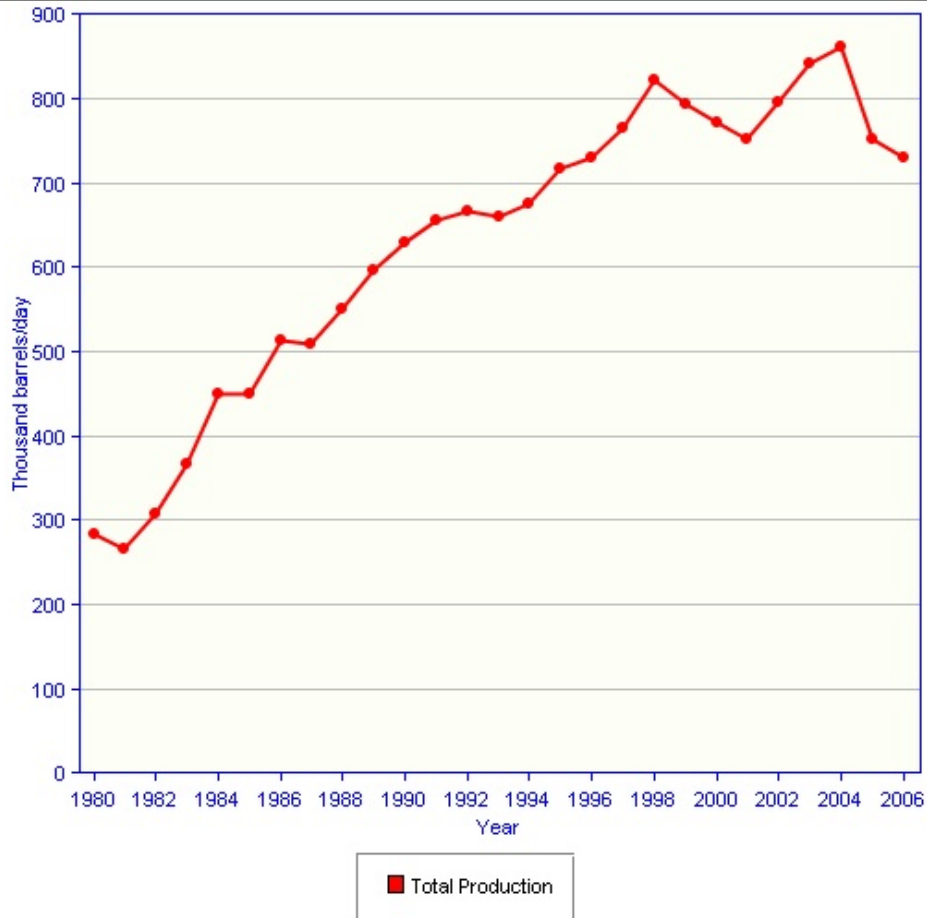


UAE Oil Exports.

Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=TC

So the UAE is showing modest increases in exports. It is probably reasonable to hope that the 12% of Australian imports supplied by the UAE may still be supplied in 5 years.

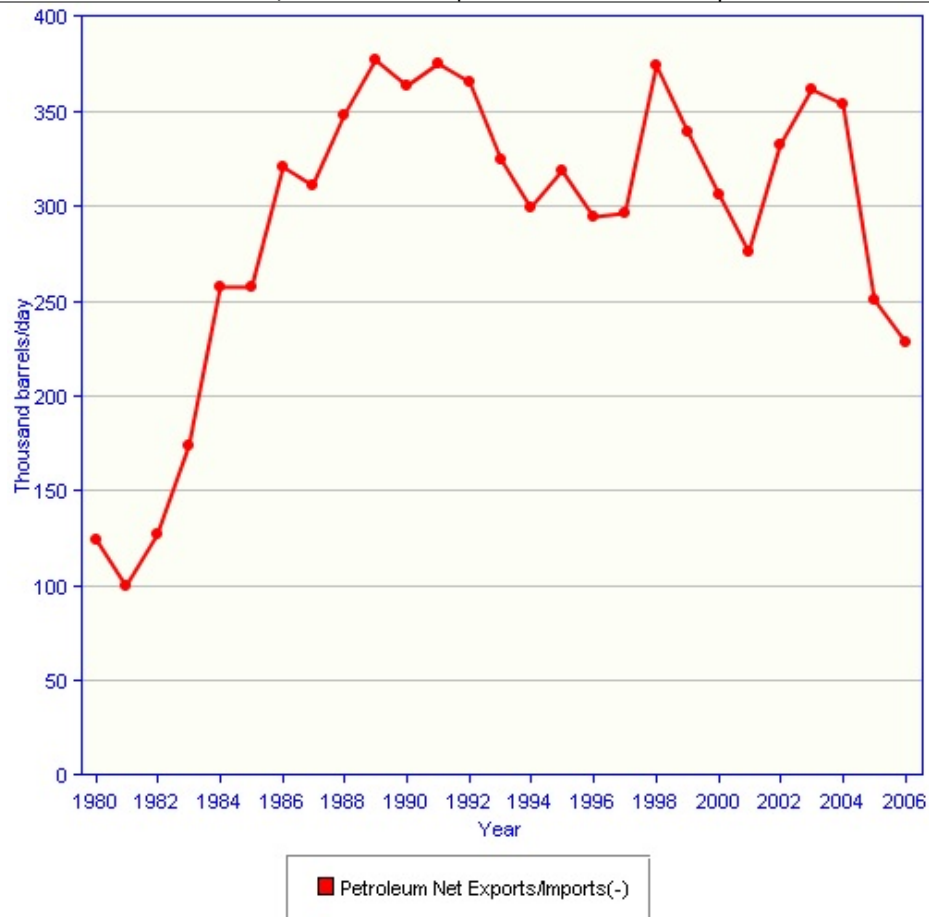
Australia's fourth largest source of oil is Malaysia. Malaysia's graph shows signs of a plateau and decline, with the production decline commencing in 2005. Colin Campbell (in material released by the ASPO and quoted at <http://www.theoildrum.com/story/2006/10/5/215316/408>) estimates that Malaysia will decline at 6%.



Malaysia Oil Production.

Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=MY

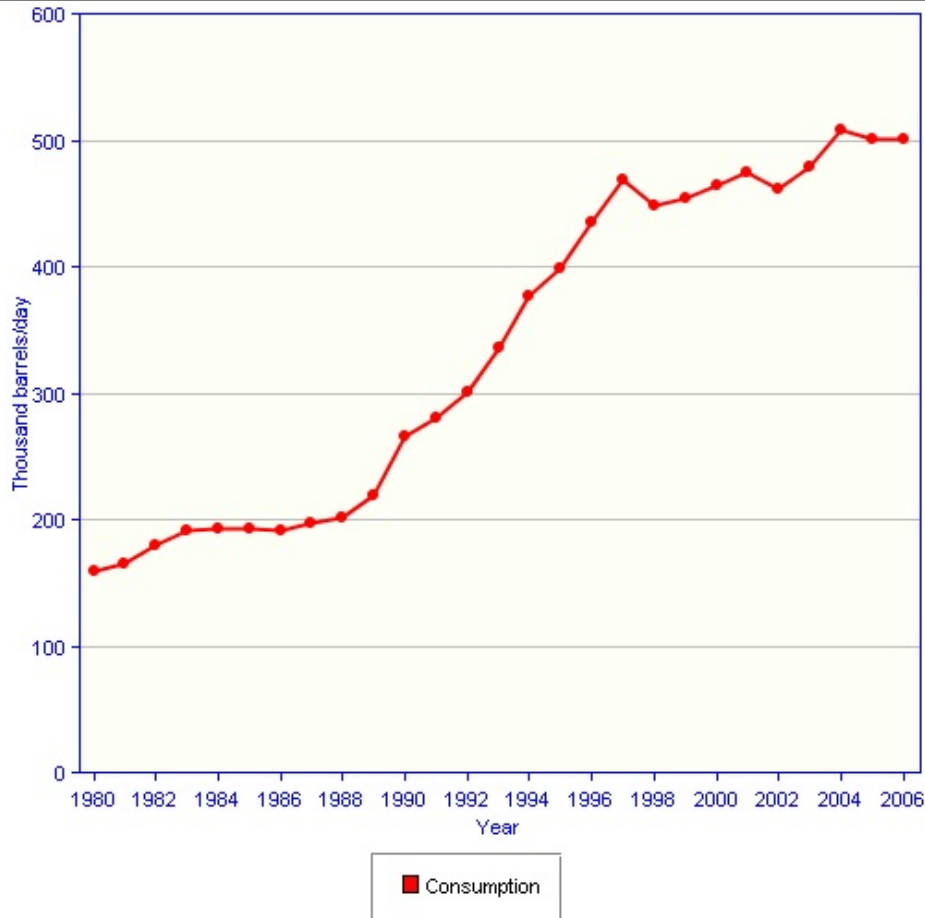
Malaysia's exports show the expected decline:



Malaysia Oil Export Pattern Matches The Pattern of Plateau and Decline.

Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=MY

Malaysia's graph suggests a drop to nil exports within around 5+ years, however this may be attenuated by Malaysia's domestic consumption, which shows signs of stabilising:



Malaysia Domestic Oil Consumption

Source: EIA data, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=MY

The megaprojects site (http://en.wikipedia.org/wiki/Oil_Megaprojects) suggests that more production might be coming online in the next few years. Malaysia may be able to prolong the decline in exports for some time if they can hold production decline to 6% or less and limit their growth in consumption.

Summary.

So of Australia's top 4 suppliers, 3 show declines in exports. I will not bore the reader with further charts; I will simply comment that as you work through the list, you do not find that it gets any better.

More worrying is the fact that Australia is not the only country competing for this diminishing supply. The exporting countries do not just export to us, they export to many countries. As their exports diminish over the next few years, they will be forced to choose. Will they choose to export to the economic and military powerhouse countries, or will they decide to "be nice" and ship their oil to Australia? I would not expect to find many analysts who would bet on "nice".

Questions:

Q. Do producers really drop to zero net exports? Surely as they approach zero they find ways to keep exporting?

A. Britain dropped to zero net exports, Australia dropped to zero net exports, Indonesia, US, etc, etc. It is possible that once the price of oil goes high enough a trickle of oil will continue to flow, but the price will need to go very high and the trickle is likely to be very small.

Q. What will happen to small developed nations that do not produce any oil?

A. They will compete with us to buy the small amount of remaining oil. They will probably be willing to go very high indeed to secure the oil they need.

Q. Are we doomed?

A. No. But we are in for a tough time.

Conclusion.

It is likely that Australia faces some tough choices. This crisis has slipped “under the radar” because the ELM is a relatively new model and we are only now coming to grips with the consequences.

In 5 years our oil demand is likely to increase by a modest amount – perhaps as little as 5-10% - but the ability of our suppliers to export to us is likely to be substantially diminished. The degree to which the exports will be diminished will depend on the success and flow rates of new projects. My estimate, based on current trends and future projects planned by our suppliers, is that a cut in exports by 35-45% is not beyond the realms of reason.

So we are likely to have less oil, and we are going to pay much more for it. We can expect locally produced oil to meet 30-40% of our needs in 5 years. If we accept that we are limited to our “share” of the diminished exports then we can expect to face a shortfall of around 20-30%.

If it is closer to 20%, then we face an extremely difficult time. However, if it is 30% we face an economic catastrophe. Which is it?

Unfortunately, the “error bars” on this estimate are significant, and even 20-30% is more precise than I can justify. For the shortfall to drop below 20%, the upcoming projects would have to be delivered on time, would have to reach their estimated peak capacity, and would have to achieve this capacity quickly. Given the recent history of such projects, this is not the way to bet. A bet that the shortfall could go higher than 30% of imports, while unlikely, is not completely ridiculous.

Australia uses oil for the transport of:

- Food
- Goods
- People
- Resources

A significant reduction in the oil-based transport of people in Australia could probably be carried out if we are willing to accept the impact on our economy associated with the loss in tourist dollars (a move to expand electrified public transport would mitigate this impact, but not in the timeframe that I am looking at). However our capacity to transport food, resources and goods is critical to our personal and economic well-being. The immediate impacts of a 30% reduction in oil supply are not pleasant to contemplate. The longer term and knock-on effects can scarcely be imagined, but are likely to be wide-ranging.

We could not accept that scenario. However our alternative is to pay potentially prohibitive prices for the small amount of oil that has not been locked in. Unfortunately, every other nation in our situation is likely to reach the same conclusion, so competition is likely to be fierce.

Where will this oil come from? Mitigating against the concerns outlined above is the fact that some countries still have an increasing production capacity. As this oil comes on line there is likely to be fierce competition for it, but Australia's economy is relatively strong - we should be better placed than many other nations to bid for some of this oil.

There seems little doubt that we will be forced to pay a very high price in order to “bridge the gap” while we commence building a sustainable energy infrastructure. However, we are lucky

The thing that I find surprising (and even a little frightening) about this scenario is that it is not in the distant future. It is only necessary to project out 5 years to see a significant probability of shortfalls.

In my next article I would like to explore the options open to us as a nation.

Acknowledgements

Obviously the whole article is based on the Export Land Model. This model was based on work by Jeffrey Brown, who credits a number of other contributors.

I would like to thank Matt Mushalik, many of whose graphics were used in this article. I use his graphics with permission.

As always, Big Gav and Phil Hart have been generous with assistance and feedback.



This work is licensed under a [Creative Commons Attribution-Share Alike 3.0 United States License](http://creativecommons.org/licenses/by-sa/3.0/us/).