# Submission on HSR Study part 2

## Australian high speed rail – too late after peak oil

First high speed trains are proposed to run between Sydney - Canberra - Melbourne ($ 50 bn) between 2035 and 2040 and Sydney – Newcastle - Gold Coast - Brisbane ($ 64 bn) between 2040 and 2060 with an assumed 110 million passengers pa. By that time, global oil production will be in decline, resulting in a permanent recession, if not worse. It would be naïve to think that oil decline will evolve without more oil wars. Climate change will cost dearly and global air traffic will be reduced by less economic activities. In this scenario financing of expensive new HSR alignments will be extremely difficult if not impossible while at the same time it will be necessary to connect Australian cities by electric rail, independent from the vagaries of oil supplies and the destiny of airlines.

Therefore, the function of electric rail will NOT be to capture a share of an assumedly growing travel market but to REPLACE existing, petroleum based air and car traffic BEFORE it is too late.

Power supply will also be a problem. As the world at present does not replace coal fired power plants with renewable energies at a speed required to keep temperature increases below 2 degrees C, we'll come into a climate emergency in which output from coal fired power plants will have to be lowered (load shedding) whether we like it or not. HSR requires almost twice as much power as ordinary express trains at 160 km/h so the solution for Sydney – Melbourne is electric night trains which would require an average speed of 125 km/h for an 8 hr trip.

Of course, a sustainable electric power supply from renewables has to be build up to replace current diesel trains. And here we are at the crux of the matter: the currently used diesel XPTs are now 30 years in service and need replacement. In year #9 of peak oil, should they be replaced again by diesel sets? It is unlikely that there will be easy diesel supplies for another 30 years. Can we introduce LNG locos? Can electrification be done in time to buy electric train sets to replace the XPTs? With every month of indecision and endless debates about HSR projects far in the future time is lost for realistic solutions. All the while Sydney wants to waste superannuation and tax money for more urban road tunnels like the F3-M2 tunnel which competes with rail.


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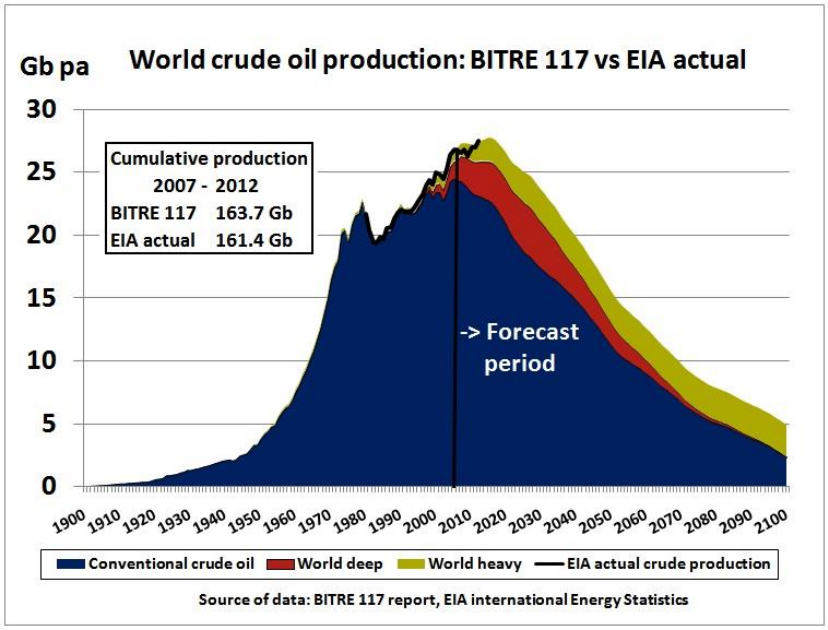
## (1) HSR Phasing compared to global oil decline

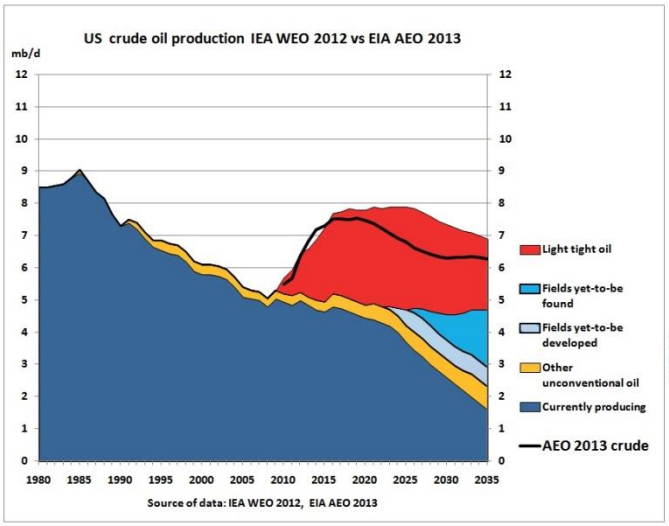
The Federal government did a peak oil report in 2009 (BITRE 117) which, however, was never published. Comparing their estimate with actual production data shows that we are pretty much on track:

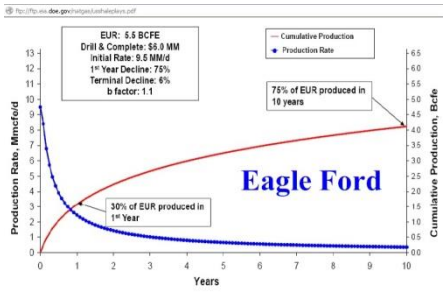



More details on this analysis can be found here:

25/2/2013 How good was the Australian peak oil report BITRE 117? (peaky leaks part 4)
http://crudeoilpeak.info/how-good-was-the-australian-peak-oil-report-bitre-117

BITRE 117 did not include US shale oil, which will peak before 2020.

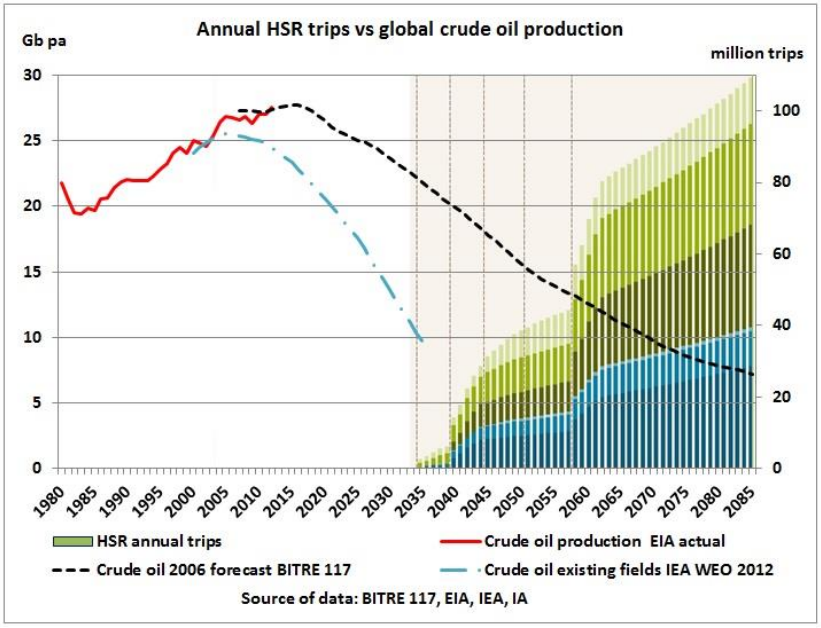



This is because a shale oil well depletes by 80-90% within 2-3 years. More than 200 K wells need to be drilled to get at oil equivalent to 10 months global oil demand.

13/12/2012 US still needs to import 50% of its crude oil requirements despite increasing shale oil production
http://crudeoilpeak.info/us-still-needs-to-import-50-percent-of-its-crude-oil-requirements-despite-increasing-shale-oil-production

In the following graph we superimpose on Fig 2-7 (Annual trips graph – blue/grey/green columns) of the High Speed Rail Phase 2 report (p 2/87)

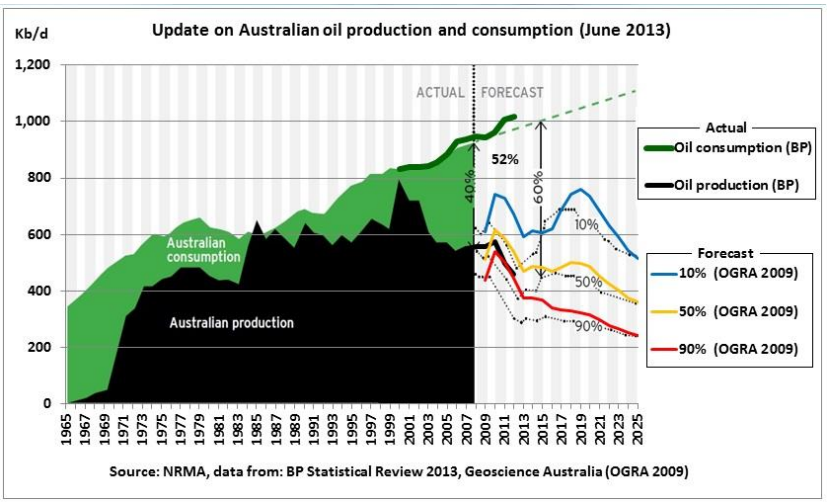



- the Federal government's crude oil forecast (black dashed line) in report BITRE 117
- actual crude production from EIA (red line) and
- actual/projected crude oil from existing fields (blue dashed line) in IEA's WEO 2012.

We can see that the 1st phase of the HSR proposal in 2035-2040 comes too late to contribute solving the problem of peak oil. According to the Hirsch report, preparation for peak oil takes 10-20 years which means this should have started in the mid 90s.

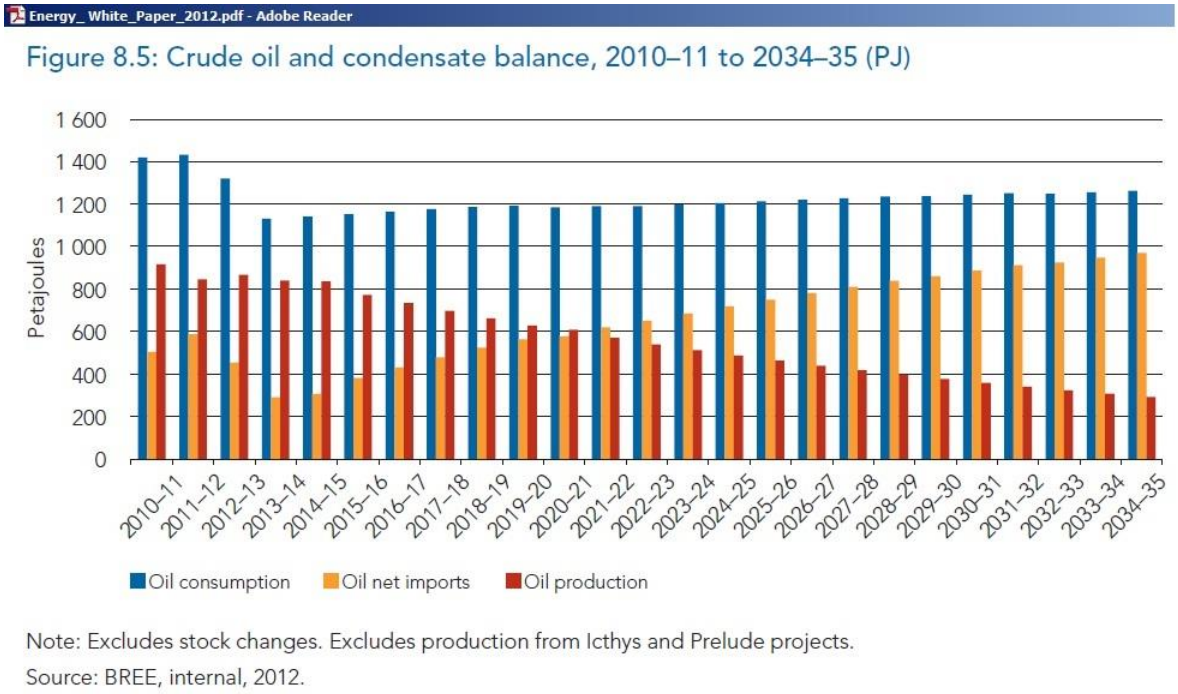
## (2) HSR Phasing compared to Australian oil decline

In February 2013, the NRMA published a paper on Australia's Liquid Fuel Security with this graph (updated with data from the BP Statistical Review 2013 and OGRA 2009):




http://www.mynrma.com.au/media/Fuel_Security_Report.pdf

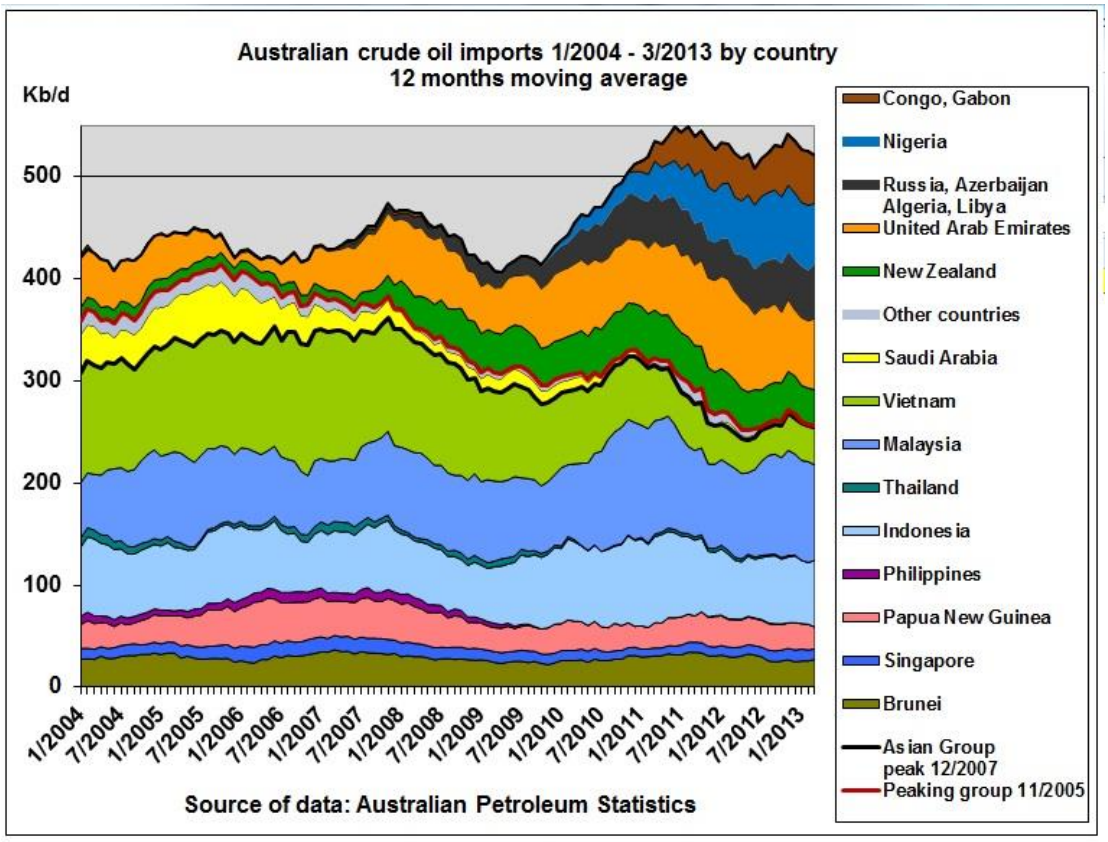
The Australian Energy White Paper 2012 included a projection in the following graph with declining oil production:

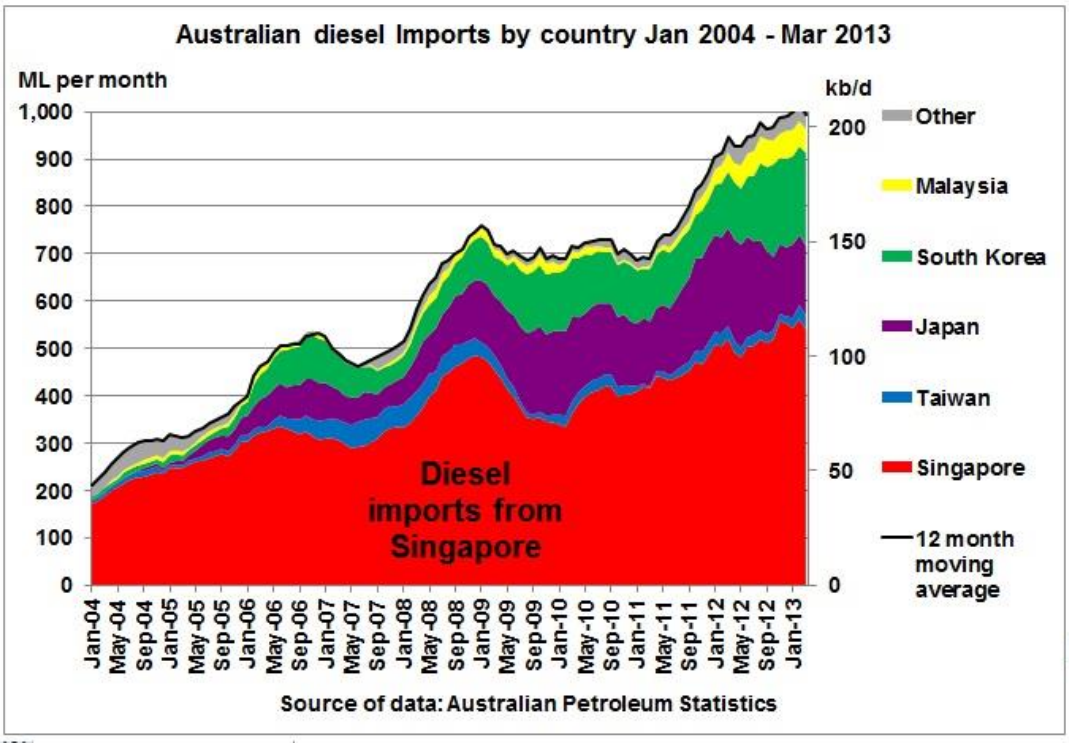


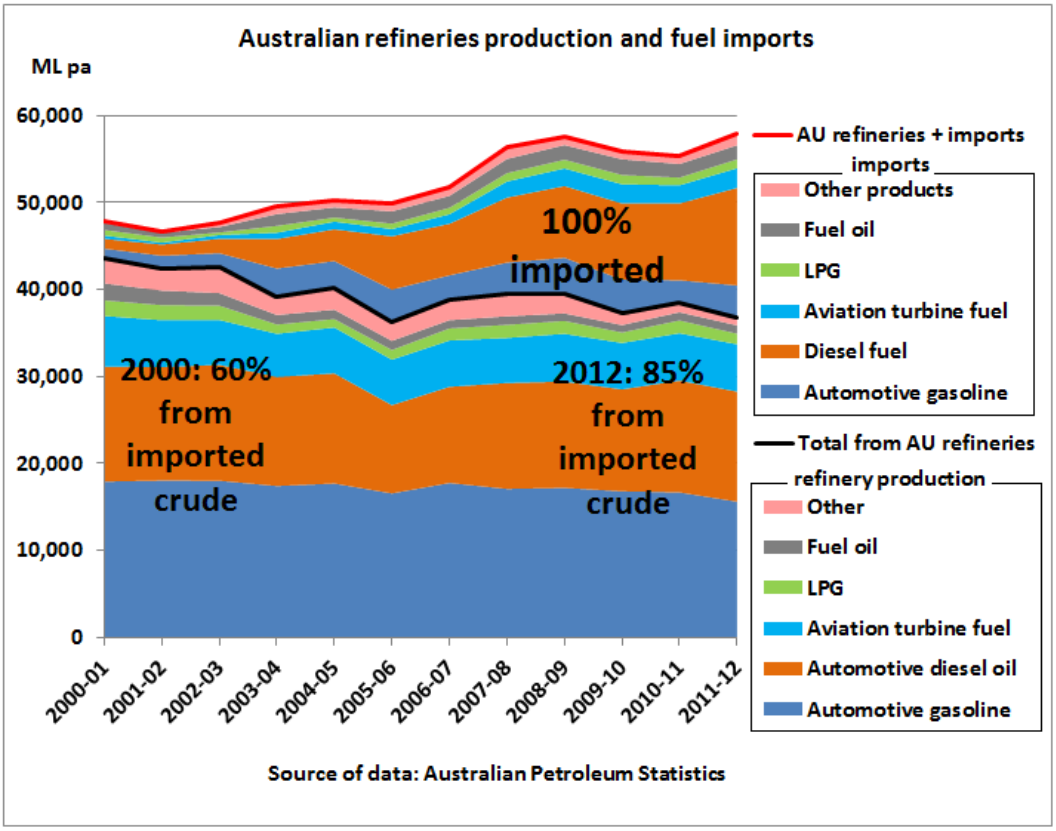

Note: Excludes stock changes. Excludes production from Icthys and Prelude projects.
Source: BREE, internal, 2012.

http://www.ret.gov.au/energy/facts/white_paper/Pages/energy_white_paper.aspx

Australian oil demand growth in the last 10 years was +2% pa on average, leading to increasing crude oil and fuel imports.



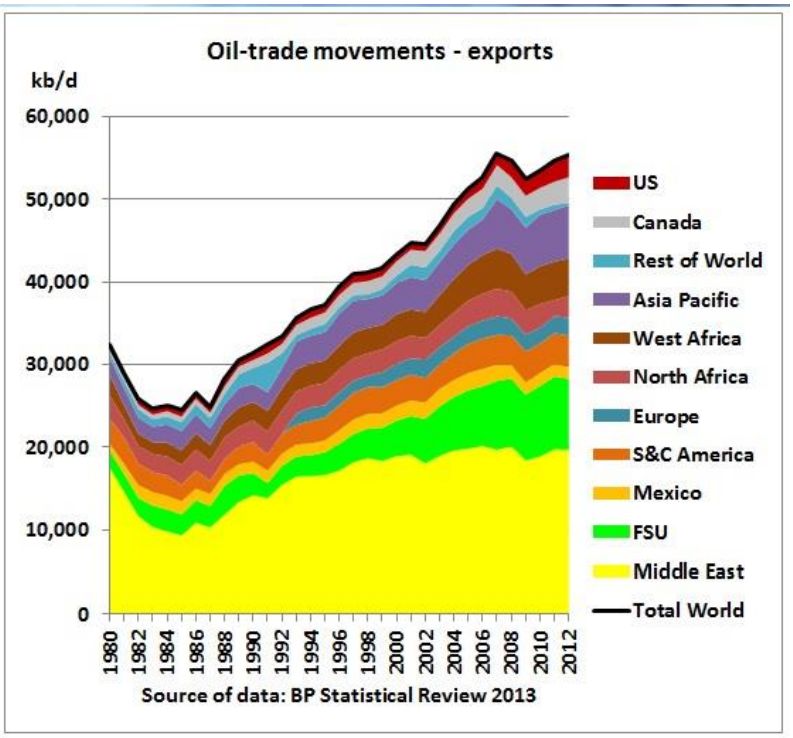



More details can be found in this article:

24/6/2013 Australian oil and fuel dependency on the Middle East is 37%
http://crudeoilpeak.info/australian-oil-and-fuel-dependency-on-the-middle-east-is-37

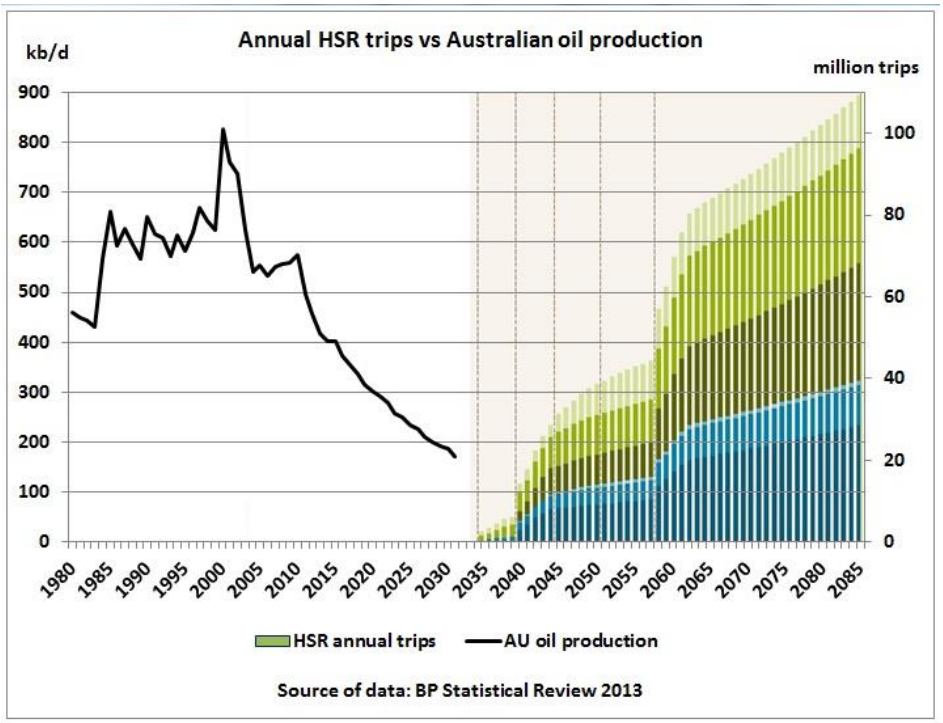
Australia's increasing oil imports are incompatible with stagnating global oil exports, graph below




<< We can see that the so-called US energy revolution of shale oil has played only a marginal role in bringing up 2012 exports to a level which was still lower than in 2007.

Middle East exports are basically flat since 2006 and FSU exports peaked in 2011.

Let's superimpose Australia's oil decline with the HSR traffic graph




Again we see that this HSR phasing is not in line with the immediate job at hand, namely to replace oil dependent transport with electric rail.

## (3) HSR demand not to be based in air traffic share

It should be clear from the above that air traffic will not continue on a perpetual growth path and that therefore it makes no sense to calculate HSR rail demand as a share of air traffic. I had made this submission:

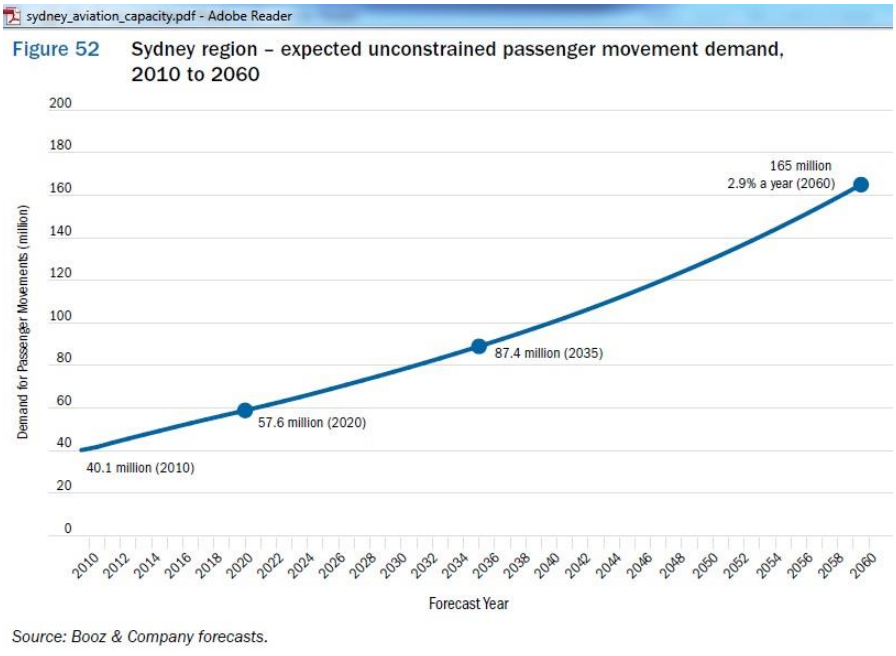
27/2/2009 Submission Green Paper on Aviation
http://www.crudeoilpeak.com/?p=43

25/11/2009 Sydney doesn't need a 2nd airport
http://www.crudeoilpeak.com/?p=670

17/2/2010 Report card 2009 (part 2): Aviation and airport plans – pies in the skies
http://crudeoilpeak.info/report-card-2009-part-2-aviation-and-airport-master-plans-pies-in-the-skies

3 years later, this study was still peak oil ignorant

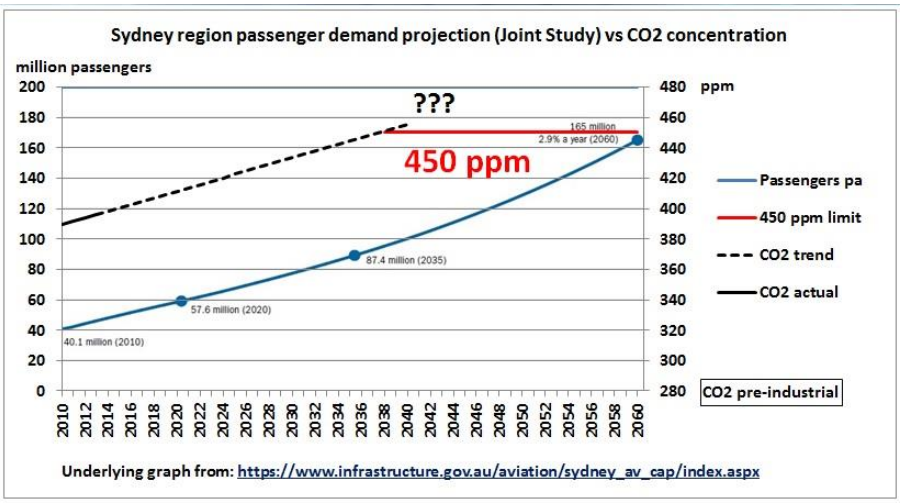
"As outlined within the recent Australian/NSW *Government Joint Study into Aviation Capacity in the Sydney Region* (hereafter referred to as the Joint Study), demand for aviation services in the Sydney region is expected to double to 88 million passenger trips per year by 2035, and then double again by 2060" (p 2/53)




https://www.infrastructure.gov.au/aviation/sydney_av_cap/index.aspx

7/10/2012 Peak oil lite: Sydney Airport passenger traffic 15% below 2009 forecast (part 1)
http://crudeoilpeak.info/peak-oil-lite-sydney-airport-passenger-traffic-15-pct-below-2009-forecast-part-1

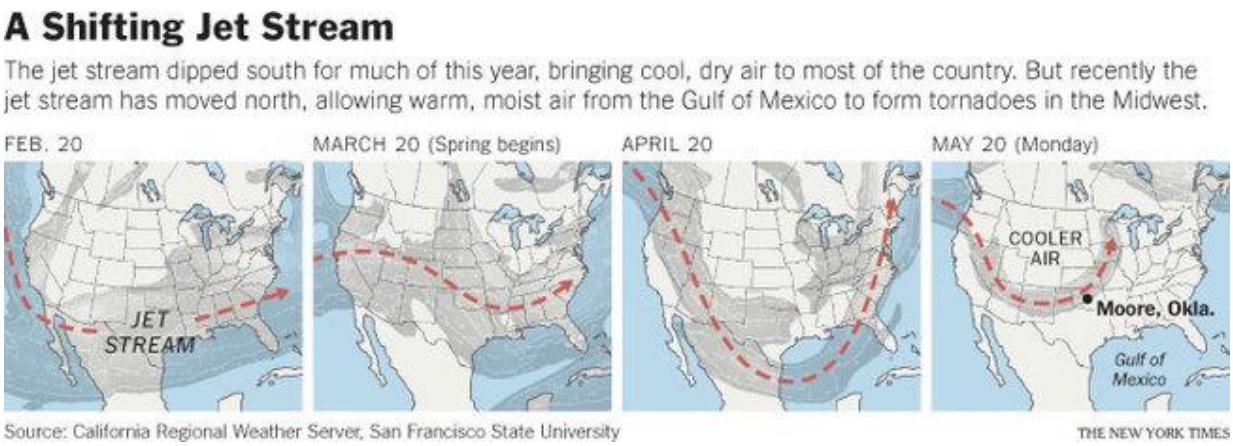
16/4/2012 Fry and Fly - the new era of sustainable aviation
http://crudeoilpeak.info/fry-and-fly-the-new-era-of-sustainable-aviation




As a side note, we have no idea how aviation will be impacted by global warming (extreme weather events, shifting of jet stream, super-cells and storms).
On current trends the critical CO2 concentration limit of 450 ppm will be exceeded in the 2030s. However, in order to keep within 2 degrees warming, CO2 concentrations must return to 350 ppm as soon as possible. In a warm period without human interference CO2 concentrations are around 280 ppm. It is impossible that air traffic can continue as envisaged in the Joint Study nor even in the most recent Sydney Airport Masterplan 2013 which reduced passenger numbers to 74.3 million by 2033.

NASA climatologist James Hansen described in his book the coming storms: http://www.stormsofmygrandchildren.com/ He gave Australian coal 10 years http://www.usyd.edu.au/sydney_ideas/lectures/2010/professor_james_hansen.shtml

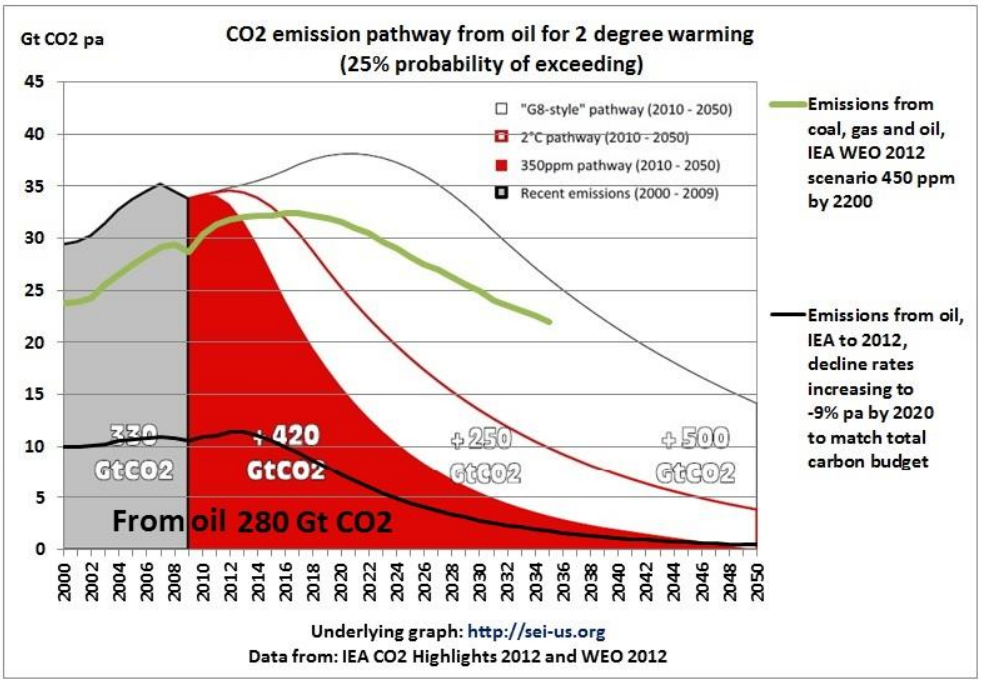
This is an example:




http://www.nytimes.com/imagepages/2013/05/22/science/0522-nat-WEATHER.html?ref=science

Extreme weather events will become more severe and frequent. This will increase risk and cost of flying in the coming decades. Therefore, it is not a good idea to calculate passenger numbers for high speed rail from aviation based estimates.

We can't even burn all the oil we have:




16/5/2013 Half of oil burnable in 2000-2050 to keep us within 2 degrees warming has been used up as we hit 400 ppm
http://crudeoilpeak.info/half-of-oil-burnable-in-2000-2050-to-keep-us-within-2-degrees-warming-has-been-used-up-as-we-hit-400-ppm

These limitations are good reasons to go for electric rail which should replace domestic flights, but much sooner than envisaged in the HSR study

## (4) What has to be done NOW

The XPT (introduced in Australia in 1982 and derived from the British Intercity 125 which started service in 1976) is nearing the end if its life. There are regular break-downs one of which I experienced in November 2011 at Yass junction when the train had to be moved back to Goulburn at 30 km/h with subsequent transfer of passengers to buses:

Melbourne-bound passengers dumped at Goulburn station when XPT broke down

This incident is documented here:

5/12/2011 Australian intercity rail run-down and unprepared to replace domestic flights after peak oil
http://crudeoilpeak.info/australian-intercity-rail-run-down-and-unprepared-to-replace-domestic-flights-after-peak-oil

In this context, the debate about high speed rail by 2040 - 2058 is academic and the first priority is to replace these XPTs, but with what? BR Class 220 (introduced in 2000), again diesel powered, in year #9 of peak oil?

In the meantime, UK has electrified both West and East Coast lines and introduced the Intercity 225 with class 91 locos (now outdated) and modern Class 390 Pendolinos. **Australia is now decades behind in inter-city rail development due to an entrenched complacency** (Resource Minister Martin Ferguson to me in a 2010 meeting: **"we can always buy oil"**).

Maitland-Brisbane (of branch line type), a section at Junee and Goulburn - Canberra are even still single tracked. Using latest European estimates for electrification (including ancillary work) of 900 thousand Euro per track km, 960 km (Melbourne – Sydney) would cost AUD 2.3 bn plus rolling stock and power supply.

Compare that to the Federal budget 2013/14: **4.663 bn on urban motorways (29.4% of infrastructure total) and 6.484 bn on highways (40.9%**). If rail electrification were started tomorrow, it could possibly be completed by the time the XPT has finally expired. As for the Canberra Explorer, one train could just accommodate the 150 MPs of the Lower House.

MPs should go by train to Canberra to get some experience! Branch line feeling >>


5/2/2012 Australian peak oil report ignored for urgent Sydney Canberra rail upgrade (Peaky Leaks Part 2)
http://crudeoilpeak.info/australian-peak-oil-report-ignored-for-urgent-sydney-canberra-rail-upgrade-peaky-leaks-part2


If electrification is not completed in time before Diesel shortages hit, locos can also be converted to LNG. http://crudeoilpeak.info/solutions/lng-locomotive-conversion

But Australia is exporting all its gas.

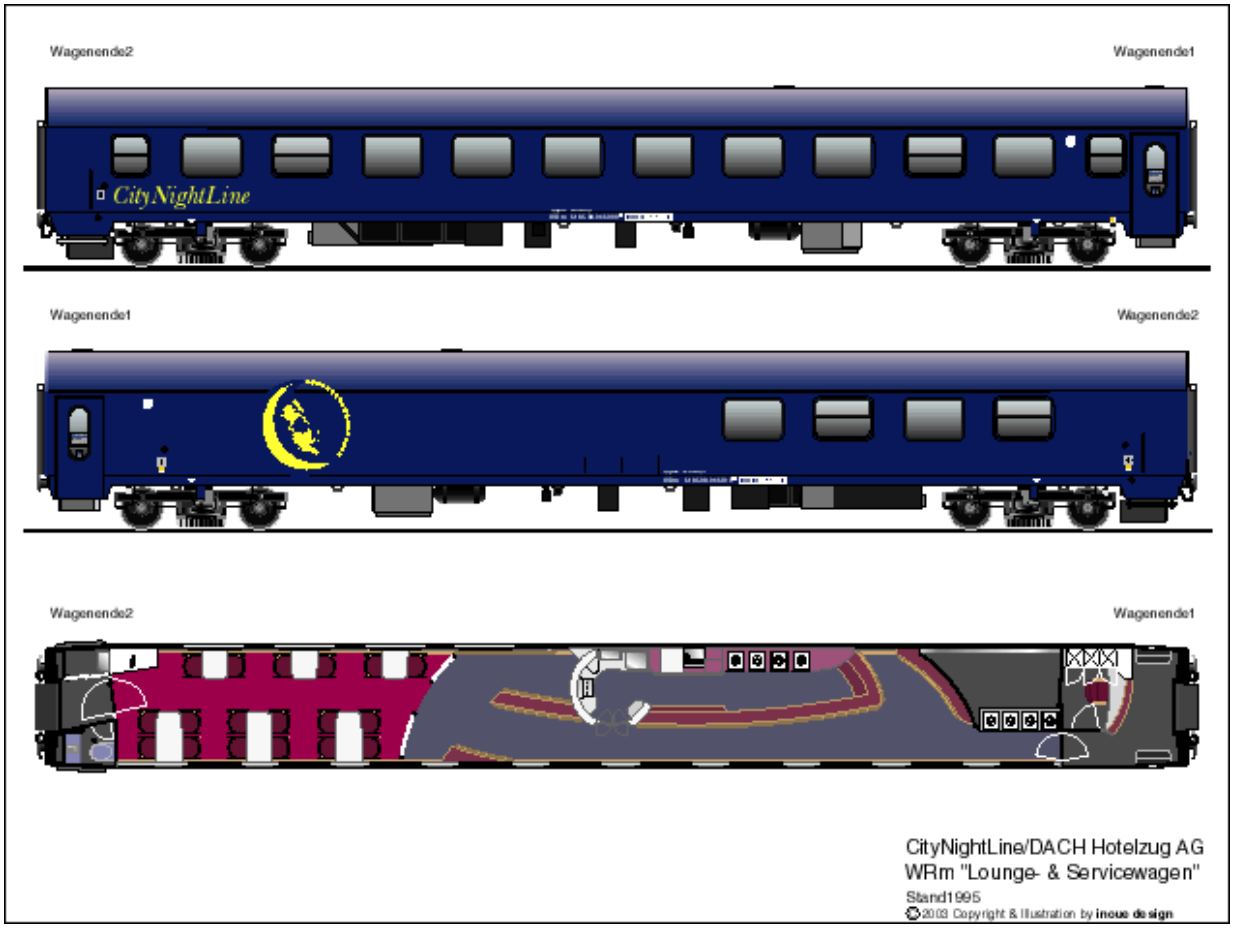
9/5/2012 Queensland plans to export more than 10 times the gas NSW needs (part 3)
http://crudeoilpeak.info/queensland-plans-to-export-more-than-10-times-the-gas-nsw-needs-part-3

The energy and transport planning is in a total mess.

## (5) Night trains

| | ICE 3 |
|---|---|
| 200 km/h | 29 Wh |
| 300 km/h | 51 Wh |

<< Energy consumption per seat km. As governments delay action on replacing coal fired power plants by a combination of renewables, geothermal and hydropower storage, global warming will get so bad that at this stage an emergency program will be necessary which will involve load shedding. This could happen in the next 10 years. Therefore, energy minimising solutions have to be found and HSR is not one of them. The most energy frugal solutions for Sydney-Melbourne are night trains.




http://www.eurorailways.com/ecart/night-trains-cnl/?gclid=CJPYvdCVibgCFcYipQodNCQA7A

http://www.italyheaven.co.uk/train-to-italy.html


http://www.eurailgroup.org/eurailsalesmanual/pass_benefits/night_trains/EuroNight.htm

Euro Night 221, Paris - Venice http://www.youtube.com/watch?v=1Du1-7t3bfw

EN 490 http://www.youtube.com/watch?v=5jICVtKPUBk

# Good night, Australia, sleep well

http://crudeoilpeak.info
Crude Oil Peak
#1 in Monitoring the Global Crude Oil Peak

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