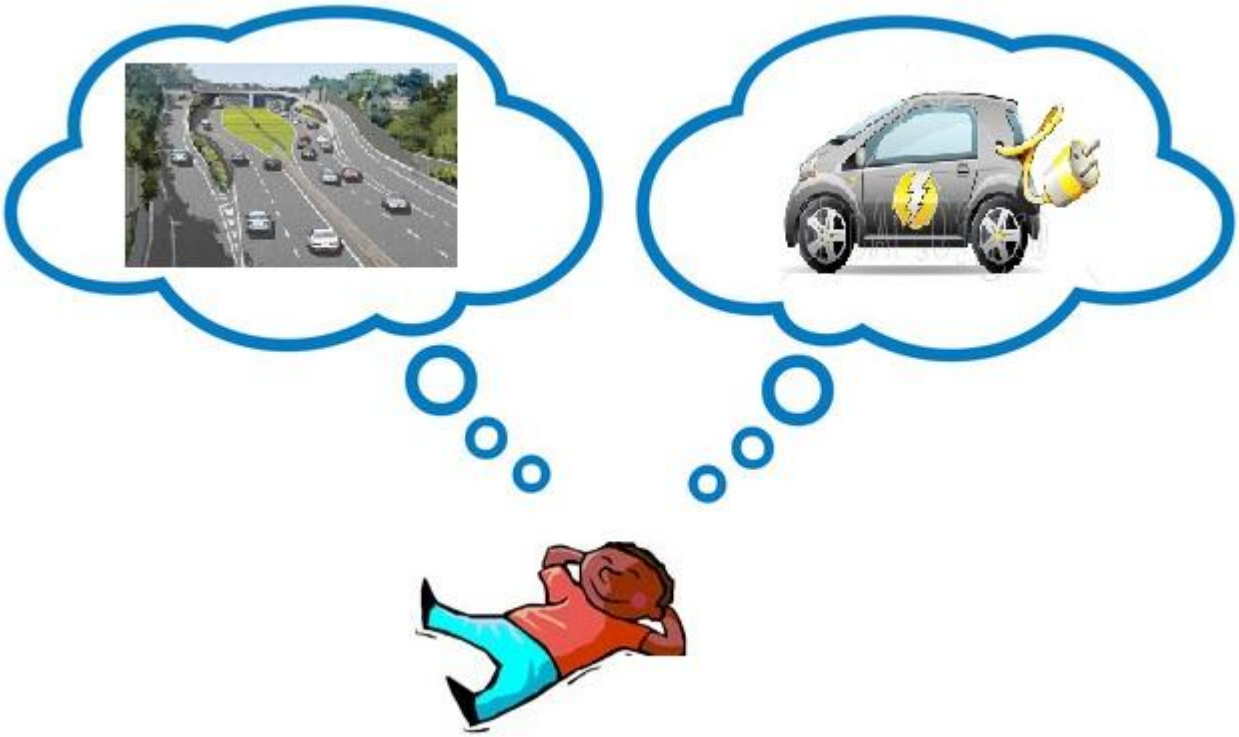
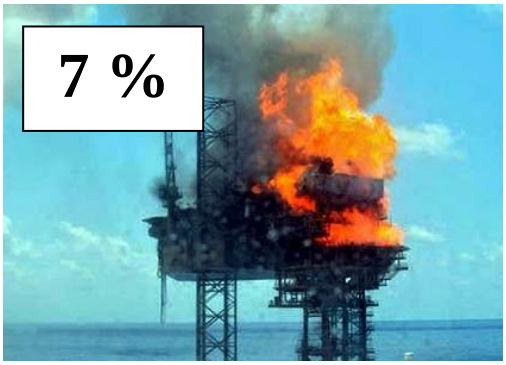
Primary energy dilemma for cars

Submission on M2 widening





Prepared by: Matt Mushalik (MIEAust, CPEng) June 2010 mushalik@tpg.com.au

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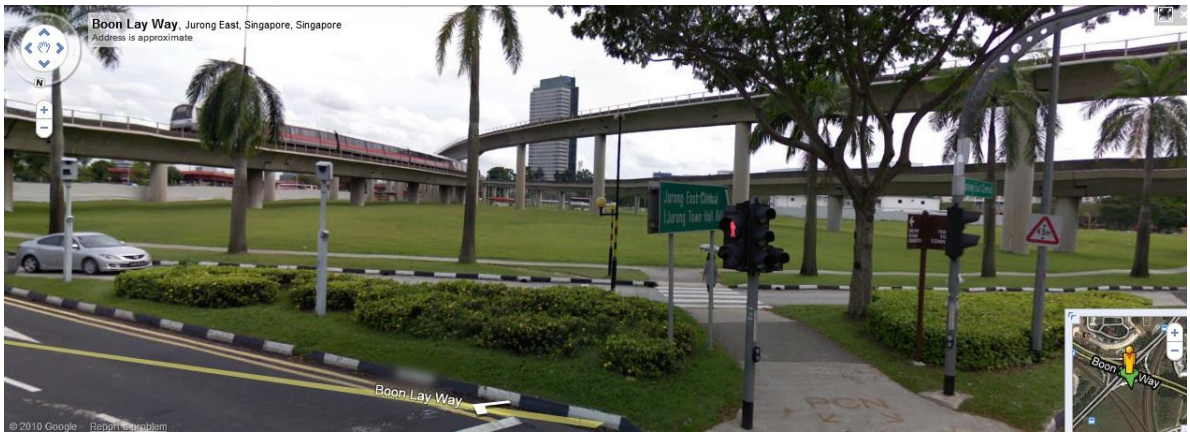
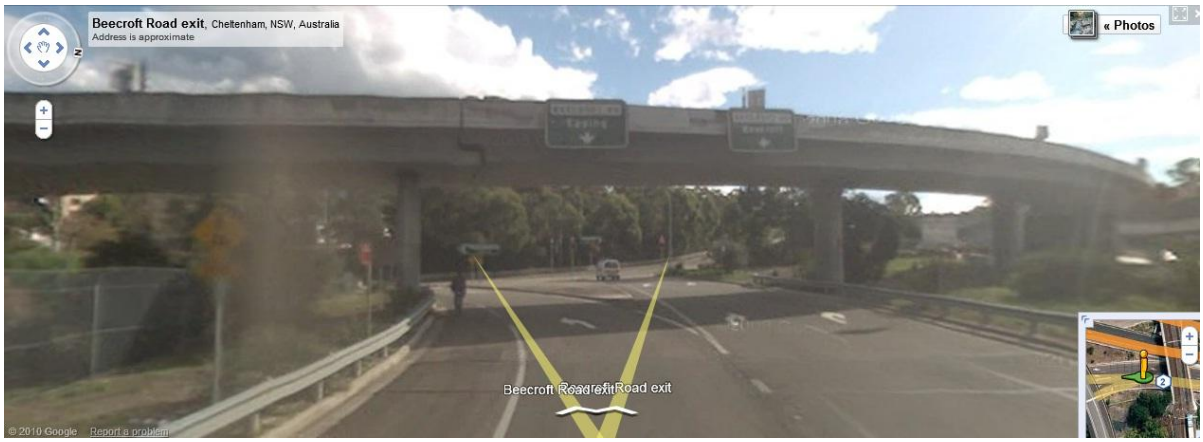
While Singapore builds a Mass Rapid Transit (MRT) system on elevated tracks



RTA wants to remove a bus ramp built just 13 years ago. This ramp will be needed when diesel shortages will force bus companies to end their service at the Epping station to save on fuel.

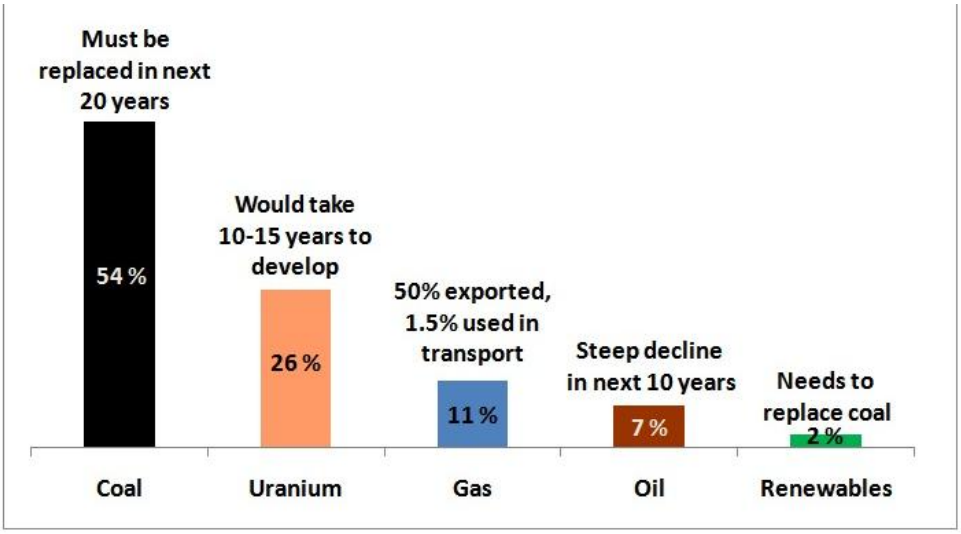


Images on cover: http://www.abc.net.au/news/stories/2010/03/15/2845647.htm
http://www.abc.net.au/news/stories/2009/09/14/2685115.htm
http://www.theage.com.au/environment/disaster-movie-fire-breaks-out-on-leaking-oil-rig-20091101-hrmt.html

Introduction: Our Energy Dilemma

Australia's present energy system stands on 3 feet: coal, oil and gas.

(1) Coal will have to be abandoned and replaced as global warming events like Arctic sea ice melt, ice sheet disintegration, drought, floods, storms and many other yet unforeseeable events will force us to do so
(2) Oil production is declining after its peak in 2000 while at the same time global export volumes available for import are shrinking
(3) Natural gas is exported instead of being used as a transport fuel



Uranium is not being used, but exported and renewables are not being developed at a speed commensurate with the challenges posed by the above energy dilemma. The timeframe in which these problems will come to a head is 10 years. We need fossil energy to build up carbon free, genuinely renewable systems. But our fossil fuels are now being consumed, for convenience purposes. The M2 contributes to this unsustainable gas-guzzling. There is a big danger that – when the crunch time arrives – we won't have enough cheap oil left over to continue running oil dependent infrastructure AND to use it as energy input for vital energy projects.

Consequently, we are going to slide into a first class energy crisis. This submission tries to highlight these points. The RTA and the consultant would need to numerically check the calculations presented. Then and only then will it be understood that there is a problem.

The submission starts with contrasting M2 traffic forecasts with Australian oil supplies and a list of failed or failing toll-way projects, followed by a timetable of peak oil related events until 2020 and a short description of war risks in the Middle East. As traffic growth is thought to come from unending population growth the next chapter presents populations scenarios in the context of peak oil and global warming. It shows the Metropolitan Strategy to be completely ignorant of resource and CO2 sink limitations. A short update on global warming and James Hansen's book "Storms of my Grandchildren" is followed by a chapter on all NSW coal fired power plants which need to be replaced. This is done with the express purpose to show the reader the gigantic task ahead. Many think nuclear is a solution but this would take 10-15 years, too late to solve the problem of declining oil production. A short chapter on solar energy highlights the limited capacity of solar power plants reminding us that we will face an energy frugal future if these plants are not mass produced ASAP. The next chapter deals with the current dreams of planners and motorists: to use off-peak power to drive electric cars, followed by a list of factors which will end our car culture in this coming decade. The submission closes with 2 detailed problems of the EA: the removal of the bus ramp at Beecroft Rd and the noise problem at Epping Heights Public school.

Summary

Peak oil not understood

Peak oil started 5 years ago, in 2005, and hit an economy with a pre-condition of accumulated debt. The combined effect of high oil prices and the financial turmoil resulted in a demand destruction in OECD countries of 5 mb/d – oil which was immediately consumed by OPEC and Chindia. Without the debt crisis and a continuing world-wide economic boom we would have had either physical oil shortages and/or skyrocketing oil prices by now – both of which would also have ultimately killed the global economy.

No crisis awareness

The M2 widening proposal knows nothing about all this and seems to be blissfully unaware of the consequences of peak oil, while at the same time the need to reduce CO2 concentrations from the current 387 ppm to 350 ppm means we have to replace our coal fired power plants, and very soon. The financial crisis is the 3rd challenge. The Middle East is another source of conflict which may impact on oil supplies. These 4 problems together will merge to a major crisis in this coming decade and have the potential to morph into a multiple system failure, if not well managed. With present business-as-usual policy settings - of which the M2 widening is part – the probability of this happening is increasing by the month, especially as problem #5 is the denial mode of governments of the above.

Energy security not checked

The M2 upgrade documentation (Environmental Assessment) does not contain any numerical calculations of the primary energy (measured in GL of fuels, GJ of fossil fuels or TWh of renewable energy) needed to operate vehicles for the duration of 30 years, the period used for the benefit cost analysis. Neither has it assessed the likelihood of the physical availability of such energies nor the risks associated with supply shortages, whether domestic or international. The Federal Resource Minister has already warned the public in February 2008 that there will be an oil import challenge (=crisis) as soon as 2015, only 2-3 years into the project life time.

Insufficient Fuel Savings

m2ueavol1appendixe.pdf - Adobe Reader

Table 5 RUCBA Summary

Item	Net Present Value (NPV) ($M at 7% discount rate)
Capex and Opex	-496
Vehicle Operating Costs	41
Travel Time Savings	1609
Accidents	33
Environmental Costs	14
Net Present Value - NPV ($M)	**1202**
BCR	**3.4**

<< The Net Present Value calculation shows that vehicle operating cost savings are less than 10% of Capex and Opex. These vehicle operating costs would contain fuel costs as a major cost factor. **From the point of view of reducing oil consumption and oil dependency this project is definitely not worthwhile.**

Moreover, most of the time savings would be savings for private commuters, savings which would not translate into actual cash savings for the economy. Only commercial traffic would accrue these direct benefits. Table 5 does not show these commercial time savings separately. Insofar the table is highly theoretical. However, this is a basic problem in the RUCBA methodology

Terms of reference incomplete

The Director General's requirements do not explicitly prescribe the above mentioned energy calculations and assessments. However, the consultant should have included this in the chapter on sustainability. After all, a project is not sustainable if there is not sufficient carbon free primary

energy available at reasonable cost to support the assumed traffic volumes. Recent financial failures of toll-way projects in Australian Capital cities, but also in the US, due to over-optimistic traffic projections should have prompted the consultant to adopt this prudent approach. The problem here is that consultants want detailed design jobs of the projects they are preparing an EA for. So quite naturally they would not recommend to stop a project.

Prudence of investors

Even more importantly, it would be in the commercial interest of the motorway operator and potential investors in the project (most likely super annuation funds) to make sure that the energy security of the M2 upgrade is checked. Similar to the self interest of consultants many investors are keen to get commissions rather than to design a project which can be successful under all adverse conditions.

Duty of care of the Government

Moreover, the State government is and will be responsible for the overall functionality of the Sydney Metropolitan area in oil crisis years. It is very short-sighted, if not irresponsible, for the NSW government to argue that no taxpayer's money is at risk. If investor money is lost, as experienced in the Global Financial Crisis, this impacts negatively not only on share holders or bond holders but also on the whole economy and ultimately on the State budget itself.

Oil supply risks in next years

There already is an oil supply risk in the next years. Oil shortages could result from an oil war or other armed conflicts in the Middle East as well as social unrest and oil hoarding when the truth comes out about OPEC's overstated oil reserves, which have never been audited. Which company would actually make business with a partner whose books have never been audited? This is exactly what toll-way operators and investment funds are doing when they are spending funds on toll-ways.

Making business on the basis of oil imports from countries who don't allow 3rd part oil reserve audits is fraught with incalculable risks. Given Australia's 80% dependency on imported crude and fuels, and the lack of a Strategic Oil Reserve, the impact of such events will be felt within weeks. Petrol rationing and/or mandatory car pooling will mean reduced traffic and toll revenue. Depending on repayment conditions of project debt, the financial end of the M2 upgrade would follow soon.

Recommendation

The M2 upgrade documentation must be re-written to include an energy availability assessment. This analysis will show, as is already calculated in this submission, that the upgrade is neither commercially nor environmentally feasible and that it does not guarantee the long distance commuting by private vehicle which will become dysfunctional within 5-10 years, irrespective of the introduction of green cars, yellow cars or electric cars.. The 2nd focus of the review should therefore be a new chapter on alternatives to the 3rd lane. There are 2 options which should be investigated:

- Transperth model (electric rail Epping – Quakers Hill on the M2/M7 with a branch to the Norwest Business Park)
- Electric trolley buses because they can be rolled out faster than rail

Manufacturing capacity for trolleys should be built up IMMEDIATELY. These buses will be needed anyway in hilly areas of Sydney. The current bus fleet needs to be converted to CNG (compressed natural gas)

1 Solutions for M2

The tollway operator must develop a new business model to survive the period of declining oil production. This can be either electric rail or electric trolley buses.

↑ Transperth

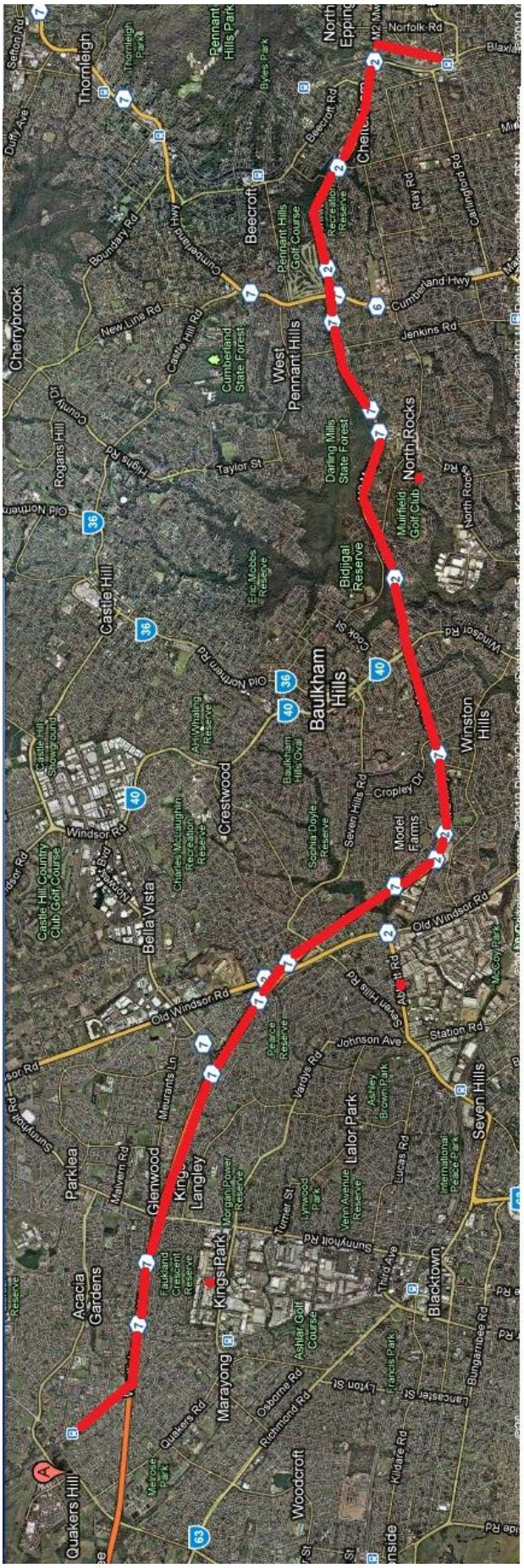
↑ Electric trolley bus in Zurich

Read:

26/5/2010
Submission Sydney's Metropolitan Transport Plan
http://www.crudeoilpeak.com/?p=1519

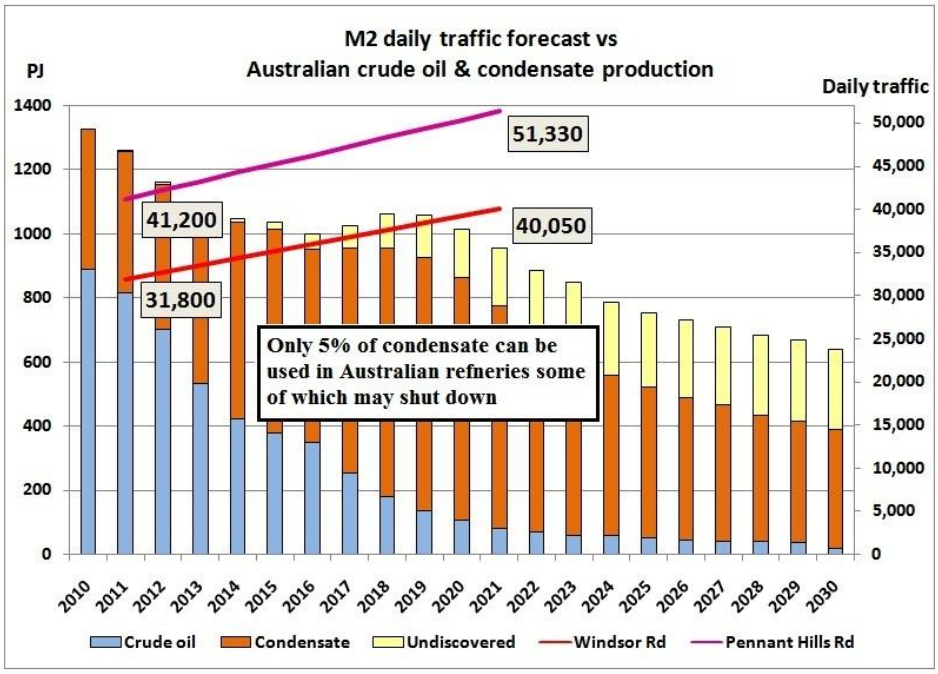
8/3/2010 Emergency Public Transport Planning
Submission to the Inquiry of the Sydney Morning Herald
http://www.crudeoilpeak.com/?p=1231

7/10/2009
Too late for Sydney Metro Tunnels
http://www.crudeoilpeak.com/?p=290

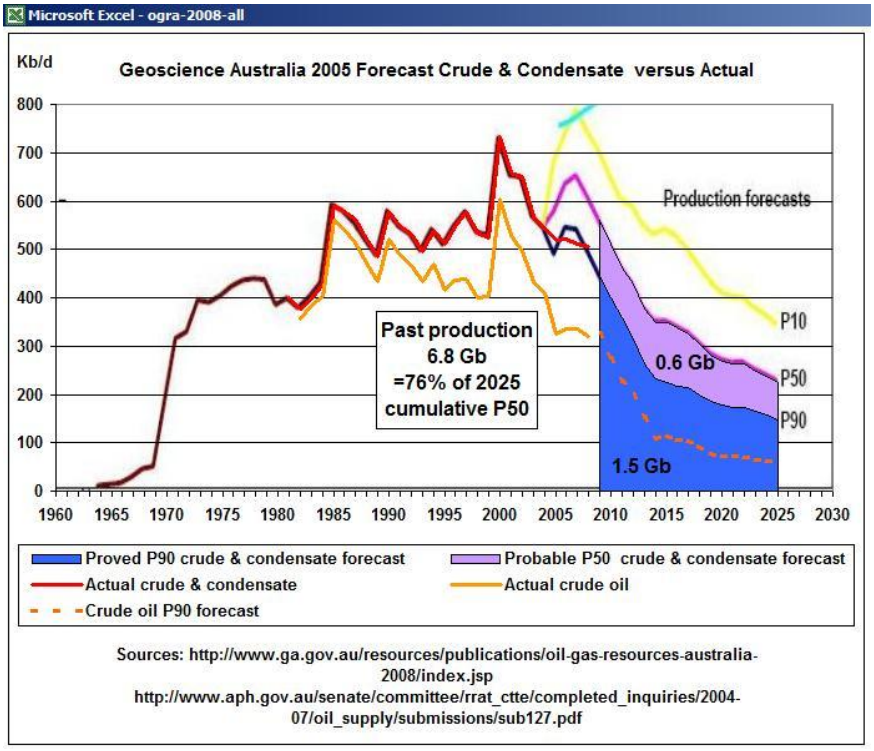


2. Traffic Forecasts vs Australian crude production

The traffic forecasts in chapter 7 are completely unrealistic. The following graph shows an opening gap between assumed traffic growth and Australian crude oil production while at the same time global oil export volumes have peaked as many oil exporting countries have now become net oil IMPORTERS themselves. See the menu item "Net oil Imports" on my website: http://www.crudeoilpeak.com/?page_id=1571

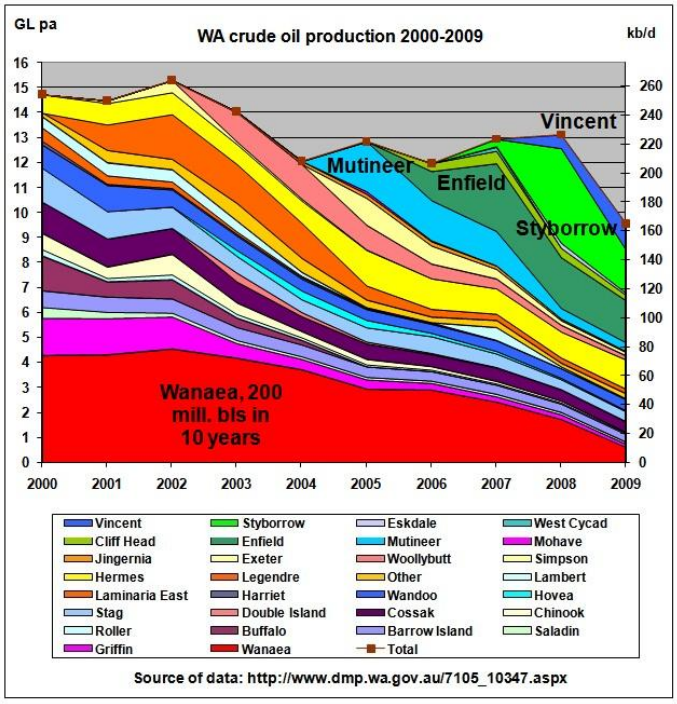


Australia is in the last quarter of its oil age http://www.crudeoilpeak.com/?p=182



The above graph uses data and projections from Geoscience Australia

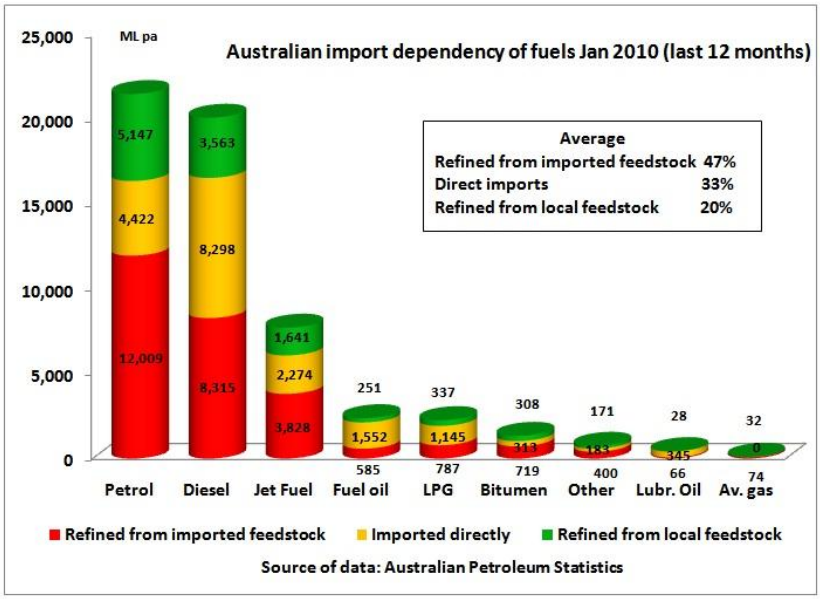
Australia's situation is similar to that of the US http://www.crudeoilpeak.com/?p=1508



The decline wedge of existing oil fields in 2004 can be clearly seen. New fields added since then deplete quickly and have high decline rates. Read: Western Australia's battle for offshore oil

Crude Oil dropped by 27% in 2009
http://www.crudeoilpeak.com/?p=1425

Australia's oil dependency stands at 80% (imported crude and petroleum products)



More Australian graphs: http://www.crudeoilpeak.com/?page_id=1225
This submission is about showing that there will be no alternative, carbon free energy which can replace Australia's declining oil production within the short time of the next 5-10 years, which is the most critical period.

3. Failed and/or failing toll-way projects

7/2/2010 Which bank would now finance more road tunnels?
http://wwwcrudeoilpeak.com/?p=1097

27/1/2010 Peak oil brought forward moment of truth for Lane Cove Tunnel
http://wwwcrudeoilpeak.com/?p=998

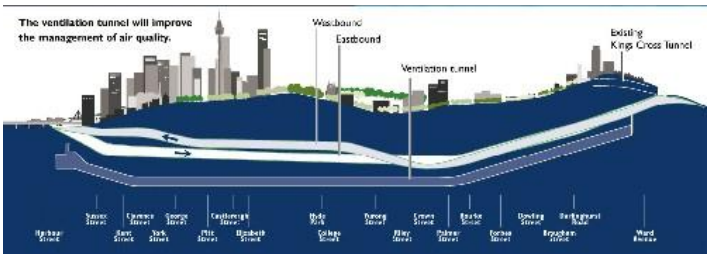
1471_Goldberg%20(2006).pdf - Adobe Reader

TABLE 7

Concession year	Traffic volume (AADT) (East)	Lane loading (east lanes) (v/l/h)	Traffic volume (AADT) (West)	Lane Loading (west lanes) (v/l/h)
2012	63 840	2850	72 120	1624
2022	78 392	3500	99 606	2243
2037	90 966	4060	115 583	2603

Figure 7 shows the fantasy growth of traffic assumed in the Lane Cove Tunnel

8/1/2006 How Cross City Tunnel Planners ignored peak oil
http://www.crudeoilpeak.com/?p=219



PPK's Supplementary EIS (July 2002): Traffic Flows 2016

Main Tunnel - Eastbound	34,300
Main Tunnel - Westbound	42,900
Exit Northbound	24,600
Total	101,700

10/6/2010 Brisbane Motorists bypass the Bypass Tunnel
http://www.crudeoilpeak.com/?p=1482

Product%20Disclosure%20Statement%20Aus.pdf - Adobe Reader

4 Traffic forecasts for the North–South Bypass Tunnel – "Base" scenario

Annual Average Daily Traffic (AADT) forecasts (vehicles per day) under the "base" scenario, *ignoring* "ramp up"

Modelling year	Cars	Light commercial vehicles	Heavy commercial vehicles	Total
2010	86,747	6,347	7,657	100,751
2011	86,345	6,318	7,622	100,284
2012	87,072	6,371	7,686	101,129
2016	100,206	7,332	8,845	116,384
2021	110,518	8,087	9,755	128,360
2026	117,258	8,580	10,350	136,188

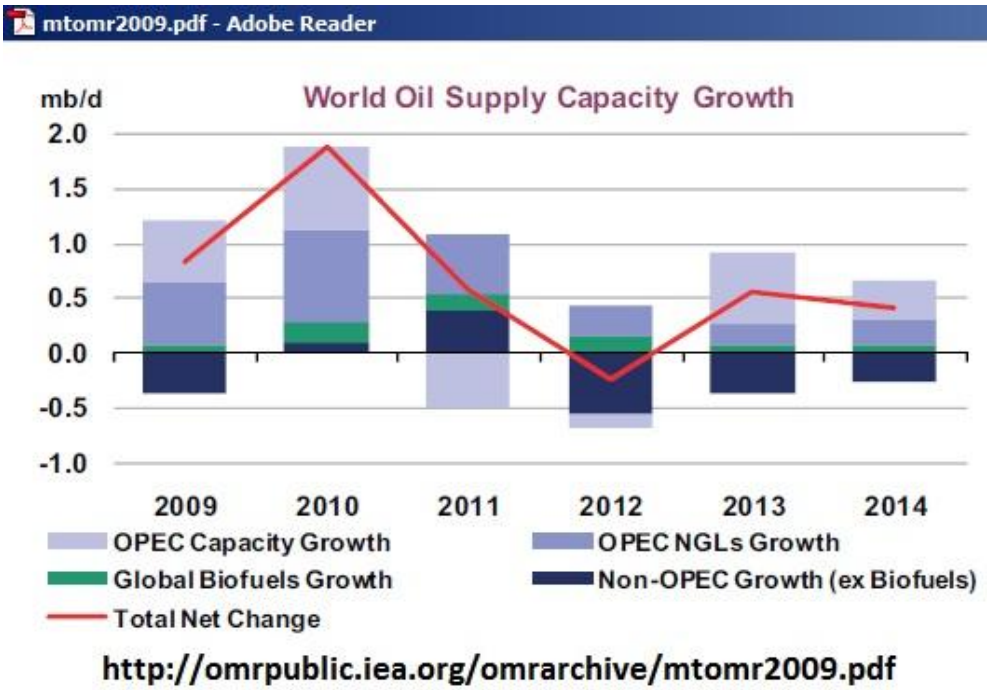
$400m stoush over EastLink

CONNECTEAST is facing a $400 million-plus legal battle with Leighton Holdings, one of its biggest shareholders, over claims the toll-road operator misled the construction giant with inflated traffic forecasts.
ConnectEast, which operates Melbourne's 39-kilometre EastLink toll road, is now engaged in a $421 million capital-raising to pay down debt.
http://www.smh.com.au/business/400m-stoush-over-eastlink-20090907-fef9.html

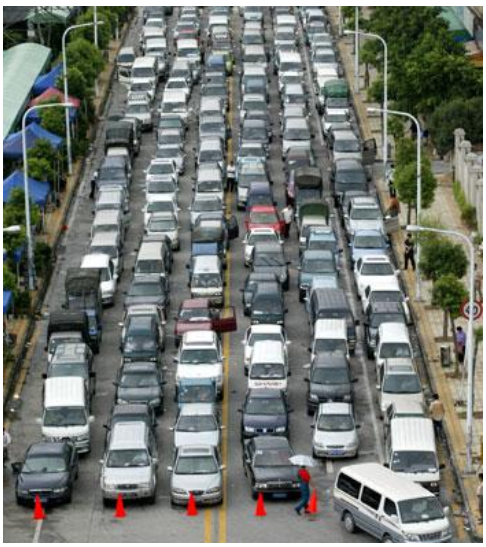
4 Time Table of Oil Related Events 2010-2020

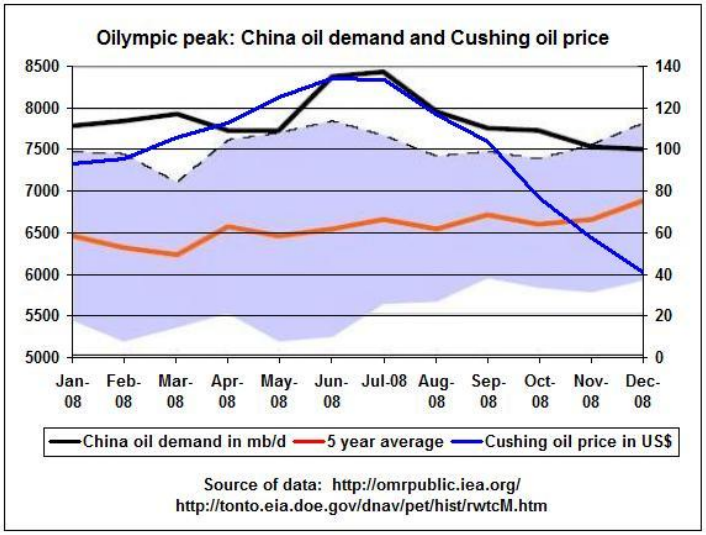
2012 Next oil price shock (1st oil crunch of 3rd oil crisis was in 2008)

This has nothing to do with the Mayan calendar. The net capacity growth of new oil production projects goes negative, according to this graph of the 2009 Medium term Oil market report of the International Energy Agency (IEA)



We are going to see a replay of 2007/2008 when Saudi Arabia could not pump enough oil to keep oil prices down, just as predicted in Matthew Simmons' 2005 book "Twilight in the desert, the coming Saudi oil shock and the world economy.
http://www.simmonsco-intl.com/files/Twilight%20in%20the%20Desert%20Presentation.pdf





China had petrol and diesel shortages in 2005 (up, left). As China did not want a repetition of this embarrassing situation during the 2008 Olympic Games in August, they ordered an extra 800 Kb/d in June and July of that year which drove oil prices up to $147. The Oilympic peak (up, right)

2015 Australian crude oil production has declined to half of 2010 levels

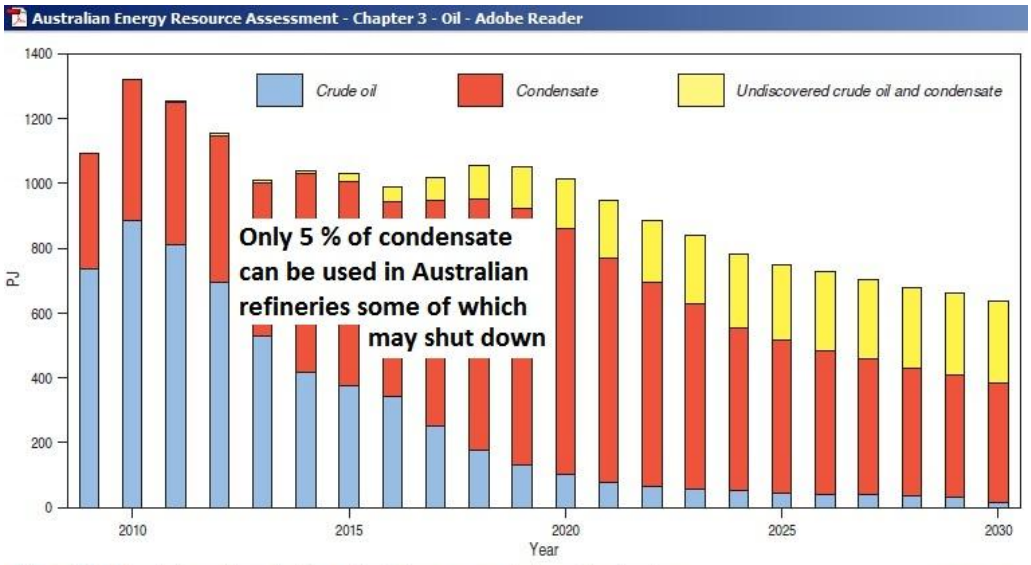


Figure 3.43 Australian oil production outlook from proven hydrocarbon basins AERA 3.43

Note: the production forecast is based on data from an industry survey of producing fields and Geoscience Australia's assessment of undiscovered resources in proven basins

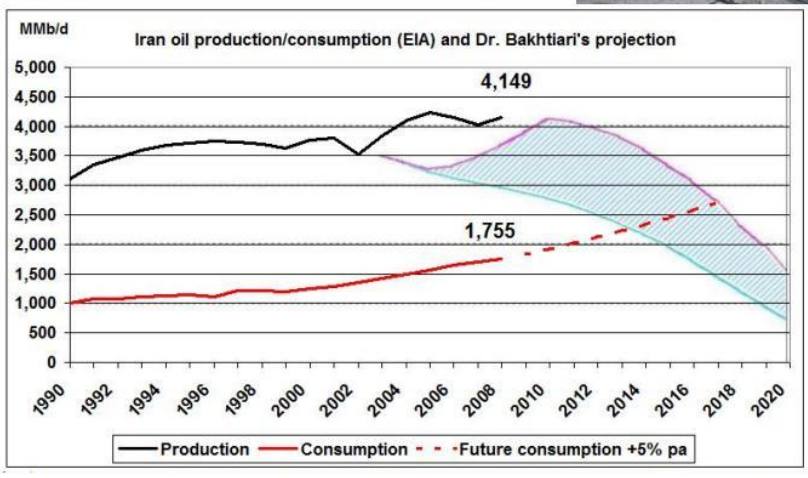
Source: Geoscience Australia

https://www.ga.gov.au/servlet/BigObjFileManager?bigobjid=GA16759

Read analysis here: Australian crude oil production to decline 85% over the next 10 years http://www.crudeoilpeak.com/?p=1243 and
Australia in last quarter of its oil age http://www.crudeoilpeak.com/?p=182

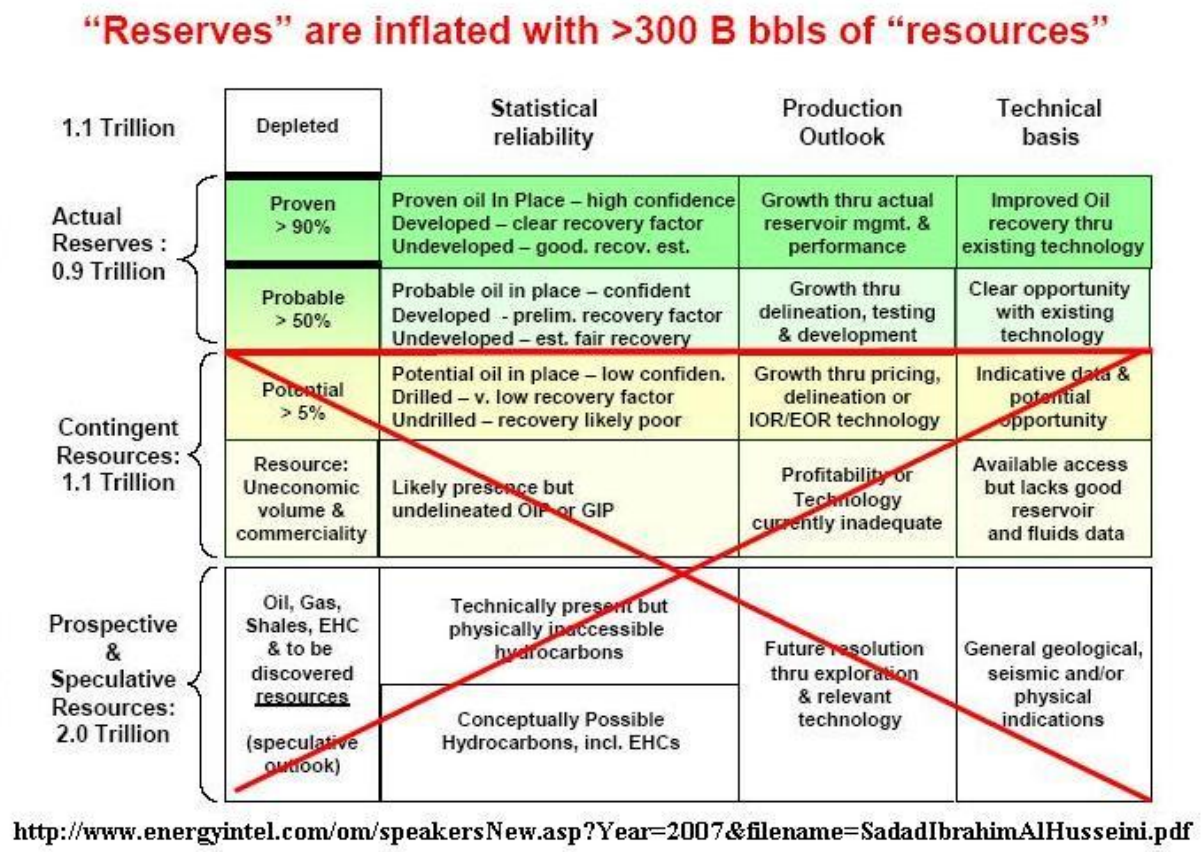
2015 Iran no longer exports oil. We were already warned in 2007: *".....export extinction in 2014–2015 is preceded by a decline to 33–46% of 2006 exports by 2011. Note, however, that export declines are substantial, even in the least likely, most optimistic scenario. Because government revenue could be sustained only by rising price in all scenarios, absent such a price rise political challenges might overwhelm the regime long before exports go to zero."* **http://www.pnas.org/content/104/1/377.full**

Petrol rationing introduced in 2007
Iranian oil exports will end in next decade



Dr. Bakhtiari warned the Senate Inquiry on oil supplies in June 2006 that there will be new economic rules. Hansard: http://www.aph.gov.au/hansard/senate/commttee/S9515.pdf

That may also be the year in which the truth comes out about OPEC's paper barrels. Ex-Saudi-Aramco Chief Sadad-al-Husseini (one of the few people who would know how much oil there really is in Saudi Arabia) crossed out 300 Gb of OPEC proven oil reserves in a presentation to an Oil&Money conference in October 2007 in London:



http://www.energyintel.com/om/speakersNew.asp?Year=2007&filename=SadadIbrahimAlHusseini.pdf

http://www.energyintel.com/om/program.asp?year=2007

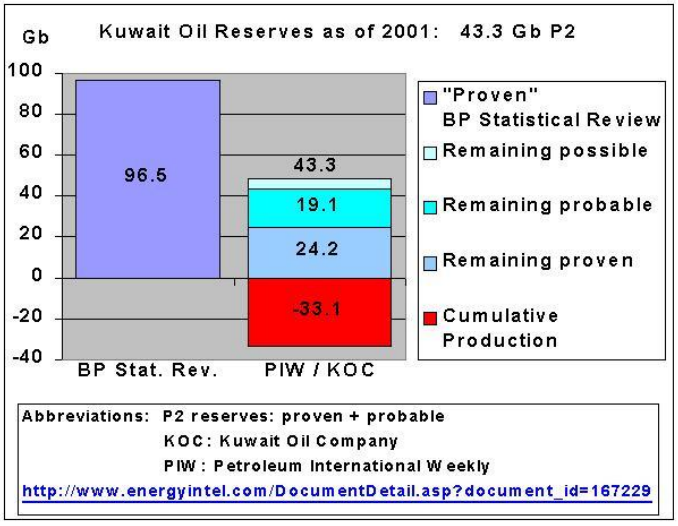
See the list of top managers who have attended this conference. Among them the Executive Director of the IEA, Managing Directors of Morgan Stanley and **Lehman Brothers!**

The conference was organised by Energy Intelligence, which also published a report on Kuwait's oil reserves being only half of what is published in the BP Statistical Review
http://www.energyintel.com/documentdetail.asp?document_id=167229

More details are here:

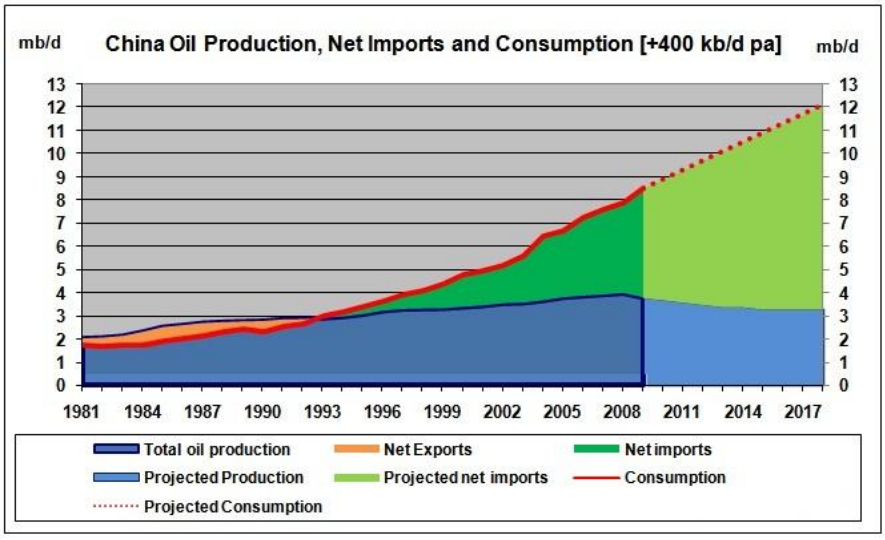
"Key oil figures were distorted by US pressure, says whistleblower"
http://www.crudeoilpeak.com/?p=564

OPEC reserves revisited
http://www.crudeoilpeak.com/?p=355



This time bomb must explode. When confidence in oil reserves disappears hoarding will start and oil markets freeze like the credit market did. Different Middle East. the oil will

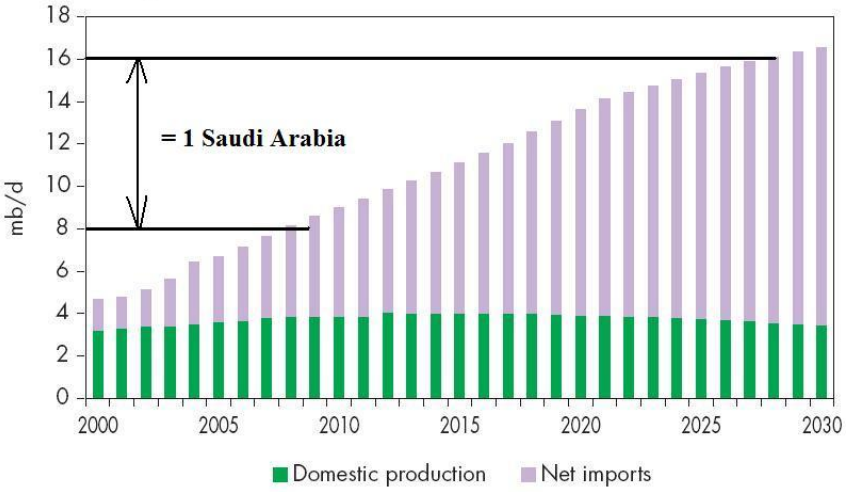
2018 China will have increased oil imports by 4 mb/d while global crude oil production had been flat at best (see WEO 2008 in Appendix)



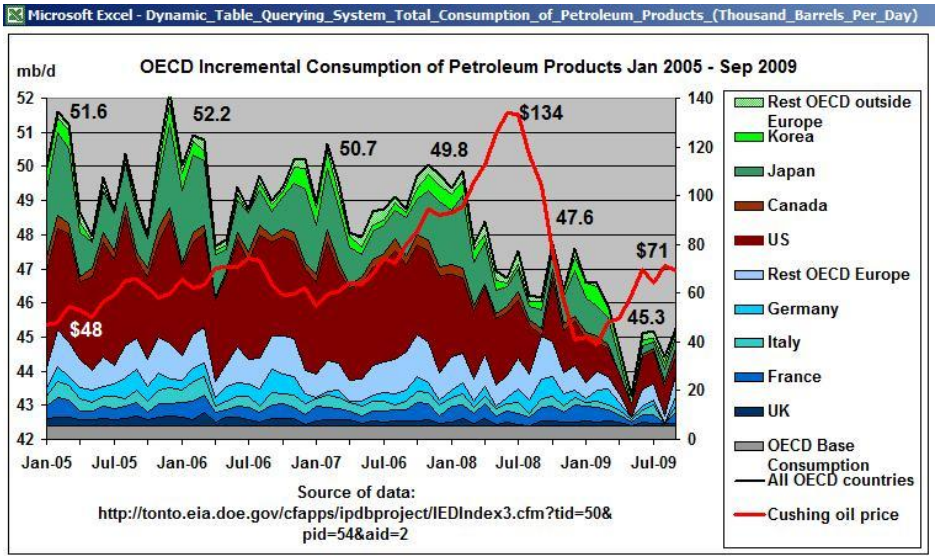
<< Chinese oil production and imports in next 8 years. Who will save 4 mb/d?

In the long term, China's imports would take up the total current oil production of Saudi Arabia.
These additional annual oil flows will simply not be there. The assumed mining boom will not take place. As a result, there will be budget and financing problems for infrastructure.

Figure 10.6: **China's Oil Balance in the Reference Scenario**



http://www.iea.org/textbase/nppdf/free/2007/weo_2007.pdf
It took extreme high oil prices, the GFC and the credit crunch to bring down demand in OECD countries by 5 mb/d:



This tells us what must happen in OECD countries to "save" 4 mb/d in order for China to grow.

5 Australia has no Strategic Oil Reserve

This chapter is on Middle East war games and global oil supply choke points.

Europe could face hundreds of Iran missiles - Gates

18/6/2010
http://in.reuters.com/article/idINIndia-49408220100618

In March 2010 the New York Times had 2 articles on war games in the Middle East involving Israel, the US and Iran.

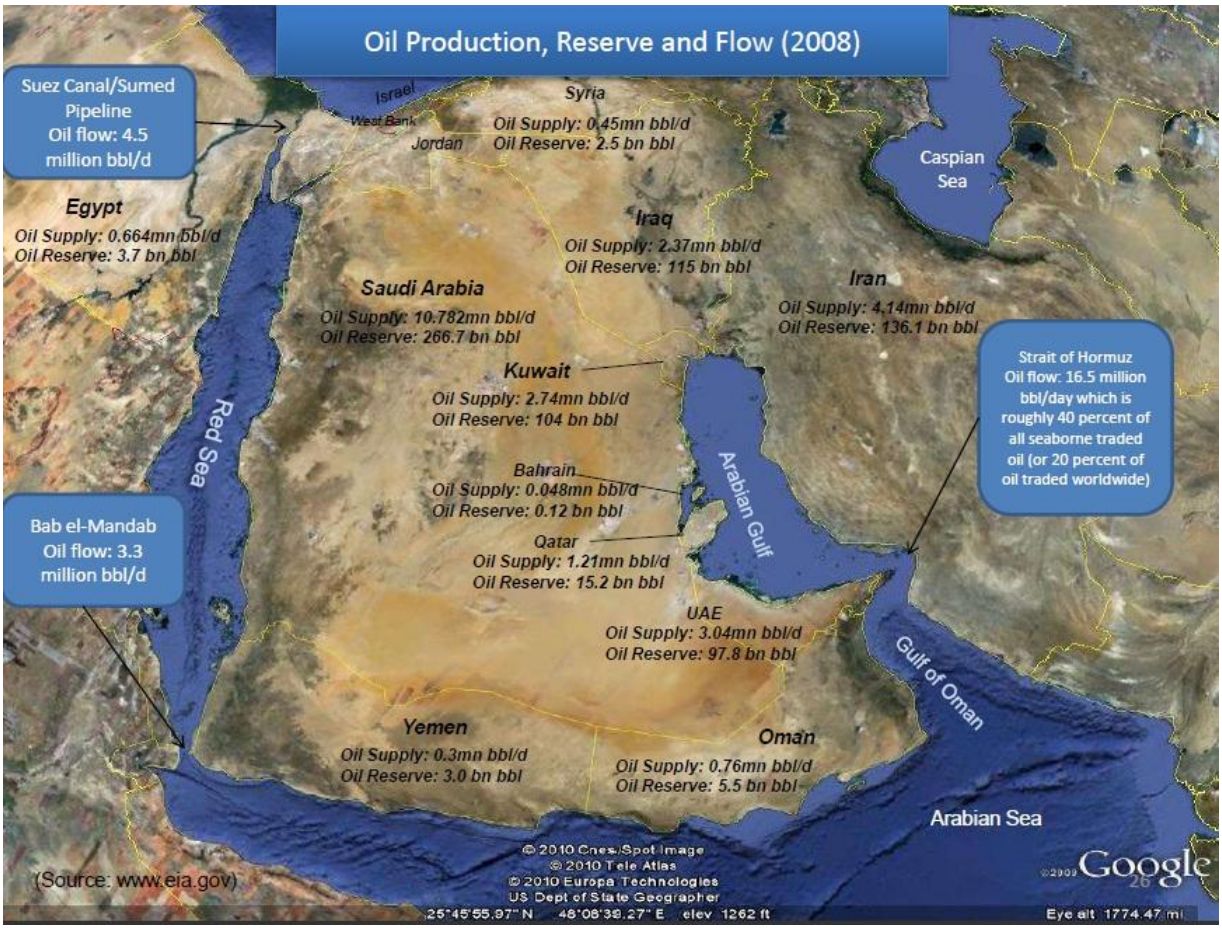
Imagining an Israeli Strike on Iran
http://www.nytimes.com/2010/03/28/weekinreview/28sangerintro.html

They describe a February 2010 report by the Brookings Institution titled

"A crisis simulation of an Israeli strike on the Iranian nuclear program"
http://www.brookings.edu/reports/2010/02_iran_israel_strike_pollack.aspx

and a March 2010 report by the Center for Strategic and International Studies (CSIS) entitled

"Options in dealing with Iran's nuclear program"



http://csis.org/files/publication/100323_Options_todealwith_Iran.pdf (page 26)

The CSIS document contains a reference to an October 2006 report by the National Academy of Sciences about Iran's possible oil export extinction by 2015,
http://www.pnas.org/content/104/1/377.full

which is in line with predictions of the late Dr. Bakhtiari who gave testimony to the Senate inquiry on oil supplies in July 2006 in Sydney's Parliament House.
http://www.aph.gov.au/hansard/senate/commttee/S9515.pdf

The war game simulation involved Iranian retaliatory attacks on Saudi oil installations and the mining of the Straits of Hormuz. The above warnings that Europe is within the range of Iranian missiles is another alarming development.

What does that all mean for Australia? If something were to happen in the Middle East we would be hard hit as we do not have any Strategic Oil Reserve. This problem goes back to Howard's 2004 energy white paper which did not consider it necessary.

http://pandora.nla.gov.au/pan/10052/20050221-0000/www.dpmc.gov.au/publications/energy_future/docs/energy.pdf (page 126)

In fact, Australia is in violation of IEA's rules of keeping 90 days of net oil imports as reserve.

http://www.aip.com.au/pdf/fs_response_system.pdf

Unfortunately, under the Rudd government, nothing has changed. See chapter 2.3 in ACIL Tasman's Liquid Fuel Vulnerability Assessment:

http://www.ret.gov.au/energy/Documents/Energy%20Security/Liquid%20Fuel%20Vulnerability%20Assessment.pdf

Australia's oil import situation is precarious anyway as our own crude oil production will be declining by a whopping 85% over the next 10 years, according to a recent report by Geoscience Australia:

https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70142

What does this mean for toll-ways? An oil crisis which becomes physical will require the Federal Government

http://www.ret.gov.au/energy/energy_security/emergency_response/liquid_fuel_emergency/lfe_act/Pages/lfe_act.aspx

to invoke the Liquid Fuels Emergency Act:

http://www.austlii.edu.au/au/legis/cth/consol_act/lfea1984213/

Part III of that Act sets out the directions the Federal Minister for Resources and Energy can make. In practice, it will mean petrol rationing. When that happens, long distance commuters on toll-ways will be forced to car-pool to save on fuel. That will immediately reduce toll revenue and endanger the repayment of interest and capital on debt.

6 Why the Sydney Metropolitan Strategy is totally flawed

6.1 Population Scenarios

The size of Australia's future population growth including immigration will be largely determined by these events:

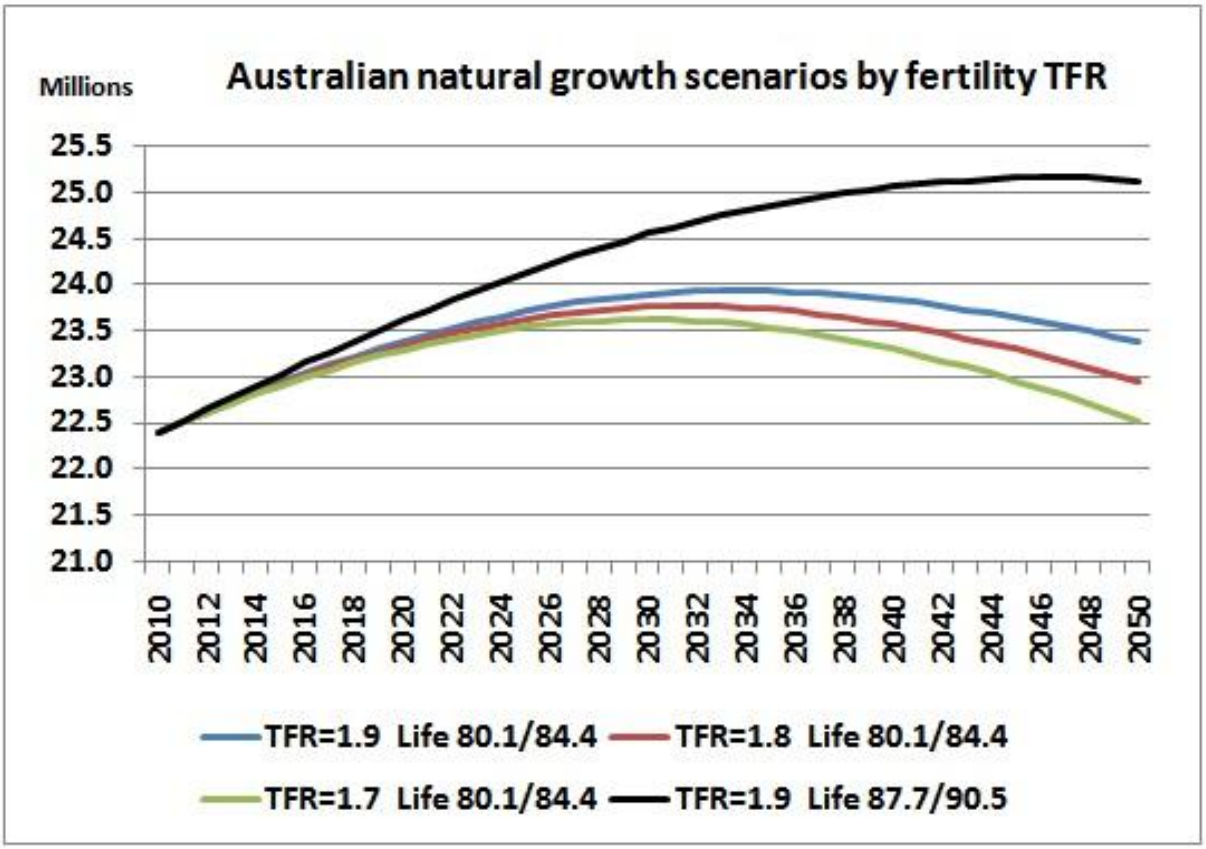
1. Fuel shortages after peak oil which started in 2005
2. Food shortages due to failure of governments to prepare for declining oil production
3. Power shortages after global warming events will have forced us to abandon coal (2020)
4. Sea level rises from global warming impacting an coastal cities
5. Climate refugees settling in the North and starting agriculture there

The next oil crunch is predicted for 2012,
http://peakoiltaskforce.net/

which will see a replay of events in 2007/08 predicted by Matthew Simmons in 2005:

„Twilight in the Desert, the coming Saudi Oil Shock and the World Economy"
http://www.simmonsco-intl.com/files/Twilight%20in%20the%20Desert%20Presentation.pdf

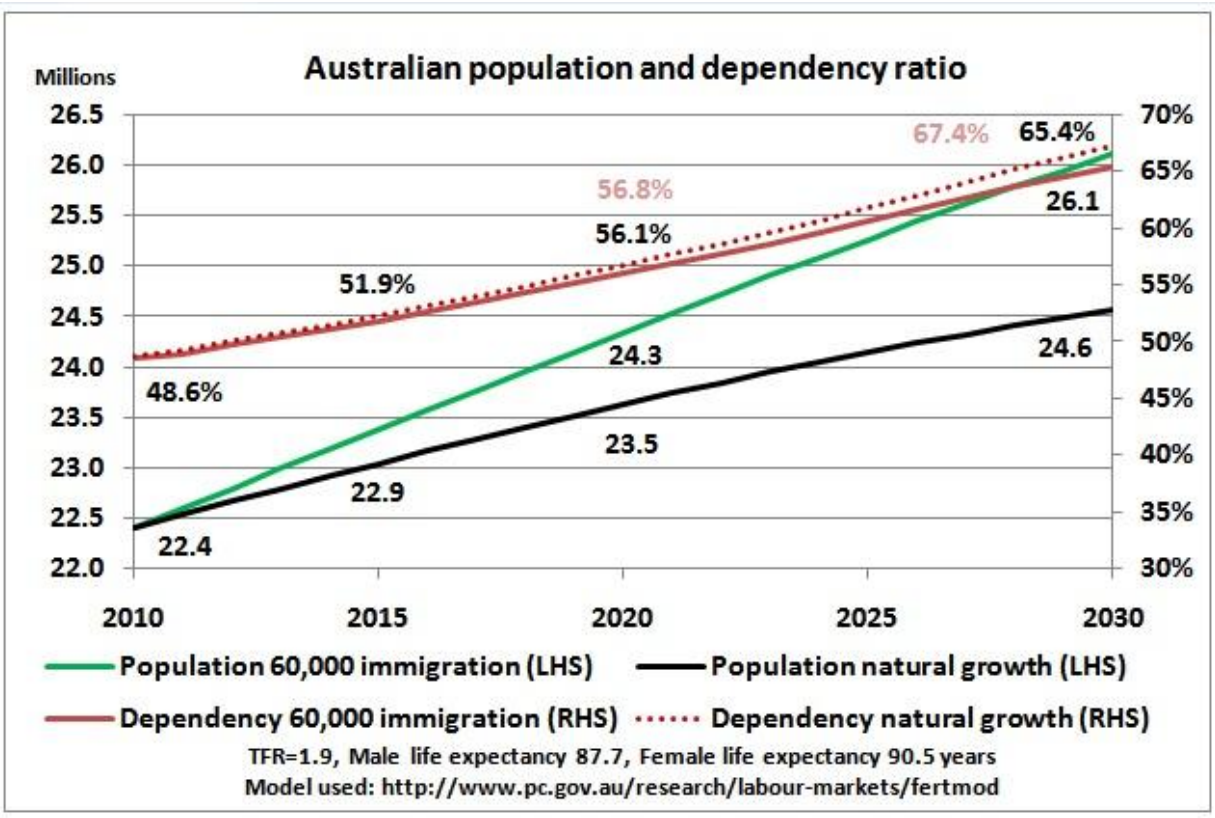
It will morph into a global oil crisis which will uncover the truth about OPEC's paper barrels. This will trigger another financial melt-down, possibly also another peak oil war. At that point Australian motorists will understand that every new arrival will mean longer petrol lines at filling stations. That will be the end of a free choice in immigration levels.



The only given in future population development is natural population growth. Assuming current trends (fertility, improving life expectancy) and barring other unforeseen Black Swan events like bird flue etc. Australia's existing population of 22 million will grow and peak between 2040 and 2050 at around 25 million.

But even that is not certain. It is likely that life expectancy stays at present levels due to funding problems in the health system and heat waves from global warming. Under such an assumption population will peak between 2030 and 2040 at around 23.5 - 24 million depending on fertility rates. For Sydney, this would translate into a growth of between 280 and 390 thousand by 2030.

Whatever immigration governments decide upon in the last years of free choice will add to the problems under (1) and (2) above. Assuming a recession type level of 60,000 pa. until 2020, the additional population to be planned for in the next 10 years is just 1.9 million in this coming decade.



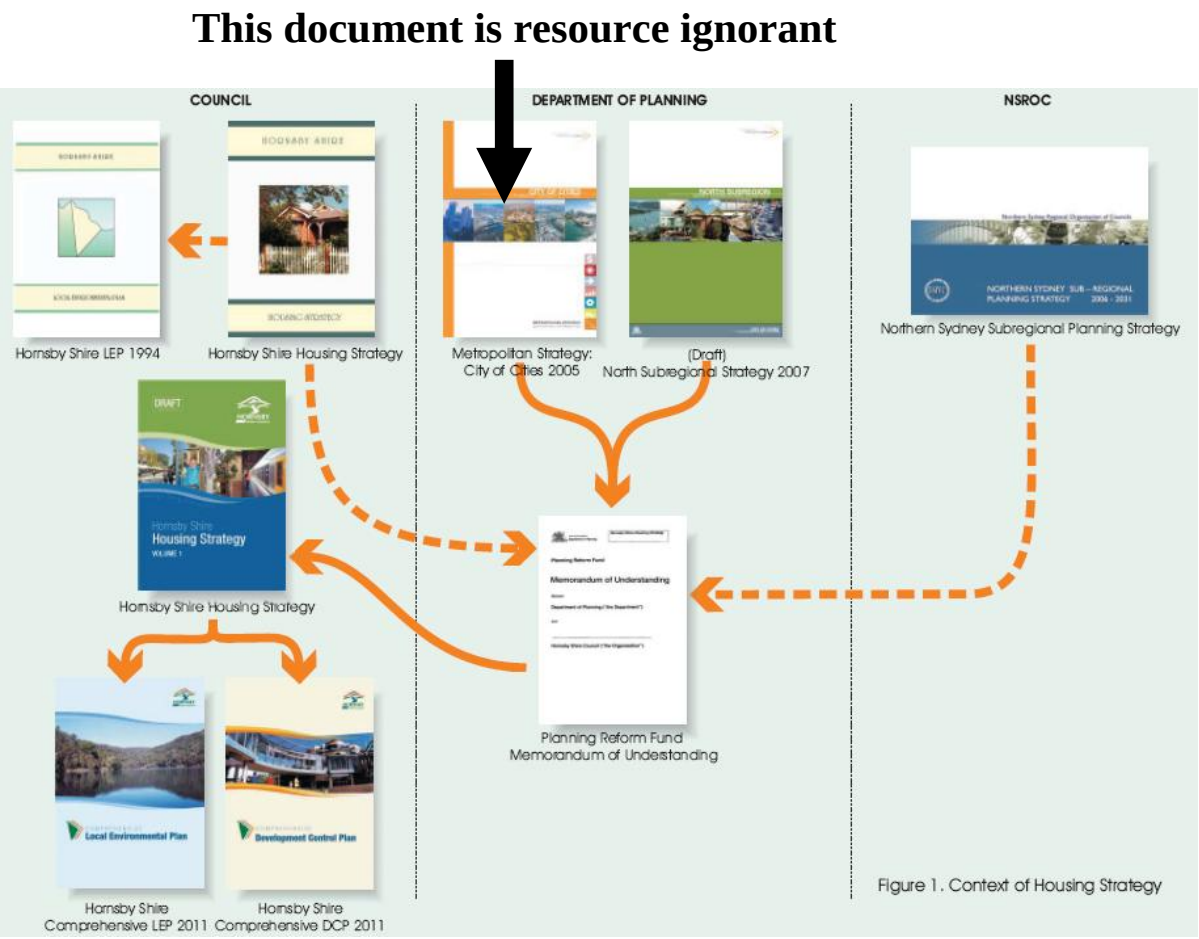
The public should not be pushed into thinking, accepting and internalising that we are going to have a population growth bonanza, as pushed by the real estate industry. Although there are many uncertainties, one thing is for sure: the current population debate with a planning horizon 2050 is totally academic.

Therefore, the assumptions of the Sydney Metropolitan Strategy are totally unrealistic.
More details on population projections can be found here:

9/4/2010
Australian Population Scenarios in the context of oil decline and global warming
http://www.crudeoilpeak.com/?p=1300

Recommendation: A realistic population projection should be done first instead of setting arbitrary dwelling unit targets.

6.2 Planning hierarchy omits resource analysis



5 years ago, during a seminar on the Metropolitan Strategy I asked the representative of the Planning Department: "Have you calculated, which physical energy resources in

(1) million barrels oil
(2) million m3 natural gas
(3) million tons coal

you need to

(a) build, and
(b) on an annual basis operate

all facilities as envisaged under your plan?

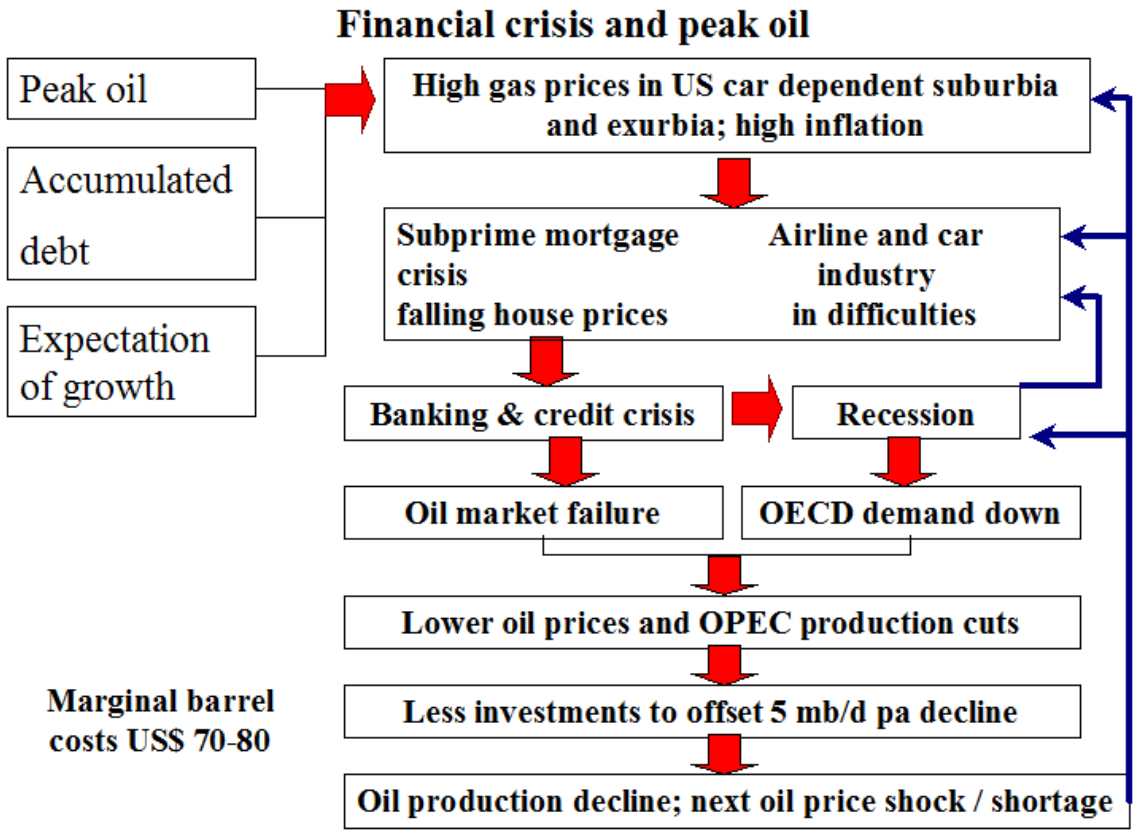
The answer was: "No".

In the meantime, we had peak oil and still the same plan is presented, this time by the Major Cities Unit of Infrastructure Australia in a recent presentation at the Sydney Uni: http://www.usyd.edu.au/news/93.html?eventid=5694

Some words on climate change and sustainability have been included but they do not seem to have materially influenced the physical planning targets.

Conclusion: All documents which are based on the Metropolitan Strategy are ignorant of peak oil, the financial crisis (which was triggered by peak oil) and global warming. Their objectives of perpetual growth are completely inconsistent with declining oil production, growing debt and the need to reduce CO2 emissions.

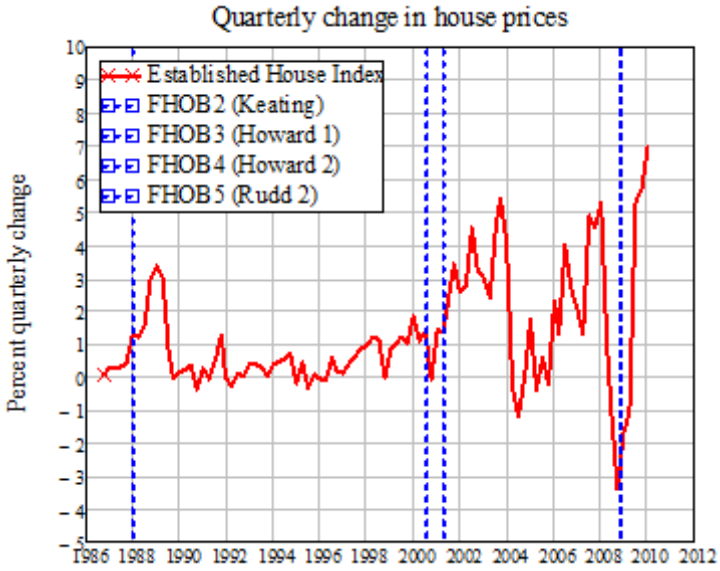
6.3 Financial crisis will not go away



Top: The world economy may have entered a vicious cycle in which financial crisis, recession, declining oil production and new oil price shocks could lead to a downward spiral steeper than dictated by oil geology.

Prof. Steve Keen's debtwatch site: http://www.debtdeflation.com/blogs/

Debt watch #44 April 2010: Quarterly house prices are not normal



http://www.debtdeflation.com/blogs/2010/04/06/debtwatch-no-44-april-2010-house-prices-are-not-normal/

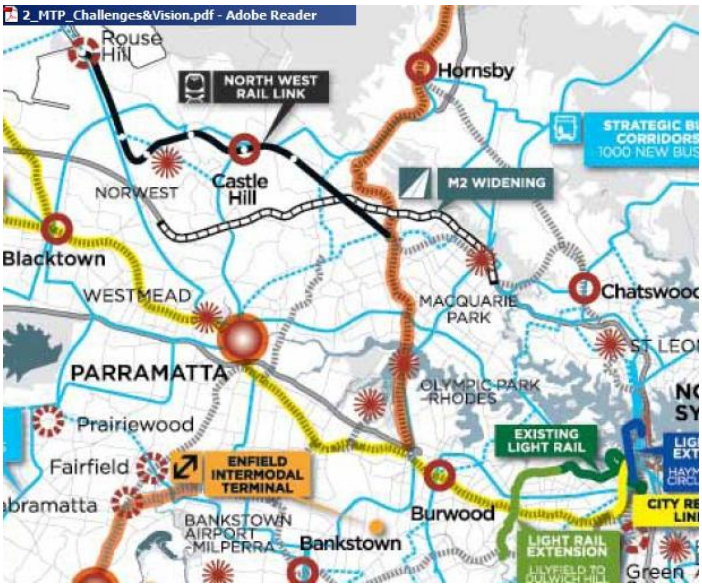
"I think it is a mistake to assume that a riskless, easy, guaranteed way to prosperity is to be leveraged into property. It isn't going to be that easy." (RBA Governor Glenn Stevens, Sunrise Program March 29 2010)

http://www.businessspectator.com.au/bs.nsf/Article/House-prices-are-not-normal-pd20100406-495DK?opendocument&src=rss

The European debt problem means for Australia that housing loans will be much more difficult to obtain. Where will the finance come from for all those new subdivisions in the North West? That will impact on traffic forecasting for the M2.

6.4 Cancellation of Epping – Parramatta rail link

The NSW government has cancelled the North West Rail Link – due to budget problems which will continue as highlighted above.

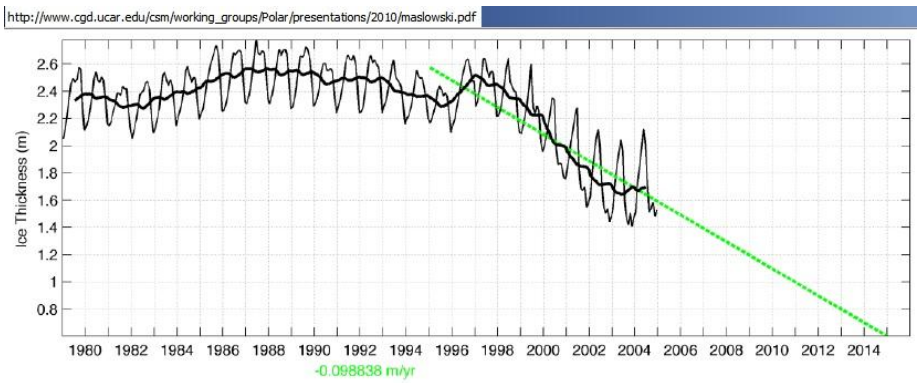


http://www.nsw.gov.au/metropolitantransportplan

Rail on the M2 and M7 could now fulfil that function.

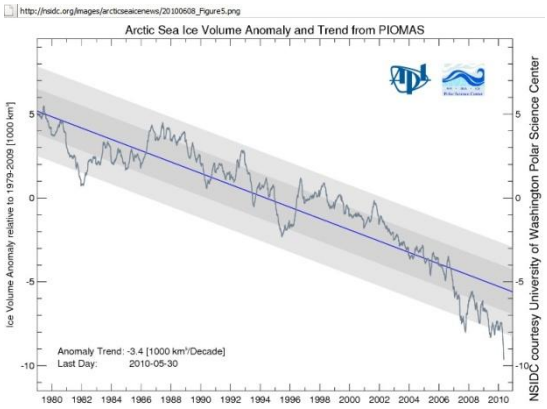
7 Global warming update

2015 The Arctic summer sea ice is just 60 cm thick, according to a February 2010 study from Dr. Maslowski

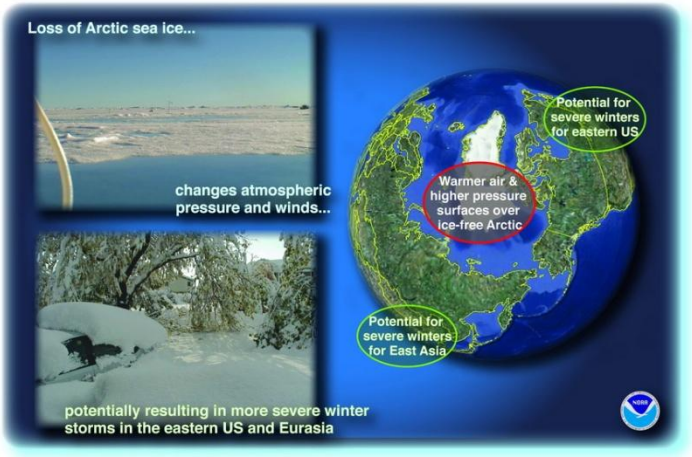


http://www.cgd.ucar.edu/csm/working_groups/Polar/presentations/2010/maslowski.pdf

The June 2010 report of the NSIDC >>>



http://nsidc.org/arcticseaicenews/2010/060810.html has a link to PIOMAS which shows the Arctic sea ice VOLUME is now 2 standard deviations below a linear trend >>

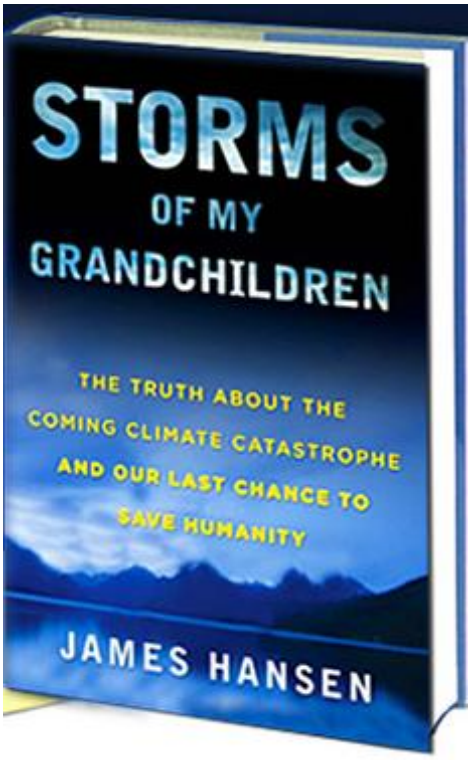


<< There will be dramatic weather changes on the Northern hemisphere like the US snow storms

http://www.arctic.noaa.gov/future/impacts.html

Tipping elements in the Earth's climate system (National Academy of Sciences of the USA) *"We conclude that the greatest (and clearest) threat is to the Arctic with summer sea-ice loss likely to occur long before (and potentially contribute to) GIS melt. Tipping elements in the tropics, the boreal zone, and West Antarctica are surrounded by large uncertainty and, given their potential sensitivity, constitute candidates for surprising society"*
http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2538841

NASA climatologist Hansen published a book in end 2009 entitled "Storms of My Grandchildren, The truth about the coming climate catastrophe and our last chance to save humanity"
http://www.stormsofmygrandchildren.com



Here are some extracts from a Lateline interview on this book:

TONY JONES: Now you're accusing governments of lying through their teeth even as they sign up to large emission reduction targets for Copenhagen. Why so pessimistic?

JAMES HANSEN: Well it's very easy to show that they are either lying or kidding themselves because all you have to do is look at the geophysical data. You know, the governments all around the world now agree that we're going to have to stabilise atmospheric composition, carbon dioxide in particular, at a relatively low level.

And if you look at how much carbon there is in oil, gas and coal, what you quickly realise is that oil and gas is already going to be enough to get us up to approximately the dangerous level. The only way we can solve the problem is by phasing out coal emissions and prohibiting unconventional fossil fuels like tar sands and oil shale.

But in fact, if you look at what's happening, the United States just signed an agreement with Canada to make a pipeline to carry oil from tar sands to the United States, and Australia is expanding its port facilities to export more coal.....

TONY JONES: Okay, well you're talking about what you find from the examination of ice core data. Is there a comparable period in history, the history of the planet that is, where warming accelerates due to these feedback mechanisms, and do you get much more rapid sea level rises during that period?

JAMES HANSEN: Yeah, well, in the relatively recent paleoclimate, coming from the last ice age to the present interglacial period that we've been living in for 10,000 years, when that icesheet, the big icesheet on North America began to disintegrate, sea level went up five metres per century. That's one meter every 20 years for several centuries. So once an icesheet begins to melt and begins to disintegrate, things can move very rapidly.....

TONY JONES: Okay, if I understand it correctly your argument is that climate change is not only about droughts, but that effect you're talking about will cause much more frequent and much more severe storms; is that correct?

JAMES HANSEN: Yeah, the, both extremes of the hydrologic cycle must increase, become more intense as the planet becomes warmer. At the times and places where it's dry, the increased heating of the surface makes it hotter and drier.

On the other hand, the oceans, the places where you have water, the increased heating evaporates more water, so the atmosphere holds more water vapour and at the times when you get rainfall you will get heavier rainfall and greater floods, so the extremes of the climate increase, the extremes of the hydrologic cycle.

Now as far as storms are concerned, the storms that are driven by latent heat - that means thunderstorms, tornados, tropical storms - the strongest ones will get stronger because there's more fuel. The water vapour provides the fuel for those types of storms.

Not all of them will be stronger, but the strongest ones will be stronger than the strongest ones now. **But in addition to that, and one thing I talk about in my book, Storms of my Grandchildren, I'm talking about the mid-latitude storms, the fact that as the icesheets on Greenland and Antarctica begin to melt more rapidly than they are now, they will discharge ice fast enough that it will cool the surface of the ocean, nearby ocean, in the North Atlantic and in the circum Antarctic Ocean.**

That will cause the temperature gradient between low latitudes and high latitudes to increase, so the storms that are driven by horizontal temperature gradients will become stronger, and these can be very damaging storms, this is like the storms that hit the Netherlands and England in the 1950.

They can do enormous damage. So, yes, it's true that all the storms that we can think of will become stronger as the climate becomes warmer.

TONY JONES: James Hansen, one final question: what's your estimate; how long do we have before the planet reaches one of those tipping points that you're talking about and global warming is irreversible? And if that happens, what are the consequences?

JAMES HANSEN: Well, you know, we are probably, we're already into the dangerous level of carbon dioxide and it's going to increase more. If we would phase out the coal emissions over the next 20 years, then CO2 would peak at something like 425ppm.

http://www.abc.net.au/lateline/content/2008/s2764523.htm

Lennox tornado:

Debris flies through the air as a tornado strikes Lennox Head on the northern NSW coast on June 3, 2010. (Ross Tuckerman of Lennox Head) (User submitted)

http://www.abc.net.au/local/photos/2010/06/03/2916813.htm

8 All these coal fired power plants have to be replaced by 2030

This chapter is to show the gigantic task ahead of us to replace NSW's coal fired power plants within the next 20 years.

8/3/2010

NASA climatologist James Hansen at Sydney Uni: "Australia doesn't agree now that they got to stop their coal, but they are going to agree.
I can guarantee you that within a decade or so because the climate change will become so strongly apparent that's going to become imperative"

http://www.usyd.edu.au/sydney_ideas/lectures/2010/professor_james_hansen.shtml

Let's go through the list of NSW main coal fired power plants to get an idea what this means:

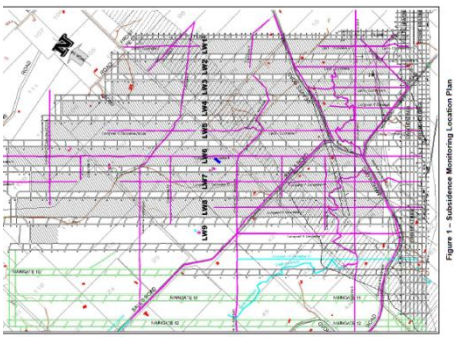
18 km

↑ Moonscape left behind around power stations Bayswater (4x660 MW) & Lidell (4x500 MW) = 4640 MW = 40% of NSW power

Lidell Power plant: 1971, 4 x 500 MW,
14.7 mt CO2 pa, 13.2 TWh pa

Bayswater Power plant: 1985, 4 x 660 MW,
8 mt coal pa, 18.2 TWh electricity pa,
19.8 mt CO2 pa .

Eraring power plant: 1982, 4 x 660 MW,
5.2 mt coal pa from Mandalong,

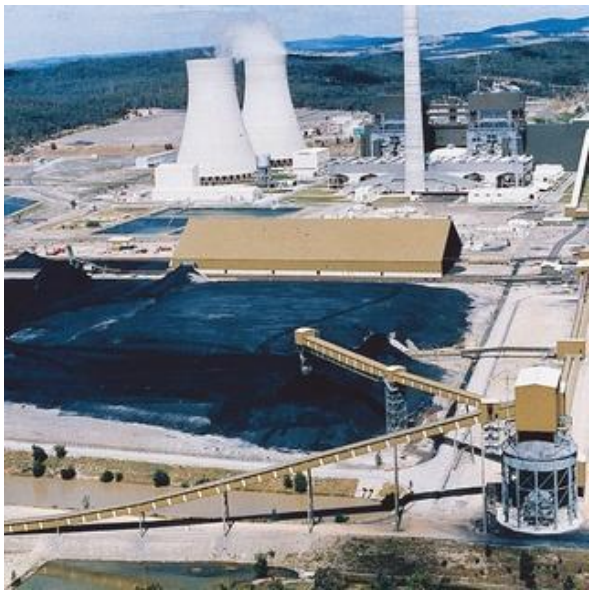


19.8 mt CO2, 18.5 TWh

<<< Longwall mining leaves behind Swiss cheese under prime agricultural land. Totally unsustainable: a 3 km long wall with 2-3 mt of coal is depleted in just 6 months.
There is an earthquake risk, too:
http://www.abc.net.au/7.30/content/2006/s1824101.htm
http://www.springerlink.com/content/r0765k18488l23lk/ http://carma.org/

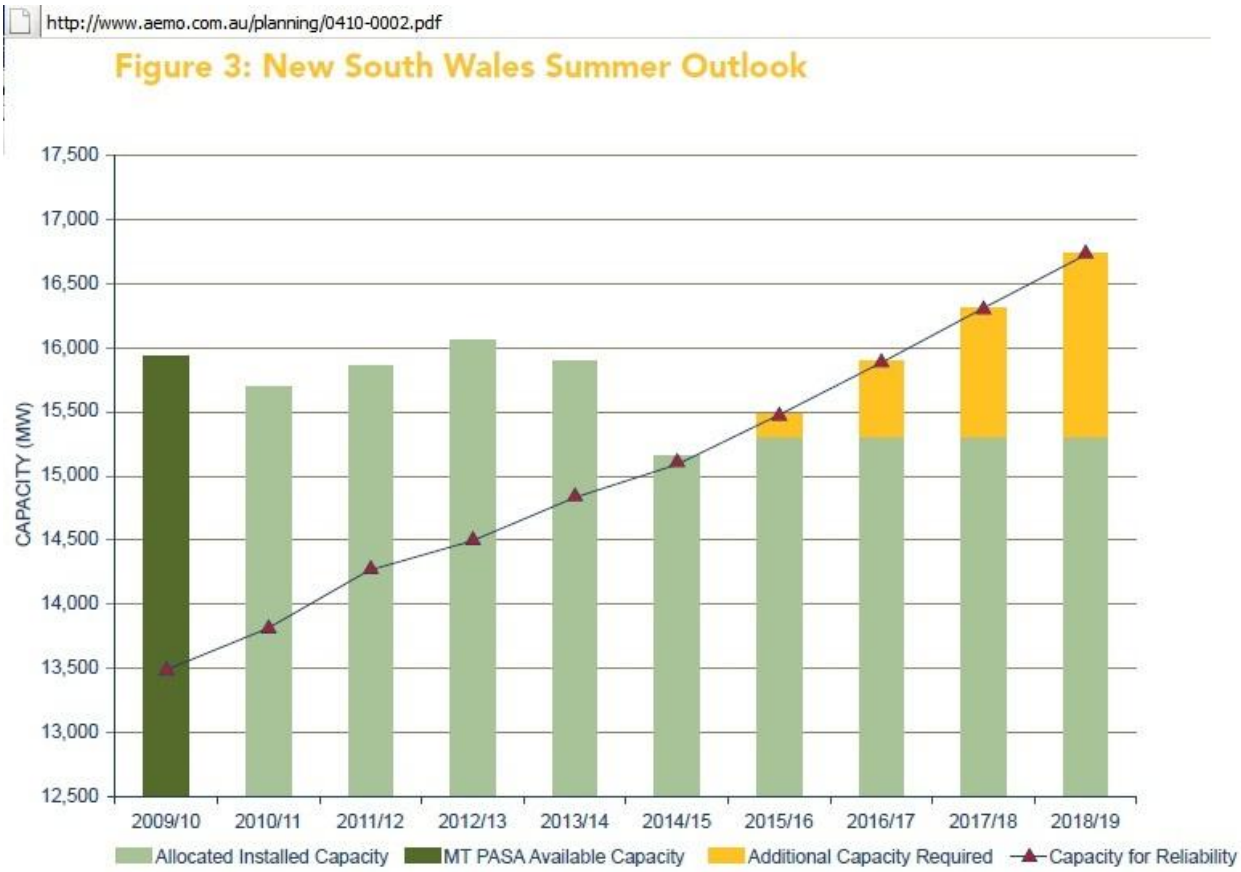
Vales Point Power Station, 1963, 2 x 660 MW ((phase B in 1978), 9.3 mt CO2 pa, 8.0 TWh

Wallerawang Power Station, 2 x 500 MW (1976),
7 mt CO2, 5.9 TWh,



Mt. Piper, 2 x 700 MW, 1992, 9.1 mt CO2,
7.8 TWh

We have to expect power shortages if demand is allowed to grow:



Global warming ignorant plans of the NSW government drive Delta to submit a proposal for new coal fired power plants.

A Mt Piper expansion (2 x 1000 MW) was approved in March 2010
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3325

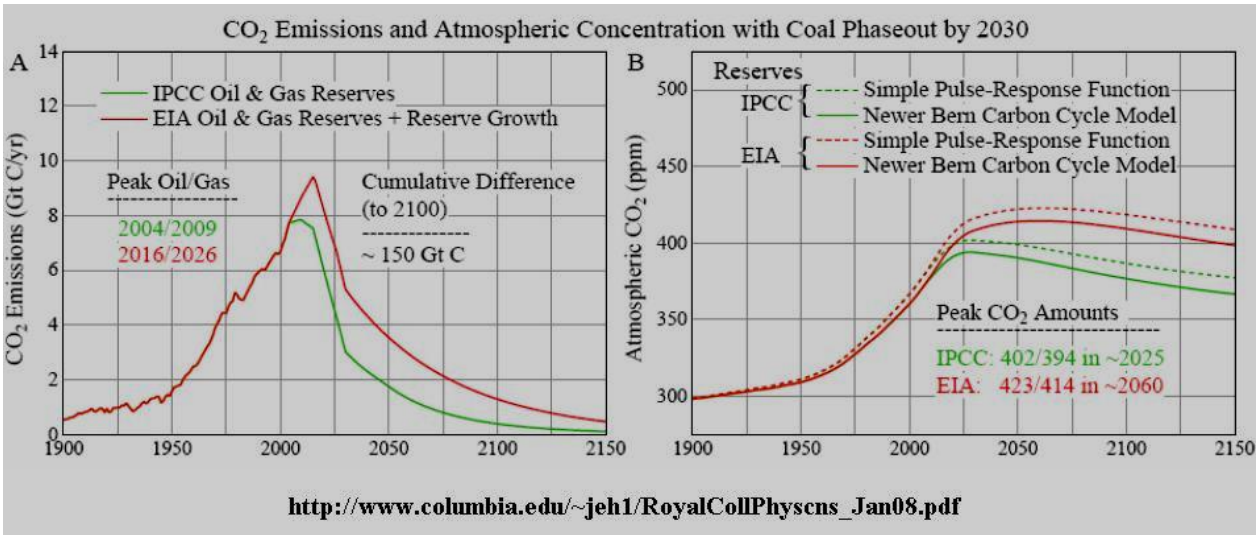
Trying to ignore the laws of nature will of course have costly consequences. As climatologist Hansen basically says: nature will force us with nasty climate change events to phase out coal by 2030. There is little use for Delta building a new coal fired power plant now.

Building new coal fired power plants means:

(1) Other, older power stations will have to be de-commissioned much earlier and faster to keep CO2 down as the total amount of emissions will have to be capped
(2) Funds invested will have to be written off as the lifespan of coal fired power plants is definitely not the usual 40 years
(3) Time is lost to get away from coal which nature will force on us anyway
(4) As declining oil production will continue to damage our financial system and the economy we may, already at the end of this decade, have a situation where not enough funds and not enough diesel are available for renewable energy projects.
(5) There will be many court cases about who will be legally responsible to pay compensation claims from damages caused by global warming (after the IPCC report 2007 all managers can be reasonably expected to be conversant with the main documents of that report and its implications)

Nature – which is more powerful than the coal industry - doesn't care about government approvals. It just responds to CO2 emissions.

This is Hansen's coal phase out plan, from http://www.columbia.edu/~jeh1/



Climate Situation

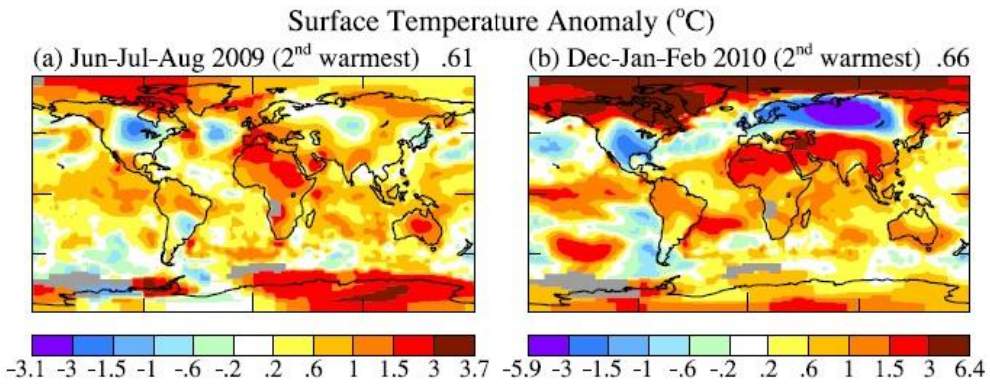
Our global climate is nearing tipping points. Changes are beginning to appear, and there is a potential for rapid changes with effects that would be irreversible – if we do not promptly slow fossil fuel emissions during the next few decades.

Tipping points are fed by amplifying feedbacks. As Arctic sea ice melts, the darker ocean absorbs more sunlight and speeds melting. As tundra melts, methane, a strong greenhouse gas, is released, causing more warming. As species are pressured and exterminated by shifting climate zones, ecosystems can collapse, destroying more species.

We already have caused atmospheric carbon dioxide to increase from 280 to 387 ppm (parts per million). What science has revealed in the past few years is that the safe level of carbon dioxide in the long run is no more than 350 ppm. The optimum CO_2 level to support civilization may be less than 350 ppm, but more precise knowledge is not needed immediately for the purpose of establishing present policies.

The conclusion that CO_2 must be reduced to a level <350 ppm was startling at first, but obvious in retrospect. Earth's history shows that an atmospheric CO_2 amount of say 450 ppm eventually would yield dramatic changes, including sea level tens of meters higher than today. For reference, 450 ppm yields global warming about 2°C (3.6°F) above the preindustrial level. Such a level of atmospheric CO_2 and global warming imply that we would hand our children and grandchildren a condition that would run out of their control, a situation that should be unacceptable to humanity.

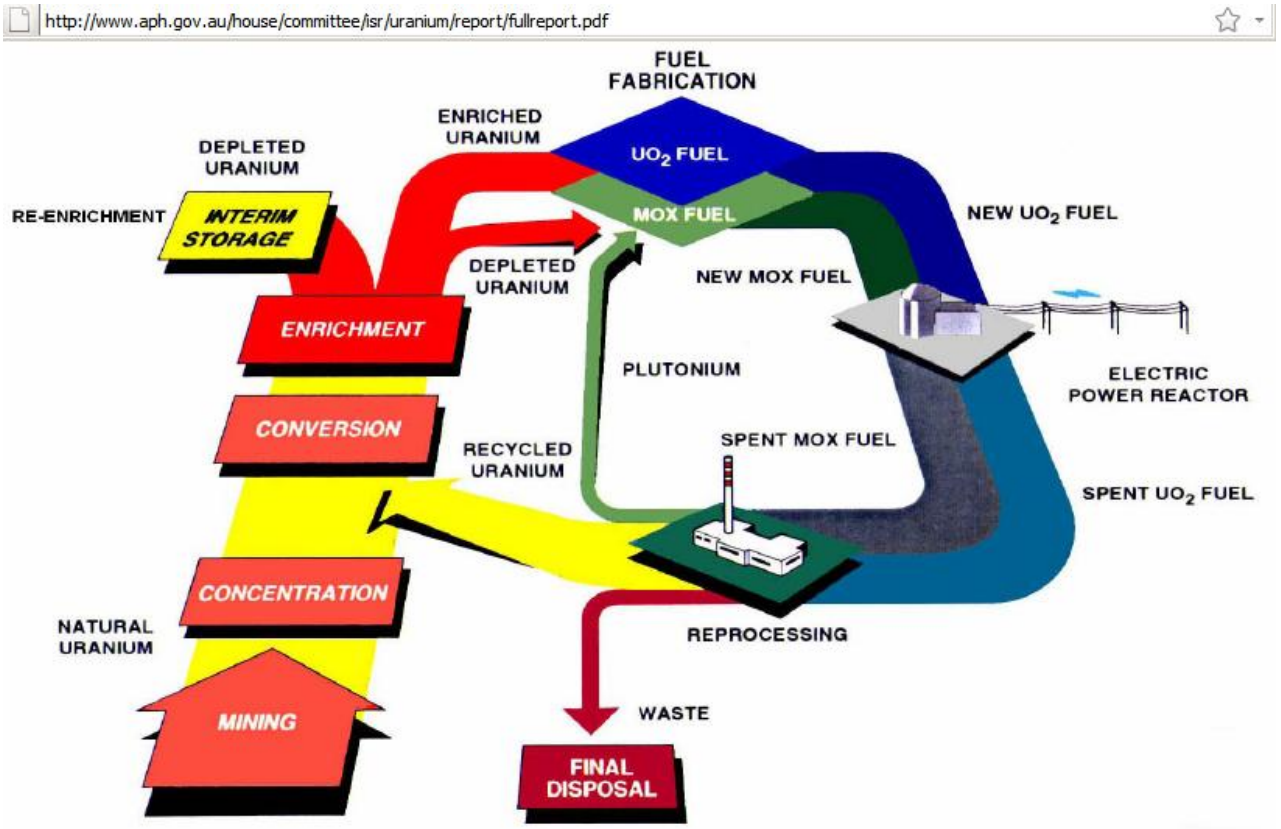
http://www.columbia.edu/~jeh1/mailings/2009/20090713_Strategies.pdf



<< Big surprises are waiting for society as the Arctic warms (3 to 6 degrees plus). Hansen gives coal 10 years. That's how urgent it is to replace our coal fired power plants

9 Nuclear power

In November 2006, the Standing Committee on Industry and Resources of the House of Representatives wrote a report entitled "Australia's uranium – green house friendly fuel for an energy hungry world" http://www.aph.gov.au/house/committee/isr/uranium/report/fullreport.pdf



Nuclear power would require to build up the above nuclear fuel cycle (page 24 from above report). The Committee did not elaborate how long it would take to establish this system including nuclear power plants in Australia itself.

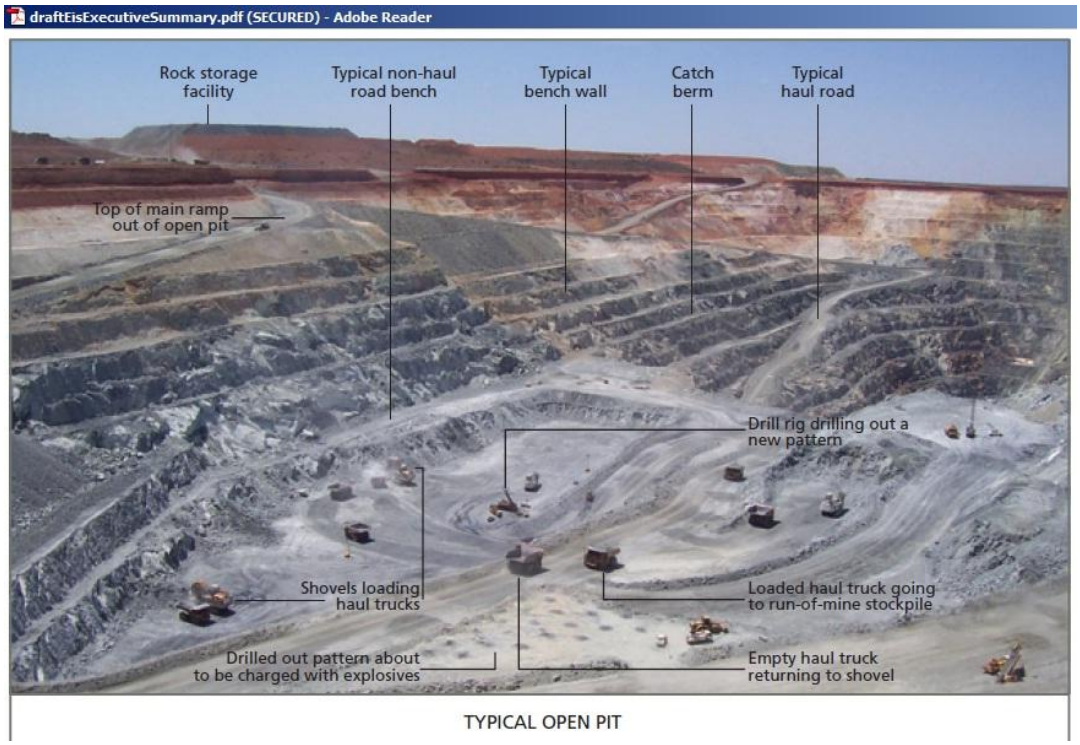
One critical issue not considered in uranium mining are the huge quantities of diesel needed. The Olympic dam expansion requires diesel supplies to go up 16 fold. Overburden has to be removed over a period of 5 years to establish an open pit operation and before the 1st ore can be mined. This process will continue, at varying rates, over a period of 40 years.

odxEisChapter5DescriptionOfTheProposedExpansion51To57.pdf (SECURED) - Adobe Reader

Table 5.2 Indicative major infrastructure demands

Expansion requirement	Current operation	Proposed expansion	Combined operations
Water demand (average GL per annum/ML per day)	13/37[1]	70/183[1]	83/220[1]
Electricity consumption (MWh per annum)	870,000	4,400,000	5,270,000
Diesel usage (ML per annum)	26	403	429
Peak construction/shutdown workforce	1,400	6,000	1,400
Ongoing operational workforce	4,150	4,000	8,000
Sulphur usage (tpa)	80,000	1,720,000	1,800,000

[1] Excludes additional water demand from off-site infrastructure.

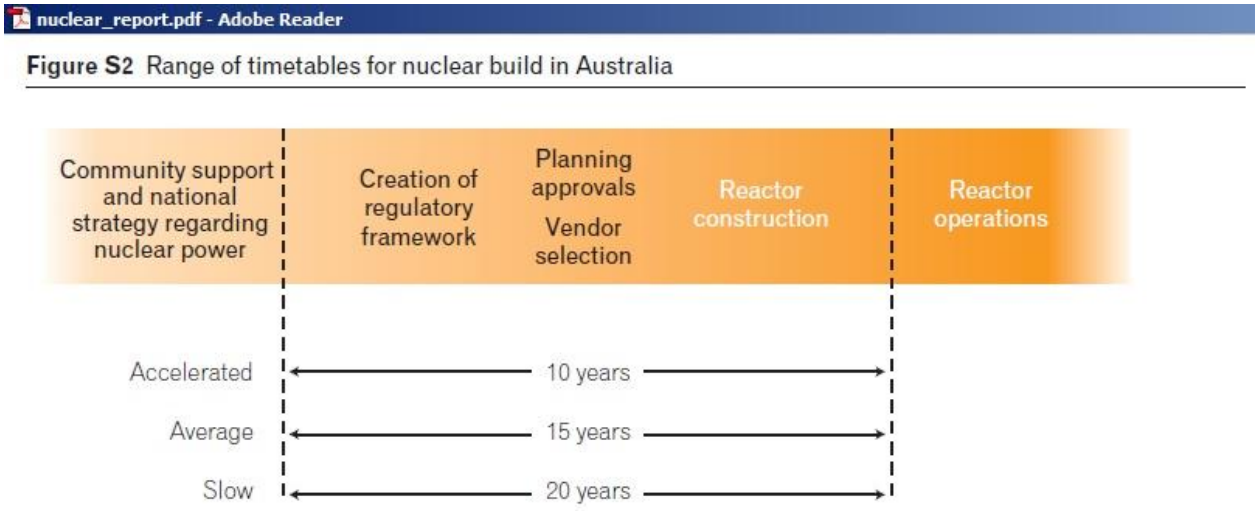


http://www.bhpbilliton.com/bbContentRepository/docs/odxEisChapter5DescriptionOfTheProposedExpansion51To57.pdf

In December 2006, the final UMPNER (Uranium Mining, Processing and Nuclear Energy Review) report was published, which is now archived in Pandora. http://pandora.nla.gov.au/tep/66043 It proposed 25 nuclear power plants until 2050

The submissions are here:
http://web.archive.org/web/20070830182528/www.pmc.gov.au/umpner/submissions.cfm

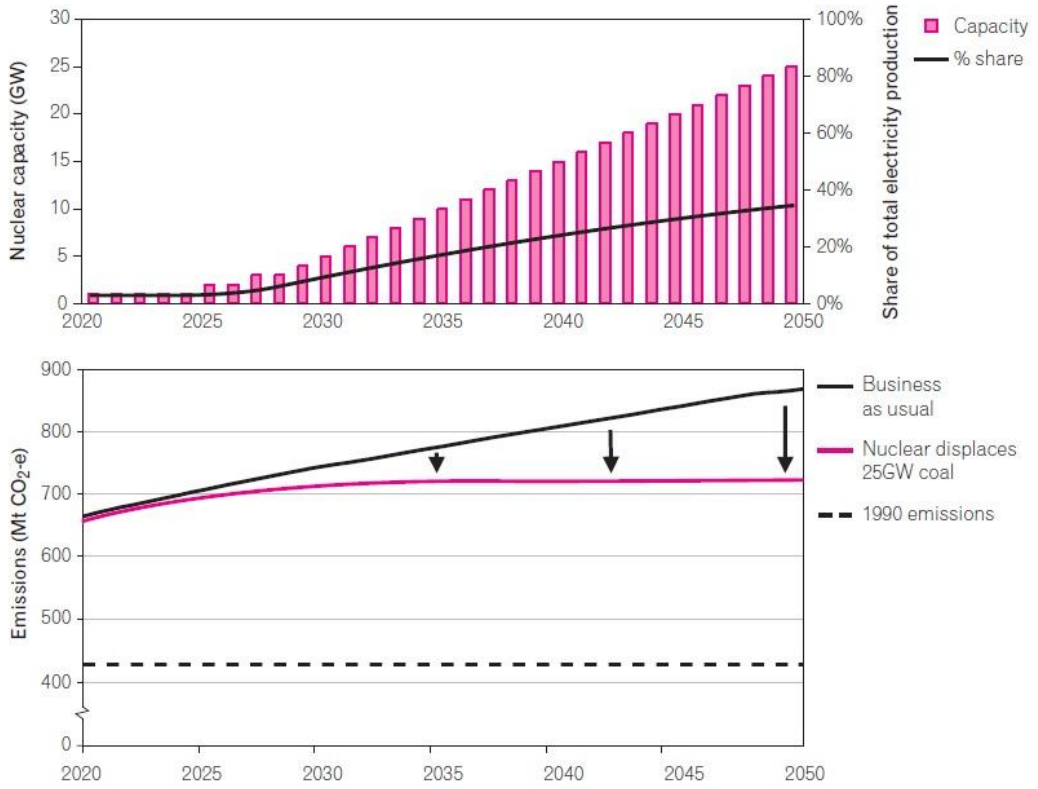
This is the timeframe the review assumed for the implementation:



The 1st NPP could have been in operation by 2020 It is to be noted that at present there is no community support for nuclear power. Therefore, the review did not propose locations of NPPs but these would have to be near to big consumers (grid stability), the coast (cooling water), but safe from future sea level rises **It is a pre-condition for community support for nuclear power that the Government told the electorate the truth about peak oil and the urgency to get rid of coal.**

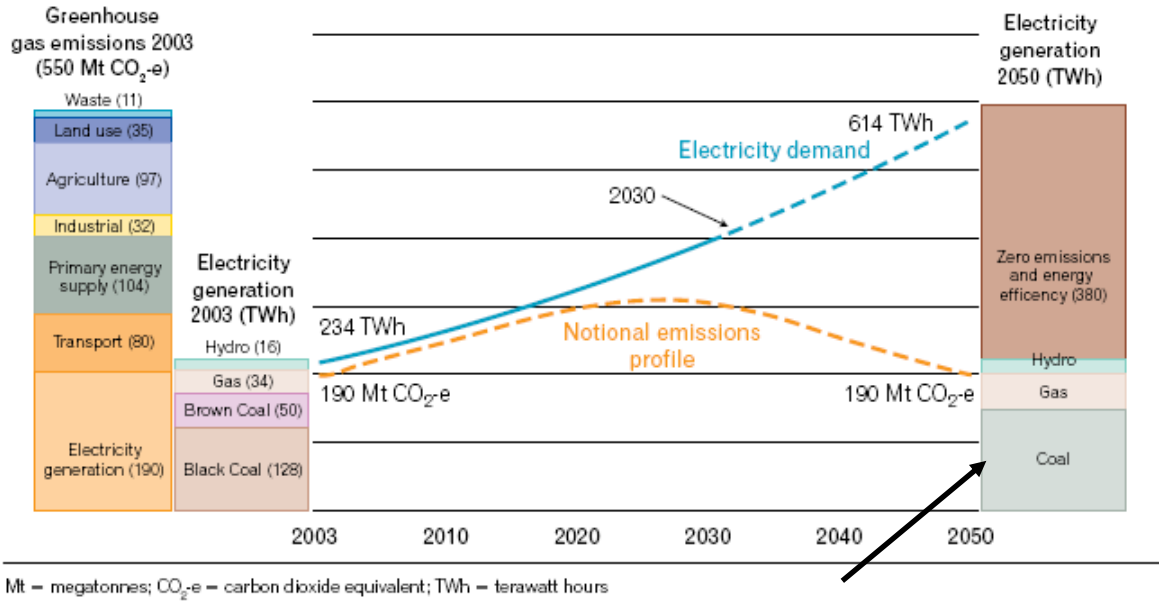
nuclear_report.pdf - Adobe Reader

Figure S3 Potential emission cuts from nuclear build — illustrative scenario to 2050



Note in Figure S3 that the proposal would NOT help reducing emissions in the critical period up to 2030 as those NPPs do not replace coal but are added to provide for growth in energy demand. Only at a later stage would existing coal fired power plants be replaced as they reach the end of their life. Fig S1 shows greenhouse gas emissions and electricity generation in 2003 and 2050. We can see that in this perpetual growth scenario coal is still burnt in 2050 in current quantities.

Figure S1 Electricity generation and greenhouse emissions — a scenario to 2050



Mt = megatonnes; CO_2-e = carbon dioxide equivalent; TWh = terawatt hours

http://pandora.nla.gov.au/pan/66043/20070301-0000/www.pmc.gov.au/umpner/docs/nuclear_report.pdf The review did not consider peak oil and declining oil production, its economic impact and any transition scenarios necessary to replace oil.

10 Solar and Wind Power plants

Olmedilla is the world's largest PV plant, in Spain, at 39°, approximately the equivalent Southern latitude of Melbourne. 2008 cost: $530 million. Compare the data below to 8,300 GWh pa of a 1 GW coal fired power plant and you get an appreciation of how difficult it will be to replace them with solar power. There is a factor of 100 involved here, both in energy output and power density.

Name	Peak power	Annual output	panels	Power density	Capacity factor	Site area
Olmedilla	60 MW	85 GWh	160,000	9 W/m2	16%	108 ha

Seville's solar thermal plants (planta solar) PS 10 and PS 20 (latitude 37°)

Name	Peak power	Annual output	Mirror area	Power density	Capacity factor	Site area
PS 10	11 MW	24.3 GWh	7.4 ha	37 W/m2	25%	65 ha
PS 20	20 MW	48.6 GWh	15 ha	37 W/m2	25%	90 ha

http://www.masterresource.org/2010/05/smil-density-new-renewables-iv/
Power density primer: http://www.vaclavsmil.com/wp-content/uploads/docs/smil-article-power-density-primer.pdf

https://climatefriendly.com/skins/files/file/pdf/project_page/Lake_Bonney_Wind_Farm_Project_Profile.pdf?PHPSESSID=d1gaovfr8o0lnvlv2n7ucnalh4

The largest wind farm in Australia is Lake Bonney with 46 turbines @ 1.75 MW and 53 turbines @ 3 MW, giving a rated capacity of 240 MW. Using a capacity factor of 0.3 this would be 72 MW.

Let's assume wind would have to replace just 1 out of 8 NSW coal fired power plants, Lidell, at 4 x 500 MW:

We'd need to build 2,000 MW / 72 MW = 28 Lake Bonney sized wind farms with a total of 2,800 turbines.

At the end of 2008, there were 756 operating wind turbines in Australia, mostly between 1 and 3 MW rated capacity.

Wind power is one of the cheapest renewable energy sources. A larger scale implementation is highly reliant on government policy & electricity prices. The "cheap" coal based electricity in Australia (without external costs from damage to the climate) has so far slowed the growth rate of wind power.

The intermittency of wind poses problems with regard to storage & supply. Although a widely dispersed array of wind farms can reduce this problem, a lack of interconnection and a small grid capacity imposes wind power penetration limits that can only be realistically addressed with pumped storage hydroelectricity at the current level of available technology.

11 Potential energy sources for electric cars (off-peak)

Better Place writes: *"First, an electric vehicle system can take advantage of underutilized electricity….U.S. government research shows that 73% of its domestic light vehicles could be replaced by EVs without requiring any additional capacity when the EV system is complemented with a "smart grid" that optimally manages the flow of available electricity"*
http://www.betterplace.com/opportunity/energy/

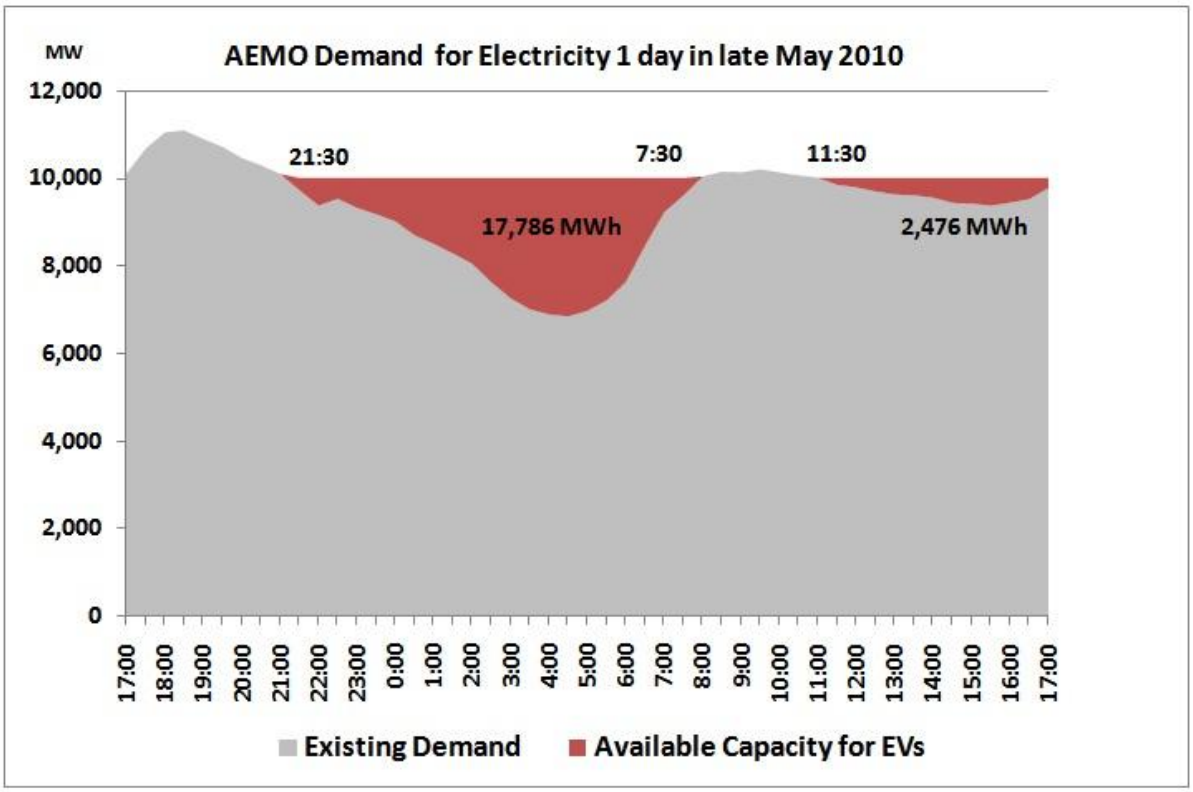
Let's check on this. There are approximately 2.9 million passenger vehicles in NSW.
http://www.rta.nsw.gov.au/publicationsstatisticsforms/downloads/statiregis_dl6.html

The 2005 VKT for the Greater Metropolitan Area was 106.807 million kms per day for 2.876 million cars equal to 37.14 kms per passenger car per day. For 2.897 million NSW cars in 2009 that would be a total of 108 million VKT.
http://www.transport.nsw.gov.au/sites/default/file/tdc/documents/TransFigures-2007.pdf?q=tdc/documents/TransFigures-2007.pdf

This would give requirements for 2 different EV models of:

Low:	108 mill km x 130 Wh/km = 14,040 MWh per day
High:	108 mill km x 180 Wh/km = 19,400 MWh per day
CSIRO:	108 mill km x 200 Wh/km = 21,600 MWh per day

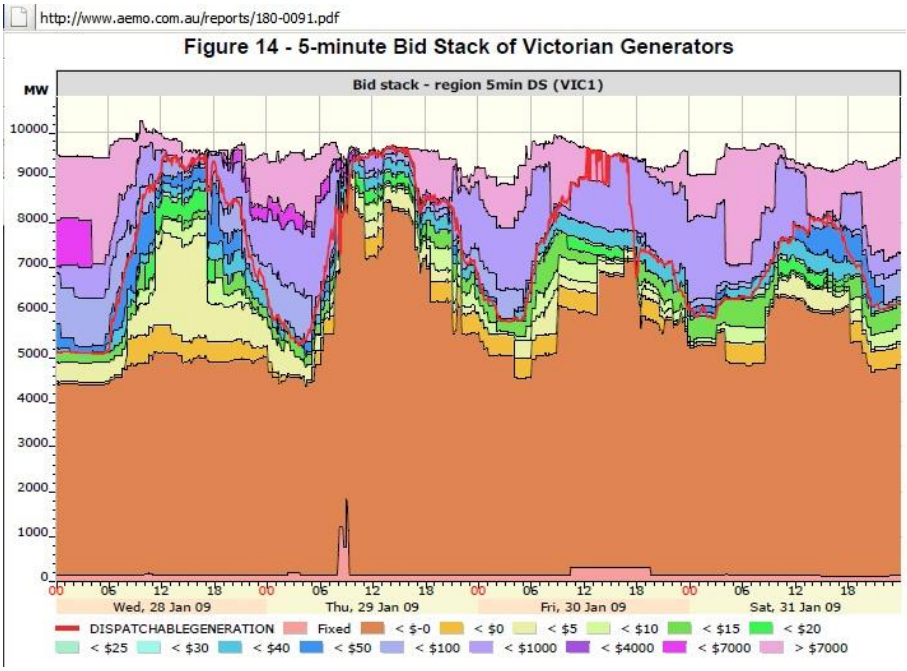
Using AEMO demand data for a winter day we find 17,786 MWh available between 21:30 and 7:30 which would therefore not be sufficient for the whole fleet.



From: http://www.aemo.com.au/data/GRAPH_30NSW1.html

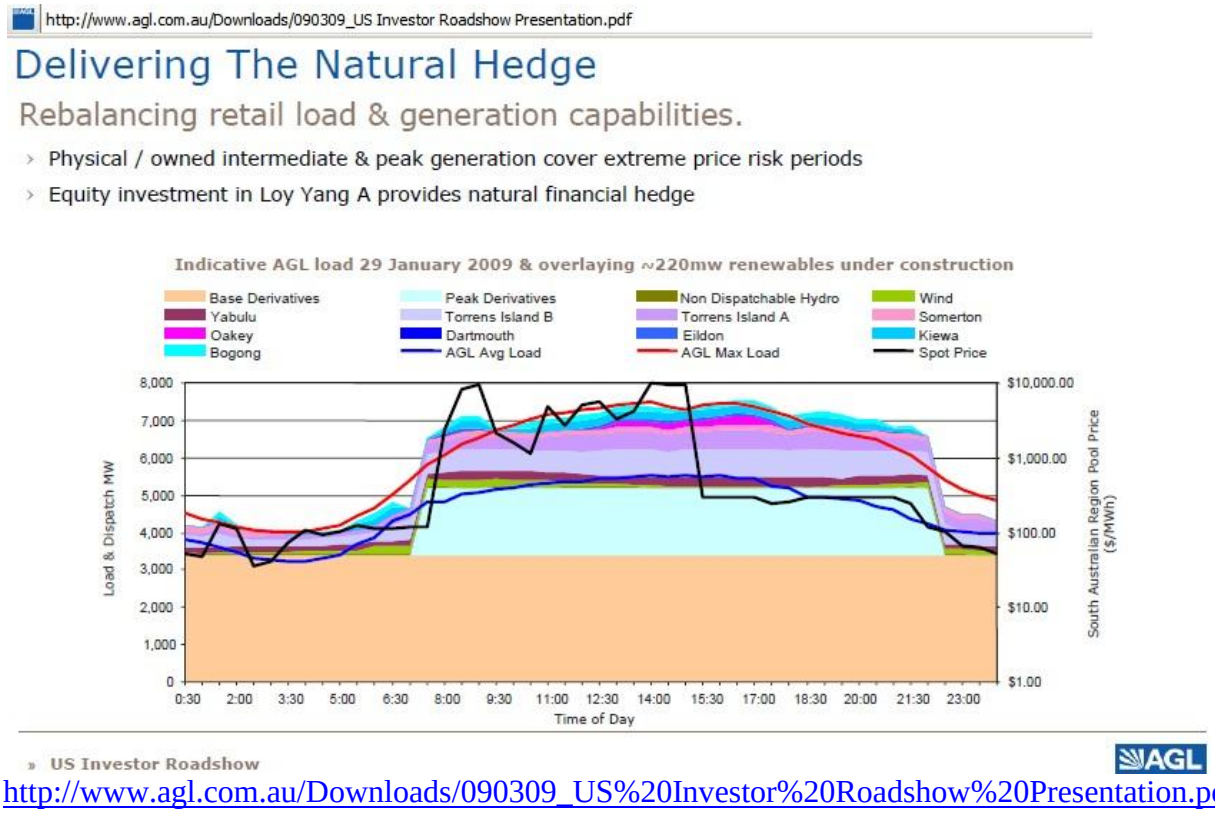
Moreover, assuming a 24 KWh battery storage, 2.9 million cars would need 69,600 MWh if re-charged fully from empty batteries. Obviously, motorists could not be allowed to do that.

Not only that, but, the availability of off-peak power is not guaranteed. The following graph shows an example from Victoria in the hot January 2009. With global warming, this can only get worse. Drought reports are here: http://www.aemo.com.au/corporate/0400-0008.pdf



http://www.aemo.com.au/reports/180-0091.pdf

Another graph from the same period shows that demand is so high that base power is running at full capacity over the whole day, 24 hrs, and the day peak is supplied from many different sources. There is no surplus power from off peak power.

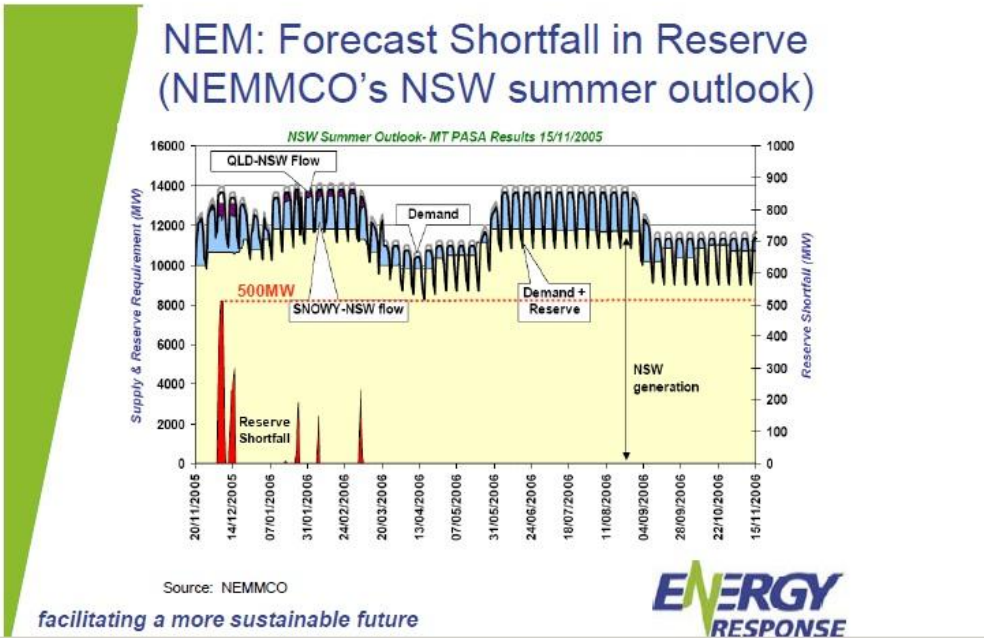


http://www.agl.com.au/Downloads/090309_US%20Investor%20Roadshow%20Presentation.pdf

A warning about an electricity shortfall was already given in 2006

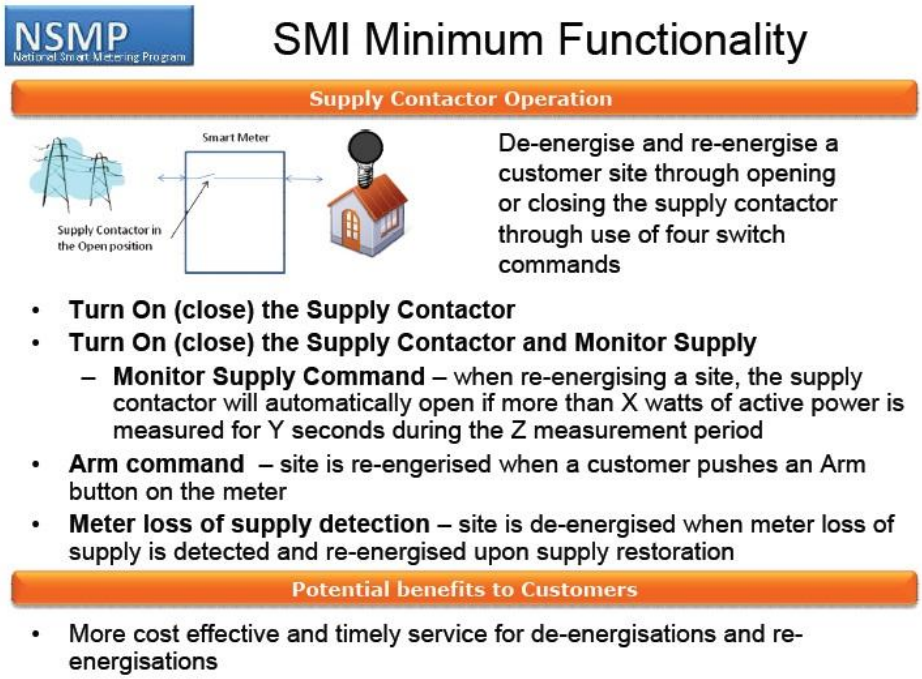
http://www.energyresponse.com/uploads/managing peak demand by m zammit.pdf

Also, for the first time since the formation of the NEM the New South Wales grid is running short of reserve and to a lesser degree so is Queensland as shown below.



http://www.energyresponse.com/uploads/managing%20peak%20demand%20by%20m%20zammit.pdf

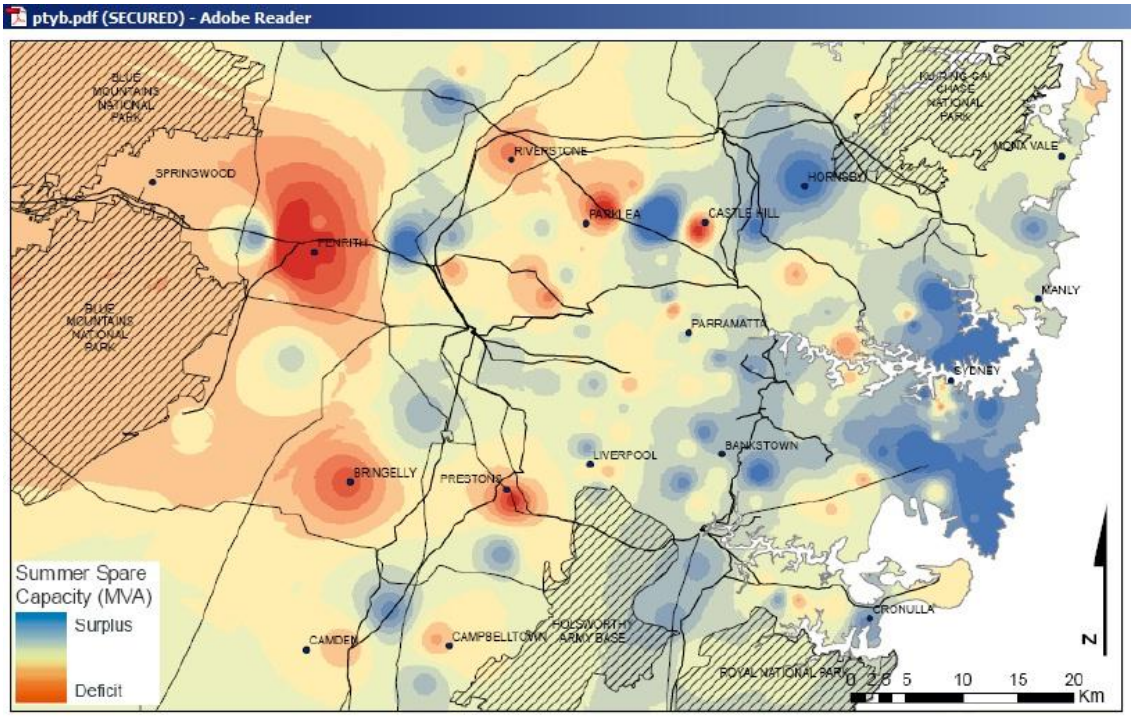
In any event the load curve is irregular over the off peak period so smart metering is absolutely necessary to limit the total amount of electricity drawn from the grid at night. This may vary from day to day and throughout the year depending on the season.



http://share.aemo.com.au/smartmetering/Document%20library/Smart%20meter%20background%20info/Presentation%20-%20MMI%20Conference%20-%2019%20May%202010.pdf

So there will be no freedom for motorists to re-charge whatever and whenever they like. Add the ambitious growth plans of the NSW government, all involving new power consuming

developments like Barangaroo and there could be big problems. We have also to consider the capacity of the local grid to cope with extra loads. From the intelligent grid report of the CSIRO this is Fig. 9.39 displaying deficit areas in Sydney.



http://www.csiro.au/science/Intelligent-Grid.html

For the catchment area of the M2 there are a couple of deficit areas, just where the long distance commuters live: Castle Hill, Parklea and Riverstone. As an example, on 8/6/2010, there was a 2.5 hr blackout at the Loftus Park transformer due to overload (West Epping).

Better Place continues: *"Second, EVs can alleviate the problems of intermittency, unpredictability and off-peak generation that have hindered the progress of renewable energy in the past"*

This refers to the battery storage. Let's have a look:

This image shows storage of just 24 batteries, equivalent to 24 x 24 = 576 KWh = 0.576 MWh. Let us assume that half of all EVs would use this facility in Sydney we would get 1.86 million cars x 0.5 x 37.14 kms x 200 Wh/km /24 KWh = 287,000 batteries in circulation. We can already visualize the fleet of semi trailers necessary to bring battery packs for repairs and maintenance to huge depots around town, and all that while there are severe diesel shortages.

Better Place: "*Third, because EVs offer energy efficiency up to three times greater than that of gasoline-powered vehicles, EVs reduce the overall burden on energy resources."*

The energy efficiency advantage factor is only 2 as shown in following calculation:

Well to wheel fuel efficiency ICE (Internal Combustion Engine)

$$\frac{Fuel\ Efficiency\left(\frac{l}{km}\right) * Energy\ Content\left(\frac{MJ}{l}\right)}{Pumping\ Efficiency} = Well\ to\ Wheel\ Fuel\ Efficiency\ \left(\frac{MJ}{km}\right)$$

$$0.114\ \left(\frac{l}{km}\right) * \frac{34.66}{0.82}\left(\frac{MJ}{l}\right) \approx 4.81\left(\frac{MJ}{km}\right)$$

Well to wheel energy efficiency EV

$$\frac{Energy\ Efficiency\left(\frac{Wh}{km}\right) * 3.6/1000(\frac{MJ}{Wh})}{(1 - Transmission\ Loss) * Generator\ Efficiency} = Well\ to\ Wheel\ Fuel\ Efficiency\ (\frac{MJ}{km})$$

$$\frac{200\left(\frac{Wh}{km}\right) * \frac{3.6}{1000} * (MJ/Wh)}{(1 - 0.095) * 0.33} \approx 2.41\ (\frac{MJ}{km})$$

Therefore, the factor is:

$$\frac{4.81(\frac{MJ}{km})}{2.41\ (\frac{MJ}{km})} \approx 2$$

Although seemingly beneficial, in terms of our current electricity generation (coal based), this energy efficiency advantage does not translate into reduced emissions. We can calculate emissions for various cases:

11.4 ltr/100 km

$$0.114\left(\frac{l}{km}\right) * 2.3\left(\frac{kgCO2}{l}\right) = 0.2622(\frac{kgCO2}{km})$$

9 ltr/100 km

$$0.09\left(\frac{l}{km}\right) * 2.3\left(\frac{kgCO2}{l}\right) = 0.207(\frac{kgCO2}{km})$$

Hybrid 4.7 ltr/100 km

$$0.047\left(\frac{l}{km}\right) * 2.3\left(\frac{kgCO2}{l}\right) = 0.108(\frac{kgCO2}{km})$$

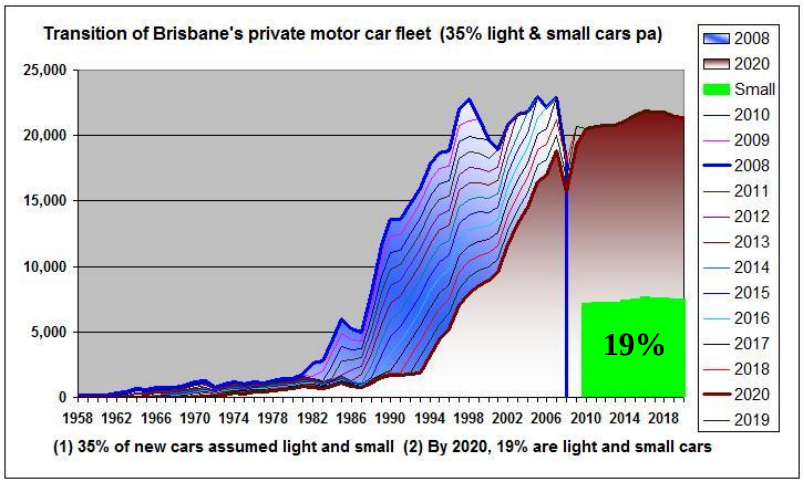
Electric car

$$0.2\left(\frac{kWh}{km}\right) * 1.06\left(\frac{kgCO2}{kWh}\right) = 0.212\ (\frac{kgCO2}{km})$$

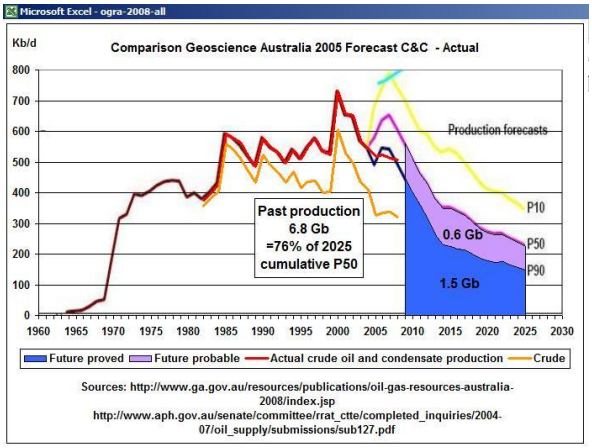
An electric car with electricity from coal produces twice the emissions of a hybrid car. And we swap oil dependency with coal dependency.

12 Problems with car fleet transitions - summary

1. Peak oil has already happened 2005-2008. We are in an emergency as we face declining oil production. Modelling of Brisbane's private car fleet (age distribution, graph >>) based on current behavioural patterns (which could only be changed by a fundamental oil shock) shows only 19% of cars could be "green" or electric cars by 2020. A reduction of fuel consumption at this percentage rate could be easily achieved by car pooling of long distance commuters.



2. Denial mode in governments and Parliaments will almost guarantee that the transport system will crash. In November 2009, the Senate voted down a peak oil and alternative fuels motion by 31:6 http://www.theoildrum.com/node/5977 13 Senators of 31 participated in the 2006 oil supply inquiry.
Immigration must be reduced to an absolute minimum otherwise all resource problems (water, oil, electricity, food supplies) will just be worsened. The expected population growth now assumed, accepted and unwittingly internalised by all planners (another growth bonanza) will NOT happen. The physical resources aren't there, neither the political will to acknowledge this.



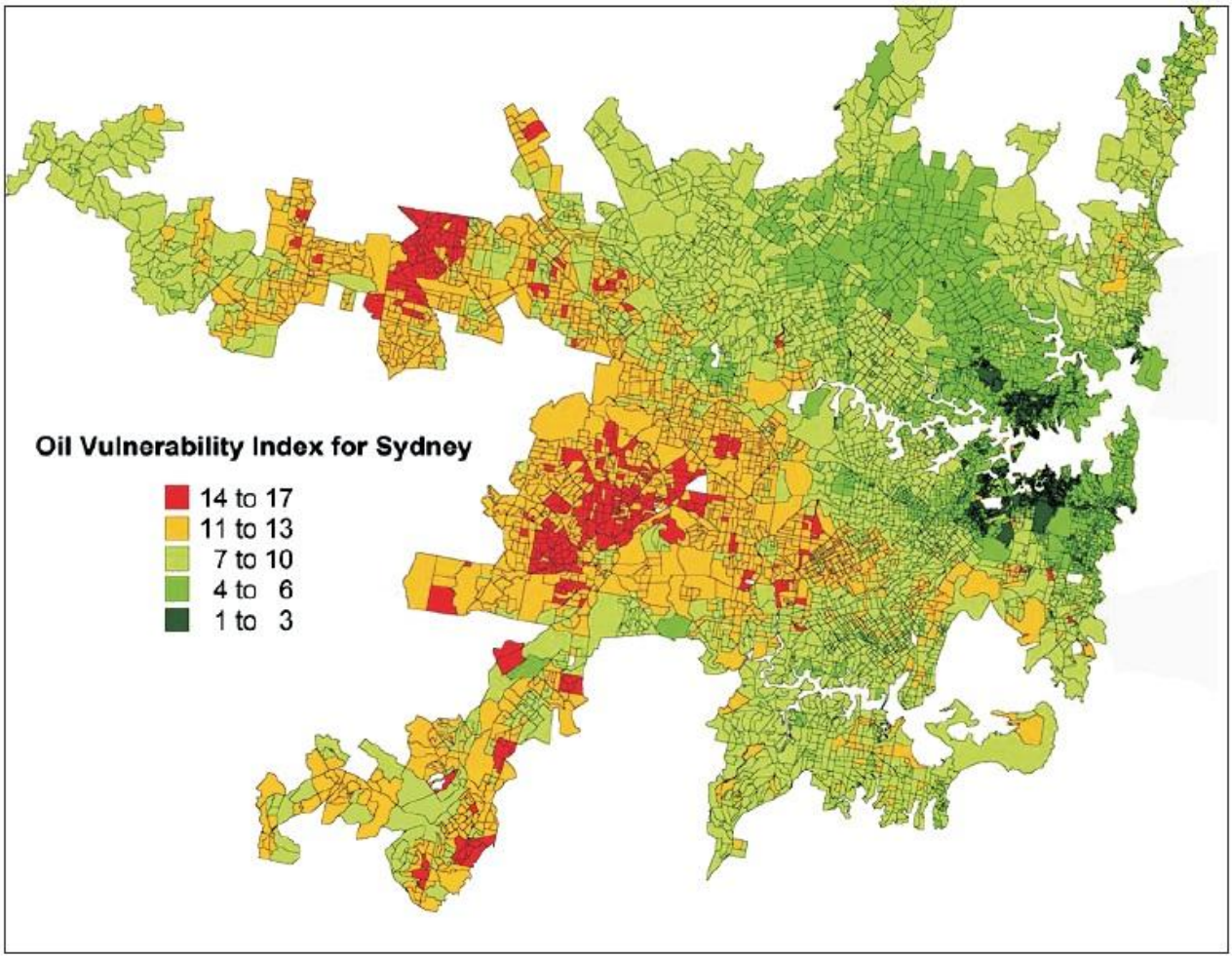
3. Oil decline is too steep to allow transition of car fleet. << Australia in the last quarter of its oil age. http://www.crudeoilpeak.com/?p=182

The Liquid energy balance to drive private petrol or diesel cars is already zero by 2015 if we want all other transport services to continue at current levels (not to mention any growth). Quick calculation: assume Australian oil production is half by 2015 and global net oil exports down by 10% (very optimistic). Then the reduction is 260/340 = 76%, down 24%. All cars consume 28%.

	2008	2015	Passenger vehicles personal	339 PJ
Net imports	220 mb pa	200 mb pa	Commuting	163 PJ
Local crude	120 mb pa	60 mb pa	Light commercial personal	31 PJ
Total	340 mb pa	260 mb pa	Subtotal	533 PJ of total 1879 PJ = 28%

There will be a huge problem of refineries to adapt to higher percentage of diesel requirements.
http://www.aip.com.au/pdf/AIP%20Paper%20-%20Maintaining%20Supply%20Reliability.pdf

4. Oil vulnerability is high in suburbs with older cars (higher fuel consumption) most in need for replacement



http://www.griffith.edu.au/__data/assets/pdf_file/0011/48575/urp-rp06-dodson-sipe-2005.pdf

The above graph is from the Griffith University.

5. Oil decline after peak oil will NOT evolve peacefully or smoothly: roller coaster oil prices, oil wars, oil proxy wars and global power conflicts, civil unrest in Middle East when OPEC's oil reserve bubble bursts, trade deficits and regional imbalances. Australia does not even have a Strategic Oil Reserve, thereby violating its obligations as a member of the International Energy Agency. No one will help us when there are shortages on the global oil market.

6. Global warming, unpredictable climate change events and weird weather will physically force us to abandon coal much earlier than naively thought => huge electricity crisis on top of the problem of declining oil production. Turning point is disappearance of Arctic summer sea ice around 2015.

7. Demand for power to drive electric cars will increase household consumption by 30%. If recharging of batteries is done at night from coal fired power plants we'll swap oil dependence with coal dependence. Local grids/transformers are also too weak in hot summer nights. New wind farms in Canberra are used for desalination which is global warming adaptation, NOT transformation of our power supply to green power which is actually our job #1. Global warming = less reliable rainfall also means shortages of cooling water e.g. for power plants at Lithgow. http://www.smh.com.au/environment/people-v-power-station-as-water-levels-plunge-20091118-imjy.html

8. Peak oil = peak credit. The Greek debt crisis shows us that GFC problems have NOT been solved. Availability of car finance will be a severely limiting factor in transformation of car fleet.

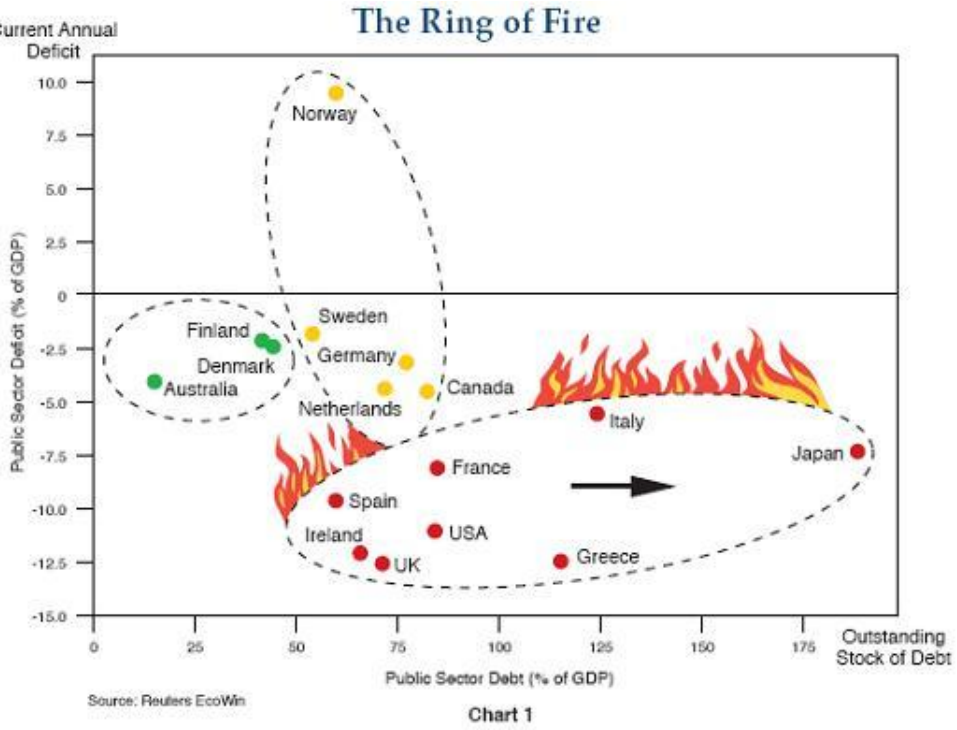


Chart 1

http://www.pimco.com/LeftNav/Featured+Market+Commentary/IO/2010/February+2010+Gross+Ring+of+Fire.htm

9. Biofuels don't have a high energy profit ratio and must be used in the agricultural sector itself. Diesel shortages = food shortages. What cars we drive will NOT be our main problem.

Powerful choices from Barney Foran: large areas of plantation forests are needed ro replace liquid fuels

pn30178.pdf - Adobe Reader

Table 54. A comparison of key indicators over the 45-year scenario period (2006–2051) for the base case and 90% oil replacement with ethanol from biochemical (crop and lignocellulose feedstocks) and thermochemical (wood feedstock) conversion processes.

Indicator	Base Case	Biochemical Ethanol from Crop Feedstock	Biochemical Ethanol from Crop and Lignocellulose	Thermochemical Ethanol from Wood Feedstock
Total ethanol produced – PJ	0	96,126	105,402	94,547
Total biomass electricity produced – GWh and % of total at 2051	171,000 (1%)	1,174,000 (10%)	1,685,015 (11%)	1,556,000 (11%)
Arable cropping land – million hectares	22.9	45.9	32.9	22.9
Plantation forest land at 2051 – million hectares	6	6	32.8	43.2
Energy profit ratio of ethanol at 2051	n/a	0.7	1.3	10.3

http://lwa.gov.au/files/products/innovation/pn30178/pn30178.pdf

10. The laws of thermodynamics will not allow to introduce fuels like liquid hydrogen

Catalysis and syngas for the production of hydrogen **by Professor David Trimm**

5 May 2006 Science on the way to the hydrogen economy
"To achieve adequate supply of hydrogen we will need an extra 6,000 chemical plants. Alternatively 9,000 nuclear plants would be needed – and in the USA that means about one at every 100 kilometres around the coast – or about 220,000 square kilometres covered in solar cells. I suspect that this will eventually happen, but there are problems, as Kuwait, where I did a lot of work for a time. Essentially, they put in a solar cell and it really worked tremendously well, until the first sandstorm, when all the mirrors were very nicely abraded and the whole thing collapsed to 0.1 per cent efficiency."
http://www.science.org.au/events/sats/sats2006/trimm.htm

11. Compressed natural gas is a solution but is not being pursued at a speed commensurate with the expected oil decline. Current conversion capacity is 150,000 cars pa. (12 million fleet) Training of licensed gas mechanics would be a bottleneck. Trucks will get priority:

LNG refuelling stations for east coast

http://www.smh.com.au/business/lng-refuelling-stations-for-east-coast-20100506-ugxc.html

12. Less working hours and/or unemployment will mean less purchasing power and fewer new cars are bought, further delaying the transformation of the car fleet.

13. Car industry is weakened by 1st oil price shock of peak oil and is in the process of downsizing.
Global automakers face slowing demand in Europe and the expiration of government incentive programs http://news.yahoo.com/s/ap/20100521/ap_on_bi_ge/eu_germany_gm_opel

'The Idea of State Aid to Opel Is Absurd'

"After months of stalemate this would have been the worst possible moment for giving aid to Opel. Right after its savings package, the government would be facing questions about how it could introduce sweeping cuts to welfare, parental pay and other social services and then a few days later throw a huge part of the money saved at an automaker that is not sustainable."

http://www.spiegel.de/international/germany/0,1518,699910,00.html

Conclusion: Basically, it is too late trying to transform the car fleet. **In fact this is absolutely dangerous** because unrealistic EV dreams lead to more mis-investments in toll-ways, road tunnels, car-dependent sub divisions and shopping centres. Read more details in chapter 5 of my submission "Too late for Metro Tunnels" http://www.crudeoilpeak.com/?p=290

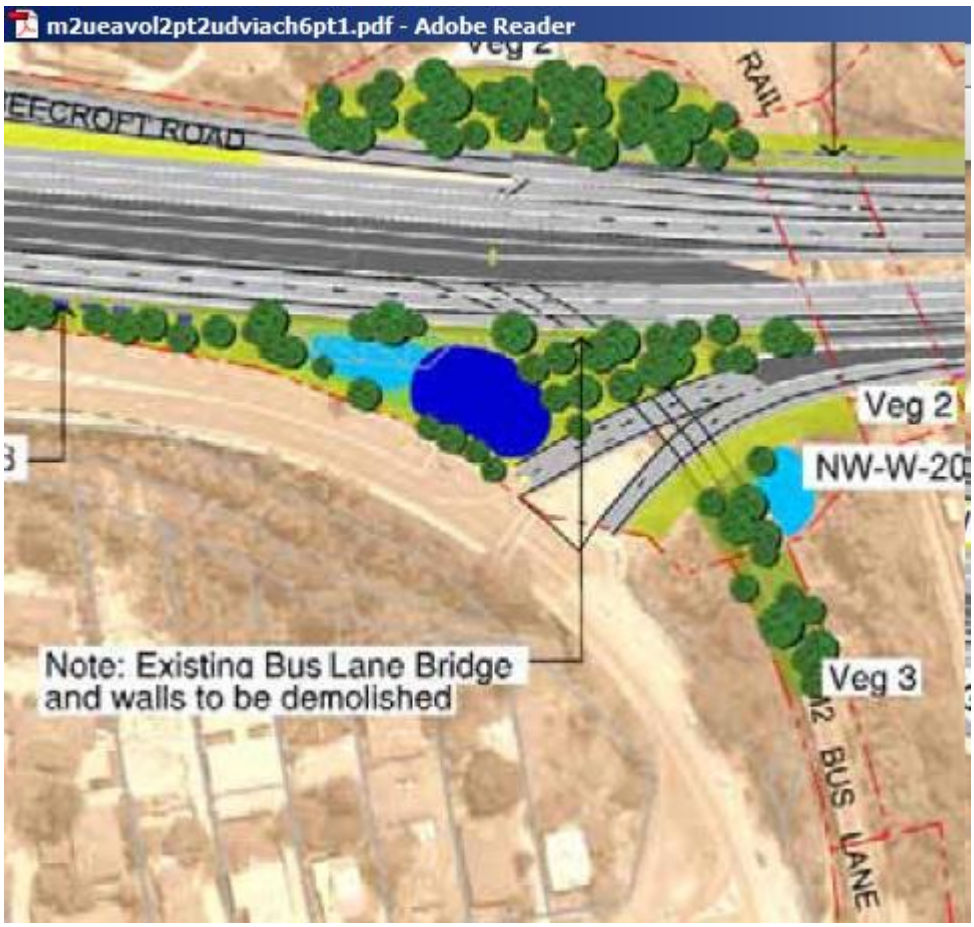
Mitsubishi i-MiEV Electric car dreams =>>
Happy motoring for $70,000
http://smh.drive.com.au/motor-news/leading-the-charge-20100416-sixn.html?autostart=1

Sydney gets electric car charge station

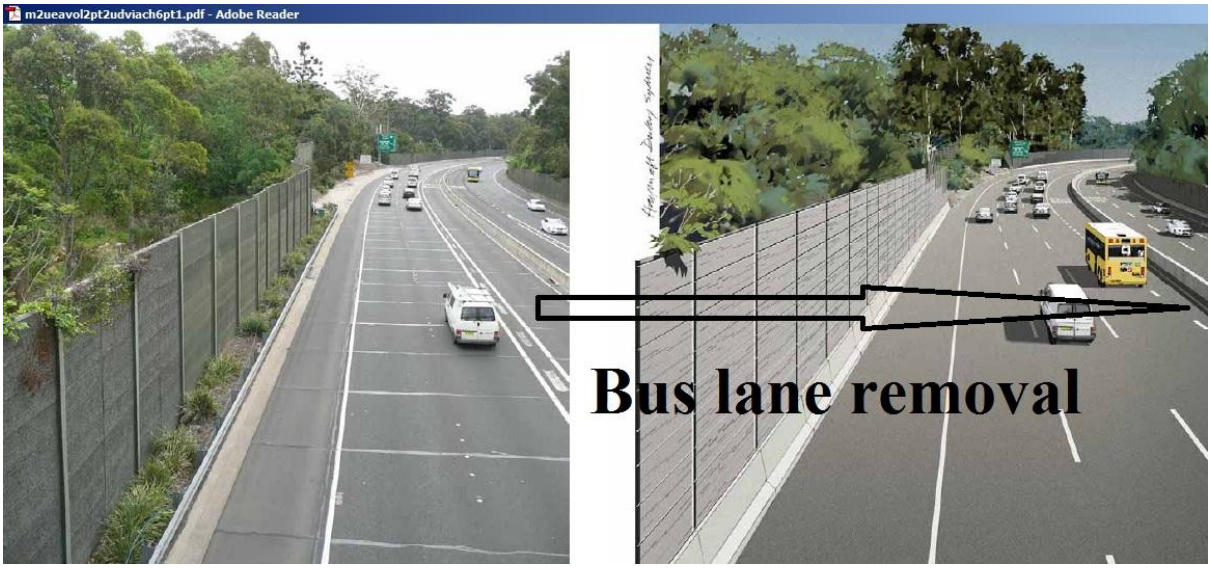
http://news.theage.com.au/drive/motor-news/sydney-gets-electric-car-charge-station-20100524-w57g.html
Before using green power for EVs we must first replace our existing coal fired power plants to renewable energy.
Rest assured: EVs will have to pay a road tax proportional to KWh consumed.

13 A step back: Removal of Bus Ramp at Beecroft Rd

Existing bus ramp from M2 bus lanes to Epping station: 1 lane comes from the East side of the station (tunnel under the rail line), the other lane merges into Beecroft Rd.



This is incomprehensible and demonstrates that planners have no clue what is going to happen with future fuel supplies. When the first diesel shortages arrive at filling stations and depots, all city bound buses from the West will end at Epping station to save on fuel. Then this ramp will be absolutely necessary.



At Somerset St: Why is this bus lane removed? We'll see the end of the car culture in this decade. The short-sightedness of the RTA knows no bounds.

http://www.hillsm2upgrade.com.au/files/environmental_assessment/volume2_part2/techpaper4/m2ueavol2pt2udviach6pt1.pdf

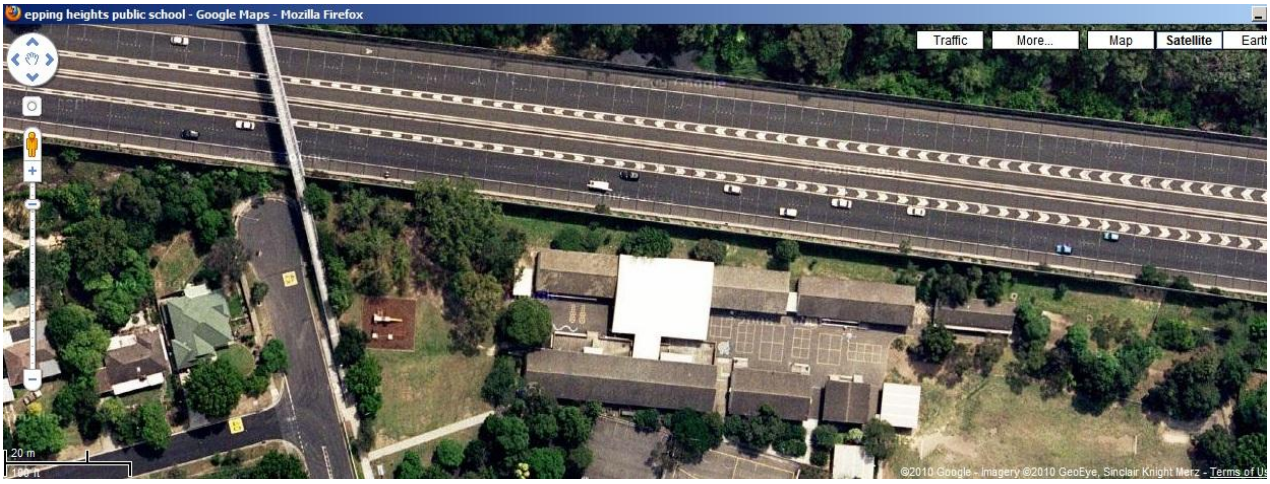
14 Epping Heights Public School

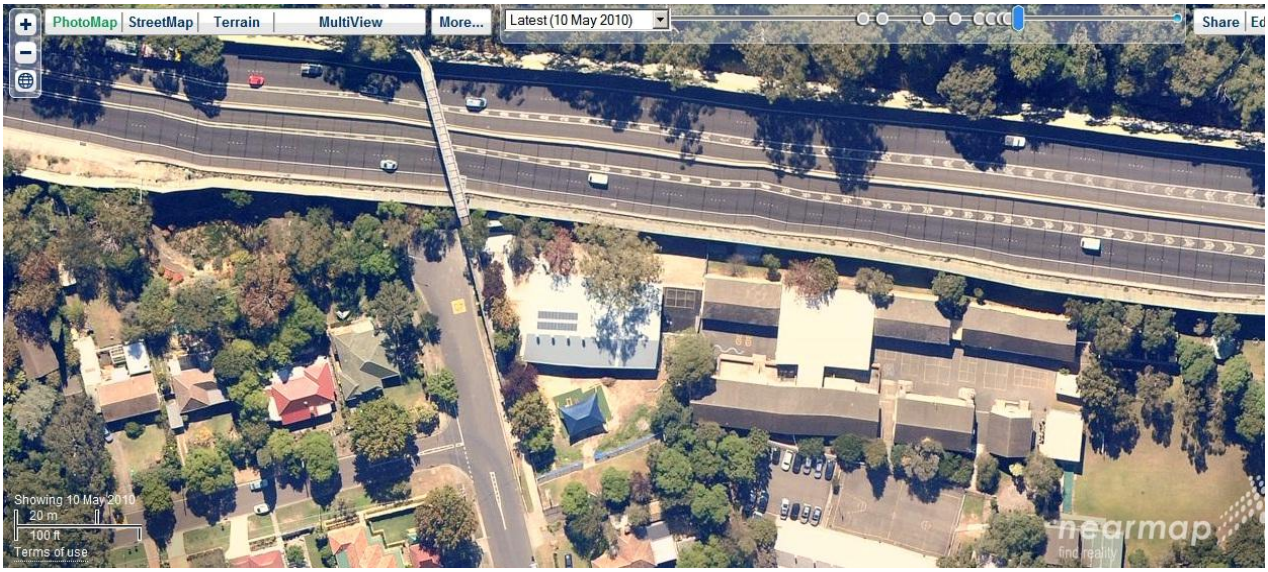
The Federal government has just funded a new hall at Epping Heights Public school.

“Primary school projects funded in the first round of BER at Epping Heights, Epping North, and Epping Public are all close to completion, with work at other schools making steady progress.” May 10, 2010

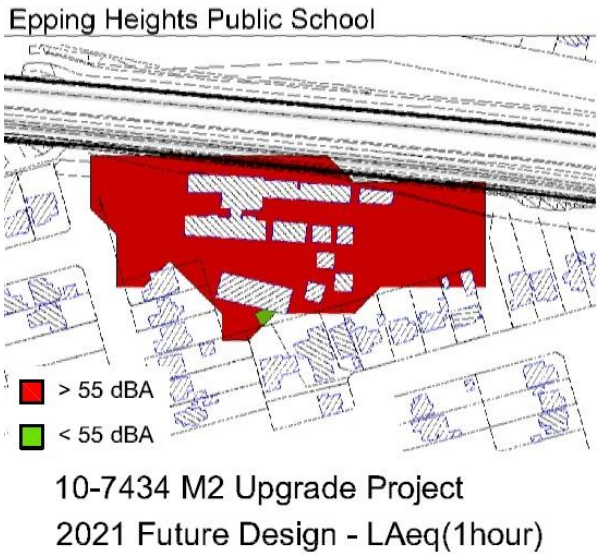
http://www.maxinemckew.com.au/2010/05/10/julia-gillard-and-maxine-mckew-to-host-bennelong-school-principals-forum/

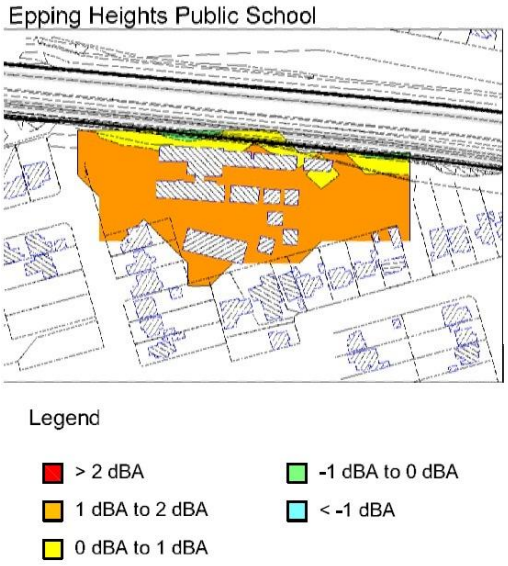
These images show the Epping Heights public before and after the new school hall.





And here comes along the NSW government and plans a widening of the M2, bringing the noise wall closer to the school and increasing noise levels. Thanks God traffic will go down when oil decline starts to bite.



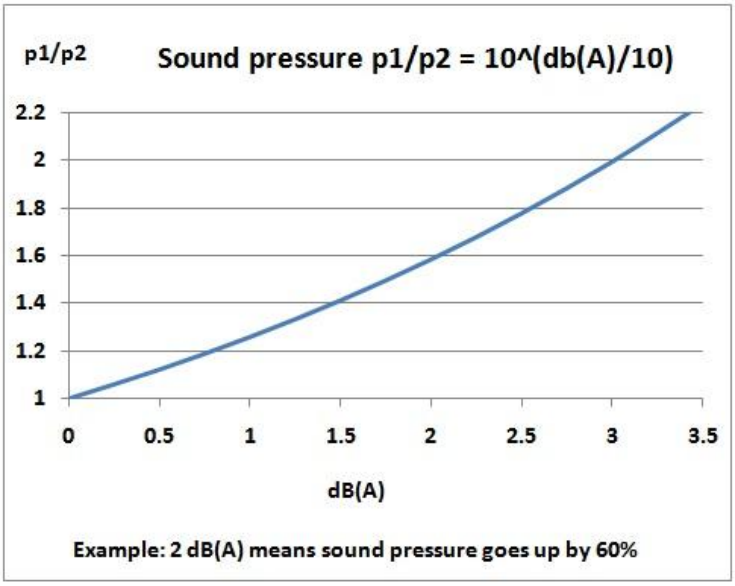


Left: noise levels Right: Changes in noise levels

According to the noise map
http://www.hillsm2upgrade.com.au/files/environmental_assessment/volume2_part1/techpaper2/m2ueavol2pt1nviaappendixj.pdf

the school could be subject to an increase in noise levels of up to just under 2 dbA (seems to have been calculated in a way that the requirement is met) .

Since this is a log scale,
http://www.phys.unsw.edu.au/jw/dB.html (very interesting broadband noise file you can listen to)



an increase of e.g. 1.9 db(A) would be equivalent to an increase of 55% in sound pressure.

This is shown in the graph to the left. As an example, a 2 dBA increase means a 60% increase in sound pressure.

All calculations have error bars. A small change in dB(A) to e.g. 2.5 would mean a jump to 80% in sound pressure

Here are some more detailed issues:

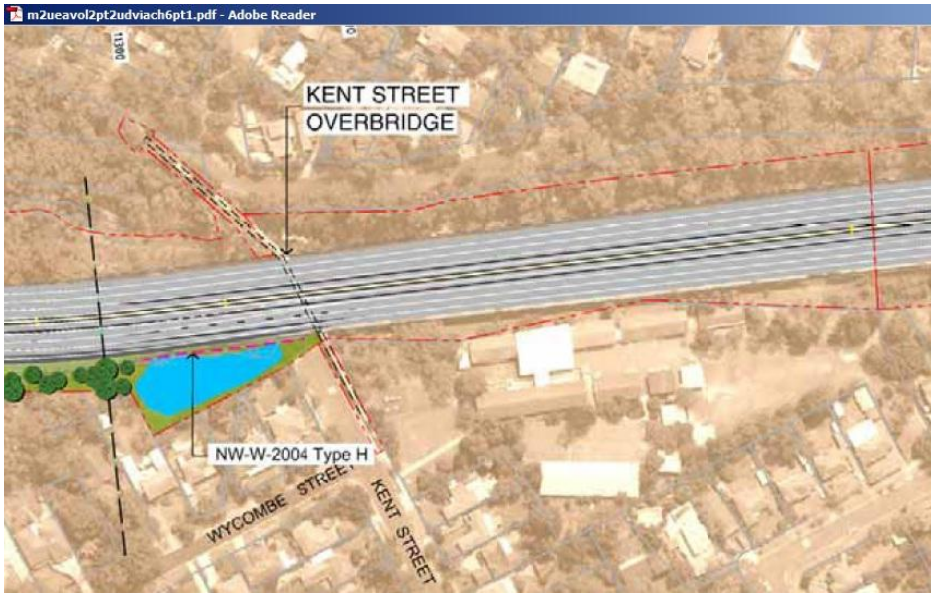
The closest noise logging station to Epping Heights Public is Dunmore Rd
Question: why not at the school itself?

Table 11 - noise logging at S3-1 30 Dunmore Road Epping 64 dB(A) LA10 (18 hr), 61.5 dB(A) LAeq(15 hr), 57.5 dB(A) LAeq(9 hr)

Reference to the background noise logging data contained in Table 11 shows that where receivers are situated adjacent to the M2 Motorway and are not screened from view of the motorway by other houses, the existing levels of road traffic noise are, in the majority of cases, already above the ECRTN base criteria of 60 dBA LAeq(15hour) and 55 dBA LAeq(9hour).

Table 39 - predicted noise data
Question: No calculations for Dunmore Rd. Why?

Table 40 - relocated noise walls at Kent Street overpass NW-W-2004



"No acute properties are predicted in the vicinity of this noise wall, and as such this relocated wall is the same height as the existing wall. The existing wall is 6.0 m high.
A comparison of the 2021 Future Design noise levels with the 2011 Future Existing levels at properties in this location shows a predicted sensitive receiver noise level change that varies between +1.5 dBA and +2.0 dBA."

The acute property is the new school hall

http://www.hillsm2upgrade.com.au/files/environmental_assessment/volume2_part1/techpaper2/m2ueavol2pt1nviamainreport.pdf

A relocated noise wall would be so close to the school that it would fall on the school if a Lennox type tornado hit the area.

New in Australia: tornados >>>

Are these already James Hansen's "Storms of my grandchildren?
http://www.abc.net.au/local/photos/2010/06/03/2916813.htm

Who will take the responsibility for the noise wall collapsing onto the school?

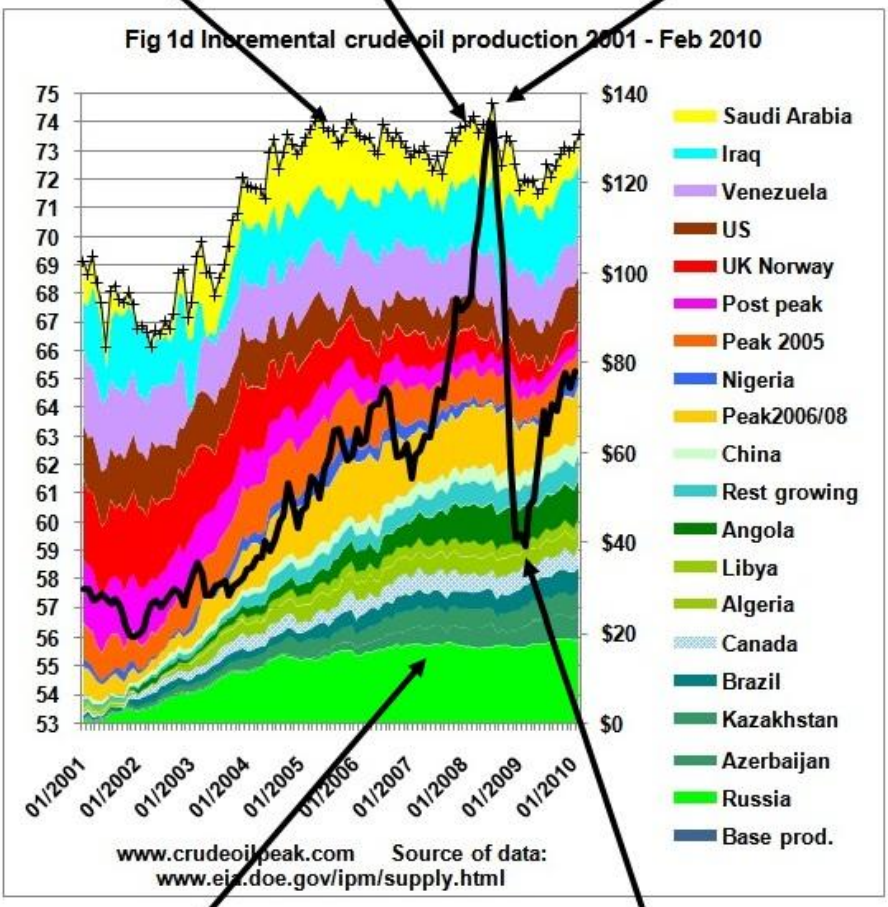
Appendix on Peak Oil – extracts from this web site:

www.crudeoilpeak.com
Crude Oil Peak
#1 in Monitoring the Global Crude Oil Peak

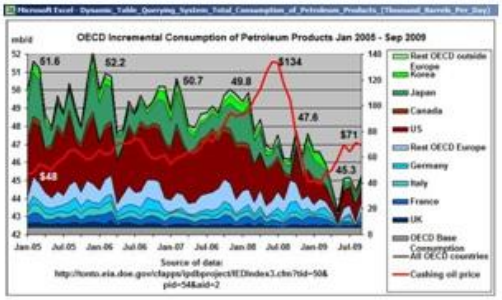
May 2005: crude oil production started to peak at around 74

Extra demand from China for the Olympic Games drove oil prices sky high

Saudi Arabia could not produce enough oil to stop oil prices from rising



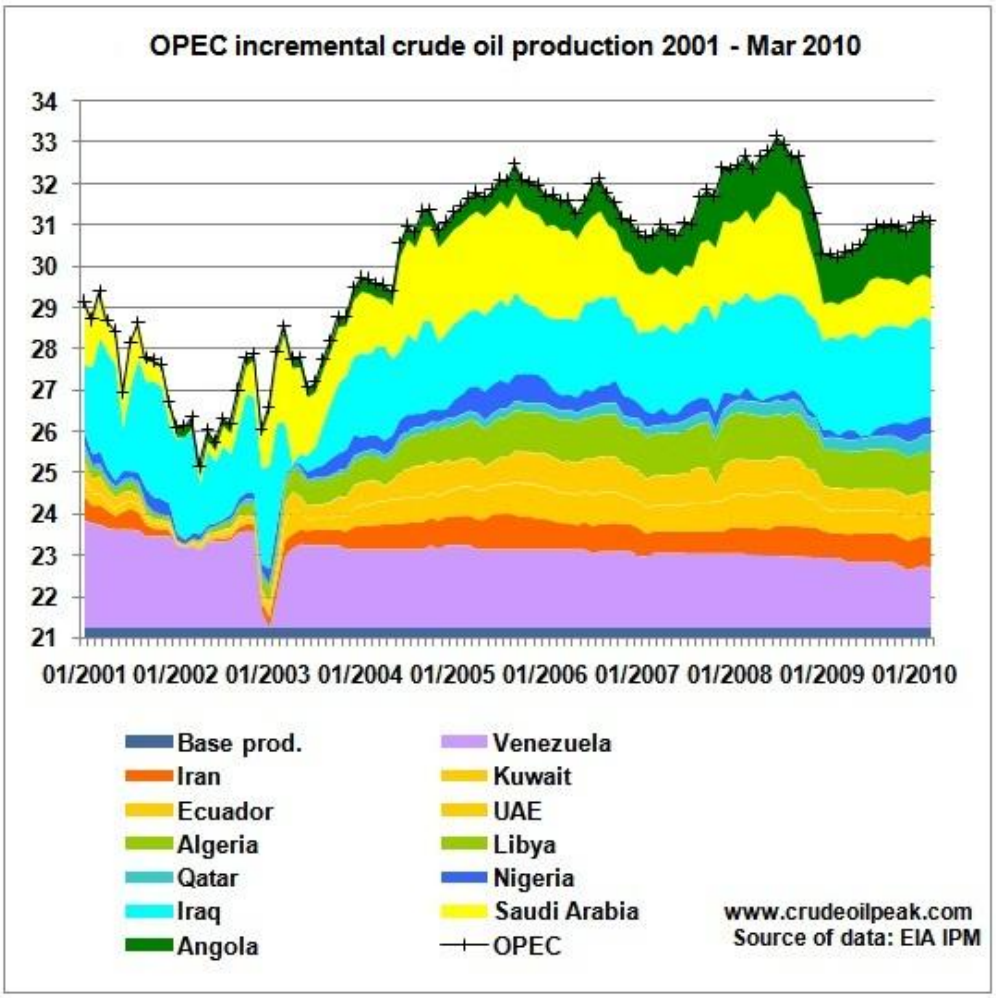
Russian oil production on plateau



Convergence of accumulated debt and limited oil supplies triggers financial crisis, culminating in the collapse of Lehman Brothers. Oil prices drop in the ensuing recession, overshooting on their way down.

<<< OECD demand fell by 5 mb/d. This oil was mainly used by OPEC countries and China

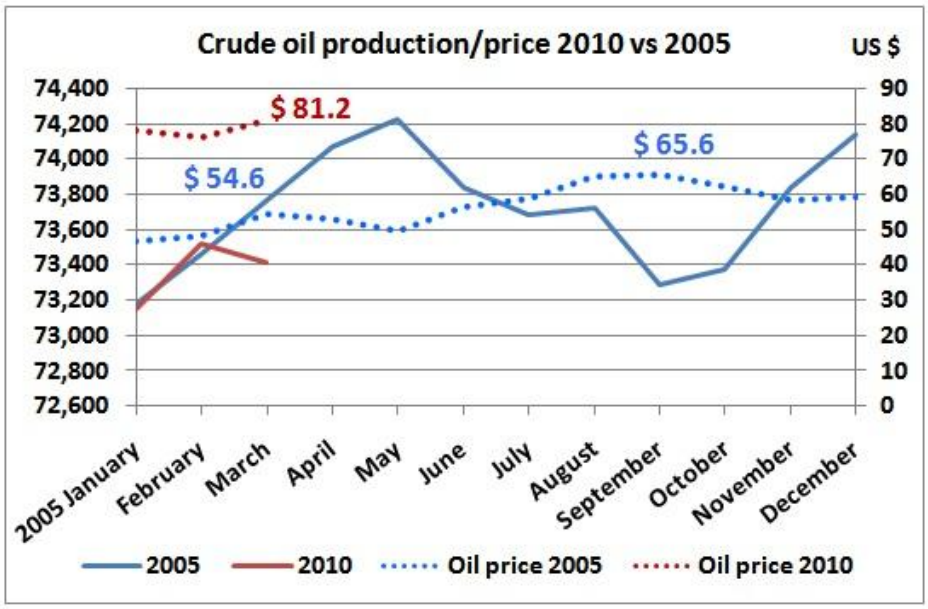
Without the debt crisis we would have already had oil shortages



Clearly visible: Saudi Arabia could not produce enough oil in 2007/2008 to keep oil prices down. Peak oil popped the debt bubble prematurely.

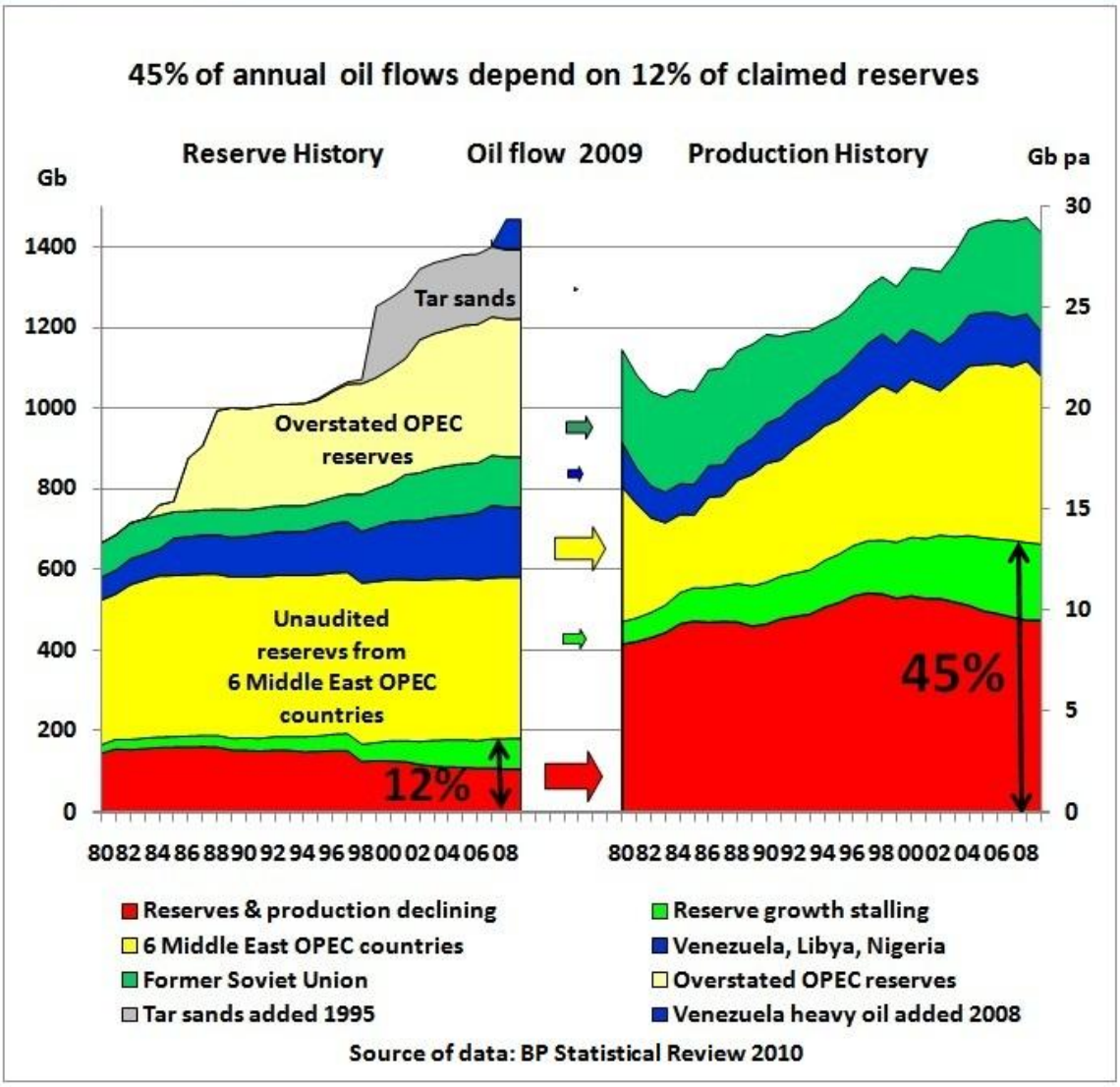
Use the option "Latest Crude Oil Graphs", updated monthly with data from the Energy Information Administration, International Petroleum Monthly http://www.eia.doe.gov/ipm/

The methodology of graphs is explained here: http://www.theoildrum.com/node/3793

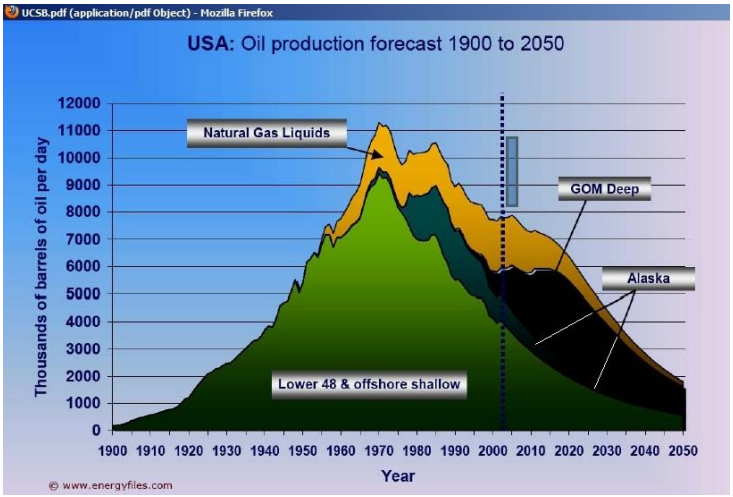


<< 5 years peak oil. Global crude oil production is back where it was 5 years ago. But the world pays $25 more per barrel now

What we have seen so far is the response of the economy and the financial system to oil production not growing.

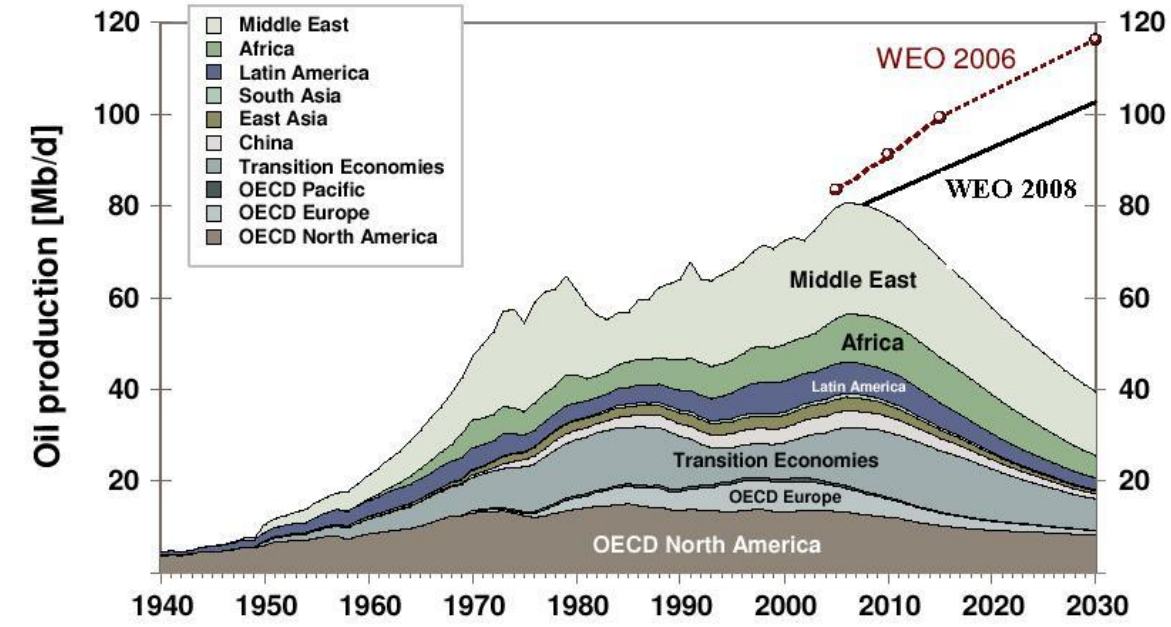


BP Statistical Review June 2010: Oil reserves and production don't match
http://www.crudeoilpeak.com/?p=1591



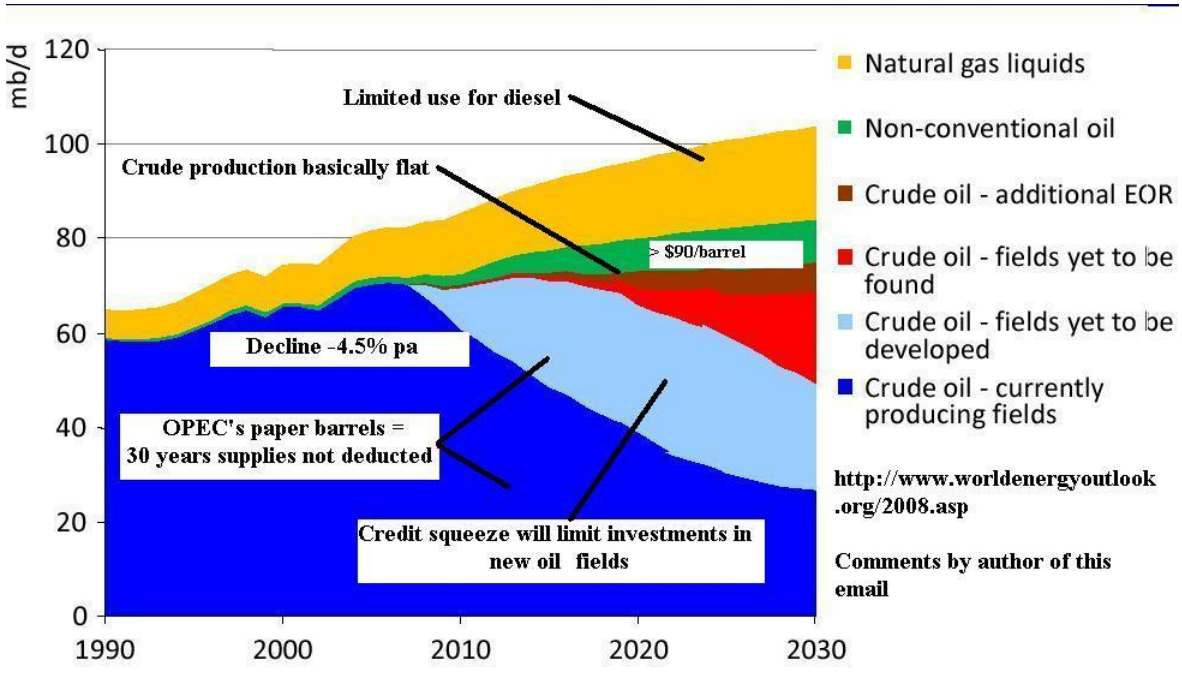
The oil spill in the Gulf of Mexico symbolizes the fight for offshore oil half way down the backside of the US oil peak which happened in 1970. In 1971, the convertibility of the Us dollar to gold was discontinued. The oil import game came to an end with the global oil peak in 2005, which triggered the subprime mortgage crisis. http://www.crudeoilpeak.com/?p=1508

Figure 40: Oil production world summary

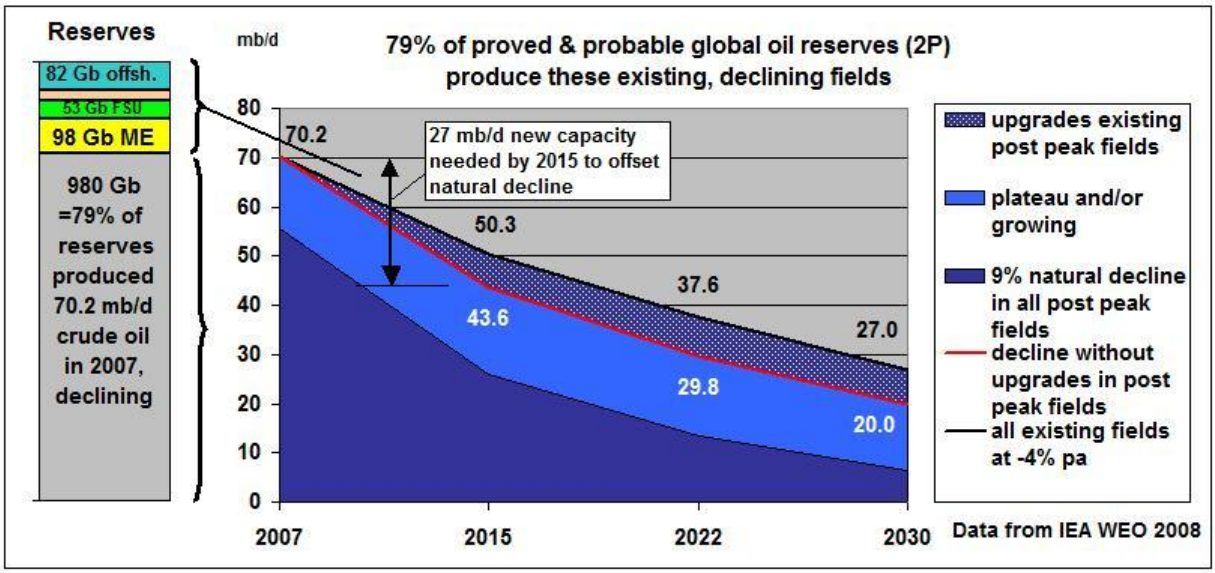


http://www.energywatchgroup.org/fileadmin/global/pdf/2008-02_EWG_Oil_Report_updated.pdf

Why is there such a huge gap between the Energy Watch Group and the IEA? The WEO curves are DEMAND curves, not PRODUCTION or SUPPLY curves!! This is the EIA WEO 2008 in detail:



What does the above graph tell us? Crude oil production, the most important part, will stay practically flat, even under all the optimistic assumptions the IEA is usually making. Growth would only come from natural gas liquids. But these are not as versatile as crude. You can run forklifts with Propane but you can't fly planes with these liquids.



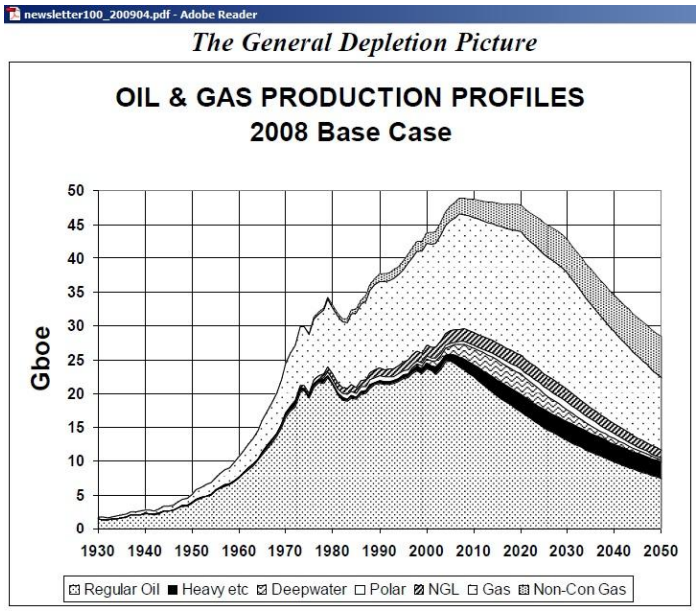
Disassembly of the WEO 2008

79% of P2 reserves (whatever the true figure is) are already exploited in existing fields which are declining at the above rates. In order to offset natural decline in these fields 27 mb/d of new capacity have to come on-stream until 2015 alone. With lower oil prices, there will be less investments and this target cannot be met. On the other hand, if oil prices go up again, our economy will get damaged.

Therefore, we must aim at a soft, continuous "landing" or rather a sliding down along the decline curve. Try to grow the system with increasing oil demand, like in the Metropolitan Growth Strategy, and you end up with multiple system failure.

And what about the remaining reserves for those new oil fields?

(1) 98 Gb are in the Middle East (not audited according to SEC rules http://www.sec.gov/interps/account/sabcodet12.htm)
(2) 82 Gb offshore – not easy or cheap oil,
(3) 53 Gb from the Former Soviet Union, outside OECD control.



Estimate from ASPO http://www.energiekrise.de/e/aspo_news/aspo.html

National 10 Point Program	
Events/impacts/problems	What to do
Next oil price shock and/or fuel shortages around 2012. When the truth comes out about OPEC's oil reserves (overstated by 80%) confidence in oil reserves will evaporate and oil markets will freeze. Iran will no longer export oil by around 2015. Catch 22: Diesel shortages will delay implementation of essential rail and clean energy projects.	(1) Immediate moratorium on new freeways, airport and port expansions, car-dependent shopping centers and subdivisions, multi-level car parks and other oil dependent infrastructure. No more business as usual.
	(2.1) Set aside – by legislation – oil and gas fields for diesel, petrol and CNG supplies to civil works needed to mitigate the impact of peak oil and to de-carbonize our economy. Example: Turrum oil field on-stream by 2011. (2.2) Build up Strategic Oil Reserve
Public largely unaware of the physics of the coming oil, energy & climate crisis. Political system and corporate sector in denial mode and unable to grasp magnitude and urgency of problem. Too many untested assumptions around.	(3) Public education program; participation of public is absolutely essential. Nation needs to be put on a war footing; change of value system is needed. Prepare motorists for petrol rationing and car-pooling as this is the only "solution" if a physical oil crisis were to hit tomorrow, e.g. during the next oil or oil-proxy war.
Best alternative transport fuel in Australia is natural gas.	(4) Develop compressed natural gas (CNG) for buses, trucks, construction and mining machinery. This must get priority over LNG exports.
Peak oil means end of internal combustion engine which wastes 90% of energy as heat. Oil decline is so steep that there is no time for any transition to electric, hydrogen or 'green' cars. We have a clean primary energy problem, not a technology problem. EVs run on coal are dirty.	(5) Abandon unrealistic car dreams Electrification of land transport system is required which must be more efficient by an order of magnitude; urban rail on all free-ways (Transperth) and major roads; all genuinely renewable energies produce electricity, not fuels. Time is now running out for these solutions; too late for large scale rail and metro tunnel projects
Globalization built on cheap oil will go backwards; bunker oil shortages for ships will limit import/export volumes.	(6) Re-industrialization of Australia on the basis of renewable energies; focus on essential tools, products and parts.
Peak oil will quickly turn into food production and distribution problem	(7) Bio fuels to run farming machinery, trucks and other vehicles to transport agricultural produce and implements; revive rural rail lines
Proximity to 4 (out of 10) tipping points in the next years will force us to abandon coal (without geo-sequestration of CO2) much earlier than generally assumed. 1. Disappearance of Arctic summer sea ice 2. Increase of melt lakes on Greenland and hydraulic cracking of glaciers 3. Release of methane over permafrost 4. Destabilization of West Antarctic ice sheets **http://realclimate.org/**	(8) Replacement program for all coal fired power plants; re-tool car factories and suppliers (BEFORE they go out of business after peak oil) to mass-produce components for wind farms, solar power plants, solar water heaters. A 1,000 MW coal fired power plant requires the continuous sequestration 150 Kb/d of liquid CO2. NSW alone has 12,500 MW installed. Australian oil handling capacity around 500 Kb/d. 1,000s of km of CO2 pipelines needed. Huge challenge. Difficult while oil production is declining. May come too late to fix climate.
Power shortages unavoidable	(9) Drastic power down and energy efficiency. Permanent Earth Hour.
Airlines first hit by high oil prices, then the GFC and the credit crisis, now by a volcanic ash cloud from Iceland.	(10) Interstate rail development and electrification; both passenger and freight; replace domestic flights with night trains; coastal shipping for freight