

Electric Rail Crash Program

Jobs for Public Transport



Adelaide can do it



Perth has done it

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Summary

The triple whammy of peak oil, credit crisis and recession means that we are in an emergency situation that requires transport solutions, which create as many Australian, jobs as possible. In urban areas we need surface metro on all main road corridors, not capital intensive metro tunneling. We also need to replace disappearing air-links by night trains and therefore have to upgrade and electrify all rail lines between capital cities along the East coast. Implementation windows for perfectionistic solutions like very fast trains or people movers in urban areas have closed. This submission will make the case that:

General concept and time-line

- (1) peak oil has happened in 2005-2008, triggered the financial crisis and the recession
- (2) no alternative fuels or technologies can rescue our car culture in time to avoid petrol rationing and/or mandatory car pooling
- (3) many disruptive events caused by both declining oil production and global warming will happen already in the next 5-10 years
- (4) this is the timeframe during which oil-dependent, private car traffic has to be **replaced** by public transport **in all of the metropolitan areas** of capital cities
- (5) job-creation, cost effectiveness in terms of \$ invested per km of rail, speed of construction and strategic considerations for areas without rail will be the most important decision criteria to select projects
- (6) only fast-tracking of public transport projects - including a public education campaign on the urgency of the situation - and streamlining approval processes can avoid that capital cities become dysfunctional

Sydney in particular

- (1) Sydney would actually need a rail and metro system like Berlin (3.5 million)
- (2) 40 years of car oriented urban development have been wasted and time is short now before the big oil crisis hits
- (3) there is no other solution than electric rail on all toll-ways (Transperth model) and surface metro (light rail) on all major roads
- (4) dreams of a perfect metro system must be abandoned

Intercity

- (1) domestic flights have to be replaced by night trains
- (2) rail lines have to be straightened and electrified

Cover page: http://202.125.172.193/infrastructure/completed_projects/content/schedule
<http://www.transperth.wa.gov.au/>

(1) Update on peak oil

In the TOR to this Inquiry reference is made to the Senate Inquiry on oil supplies to which I contributed this submission:

Peak oil ante portas, followed by global warming

http://www.aph.gov.au/Senate/committee/rrat_ctte/oil_supply/submissions/sub69.pdf

Today, 3 years later, peak oil is behind us and global warming has started to impact on our daily lives. Both are processes, which profoundly impact on the use of private cars, on car manufacturing, on air traffic and all the jobs dependent on it.

In the meantime, I have written submissions for a number of other public consultations and those with relevance to transport issues include:

The End of Freeways (April 2007)

Submission 47 to the Independent F3 - M7 Corridor Review

http://www.dotars.gov.au/roads/F3toM7Review/pdf/SUBMISSION_47-Mr_Matt_Mushalik.pdf

Rail crash program for Sydney's North West (October 2008)

Surface Metro Solutions

Submission #129 (and #129a) to Sydney's NW Transport Inquiry

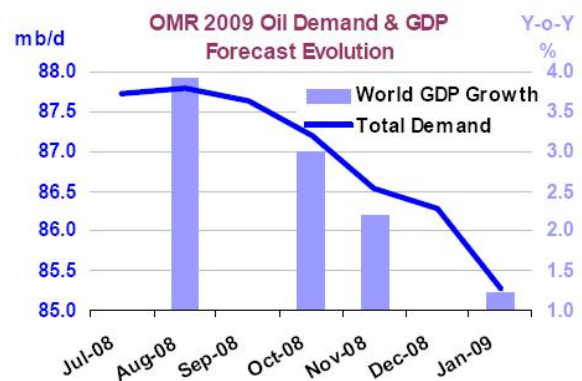
<http://www.parliament.nsw.gov.au/prod/parlment/committee.nsf/0/F6E420E701DDB4EACA2574F00001BF7E>

This chapter provides updates to the peak oil content in these submissions and will help to understand the urgency and the timetable involved to replace a substantial part of private car traffic BEFORE mobility is restricted by physical oil shortages.

The bumpy crude oil production plateau at around 74 mb/d which started in 2005 and could have continued until around 2010 (see page 4), has prematurely come to an end in 2008 as a result of complex feed back loops between an underlying accumulated debt problem, geo-political events, high oil prices, the China boom, rampant decline in ageing oil fields and last not least a general denial mode in global top government and corporate management about resource depletion and a worryingly stubborn ignorance of the limitations set by the laws of energy transformation which control the potential of alternative fuels.

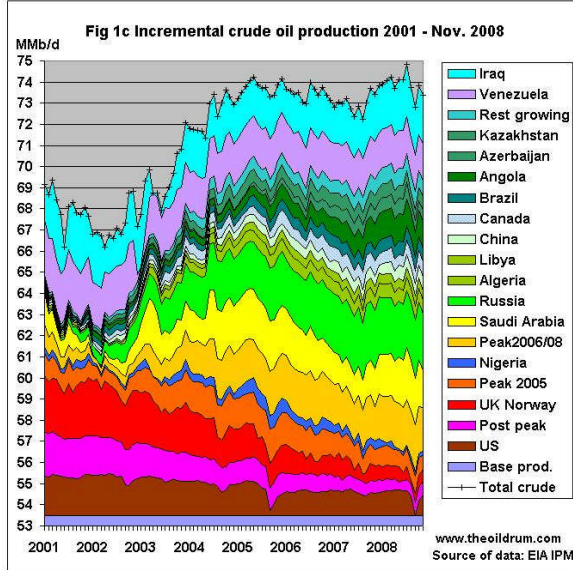
We basically have now the recession we had to have after peak oil, but instead of being brought about by physical oil shortages which were to be expected at the end of the above mentioned crude production plateau, the problem came through the front door of collapsing banks. See diagram page 5.

Oil prices are low now as demand is falling faster than production, whether voluntarily or involuntarily. The IEA has been downgrading their demand forecasts since July 2008 as can be seen in this graph >>



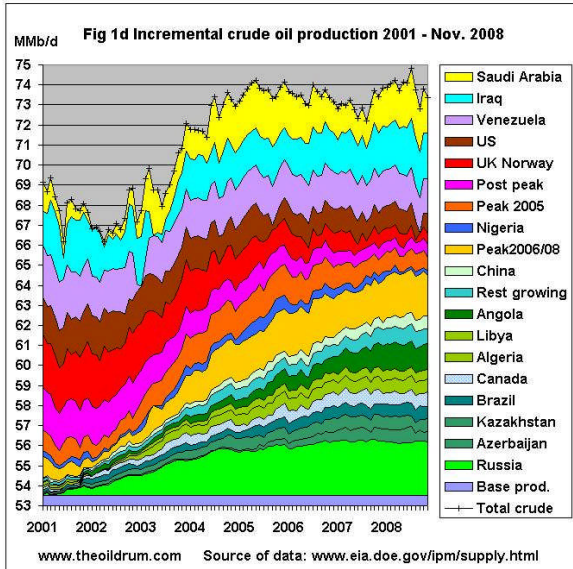
<http://omrpublic.iea.org/omrarchive/16jan09full.pdf>

Peak oil in the rear view mirror: January 2001 – November 2008 supply side limited



3 different views of the same data from the EIA, International Petroleum Monthly, www.eia.doe.gov/ipm/ tell the story:

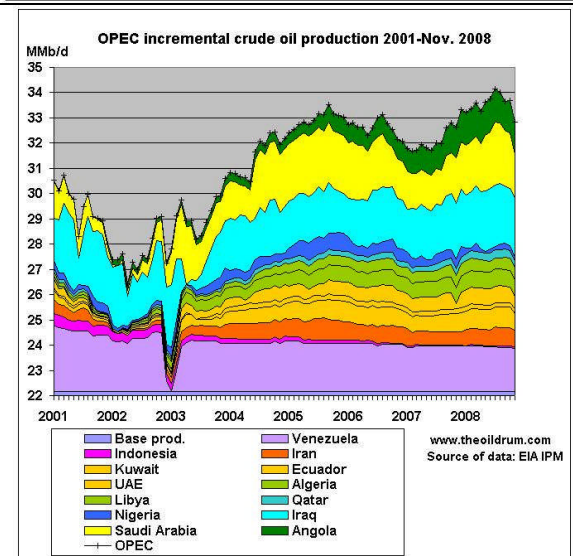
Looking at incremental production relative to January 2001, individual production profiles are stacked in following order from bottom: declining, peaking, growing. Special candidates Venezuela and Iraq on top. The declining wedge can be clearly seen. This trend is irreversible and independent of oil prices. A peaking group defines the start of a bumpy production plateau around May 2005, at approximately 74 million barrels crude oil per day.



Using the same data, production is stacked starting with the growing group, then the declining group and Venezuela, Iraq and Saudi Arabia on top.

Russia is at peak, in fact the whole growing group is shaping up a peak. Saudi Arabia lost its swing role in 2006/07, not being able to control skyrocketing oil prices. The Olympic spike is also visible, caused by a one off demand by China to avoid oil shortages during the Games.

These graphs are not rocket science. They can be replicated easily in simple spreadsheet work



The OPEC double peak, not unusual for oil supply systems. The Venezuelan strike and the Iraq war dips are clearly visible. Interesting to see that Saudi Arabia started to increase oil production already before the Iraq war.

Without Angola, a new OPEC member, even the Olympic spike was not higher than the 2005 level, demonstrating that OPEC 12 had reached its maximum, practically achievable production capacity.

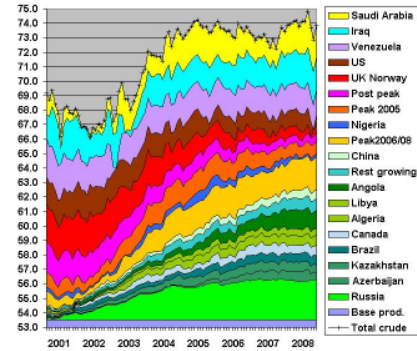
Financial Crisis and Peak Oil

<http://www.theoil Drum.com/node/5047#more>

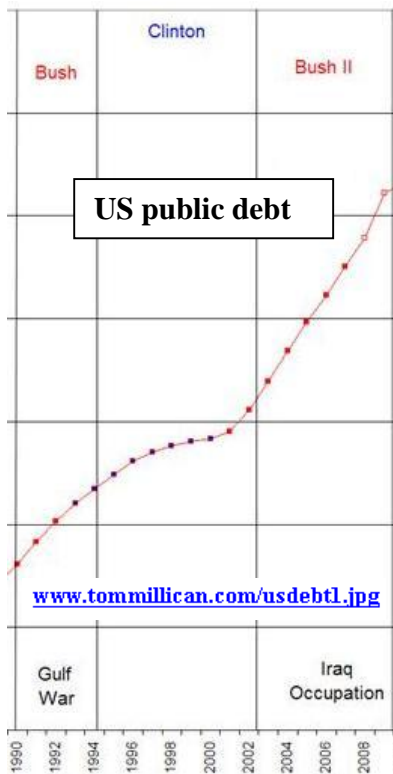
Simplified chain of **past**, **present** and **possible future** events

Crude peak 2005 – 2008

74 mb/d



Accumulated debt



www.tommillican.com/usdebt1.jpg

High gas prices in US suburbia and exurbia
High inflation

Subprime mortgage crisis

Airlines and car industry in trouble

Falling house prices

Banking crisis

Credit crisis

Recession

Oil derivatives market failure

(OECD) Oil demand destruction

Lower oil prices and (OPEC) production cuts

Fewer investments in oil fields to offset natural

Oil production decline

Oil shortages and/or 2nd oil price shock

Oil price volatility destabilizes economy
expensive oil disappears from market
credit crisis damages oil sector itself
declining net oil exports
regional imbalances
other unforeseen events

The best description of the situation comes from Irish oil geologist Colin Campbell
<http://www.aspo-ireland.org/index.cfm/page/home>

Peak Oil - The Credit Crunch Predicted In 2005



"...but apparently the banks lent more than they have on deposit, and at first sight you say that can't be possible, but it turned out that it was. And it was because banks had confidence that the resulting expansion of all of this investment and debt and loans and everything was sufficient collateral for today's debt. So expansion tomorrow covered the debt of today. But, unseen by anybody, or unrecognised, was that this expansion was not

just money, it was the good old cheap energy to make the wheels turn and do everything

So we now face the situation, I think quite soon, when, and this is happening, when the bankers begin to wake up and say, well, this expansion isn't going to go on anymore without the cheap energy to make it happen. That means that the massive amount of debt throughout the world is losing its collateral. It's getting a thin, thin cover.

So I think the crisis that might emerge, and the physical decline of oil is only 2-3% a year, this is not a catastrophe, it is quite a gentle thing. But the perception that arises on passing peak, this long decline, this could come instantaneously to the bankers and they suddenly wake up and say "my God, we got bad debt on our hands"

Furthermore, you look at every single company quoted on the stockmarket, the accounts of all of these companies have a tacit business as usual assumption about continuing cheap, easy oil such as they have known in their business. So once you realize that cheap, abundant, easy oil isn't there, that tells you really that virtually every company quoted on the stockmarket is now overvalued. There has to be some radical re-adjustment. And capital really has to be reduced in some way to match the declining energy supply on which it eventually depends.

So this is the kind of crisis that's staring us in the face. And serious as it is, it's extraordinarily difficult for anyone to do much about it because you can't change the banking structure of the world over night. What can they do? And I am talking to these bankers I find they don't really care too much. There are bundles and bundles of money flowing everyday and their main concern is to be competitive with each other. They don't want to be out of line with each other. And it doesn't matter to them if the whole thing goes down so long as they're in the crowd.

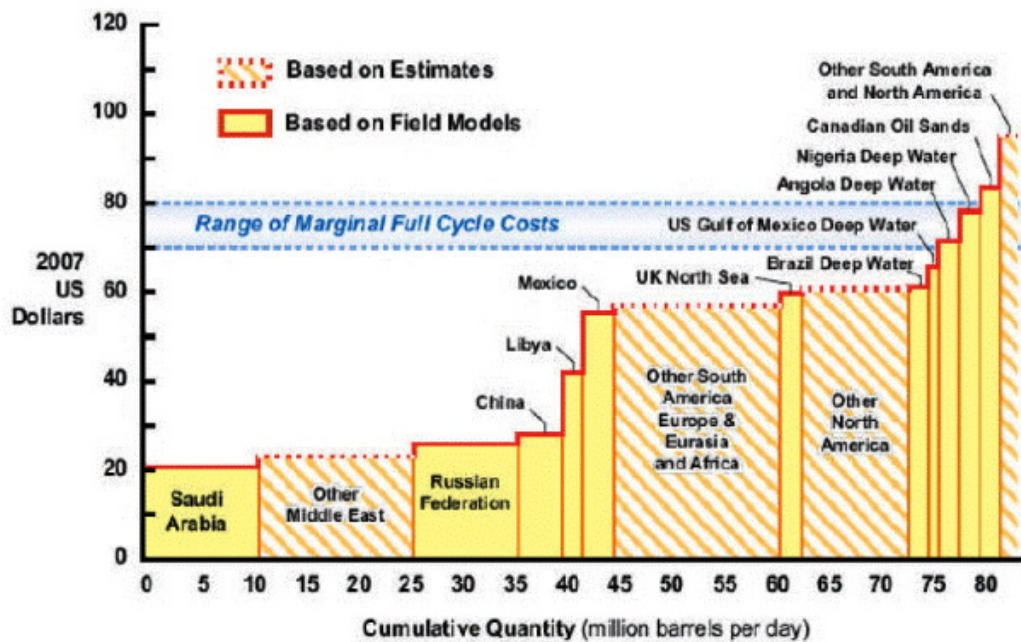
I think the bankers are aware of this now. They don't know exactly how to react, but their main interest is not to being isolated from the crowd, so to speak. So we face this monumental kind of weakness of our entire banking and financial sector. And really there isn't much easy solution to it."

Excerpt from: <http://au.youtube.com/watch?v=MgX1HIzljFs>

See also ASPO Newsletter #53 May 2005

<http://www.peakoil.net/Newsletter/NL53/newsletter53.pdf>

It is important to understand that the marginal cost of developing one barrel of oil is \$70 – 80, according to CERA:



<http://www.horizonoil.com.au/Press%20Releases/2008/November/HZN%20Chairmans%20address%20and%20presentation.pdf>

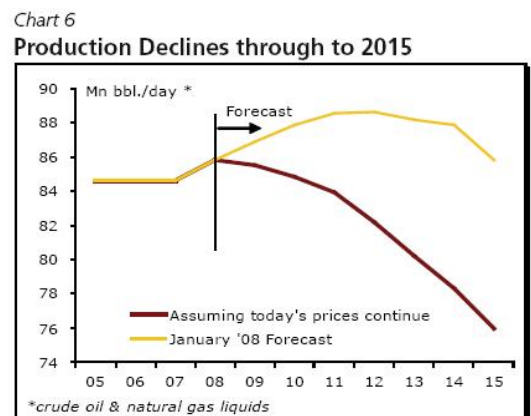
Low oil prices mean less oil production and less investments in oil fields which are absolutely necessary to offset rampant natural decline at field level of about 5 mb/d pa, accelerating to 7 mb/d in 2015. The longer oil prices stay low the more serious the supply crunch further down the track, in as little as 2-3 years. The physical supply curve may then intersect the demand curve, causing the next oil price spike. Oil shortages may come earlier if:

- (1) the financial crisis and the credit squeeze impact on the operational side of oil production
- (2) there is another (oil or oil-proxy) war in the Middle East
- (3) oil demand picks up again if world-wide stimulus packages were successful

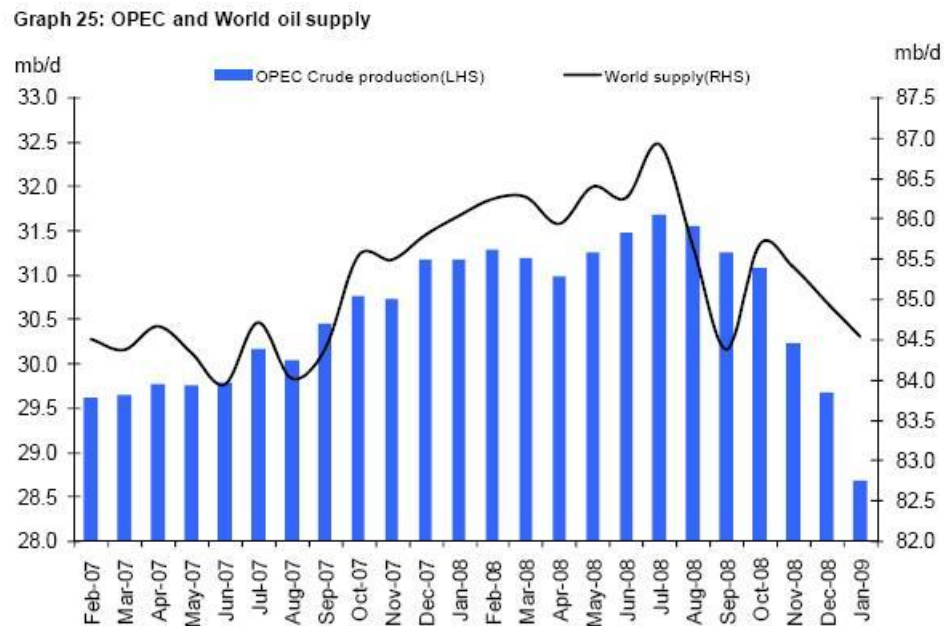
This table by Jeff Rubin from CIBC shows there is a shortage of 1.9 mb/d in 2010 if demand picks up again. http://research.cibcwm.com/economic_public/download/sjan09.pdf

	2006	2007	2008	2009	2010
World Oil Demand:					
OECD	49.6	49.1	47.6	45.4	45.9
-% chg	-0.5	-0.9	-3.2	-4.5	1.0
non-OECD	35.4	36.7	38.0	39.1	40.8
-% chg	3.6	3.5	3.6	2.9	4.3
Total World Demand	85.0	85.9	85.6	84.6	86.7
-% chg	1.2	1.1	-0.4	-1.2	2.5
World Oil Supply	84.5	84.4	85.8	85.5	84.8
-% chg	-0.2	-0.1	1.6	-0.4	-0.8
Excess Supply (+ve)/Demand (-ve)	-0.5	-1.5	0.2	0.9	-1.9
West Texas Crude, Year-end (\$/bbl)	61	96	45	65	100

Source: US Dept of Energy (history), CIBC WM (forecast)



OPEC production cuts can be clearly seen in this graph of OPEC’s February 2009 Monthly Report:



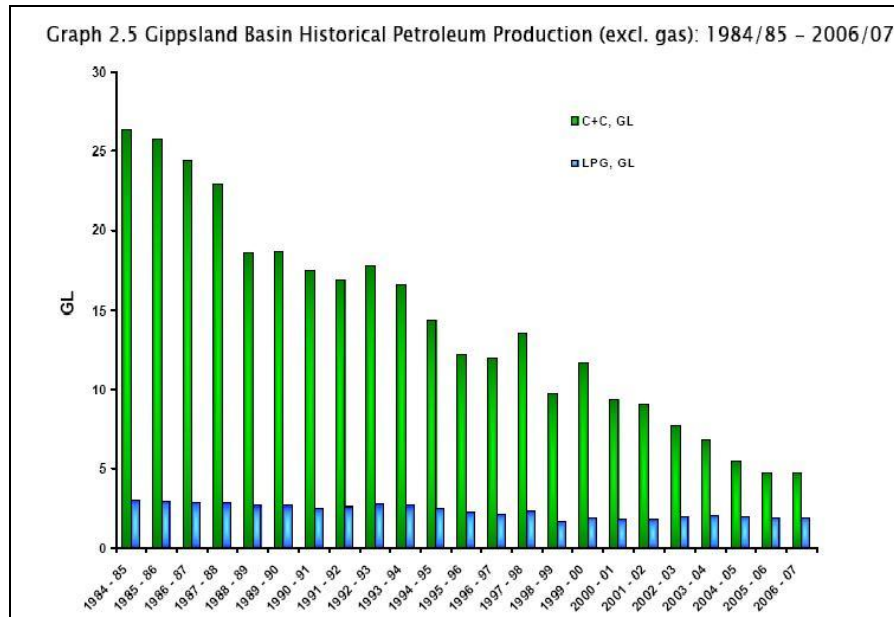
<http://www.opec.org/home/Monthly%20Oil%20Market%20Reports/2009/pdf/MR022009.pdf>

It is important to read what the Saudis themselves have said about their oil production:

- (1) April 2006; Saudi Aramco spokesman: “This maintain potential drilling in mature fields combined with a multitude of remedial actions and the development of new fields, with long plateau lives, lowers the composite decline rate [8%] of producing fields to around 2%” <http://lists.ibiblio.org/pipermail/tcrp-news/2006-April/000019.html>
- (2) April 2008; King Abdullah: “I keep no secret from you that when there were some new finds, I told them, 'no, leave it in the ground, with grace from god, our children need it’ “ <http://uk.reuters.com/article/oilRpt/idUKL139687720080413>
- (3) June 2008; Gulfnews: “Saudi Arabia has no ‘magic wand’ to bring down soaring oil prices, Arab News cited Prince Abdul Aziz Bin Salman as saying. People should not be ‘overly optimistic’ that anything beyond ‘temporary solutions’ will emerge from a meeting of oil consumers and producers in Jeddah today, the Riyadh-based newspaper cited [Deputy Oil Minister Prince] Abdul Aziz as saying” http://www.gulfnews.com/Business/Oil_and_Gas/10222827.html

What ‘temporary’ means we can see from the above graph. Most of the “production cut” comes from Saudi Arabia.

Australian oil supply situation: that Gippsland is in decline is well known



2006/07 Statistical Review from www.dpi.vic.gov.au

http://dpistore.efirst.com.au/search.asp?s=statistical+review+2007&submit.x=0&submit.y=0&csid=911294387_20090209_000755_B8ZF71BI66&csir=1

But oil and condensate production from WA will also enter a phase of steep decline:

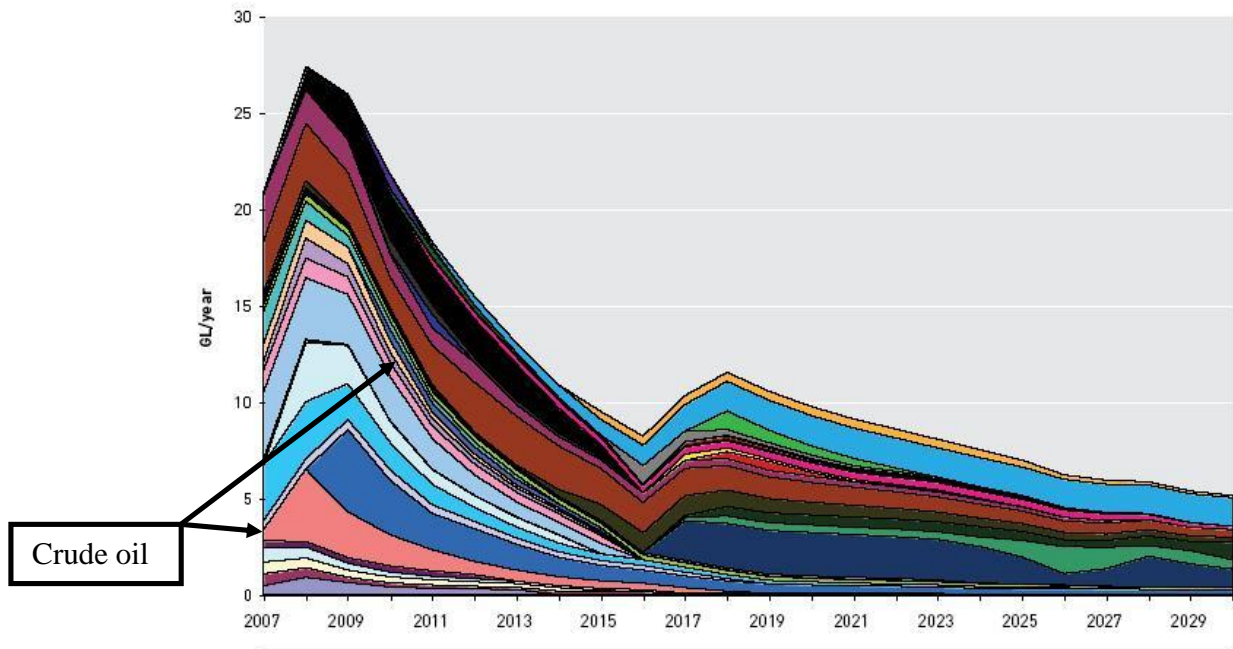


Figure 3 | CRUDE OIL AND CONDENSATE PRODUCTION FORECAST FOR WESTERN AUSTRALIA, SHOWING THE SLOWER DECLINE FOR CONDENSATE COMPARED TO OIL.

http://www.dmp.wa.gov.au/documents/PWA_September_2008.pdf

From the WA Department of Mines and Petroleum

Please note that annual crude oil production is down to 10% of current levels by 2016

The Federal Resource Minister is fully aware of the oil import crisis Australia is facing:

MARTIN FERGUSON, RESOURCES MINISTER: **Australia's got a huge challenge.** We've got huge problems on the trade front, but also importantly, a real problem in terms of energy security and our economic future by 2015.....We've got to find another Bass Strait, because if we don't by 2015 we will go from importing about 20 per cent of our needs in the 1990s to actually importing 80 per cent of our oil and related product needs, effectively contributing to a \$27 billion per year trade deficit.

<http://www.abc.net.au/7.30/content/2007/s2169087.htm>

But unfortunately, according to a recent letter, he seems to “believe” in several oil myths, which he conveniently picked from the latest World Energy Outlook 2008 of the IEA, while ignoring the hidden warnings of this report. These are the main misconceptions:

- (1) oil reserves have been growing since the early 80s (while most of that growth came from OPEC’s overstated reserves artificially created during the so-called quota wars)
- (2) there is enough oil to supply the world with oil for over 40 years at current rates of consumption (while oil is always peaking and then declining and not staying flat at current rates)
- (3) oil supply growth was sluggish since 2004 due to lack of investment and not lack of reserves (while capital efficiency was decreasing due to challenging oil geology e.g. in the North Sea)
- (4) oil will not peak until 2030 (while Fig 11.1 shows that even under all optimistic assumptions crude oil production will basically stay flat, but decline at 4% if investments in new fields are not forthcoming)

I have documented the peak oil ignorance of the Federal government in my report card 2008 entitled “Has the Federal Government prepared for oil decline and CO2 reduction?”

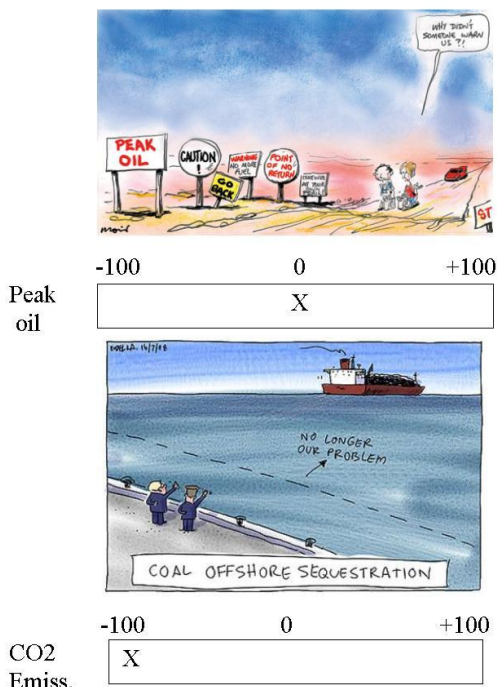
The findings are shocking. There is wishful thinking that “green cars” will reduce CO2 emissions, while at the same time coal exports have been massively increased by “Environment” Minister Peter Garrett’s approval of the Wiggins coal terminal and Kevin Rudd’s announcement to spend \$580 million for coal trains to service the 3rd coal loader in Newcastle which was approved by then NSW Planning Minister Frank Sartor.

All Australian motorists would have to walk for the rest of their lives just to offset emissions from phase 1 of Wiggins coal terminal.

<http://sydneypeakoil.com/matt/ReportCard2008.pdf>

Report Card 2008

Has the Federal Government prepared for oil decline and CO2 reduction?



Matt Mushalik (MIEAust, CPEng)

January 2009

mushalik@tpg.com.au

Highlight: Oil myths

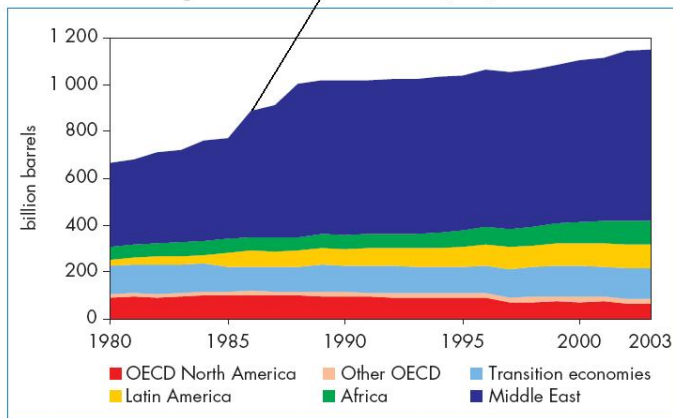
Oil myth #1: Oil reserves have doubled since 1980

The IEA World Energy Outlook 2008 says on page 202:

"According to BP, which compiles published official figures, proven reserves worldwide have almost doubled since 1980 (Fig 9.3). Most of the changes result from increases in official figures from OPEC countries, mainly in the Middle East, as a result of large upward revisions in 1986-1987. They were driven by negotiations at the time over production quotas and have little to do with the discovery of new reserves or physical appraisal work on discovered fields. The official reserves of OPEC countries have hardly changed since then, despite ongoing production"

According to BP, reserves increased dramatically in the 1980s and 1990s, from 670 billion barrels at the end of 1980 to 1 147 billion barrels at the end of 2003 (Figure 3.10).³ But most of the increase occurred in OPEC countries, mainly in the Middle East, in the second half of the 1980s. Saudi Arabia and Kuwait revised their reserves upward by 50%, while Venezuelan reserves were boosted 57% by the inclusion of heavy oil in 1988. The United Arab Emirates and Iraq also recorded large upward revisions in that period. Total OPEC reserves jumped from 536 billion barrels in 1985 to 766 billion barrels in 1990. As a result, world oil reserves increased by more than 30%. This hike in OPEC countries' estimates of their reserves was driven by negotiations at that time over production quotas, and had little to do with the actual discovery of new reserves. In fact, very little exploration activity was carried out in those countries at that time. Total reserves have hardly changed since the end of the 1980s.

Figure 3.10: Proven Oil Reserves by Region



Source: BP (2004).

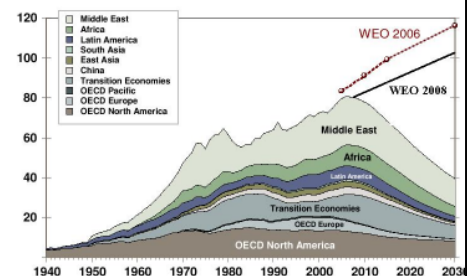
The primary sources of reserves data, such as O&GJ and *World Oil*, do not adjust reported data according to a standardised methodology. Nor do they adjust data for the large number of countries that rarely amend their official reserves estimates to account for actual production. Out of the 97 countries covered by O&GJ estimates at the end of 2003, the reserves of 38 countries were unchanged since 1998 and 13 more were unchanged since 1993, despite ongoing production. For example:

3. Part of this variation can be attributed to BP changing the sources of data they used to compile their estimates.

These are OPEC's famous paper barrels.

<<4 years earlier the WEO 2004 even had a graph with more details (Figure 3.10, underline by the author)

Despite this assessment, in every WEO, the IEA routinely INCLUDES these overstated reserves in their reference scenario projections. All WEOs are therefore inconsistent and produce future production estimates which are too high, as shown in this graph of the Energy Watch Group:



<http://www.energywatchgroup.org/>

Oil myth #2: There is enough oil to supply the world for over 40 years at current rates of consumption (this Howard ghost from his energy white paper now in Pandora is still around)

Irish oil geologist Colin Campbell writes in his Newsletter #91, in July 2008, in item 1060. Economical with the Truth

It also gives emphasis to the highly misleading concept of Reserve to Production Ratio. While the ratio itself is mathematically correct, it is clearly absurd to imply that production could stay constant for 41.6 years and then stop dead overnight, when all oilfields are observed to decline slowly during the latter part of their lives. Instead of dividing reserves by annual production to obtain a misleading result quoted in years, it would be much more meaningful to do the opposite and divide Annual Production by Reserves to obtain a Depletion Rate in percent.

On the BP Statistical Review Colin notes: **It is widely taken as an authoritative source of information coming from a very experienced and knowledgeable oil company, but not everyone reads the following critical footnote:**

“Statistics published in this Review are taken from government sources and published data. No use is made of confidential information obtained by BP in the course of its business.”

Government statistics on oil production and reserves are of course grossly unreliable in many countries. In earlier years, BP simply reproduced data from the Oil & Gas Journal, but now it uses various sources and thereby does assume some responsibility for the selection.

The Oil Reserves data carry additional key footnotes, deserving some comment

“Notes: Proved reserves of oil - Generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions.

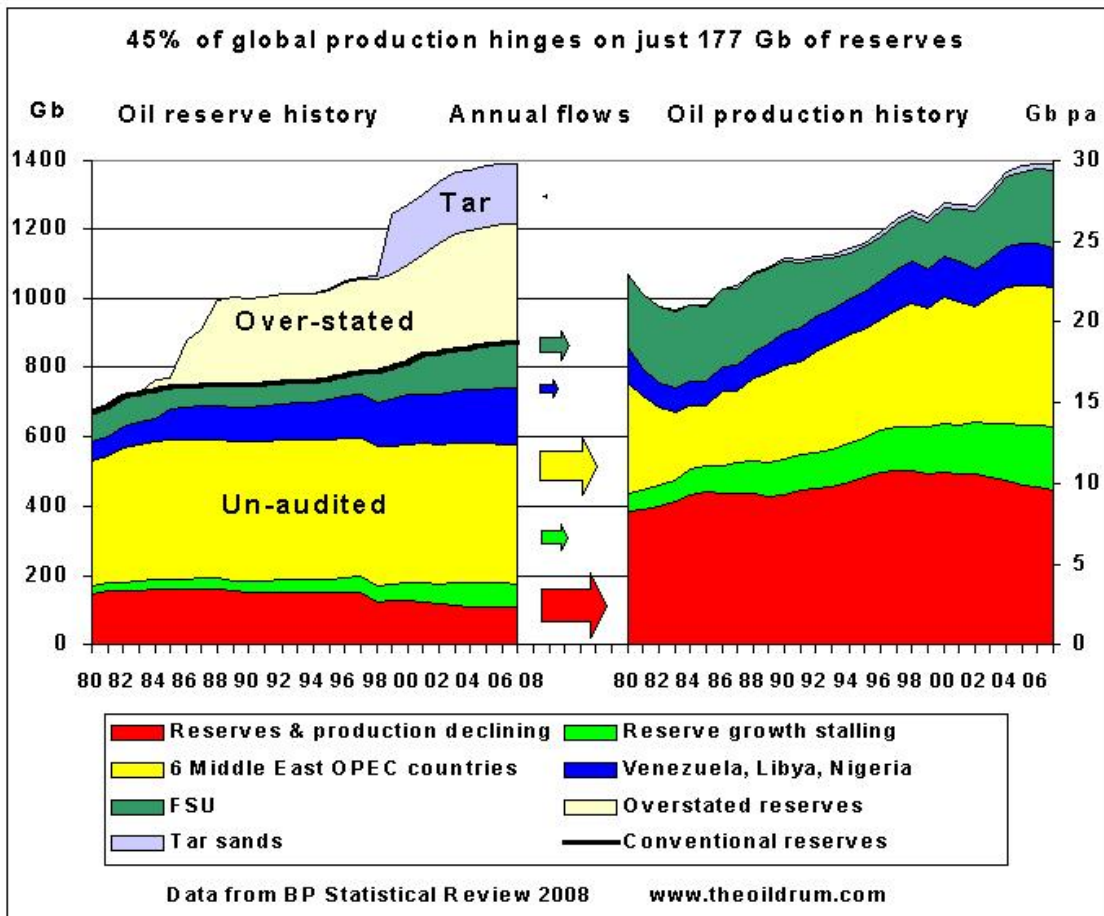
Reserves-to-production (R/P) ratio - If the reserves remaining at the end of any year are divided by the production in that year, the result is the length of time that those remaining reserves would last if production were to continue at that level.

Source of data – The estimates in this table have been compiled using a combination of primary official sources, third-party data from the OPEC Secretariat, World Oil, Oil & Gas Journal and an independent estimate of Russian reserves based on information in the public domain. Canadian proved reserves include an official estimate of 21.0 billion barrels for oil sands ‘under active development’. Reserves include gas condensate and natural gas liquids (NGLs) as well as crude oil.”

The term Proved Reserves as reported by companies quoted on the Stock Exchange is a valid financial term, subject to strict rules aimed to prevent fraudulent exaggeration, while smiling on under-reporting as laudable caution. There are two sub-classes : Proved Producing for the estimated future production of existing wells and Proved Undeveloped for the estimated future production of yet-to-be drilled infill wells, assuming current economic and operating conditions. These are important qualifiers. In the case of an offshore field, new reserves can be reported following for example the construction of a new platform or the application of long-reach drilling, although nothing unforeseen is added. This explains the observed but misleading reporting of reserve growth, which is attractive in financial terms, having additional tax advantages in some countries. As already mentioned above, reserve revisions should be back-dated to the field discovery to obtain a valid discovery trend.

The BP report attributes 152.2 Gb to Canadian tarsands, which is a remarkably

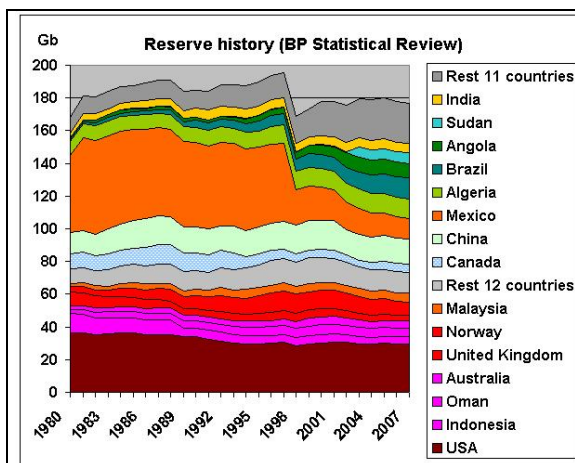
More important than reserves as such is which annual oil flows come from which reserves:



The Disconnect Between Oil Reserves and Production <http://www.theoil drum.com/node/3664>
http://sydneypeakoil.com/matt/Worlds_Fragile_Oil_Flows_From_Declining_Reserve_Base.pdf

And this gives us a completely different picture compared to looking at reserves alone:

- (1) Canadian tar sands, hyped to equal Saudi Arabia's official oil reserves, need hydrogen – from natural gas already short in supply - to turn tar into liquid hydro carbon chains, produce just 1 mb/d.
- (2) OPEC's overstated reserves produce nothing. Even OPEC's other oil is unaudited (i.e. would not qualify under SEC rules)
- (3) Total oil production is at peak and, most importantly:

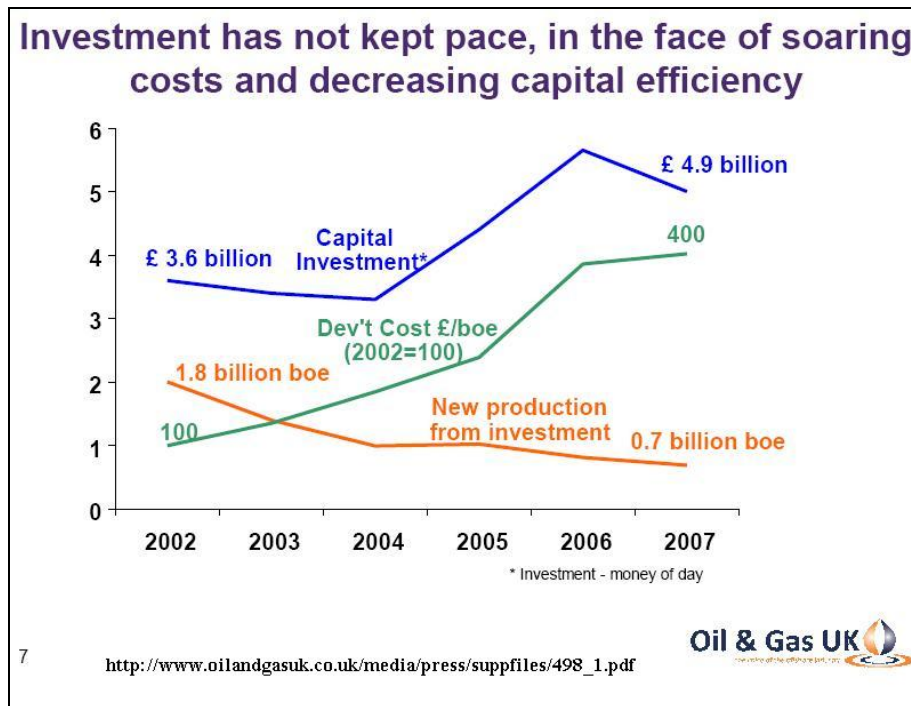


45% of global oil flows come from just 177 Gb of reserves which deplete at 7% pa. Production from these reserves has already peaked in 2002.

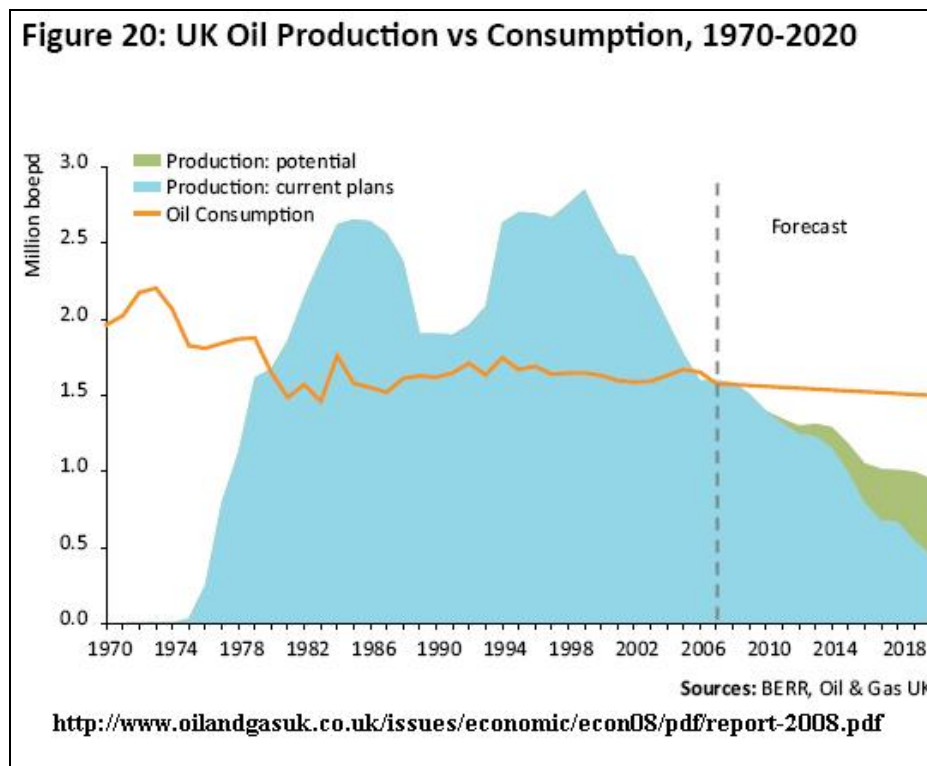
<< Looking at the 1980-2007 period these reserves have hardly changed. A dramatic re-assessment of Mexican reserves has been somehow offset by increasing reserves in other countries. **106 Gb of reserves producing 1/3 rd of global oil flows are actually in decline by 2% pa since 1999 when they were 126 Gb.**

Oil Myth #3: Sluggish oil production growth is caused by lack of investment, not reserves.

Let's have a look at what happened in UK BEFORE the financial crisis:



The real problem is that geology in the oil fields has made it hard to achieve higher efficiency



UK is now a net oil importer in terminal decline. No amount of investment will change that

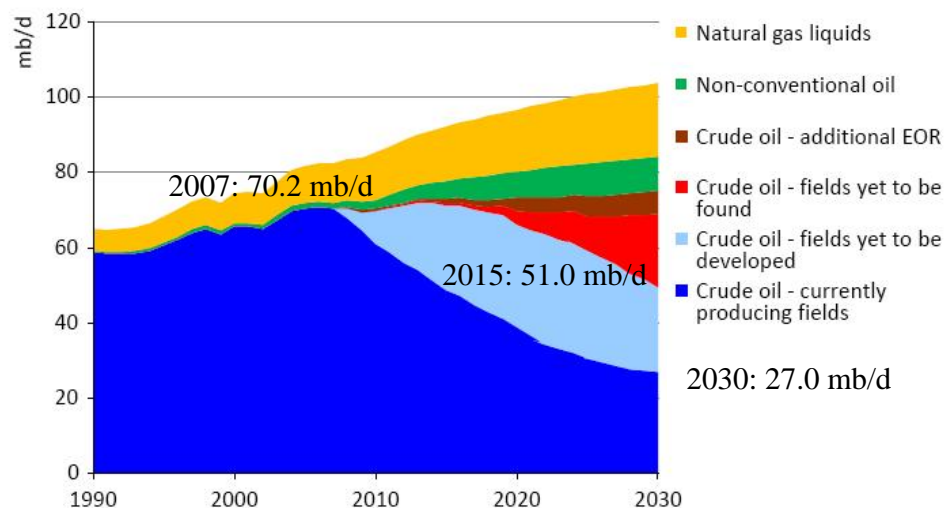
Oil myth #4: oil production will not peak before 2030

And that brings us to the crux of the matter: what future crude oil production can we expect? The WEO 2008 was presented to the press as follows:

“Current trends in energy supply and consumption are patently unsustainable – environmentally, economically and socially – they can and must be altered”, said Nobuo Tanaka. “Rising imports of oil and gas into OECD regions and developing Asia, together with the growing concentration of production in a small number of countries, would increase our susceptibility to supply disruptions and sharp price hikes. At the same time, greenhouse-gas emissions would be driven up inexorably, putting the world on track for an eventual global temperature increase of up to 6°C.”

http://www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=275

And here is the all-important graph, the reference scenario (Fig 11.1)



http://www.worldenergyoutlook.org/key_graphs_08/WEO_2008_Key_Graphs.pdf

What can we read from this graph?

- (1) The most important part, crude oil production, is estimated to increase by only 5 mb/d until 2030, that is practically flat
- (2) Total oil production growth is supposed to come mainly from natural gas liquids (assumed to DOUBLE by 2030) and non-conventional oil like syn-crude from tar sands (assumed to GROW 5 FOLD)
- (3) **Currently producing fields decline from 70.2 mb/d in 2007 to 27 mb/d in 2030**
- (4) In order to maintain crude oil production even at current levels, ever increasing amounts of crude will have to come from fields yet to be developed (19 mb/d by 2015 alone) and yet to be found

The report did a detailed analysis of 800 oil fields coming up with following facts:

- (a) These 800 fields were depleted by 48%, almost half (page 229)

- (b) 40.5 mb/d of 70.2 mb/d (58%) of crude, mainly from super-giant, giant and large fields, are post peak and declining at 5.1% pa (page 221)
- (c) Other post peak fields worldwide decline at 6.7% pa, even at 9% pa (natural decline) if no investments are made (page 243)
- (d) 79% of the world's remaining conventional oil reserves are in fields already being exploited (page 223)

Table 10.12 • Estimated production-weighted average annual observed post-peak decline rates for all fields worldwide by region

	Based on 580 field dataset	All fields
OECD North America	6.5%	9.7%
OECD Europe	11.5%	11.9%
OECD Pacific	11.6%	12.6%
E. Europe/Eurasia	5.1%	5.8%
Asia	6.1%	6.7%
Middle East	2.7%	3.4%
Africa	5.1%	6.8%
Latin America	6.0%	6.6%
World	5.1%	6.7%

Sources: IHS, Deloitte & Touche and USGS databases; other industry sources; IEA estimates and analysis.

So how will this rampant decline in existing fields be offset? The investments needed are tabled below. Where will the money come from in a never-ending financial crisis?

Table 11.5 • World cumulative investment in the upstream oil sector under different decline-rate assumptions for existing fields, 2007-2030

	Oil price* in 2030 (\$2007/barrel)	Investment (billion \$2007)		
		2007-2015	2016-2030	2007-2030
Reference Scenario	122	1 819	3 217	5 036
High decline-rate case	141	2 179	3 923	6 102
Low decline-rate case	100	1 817	2 531	4 349

* Average IEA crude oil import price.

In a presentation to the Council on Foreign relations, IEA chief economist Fatih Birol had this to say about the WEO 2008



Question: **This year's WEO report represents a radical departure from 30 years of optimistic, demand-driven consumption projections. In the past, the IEA always relied on the 'Call on OPEC' to make production rise to the level of projected demand. Your new bottoms-up, field-by-field analysis of supply and depletion rates is a major improvement and we commend you for it. Yet this report still relies on the Call on OPEC to fill the production gap. Do you, personally, believe that it**

will be remotely possible to keep supply flat in the next 5-10 years, given the current economic and geopolitical situation?

Answer: If you read the report carefully, or run a word search on it, you will see that two words occur more frequently than any others. The first word is “oil”. The second word is “if”.

<http://au.youtube.com/watch?v=m377Is4tGF0>

This got a rumbling chuckle from the audience. But no one publicly connected the dots that in order for the IEA’s supply projections to work out, ALL of the non-trivial IFs mentioned in his talk must materialize:

IF the current low oil prices rise back above the \$75-\$95/bbl marginal cost needed to bring on new non-OPEC supply in time to offset the declining production base

IF oil-producing countries and China stop subsidizing petrol prices to their own populations

IF OPEC gives the International Oil Companies access to explore and develop their national reserves

IF \$26 Trillion in exploration and infrastructure capital is invested [includes all energy related investments]

IF OPEC decides to invest seriously in capacity increases

IF EOR can really increase the recovery rate to the extent hoped

IF the unaudited reserves reported by OPEC and Russia are really there

IF the optimistic USGS 2000 predictions of Yet-to-Find oil are correct

IF the Saudis are capable of reaching and sustaining 15 mb/d, and willing to do so

(Ok, he didn’t mention these last three) IF, IF, IF, etc.

http://www.ft.com/cms/s/0/1f7f8898-c55a-11dd-b516-000077b07658.html?nclick_check=1

Some questions for the Resource Minister on the WEO 2008

- (1) Given the decline rates in table 10.12 above, how have the authors of the WEO 2008 arrived at the declining shape of “currently producing fields”, which is only around 4% pa?
- (2) How would figure 11.1 change if OPEC’s paper barrels mentioned on page 202 were actually deducted to arrive at a prudent “lower reserve scenario”?
- (3) Have you obtained bank guarantees from OPEC according to SEC rules that they actually have the reserves they claim they have, so that you can plan oil imports accordingly, for decades ahead?
- (4) Is the information given in the report consistent and sufficient to answer questions (1) and (2) or would you have to contact the IEA to get clarifications?
- (5) Has your staff ever done independent calculations to check statements in the WEO 2008?
- (6) How many hidden warnings have you found in the report and what do they mean for Australian oil imports?
- (7) Where will the crude oil come from as refinery feedstock for diesel, which will be needed to lay 1,000s of kms of pipelines for liquid CO₂ (geo-sequestration)?

(2) The need to replace private car traffic by PT in urban areas

From the previous chapter it follows that a deep and continuing oil crisis is upon us. This is not just a matter of oil prices but mainly a question of physically available oil supplies.

What is generally not understood is that we face a timetable of events, which will dictate the type of PT solutions and their implementation phases over the next 5-10 years. This means, for example, that there is no time left for expensive metro tunnels or very fast train projects.

Timetable of events

2010 more oil price shocks and/or oil shortages

2011 Mexico's net oil exports trend towards zero: US must save

2012 Qantas suffers from Australia's oil import problems

20?? China peak oil

2013 Arctic summer sea ice disappears; weather on Northern hemisphere goes berserk

2014 UK's oil production down to fractions of 1999 peak levels

20?? Middle East oil war

2015 Saudi Arabia running out of fossil water

20?? The mother of all bubbles bursts: OPEC's paper barrels go up in air

"Reserves" are inflated with >300 B bbls of "resources"

	Depleted	Statistical reliability	Production Outlook	Technical basis
1.1 Trillion				
Actual Reserves : 0.9 Trillion	Proven > 90%	Proven oil in place – high confidence Developed – clear recovery factor Undeveloped – good, recov. est.	Growth thru actual reservoir mgmt. & performance	Improved Oil recovery thru existing technology
	Probable > 50%	Probable oil in place – confident Developed – prelim. recovery factor Undeveloped – est. fair recovery	Growth thru delineation, testing & development	Clear opportunity with existing technology
Contingent Resources: 1.1 Trillion	Potential > 5%	Potential oil in place – low confiden. Drilled – v. low recovery factor Undrilled – recovery likely poor	Growth thru pricing, delineation or IOR/EOR technology	Indicative data & potential opportunity
	Resource: Uneconomic volume & commerciality	Likely presence but undelineated Oil or GIP	Profitability or Technology currently inadequate	Available access but lacks good reservoir and fluids data
Prospective & Speculative Resources: 2.0 Trillion		Technically present but physically inaccessible hydrocarbons	Future resolution thru exploration & relevant technology	General geological, seismic and/or physical indications
	Oil, Gas, Shales, EHC & to be discovered resources (speculative outlook)	Conceptually Possible Hydrocarbons, incl. EHCs		

Ex Saudi Aramco's Sadad al Hussein crosses out 30 years OPEC oil supplies

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

2015 Iranian oil exports end

2016 WA crude oil production on 10% of current levels

2020 New map in the Middle East

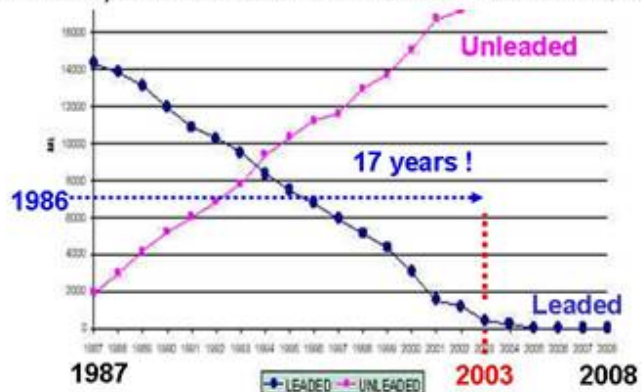
Why peak oil means the end of our car culture

(1) Peak oil (2005-2008) would have required starting a transition to new fuels and/or technologies 10-20 years ago (Hirsch report).

Car manufacturers were not officially warned about peak oil and have now been caught off-guard. The comparatively easy transition from leaded to unleaded petrol took 17 years. We simply don't have this time

<http://www.aspo-australia.org.au/References/Bruce/Good-Oil-conference-5Sept2006.ppt>

Petrol Sales, Leaded and Unleaded. Australia 1987-2008



(2) Denial mode: government departments think peak oil can be endlessly debated. They also conveniently pick overly optimistic scenarios of production forecasts – from any given pool of models - at their pleasure. This policy failed and still fails to give car manufacturers the timetable for a transition

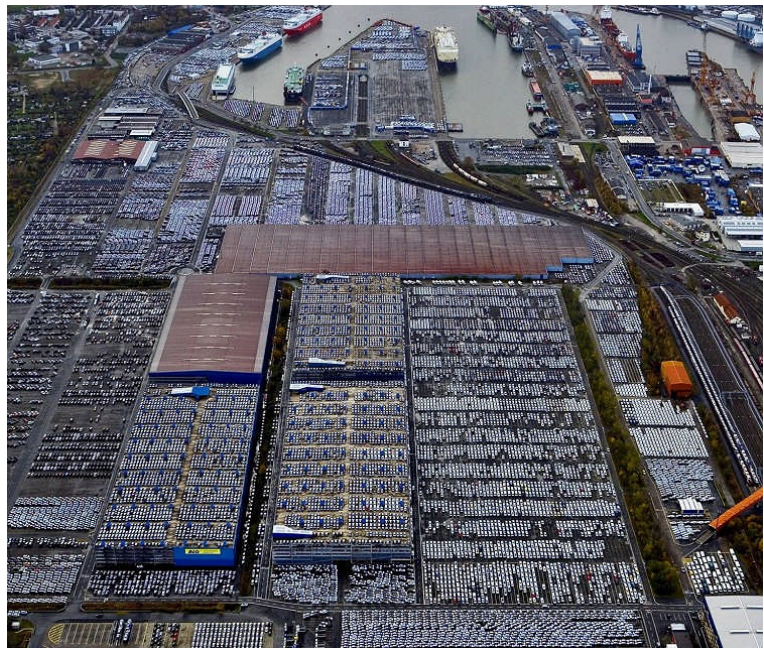
(3) The oil decline is too steep for car factories to adapt. They are designed for a continuous high capacity output of proven models, which were incrementally improved. New models take years to develop, test and bring to market. By the time this development cycle is completed, the oil and energy crisis will have moved to their next phases

(4) The decline after peak oil is accompanied by too many discontinuities in the next 10 years: roller coaster oil prices, oil wars, civil unrest, trade deficits and regional imbalances.

(5) Simultaneously, weird weather caused by global warming will force us to abandon coal much earlier than naively assumed =>> huge primary energy crisis. So we won't have electric cars in large numbers


(6) Credit crisis = car finance will remain a permanent headache as resource depletion will limit repaying capacity for loans.

German over-production of cars waiting at Bremerhaven>>>



The Day the Assembly Lines Stood Still <http://www.spiegel.de/fotostrecke/fotostrecke-38131.html>

(7) All Australian sugarcane converted to ethanol will yield around 5 litres per week per car. Bio fuels cannot be wasted on the urban motorist and will be needed to make agricultural production and transport of food less dependent on oil

<p>How many liters of ethanol a week would we get for an average Australian car if all current Australian sugar cane production would be used for ethanol production?</p>	
<p>Let's assume 10 million cars in Australia running on E85 engines: 420,000 ha * 80 tons * 1,000 liters / (12.5 tons * 52 weeks * 10,000,000) = 5.2 liters</p>	

(8) The laws of thermodynamics (loss of usable energy when transforming energy) will not allow to introduce fuels like liquid hydrogen

(9) Compressed natural gas is a solution but is not being pursued speedily enough. Priority will have go to buses, emergency & service vehicles and trucks transporting food to the cities

(10) Tar sands and oil shales need a huge energy input up-front and have therefore very low energy profit ratios. Hydrogen (from natural gas) is needed to form liquid hydro carbon chains suitable for pipeline transport. The marginal full cycle cost is \$90/barrel, which is close to the point where our economy goes to its knees. High oil prices will kill the economy BEFORE these alternative fuels come on-stream.

(11) Un-employment will mean less cars are bought

Sector	2005-06 PJ	<p>By 2020, assume there will be 30% less = 564 PJ. All essential uses in business, commerce, agriculture, mining etc. should be maintained. Efficiency improvements business, trucks, air, industry, mining 20-25% 220</p> <p>Rest to be saved by personal and commuting use 564 – 220 = 344</p> <table border="0"> <tr> <td>Passenger Vehicles 2006</td> <td>532</td> </tr> <tr> <td>Efficiency gains 10%</td> <td>53</td> </tr> <tr> <td>Enforced saving</td> <td>344</td> </tr> <tr> <td>Remaining</td> <td>135</td> </tr> </table> <p>Reduction to 135/532 = 25% of current levels for all passenger vehicle use personal and commuting, city and rural</p> <p>Sources: ABARE 2008 Road transport vehicle type allocations of fuel usage from DEWHA 2006 Passenger and Light commercial fuel usage allocations from ABS 2007; Modelling by Anawhata Associates</p> <p>http://anz.theoildrum.com/node/3867</p>	Passenger Vehicles 2006	532	Efficiency gains 10%	53	Enforced saving	344	Remaining	135
Passenger Vehicles 2006	532									
Efficiency gains 10%	53									
Enforced saving	344									
Remaining	135									
Transport subtotal	1,302									
Road transport subtotal	1,019									
Passenger vehicles subtotal	639									
Personal	339									
Commuting	163									
Business	137									
Motor cycles	3									
Light commercials subtotal	158									
Personal	31									
Commuting	25									
Business	102									
Rigid trucks	81									
Articulated trucks	117									
Non-freight trucks	2									
Buses	19									
Railway transport	27									
Water transport	54									
Air transport	202									
Industry	244									
Mining	147									
Agriculture	86									
Lubes, bitumen, solvents	63									
Commerce & services	25									
Residential, mainly LPG	12									
Totals	1,879									

A back-of-the-book calculation about how much energy is left over for motorists if we want all other oil consuming transports to remain at current levels, future energy efficiencies assumed.

(3) Best practice Australian PT examples

3.1 Transperth: electric rail on freeways/tollways

The best description of Transperth can be found in:

CORE 2008

THE INTEGRATION OF RAIL TRANSIT AND LAND USE IN WESTERN AUSTRALIA

The Planning behind Perth's Expanded Rail System

M Peter Martinovich

Member, Institution of Engineers Australia

Director of Rail Infrastructure Planning

Public Transport Authority of WA

from this Perth Urban Rail conference: <http://core2008.org/papers/index.php>

Abstract and Summary

“The traditional understanding of mass transit rail is its application to serve high density settlement. This paper is about the application of mass / rapid transit rail to low density settlement in a city of just over 1.5 million people and rapidly expanding over a 135 kilometre long, narrow, corridor.

The paper is also a case study of planning a transit system stretching 71 kilometres from the City of Mandurah to Perth over a period of ten years beginning in 1992. During that time the type of service, the mode and the route were hotly debated and underwent several major changes. It is a story of how land users planners working with transport planners with the ultimate direction and support of an enthusiastic Minister achieved an outstanding integrated outcome.

Today, trains operate from Mandurah into Central Perth directly up the median of the Kwinana Freeway, in 48 minutes stopping at eight intermediate stations. Six months after commissioning, they carry 96% of the 50,000 daily trips predicted for the first year.

Had an alternative not been developed to a plan prepared by transport planners in 1992, then buses would have operated the Kwinana Freeway direct route into Perth. The train would have run from Mandurah to Fremantle calling at up to 30 intermediate stations in a trip time of 65 minutes to Fremantle and 89 minutes to Perth carrying a projected 41,000 daily trips by 2021.



The paper discusses the importance of the Master Planning process, which quantifies the demand and then follows a logical process of scope definition to reduce uncertainty and give confidence to the cost estimates that result. It also addresses the issue of how Transit Oriented Development relates to Perth.

A brief description is included of the New MetroRail Project, the vehicle by which a \$1.65 billion expansion to the Perth suburban rail network was completed in December 2007, described by the Premier of WA in 2007 as “the best public infrastructure project undertaken by any WA Government in 100 years”.

Finally, there is a short analysis of the performance of the Mandurah line, six months after commissioning.”

<http://core2008.org/papers/abstracts/Peter-Martinovich.php>

Main features in photos:

(1) Short CBD tunnels to minimize costs, not a fully fledged expensive metro throughout



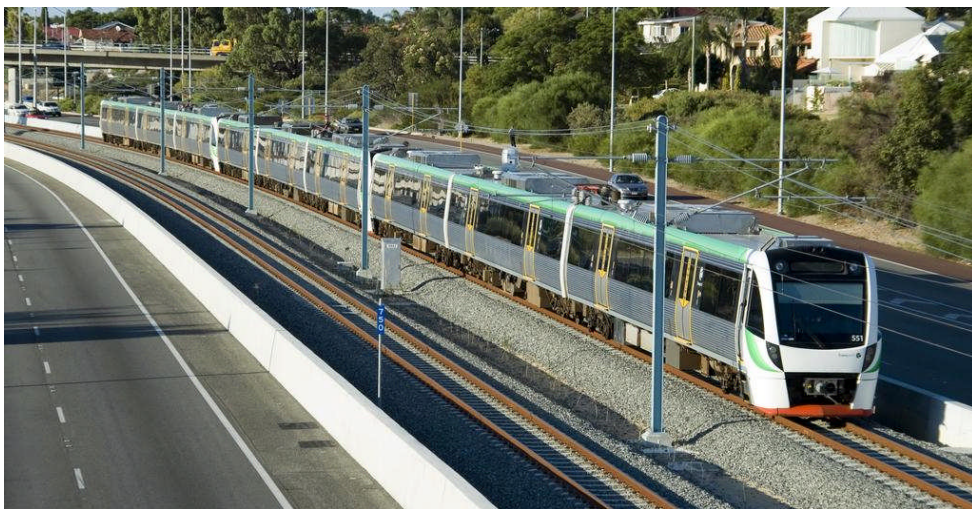
http://farm4.static.flickr.com/3043/2719221895_297363a4a7.jpg?v=0

http://farm3.static.flickr.com/2187/2211216169_b3245ff5b3.jpg?v=0

(2) Using existing freeway corridors: there, where the traffic is.



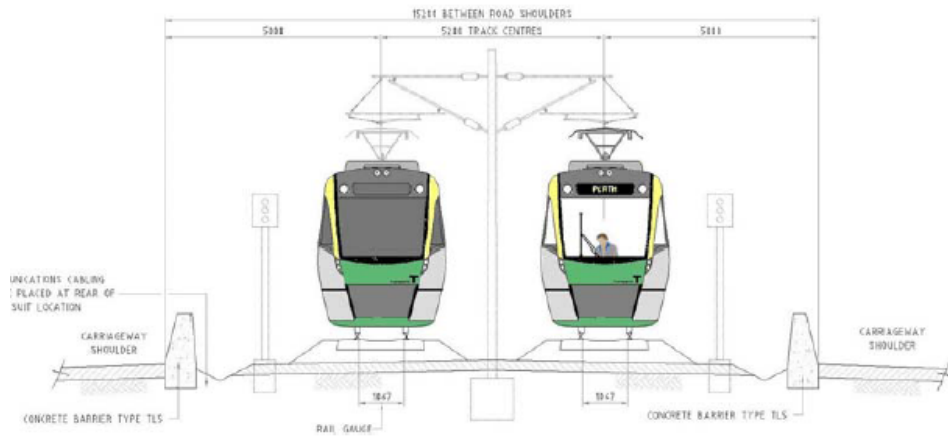
Perth motorists – not being told about peak oil by governments - have no idea how their daily lives will change within the next couple of years.....



...When circumstances (high petrol prices, long petrol lines at filling stations) will force them off the road: empty car lanes and long, full trains.

<<< Foretaste of petrol lines on Sunnyholt Rd., Blacktown. In a bizarre stint 3 months after the July 2008 oil peak, petrol prices are lowered to 99 cents for a couple of hours, attracting 100s of motorists. Few might have guessed that these queues will be normal in future.

<http://www.smh.com.au/news/national/pump-it-up-petrol-protest-fuels-giant-jam/2008/10/21/1224351253363.html>

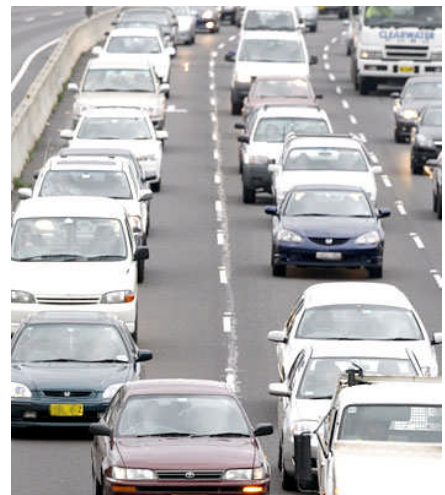


Proposed Standard Minimum Reserve Width for Concrete Barriers

<http://search.informit.com.au/documentSummary;dn=208925227741227;res=IELENG>

On many freeways in Sydney, this median strip is not available. The existing inner car lanes can be used. Mandatory car-pooling will clear away whatever traffic will survive the financial crisis. Some sort of petrol rationing will have to be introduced anyway. This will be the only solution when the crunch time comes. There will not be enough time for anything else.

Panic and chaos will reign if motorists are not being told that peak oil happened and that there is a big oil crisis around.



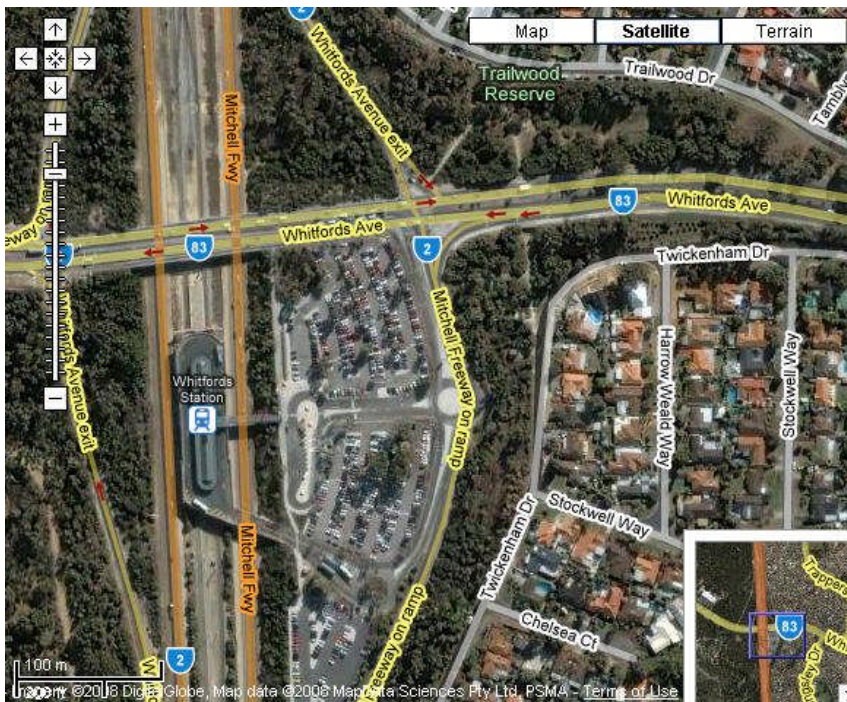
“Transit lanes in gridlock as commuters risk hefty fines
 THIS photograph shows how desperate motorists have become just to get to work on time.” >>>

<http://www.news.com.au/dailytelegraph/story/0,22049,24456821-5006009,00.html>

The solution will have to look similar to what has been done in Phoenix, Arizona



(3) Stations in residential suburbs



<<< Picture book design of Whitfords station on the Northern line.

Bus terminus on top of the station.

Park & Ride nearby.

Kiss & Ride loop and taxi stand

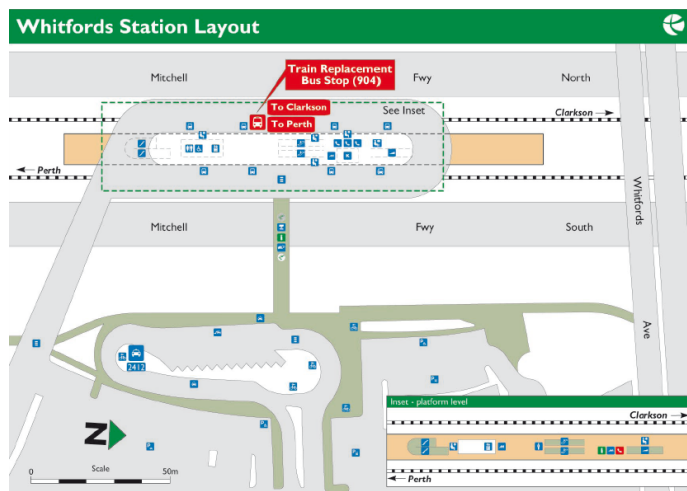
More details can be found here:

<http://www.transperth.wa.gov.au/LinkClick.aspx?fileticket=OrooX56TdZM%3D&tabid=61&mid=669>



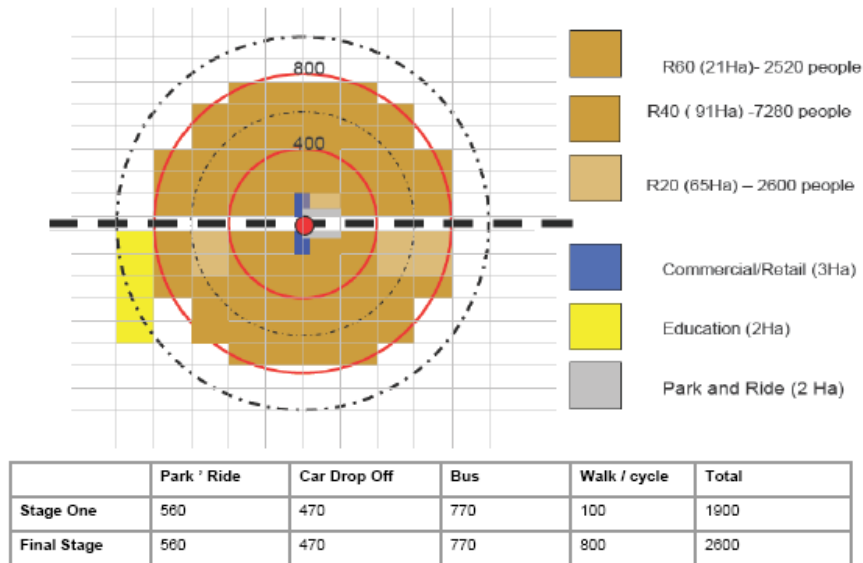
http://en.wikipedia.org/wiki/Whitfords_railway_station,_Perth

<http://www.busaustralia.com/forum/viewtopic.php?f=7&t=28578>

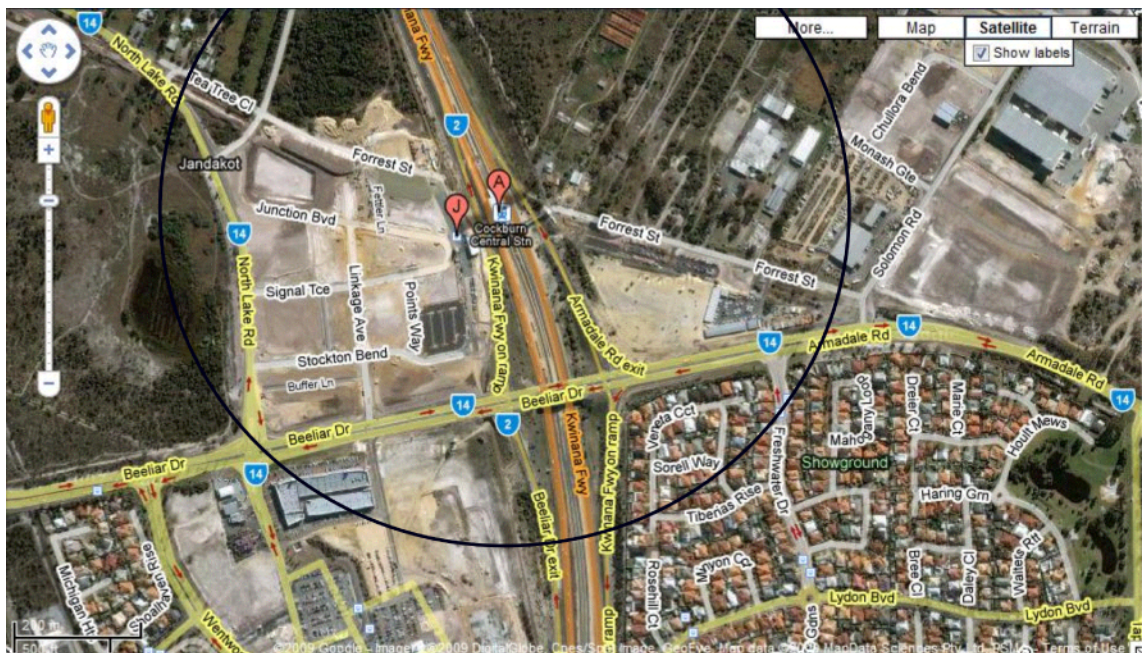


(4) Stations with Transit Oriented Development

There is a conflict between providing a lot of car parking for park&ride near rail stations and transit-oriented development, which has to be of higher density so that the station can be reached by walking.



This graph is Fig 14 from the above quoted CORE2008 document and depicts a model for TOD. There is a radius of 1 km around the rail station. After peak oil, the park&ride facilities should be better utilized by car-pooling. The radius of 1 km can also be extended as walking will become more prevalent.



Cockburn Central on the new Mandurah line. The shopping center is top, right. The radius around the station (not exactly located in the city center) is 0.5 km. This is an example showing the difficulties and compromises to be made when attempting to change the physical structure of a city, which was originally designed for cars running on cheap petrol. Note the difficult and long path residents have to walk to get to the station. This is the late price to pay for subdivision designs, which maximized land values by creating fashionable loop roads and cul-de-sacs.

3.2 Adelaide: Trams on major roads



This recent Australian example shows how trams were integrated into a major road. The same can be done with light rail trains. Car lanes can be closed as traffic will decrease (see below). This solution creates many jobs for local sub-contractors as this is simple work.

<< Opening ceremony with heritage tram

http://www.lightrainow.org/features/f_ade_2007-11a.htm



On the web site Sensational Adelaide a reader familiar with the roads there used google street view to create this photomontage how car lanes can be replaced

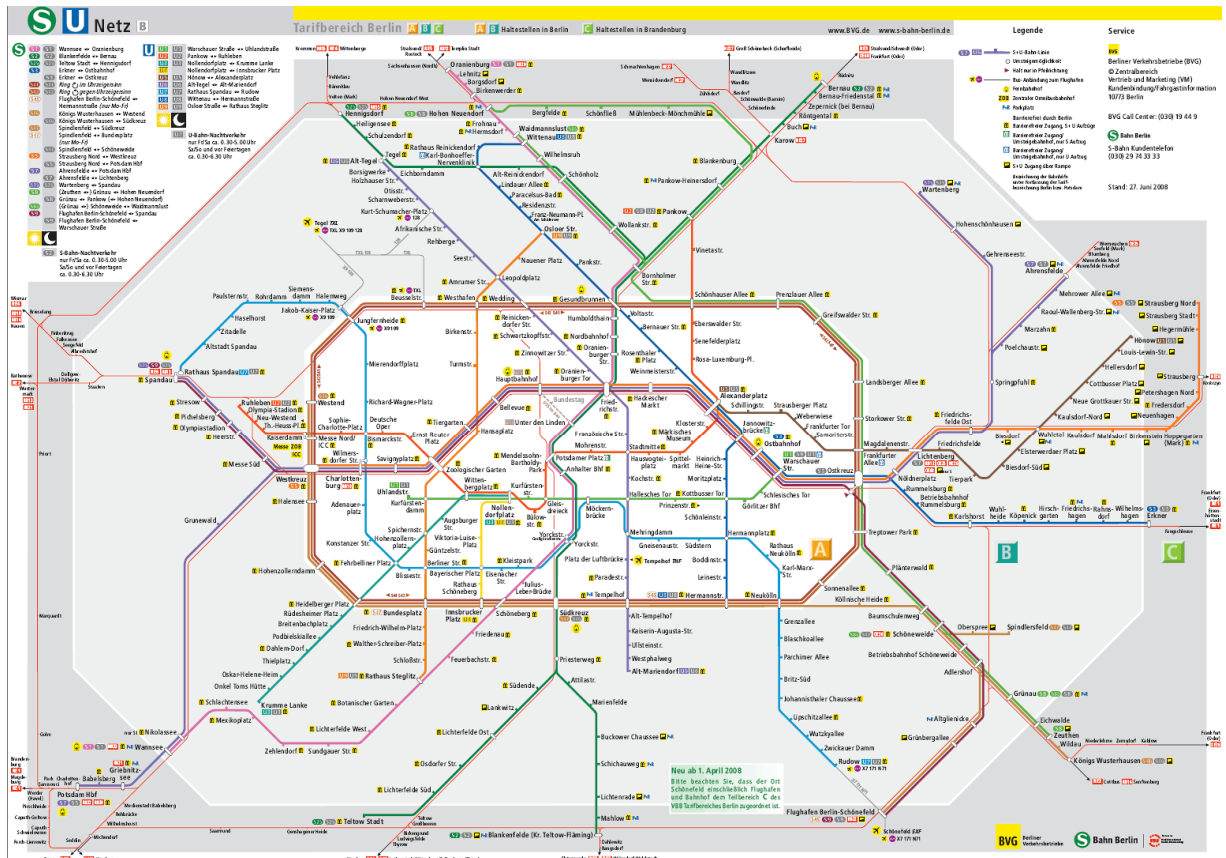


<http://www.sensational-adelaide.com/forum/viewtopic.php?f=17&t=1386&start=60>

(4) Best practice international PT examples

4.1 Berlin

Among the European cities and from the point of view of population size, Berlin (3.5 million) could be best compared with Sydney. London and Paris are actually too big. This is Berlin's rail (S Bahn) and metro (U Bahn) network



http://www.s-bahn-berlin.de/images/s_bahn_netz.gif



20% of Berlin's U Bahn runs on elevated track>>>

As can be seen it is virtually impossible to replicate such a system in any timeframe given by declining oil production.

<< S Bahn



4.2 Frankfurt: surface metro



In 1961, when Sydney closed down its last tram line www.flickr.com/photos/ Frankfurt City Council decided to build rail tunnels for its trams running through the CBD, initially because it was thought

U Bahn Eröffnung Frankfurt am Main 4.10.1968



Trams at Frankfurt Central Station end 1950s

No sign of closing down: new tram cars

<http://www.aufbau-ffm.de/>

that trams cause traffic jams which had started in the mid 50s. The 1st section of a rail tunnel was opened in 1968, later extended to 6 kms (tunnel A, 8 stations), connecting Northern suburbs and towns of neighbouring Councils with the main shopping center. Outside the CBD, trams continued above ground on improved track, a total of 31 kms used by 3 lines. 65% was financed by State and Federal

grants. Using an average discount rate of 5%, that first section has a net present investment value of AU \$500 million per km. The Federal railways joined in and built a heavy rail tunnel connecting central station with a station in the East, thus creating a city circle.

In the late 60s and early 70s the objectives of moving trams underground changed from providing more space for cars to creating more pedestrian zones, as the car free main shopping mall above a combined rail and metro tunnel proved to be a commercial success. Public environmental awareness also increased. Attempts to reduce road congestion with flyovers failed

Plans were drawn up for a fully-fledged metro system but these turned out to be too ambitious and could not be fully implemented even up to now. Altogether 4 metro tunnels for 7 lines were built. As of 2007, this hybrid system now consists of a total of 60 kms, 23 kms out of which are tunnels. There are 27 underground and 58 above ground stations handling 109 million passengers annually.

There are still several tunnel- and other upgrading projects in the pipeline awaiting funding. Others have been shelved indefinitely and/or replaced by more economic light rail projects. Though Frankfurt has also built many city freeways and greatly benefits from intersecting north/south and east/west federal freeways to its west and south, party political and electoral awareness for the importance of public rail infrastructure development is much higher than in Sydney. Rail development is part of 10 year transport plans mainly funded by Federal and State grants. Cities have to compete for these funds.

Taking the North-South line as an example, we can distinguish 4 different sections:

- (1) tunnel in commercial CBD area
- (2) tunnel in high density residential area
- (3) above ground dedicated track on median strip of major road in high density residential
- (4) above ground rail line to outlying areas and towns



<http://www.flickr.com/photos/aundweber/2743732343/>



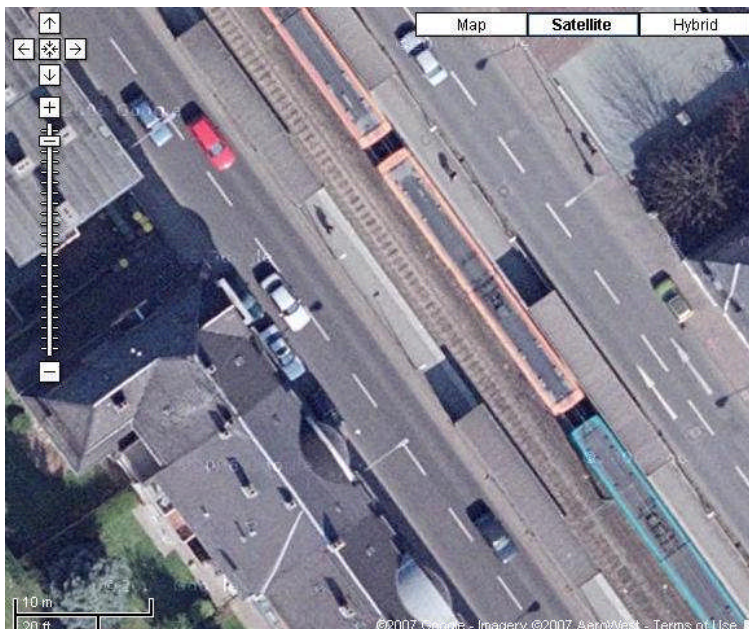
The North-South line U1-U3 leaving the CBD tunnel and continuing above ground on a median strip of a major road through a high-density residential area.

Station platforms are accessible by pedestrian tunnels.



At intersections traffic lights give priority to trains so that the time table can be maintained. On this section with 3 lines trains run every couple of minutes.

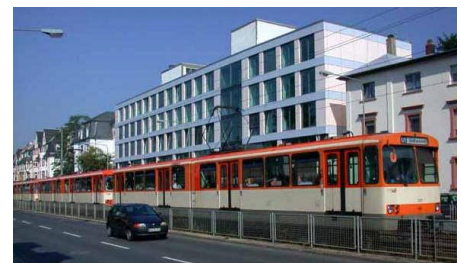
<http://de.wikipedia.org/w/index.php?title=Datei:Eschersheimer-ffm0042.jpg&filetimestamp=20080425143626>



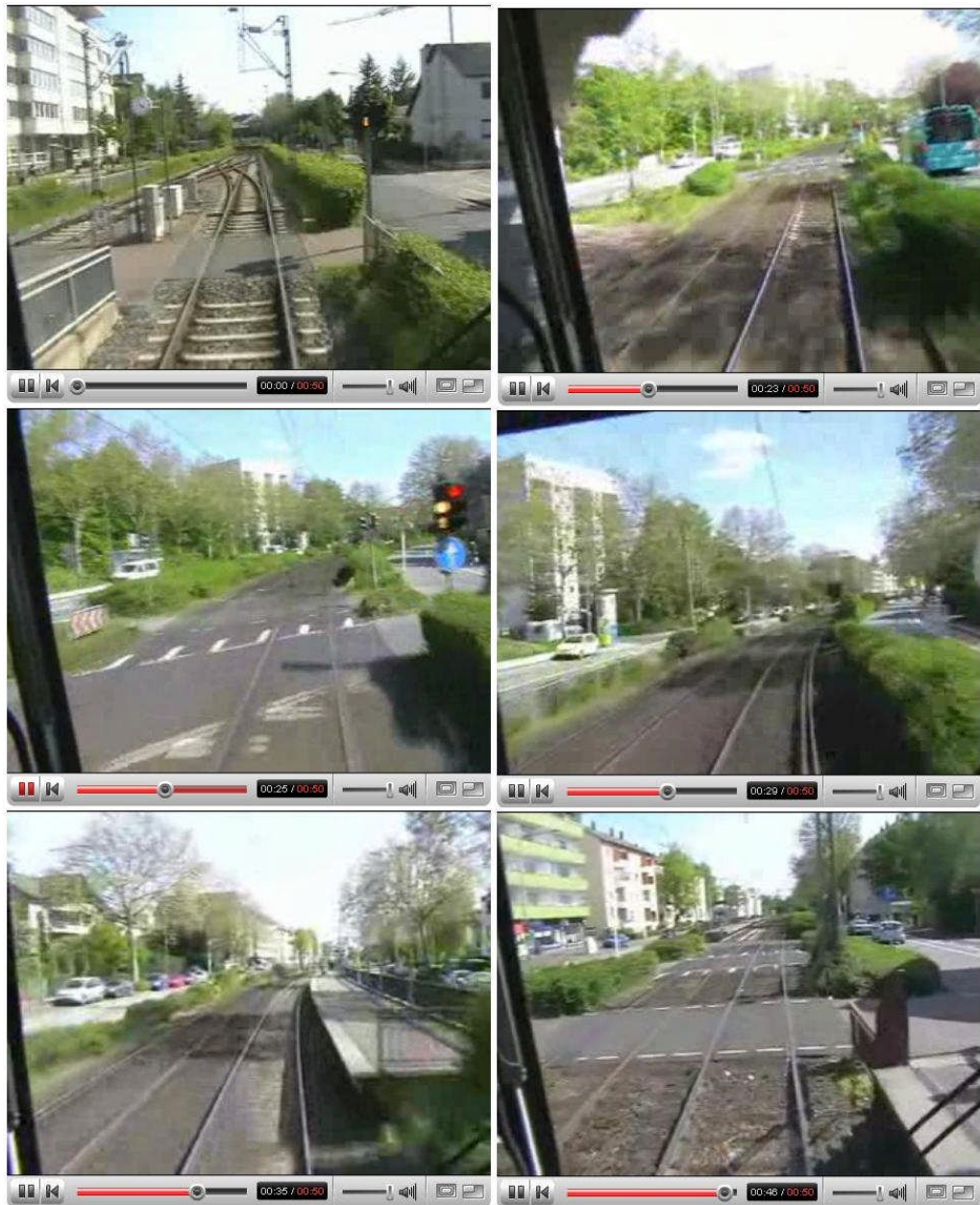
Arrangement of tracks, platforms and 2x2 car lanes.

Platforms are 100 m long to accommodate 4 unit trains with 8 cars.

Some sections of road are narrower and in these cases platforms are staggered



More information is here: <http://www.urbanrail.net/eu/ffm/frankfrt.htm>



<http://www.youtube.com/watch?v=gjh3FAXTZik>

Cab view: the trip starts at the terminus in a residential area (1), enters a major road with 2x2 car lanes (2). At an intersection, priority for rail (3). Standard alignment (4). Approach station platform and stop (4-5). In the distance the staggered platform on the other side can be seen (to save space between car lanes). Watch other videos to see how surface metro works:

Departure from above ground station <http://www.youtube.com/watch?v=kej8uwR9pPI>

Arrival in tunnel station <http://www.youtube.com/watch?v=GoM7TScJqr4&NR=1>

Intersection with road <http://www.youtube.com/watch?v=RRW5bd1enbI>

Urban rail Frankfurt <http://www.youtube.com/watch?v=llxKvYeAdq8>

Dornbusch <http://www.youtube.com/watch?v=djz6Pp0GK2g>

http://www.youtube.com/watch?v=SN_XXUH4J1w

Hierarchy of Urban Rail System in Frankfurt

Heavy rail



Double deckers are used as city or regional express only; limited stops every 15 mins or so



Single deckers for all stopper services. Average distance between stations: 2.5 kms

Metro



Stops every 800-1000 m, runs every 5 mins



Also above ground on dedicated track.

Light rail – surface metro



8 car trains - high platforms - frequent stops



Simple stations can be built fast

Trams – low floor

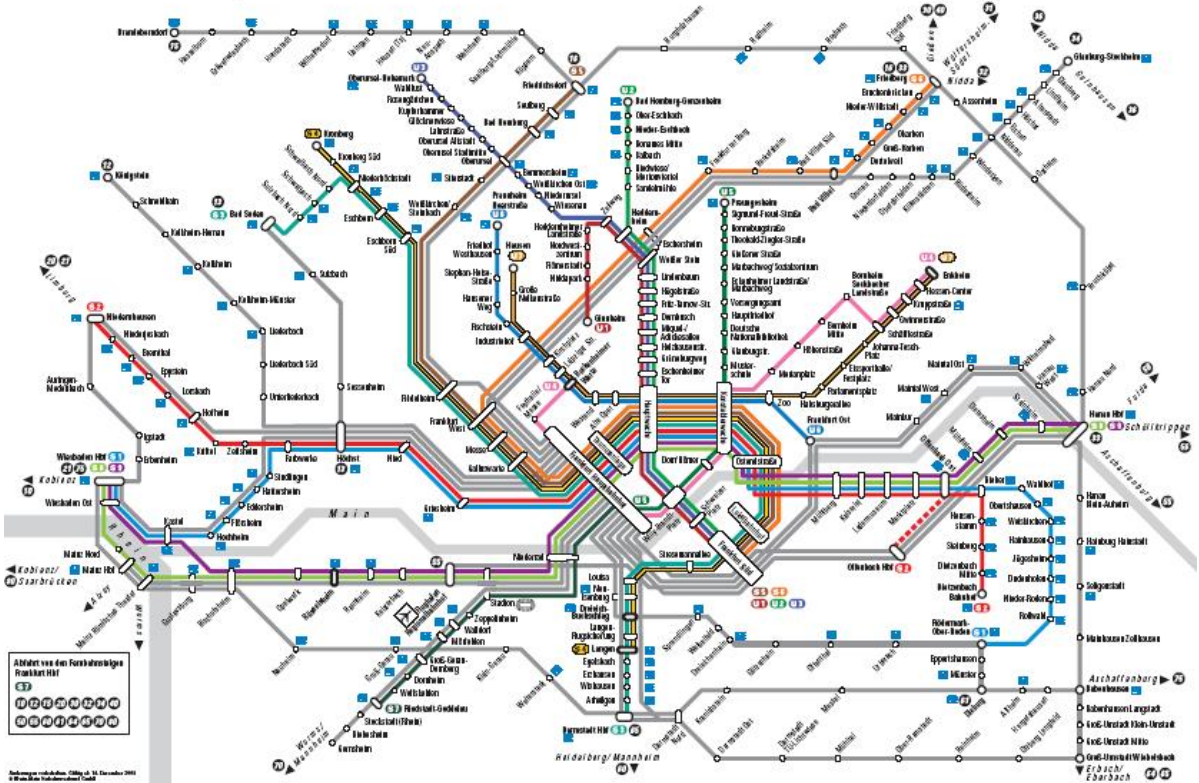


Sharing road way



On dedicated track; car lanes gone

Schnellbahnplan



Frankfurt's network of heavy rail, metro tunnels and surface metro (light rail) Pulse timetabling and integrated ticketing (rail/metro/light rail/tram/bus) are in place for 30 years now.



Frankfurt tram lines still remaining after introduction of metro/light rail U1-U7. There is a tram revival as funds for metro tunnels have dried up.

Even the only genuine metro line U4 that was running in tunnels only has now been extended above ground to improve network capabilities with the light rail section of U7.



Car lanes have been removed for tram tracks in the inner city. There is not enough room for platforms in the center of the road so they have been moved onto the pedestrian lane.

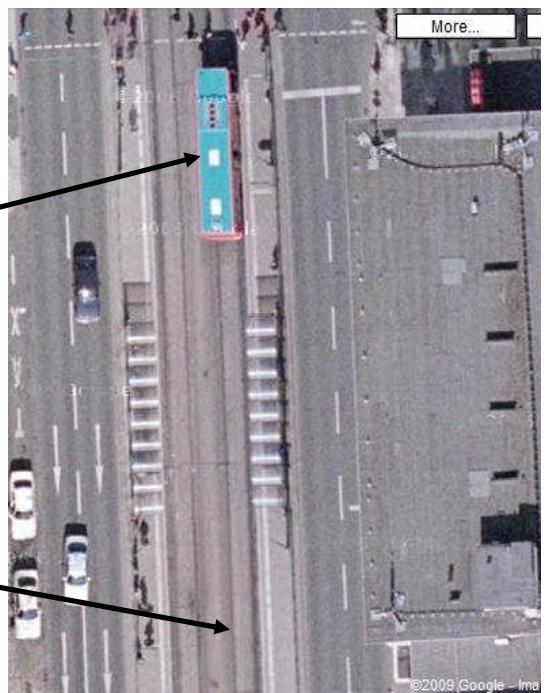
Note that traffic lights turn red when tram approaches stops to pick up passengers. Vehicular traffic will come mainly from residents, visitors, basement car park users, delivery vans etc., no through traffic. Hostile environment for cars (no on-street parking)



(c) 2003 Thomas Luszöller
www.nahverkehr-ffm.de



(c) 2003 Thomas Luszöller



©2009 Google - Im

Buses can use the same track way, too >>>>

4.3 Karlsruhe model

When the 1st oil crisis hit in 1973/74, the Karlsruhe City Council commissioned the Technical University Karlsruhe to make proposals for future transport systems in the city. There were trams in the city with the usual problems of conflicts with vehicular traffic. 2 options were considered:

- (1) people mover on elevated track (4 passengers per cabin)
- (2) upgrading trams to light rail

The problem with the people mover was that the cabins could not be accommodated off-peak anywhere near the city center to be available for the afternoon peak. That would have required converting the existing multi-level car parks to holding bays for the cabins. The car parks had just been completed and were strategically located at the best sites. Councilors could not decide to do this conversion. This is a lesson every transport planner working on a transition model should learn: you cannot have competing transport systems in a city; they must be complementary.

The Council decided to upgrade the trams and developed the so-called Karlsruhe model

http://en.wikipedia.org/wiki/Karlsruhe_model

<http://www.urbanrail.net/eu/karl/karlsruhe.htm>

in which tram trains can also use heavy rail track (dual voltage trams)

Tram trains are running in 3 modes:

- (1) on street/pedestrian zones
- (2) dedicated track
- (3) heavy rail track



Uses heavy rail track



As regional tram



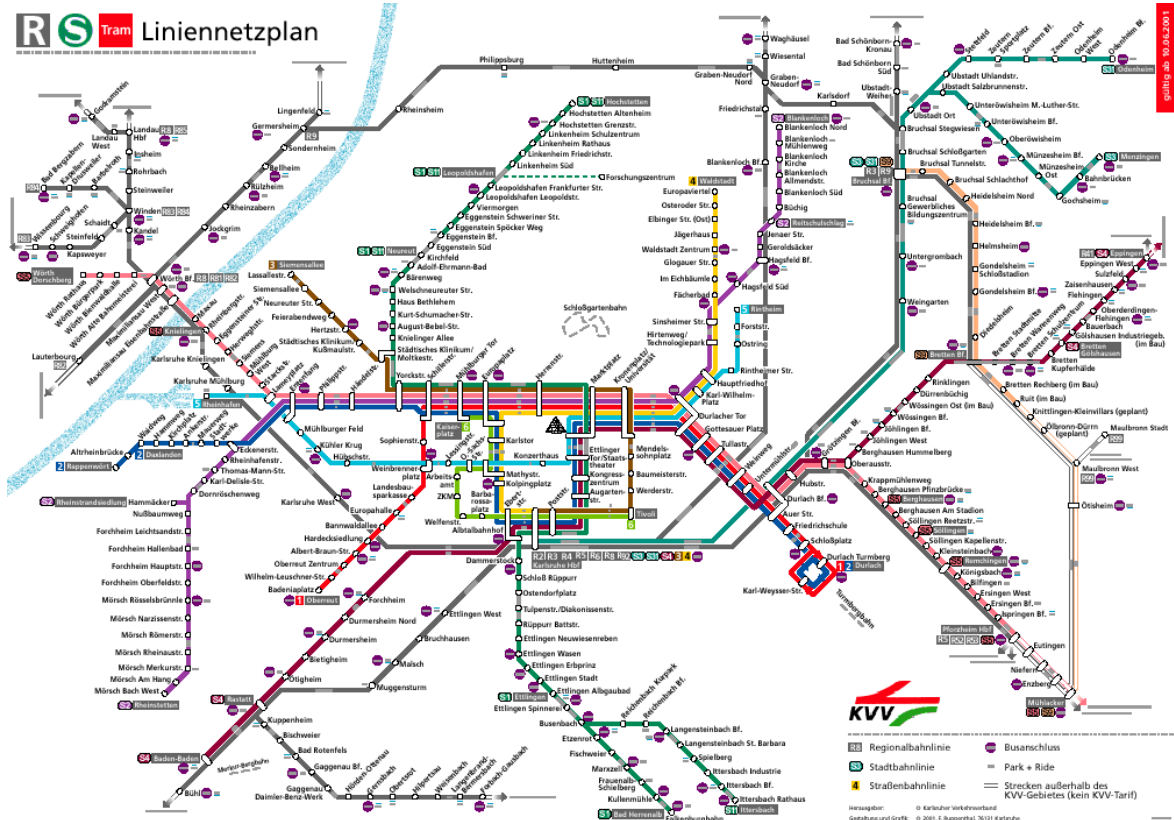
On arterial road



In pedestrian zone/shopping mall

Watch the smooth change of voltage: <http://www.youtube.com/watch?v=1cS6B1Tgr5Y>

The advantage of these dual voltage tram trains is that passengers do not have to change at the station and that many existing branch lines can be used. In Sydney, for example, such tram trains could use the Richmond line, then run on a new line on the M7/M2 and then enter the Epping-Chatswood tunnel.



This is the light rail network Karlsruhe built up since the 1st oil crisis in 1973/74. That's how long it took. The city itself has only a population of 250,000 but the whole region has approximately 1 million. **It will take a lot of improvisation and imagination to extend rail into areas of Sydney, which have no rail services at all.**

More videos to watch: Regional tram: <http://www.youtube.com/watch?v=ivZkH81jtl>

In city center

Warning! RTA readers may get a heart-attack



<http://www.youtube.com/watch?v=zLPkzNozzSQ>

4.4 Phoenix, Arizona

These pictures speak for themselves. See also earlier picture on medium strip of



<http://www.flickr.com/photos/railfepics/page48/> (pan through the pages)

(5) Lessons for Sydney

There is total confusion in Sydney politics about the role of different types of rail systems, their function and integration in a large urban region. This is best reflected in this article of the Sydney Morning Herald where light rail is seen only as a type of modern tram, connecting the CBD to its surrounding suburbs.

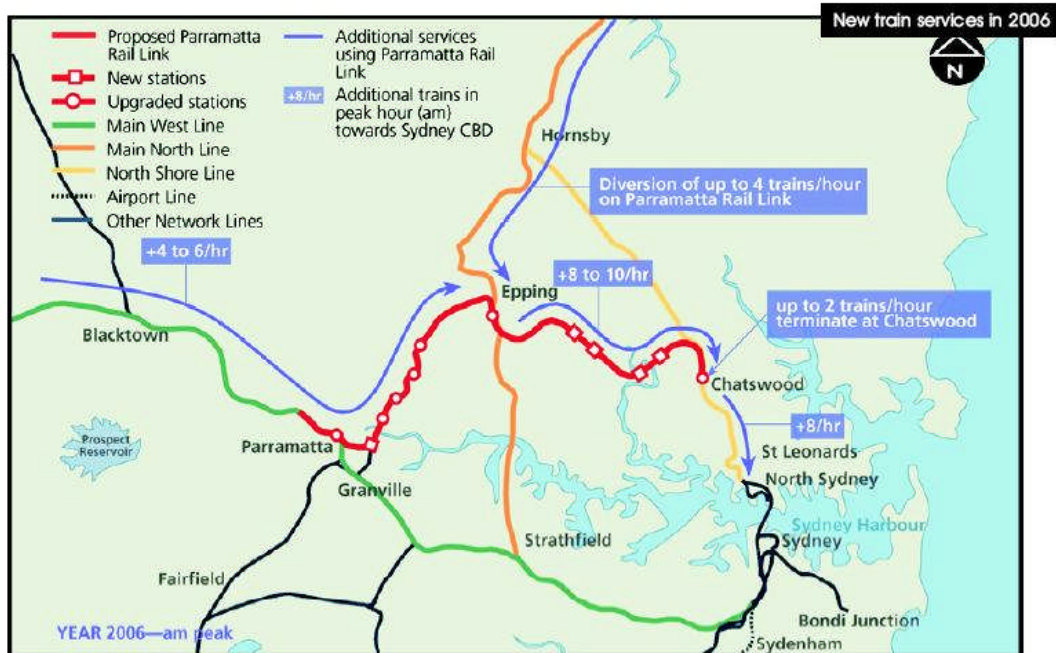
The future of bus city - clogged streets



<http://www.smh.com.au/news/national/the-future-of-bus-city--clogged-streets/2006/01/09/1136771500679.html>

But congestion on CBD roads is not Sydney's main problem. What is at stake is the overall functionality and connectedness of the metropolitan area.

So what has been done? Let's take the Parramatta – Chatswood rail link



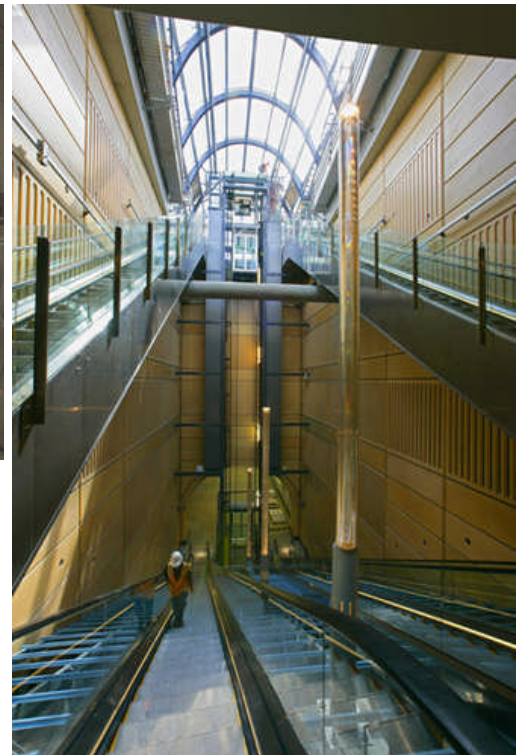
The above graph shows the original intention (1999, from the CD) of diverting Western trains away from the crowded Strathfield – CBD corridor and provide direct access to jobs in the Macquarie Park – North Ryde area and to the Chatswood – St Leonards – North Sydney area It

would have added considerable network capabilities of a system which at present is mainly aimed at providing direct access to the CBD only, in a typical radial structure (monodirectional traffic flows are always expensive). But just 3 years later, in June 2003, Transport Services Minister, Michael Costa, cancelled the Epping – Parramatta leg of the link, thus effectively killing its original objective.

Last stop Epping as Parramatta rail link in doubt

<http://www.smh.com.au/articles/2003/06/02/1054406133708.html>

The truncated line, from Epping to Chatswood, has just been opened. 12.5 kms with 3 stations for \$2.3 bn in 6 years. Sydney would have to substantially speed up its rail program if it wants to survive the coming oil and energy crisis.



In future, such luxurious design will no longer be affordable, because of the high energy consumption to operate the stations deep underground which was dictated by hilly topography and modest gradients, which can be handled by heavy rail double deckers. This part of Sydney is actually more suited for light rail, which can go up 7% slopes.

<http://www.cityrail.info/ecrl/images/gallery5.jpg>

In particular, there are doubts whether enough (and cheap) diesel will be available for the removal of large volumes of excavation material from rail tunnels once physical oil shortages start. It will be easier to organise small volumes of diesel for light rail projects.

The European light rail solutions presented above are to be seen as a guideline for what has to be done, adapted to Sydney conditions. It is important that the RTA come on-board because their role will change anyway with the decline of the motor car. The newly created Metro Authority, at present headed by a former RTA chief, could do this job, as intimate knowledge of the road system is needed to implement rail solutions on existing road corridors.

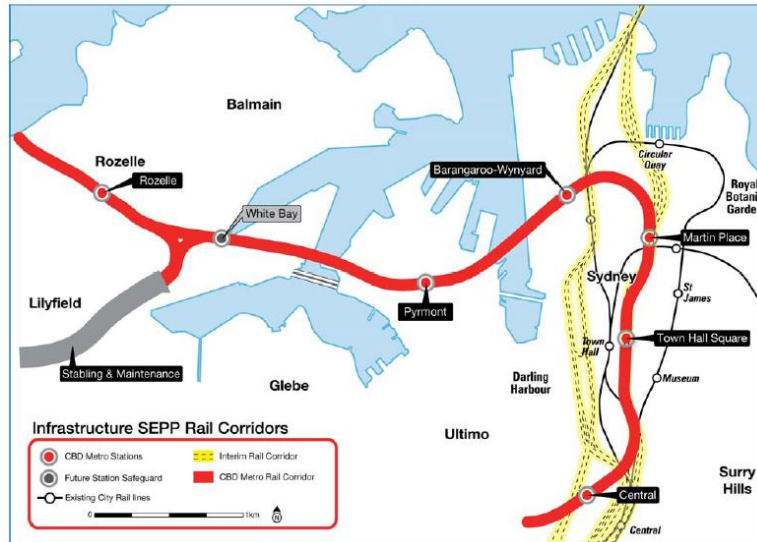
In the meantime, all rail tunnel proposals in Sydney (NW-SW heavy rail (global arc), NW metro, West metro, Harbour rail link) have gone no-where.

With its Rozelle mini metro proposal (just 7 kms for \$ 4.8 bn) the NSW government thinks it can now, 4 minutes past 12, catch up with the tunneling European cities did in 40 years. That is

impossible. A metro tunnel under the CBD is a major and costly engineering challenge due to existing tunnels and basements. Frankfurt's skyscrapers were built AFTER the rail tunnel planning was done.

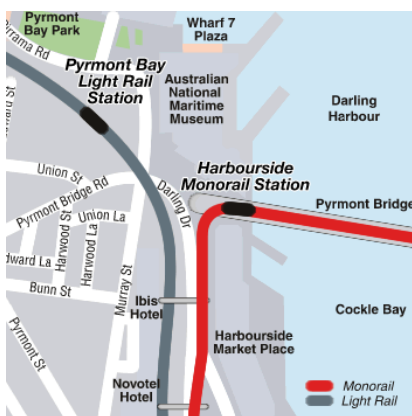
Let us check what this metro could do, having in mind that we are in an emergency:

Figure 2.1 Protected rail corridors within the Sydney CBD.



http://www.sydneymetro.nsw.gov.au/news/latest_news/preliminary_environmental_assessment/files/109/PEA_CBD_Metro_16.02.2009.pdf

- (1) we have a duplication of stations: Central, Town Hall, Martin Place. The latter 2 are within walking distance of the city circle stations St James and Museum, which still have spare capacities
- (2) Barangaroo is a development which is in doubt after the financial crisis hit. Many financial planners have lost their jobs. The future job market will completely change from office based jobs to hands-on trade jobs to retrofit our existing economy. These jobs will not be located in the city. The existing docking facilities will also be needed when coastal shipping becomes important again. If immigrants are still interested to come and welcome by Australia, they will rather come by ship than by plane, as many airlines will become insolvent in the next oil price spike. There are also threats from sea level rises
- (3) Pymont has already a light rail connection. There is no need for an additional metro station there.



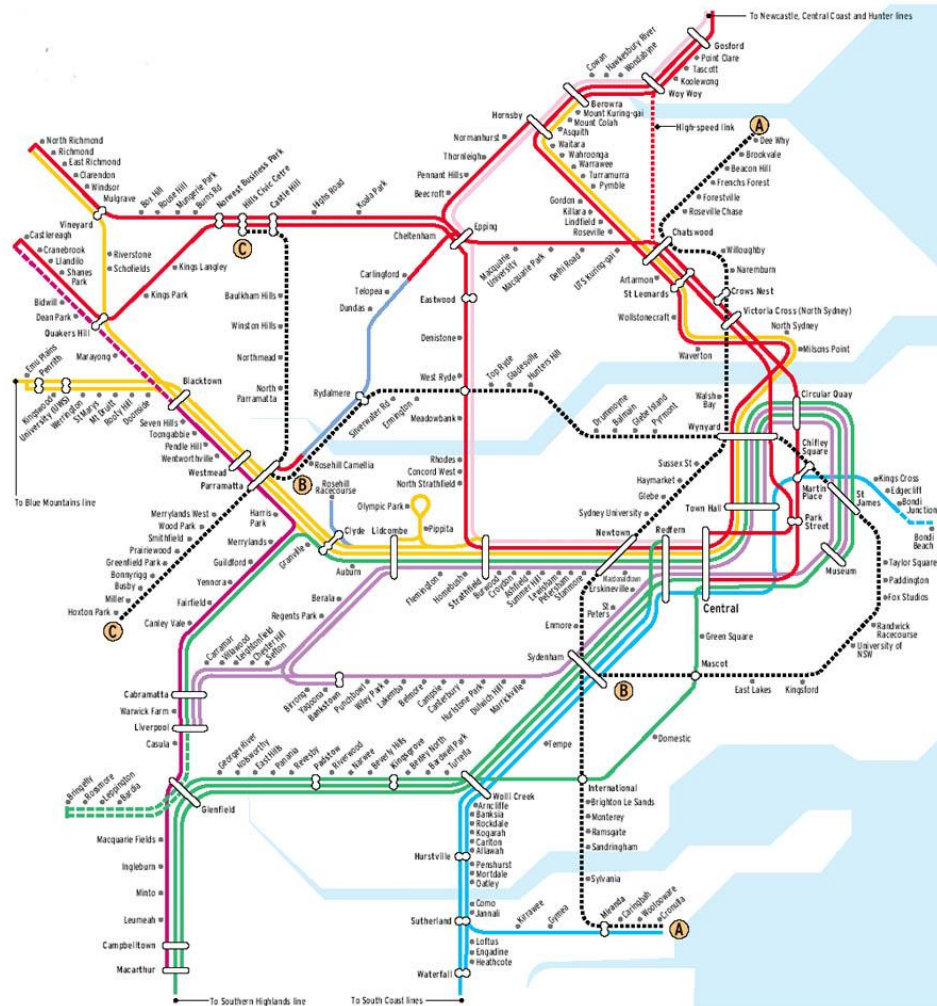
<http://www.tidc.nsw.gov.au/>

A tunnel boring machine does not create many jobs

http://www.metrotransport.com.au/uploads/images/station_pyrmont-harbourside.gif

- (4) Remains Rozelle; that could be serviced by light rail/surface metro on Victoria Rd. The NSW government is now also wasting funds for the Iron Cove bridge widening
- (5) Continuation to Ryde in 2015. By that time we are going to be in a permanent, deep oil crisis world-wide.
- (6) Driverless metro. In a period of growing unemployment that is completely inappropriate

So this proposal makes no sense at all. The problem here is not just the public transport concept but the whole economic, oil supply and climate change outlook which has to be considered but still ignored by all governments. The Rozelle metro would have been OK if started in the 1960s like in Frankfurt but now it is too late. For the same \$ 4.8 bn approximately 200 km of light rail (@ 25 million/km) could be built in the whole of the Sydney region.

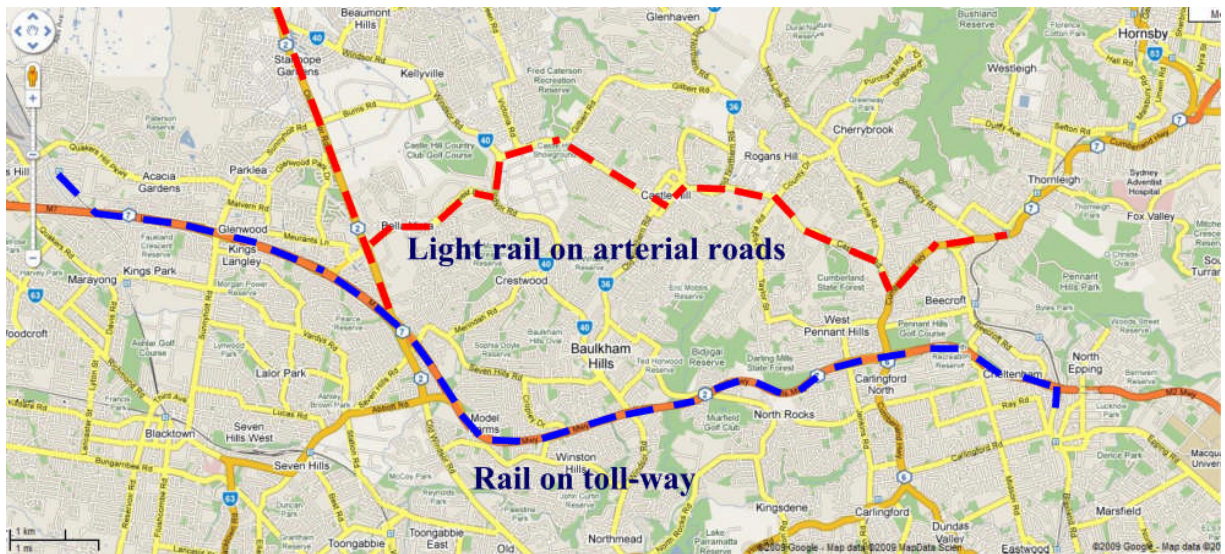


Sydney's network plan as proposed by former Rail Chief Ron Christie in the year 2000 including 4 additional metro lines (dotted)

Due to the combined peak oil and credit crisis, this plan is no longer implementable. What is needed most for the overall functionality of Sydney? These rail links:

- (1) to the North West sector
- (2) on Victoria Rd
- (3) on Anzac Parade
- (4) to the Northern beaches

Here is a sketch design how to replace the cancelled NW heavy rail/metro proposals:

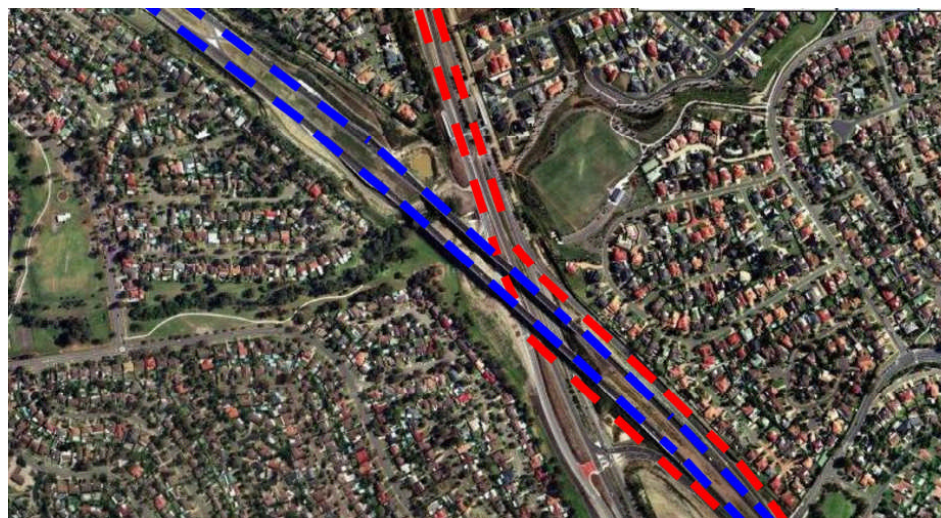


(a) Electric rail connecting Quakers Hill with Epping (blue line), operated by Hills M2 and Westlink M7, funded by the superannuation industry. This is in their own interest. The existing bus lanes can be used. Buses can still run if track way is paved.

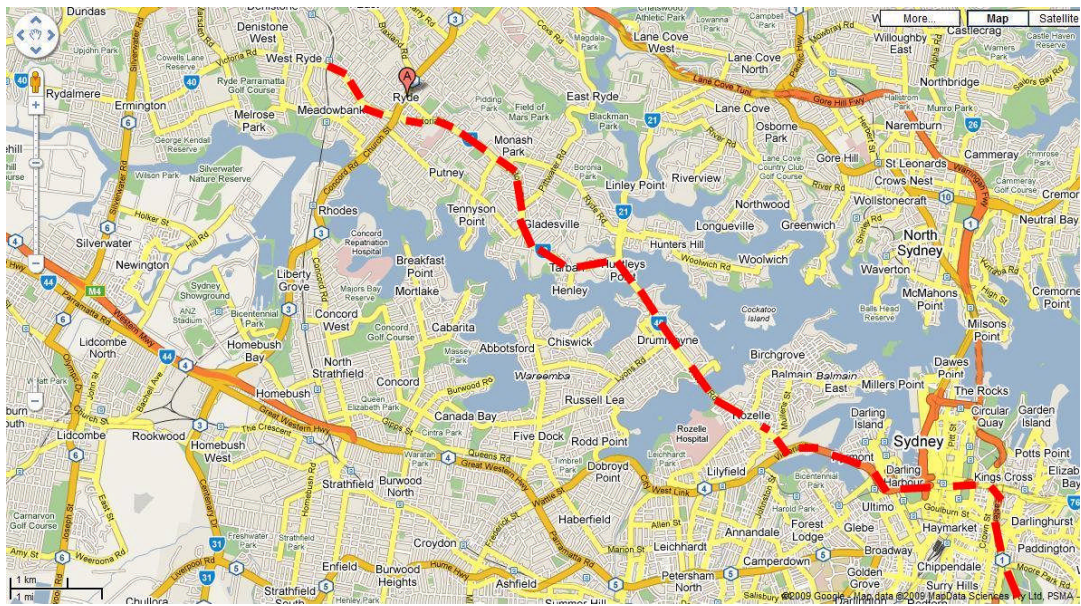
(b) Light rail/surface metro (red lines) as described in previous chapters, on Windsor Rd operated by a new mass transit authority and funded by the State/Federal governments.

The above is only a minimum proposal and should be integrated with the Bus ways to Blacktown and Parramatta

Why has it to be electric rail? Because all genuinely renewable energies produce electricity, not fuels. This intersection between the M7 and Old Windsor Rd could be easily adapted to rail.

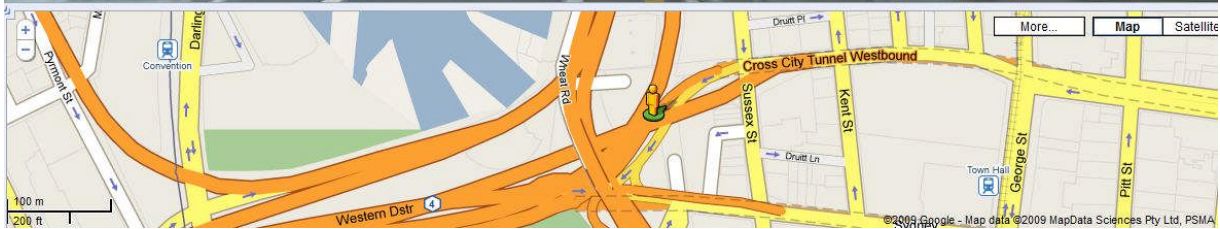
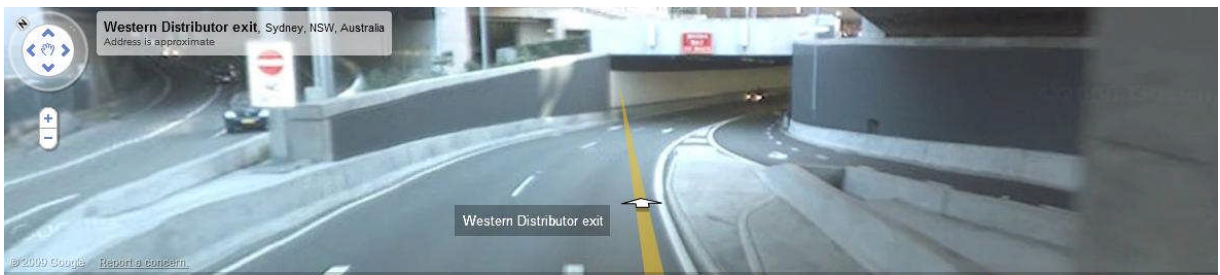


The Victoria Rd section of the cancelled NW metro could be replaced by a surface metro West Ryde – Central/CBD – (UNSW/Maroubra)

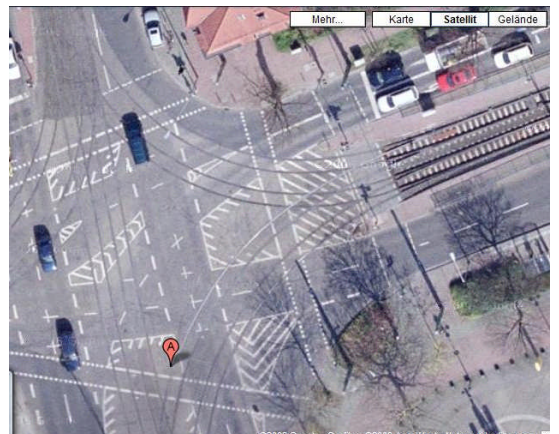


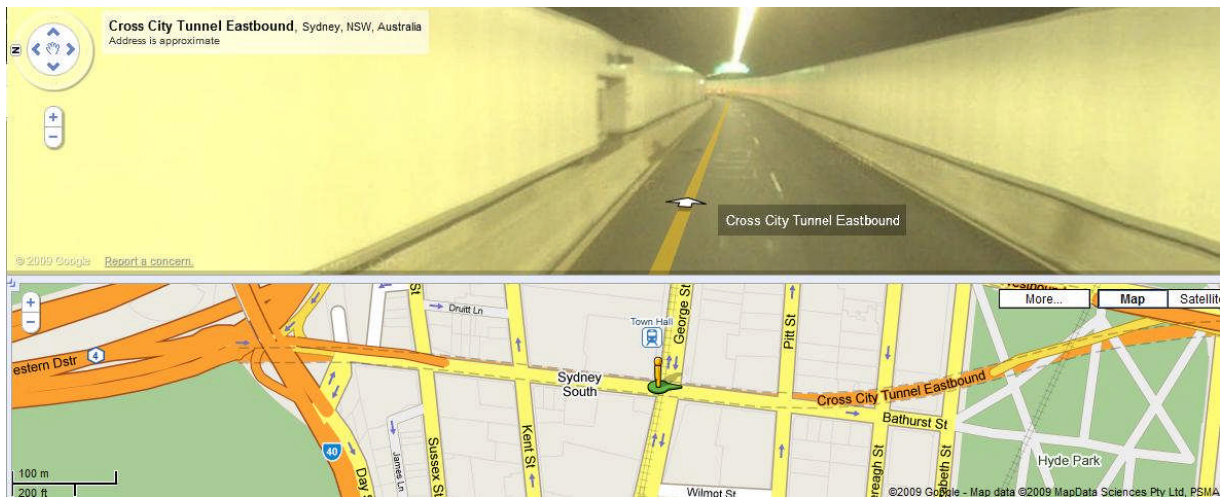
On the city side there would be several options:

(a) use the X city tunnel, then on to Anzac Parade, UNSW and Maroubra

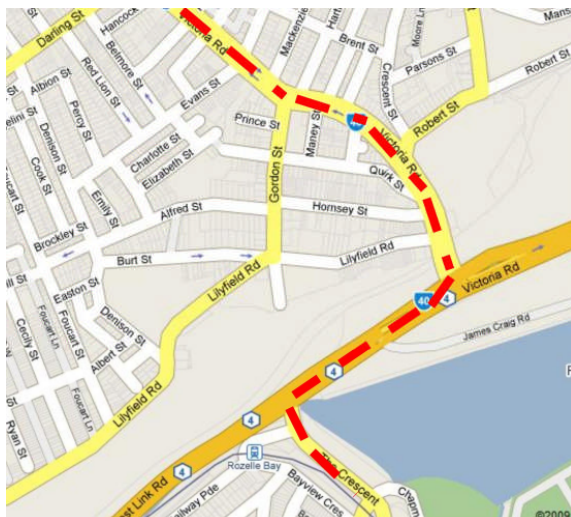


This is the view back East into the West bound tunnel exit onto the Western distributor. Look at the ramps and bends Frankfurt's metro can handle:



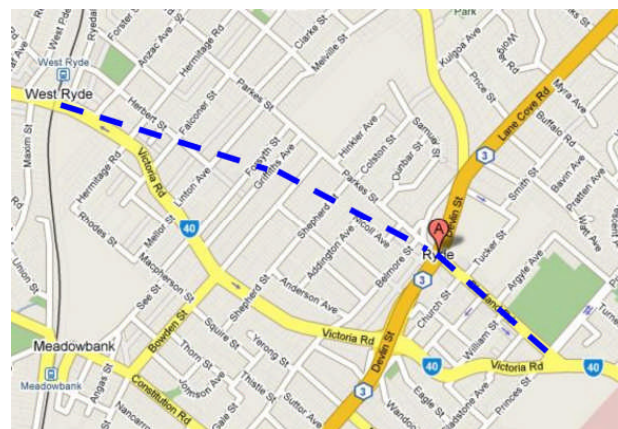


Up↑ This is the X city tunnel right under Town Hall. A station could be built here to make use of the tunnel. The financial destiny of the current road tunnel is uncertain



(b) <<< Connect via City West Link Rd to Rozelle Bay light rail station and on to Central on the existing tracks.

(c) Alternatively: via Pyrmont on the Allen St ramp and Harris St onto Broadway and back via Wattle St. Some very tough nuts here. Nothing around the Western distributor has been designed with rail in mind.

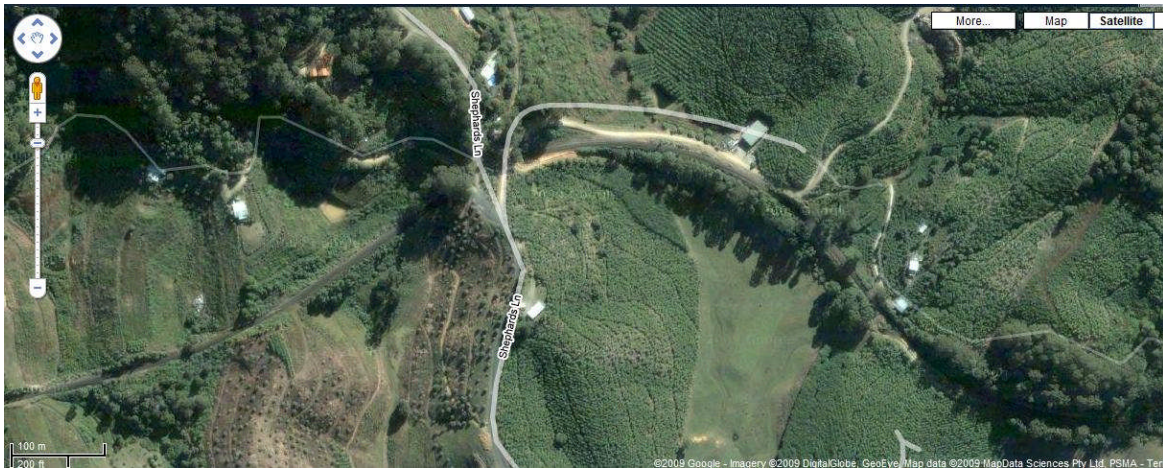


At the Top Ryde end an uneconomic 3,000 car park has been built as part of the new shopping center - against my advice during a Ryde Council hearing. It will hang like a financial mill-stone around the neck of the investors who are now faced with tough retail times. A metro station should have been built for a short tunnel section under the old center (due to steep gradients towards West Ryde). The NW metro debate also did not help. No one trusts rail announcements of the NSW government any more. The money spent for Symlink TV ads could have been used to buy 2 natural gas fired buses. The site <http://www.symlink.com.au/> is offline now.

It is not the task of this submission to propose technically optimized solutions. Rather, these examples should demonstrate the challenges ahead as we have to rebuild our cities for a period of permanently declining oil production.

(6) Intercity Rail

Many parts of the intercity rail system are sub-standard, at 3rd world level due to decade long negligence and priority for highway developments. Watch proper a intercity express here:
<http://www.youtube.com/watch?v=5F2r9kwU21Y>



These are some examples of the Rail line between Sydney and Brisbane near Coffs Harbour. The images speak for themselves.

Single tracked, not electrified. And the NSW Planning Minister has just approved another section of Pacific Highway upgrade.

As many airlines will go into receivership in the next oil price shock, domestic flights will have to be REPLACED by night trains. Have the sleeper cars already been ordered? Which Australian manufacturer can do it? New jobs!



(7) All projects have to be integral part of this 10 point program

Events/impacts/problems	Action
Australia will hit oil import crunch 2010-2012. Another bubble waiting to burst are OPEC's paper barrels artificially created in the 1980s quota wars. They are the equivalent of the credit default swaps.	(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.
Catch 22: Diesel shortages will delay implementation of essential rail and clean energy projects Oil crisis will start with intermittent supply disruptions. We can have 'lower' oil prices and still physical shortages.	(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; prepare fuel rationing plans
Globalization built on cheap oil will go backwards; bunker oil shortages for ships will limit import/export volumes.	(3) Re-industrialization of Australia on the basis of renewable energies; focus on essential tools, products and parts
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.	(4) 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 tunnel projects
Peak oil will quickly turn into food production and distribution problem	(5) Bio fuels to run farming machinery, trucks and other vehicles to transport agricultural produce and implements; revive rural rail lines
Other alternative fuels	(6) Develop compressed natural gas (CNG) for buses, trucks, construction and mining machinery
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	(7) 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	(8) Drastic power down and energy efficiency. Permanent Earth Hour.
Airlines first hit by high oil prices, now by financial crisis	(9) Interstate rail development and electrification; both passenger and freight; replace domestic flights with night trains; coastal shipping for freight
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. Society lives on too many untested assumptions about future.	(10) 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 car-pooling as this is the only "solution" if a physical oil crisis were to hit tomorrow, e.g. during the next peak oil war.

