

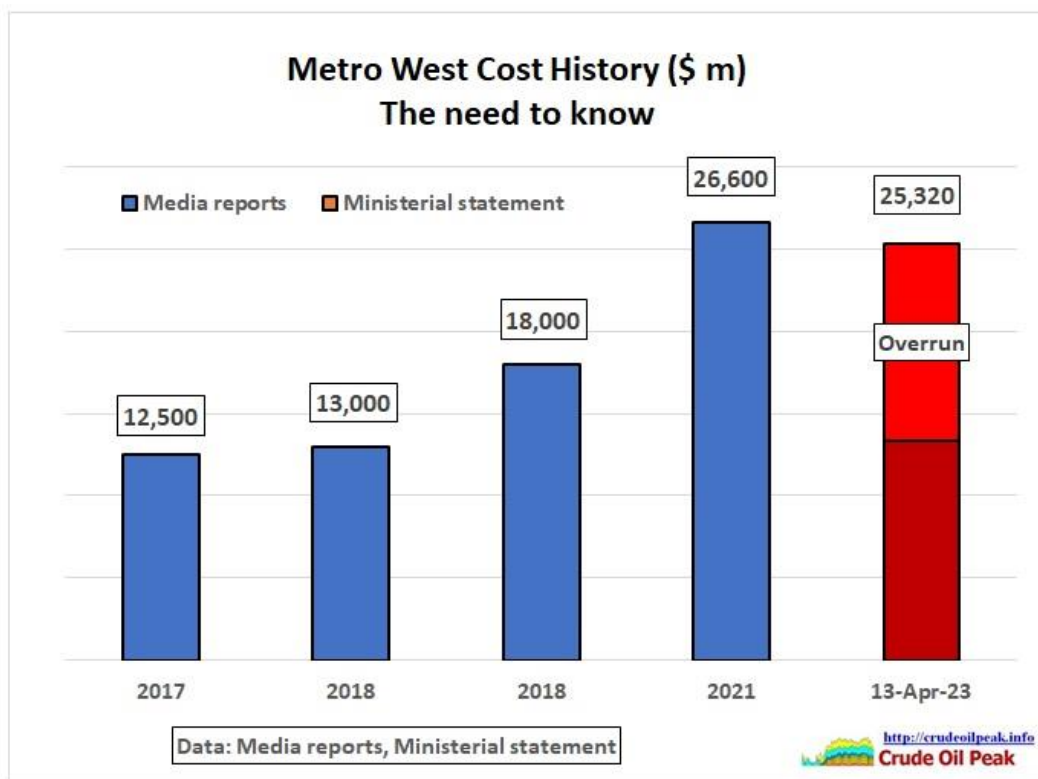
Submission Sydney Metro West LC Inquiry



By Matt Mushalik (MEng) 19/9/2023

To: transportinfrastructure@parliament.nsw.gov.au

The Cost Adventure of Sydney's Metromania



Re: <https://www.parliament.nsw.gov.au/committees/inquiries/Pages/inquiry-details.aspx?pk=2982>

TOR: "That the Committee on Transport and Infrastructure inquire into and report on the Sydney Metro West project, with reference to:

- The original business case for the project
- The establishment of the route and selection of station locations
- The cause of blowouts in project cost and timelines
- Whether the Minister at the time considered any other consequential benefits that could be achieved from the project
- Other matters relevant to the Sydney Metro West project.

Executive summary:

At present there is no valid, verifiable business case in place. The INSW Evaluation Summary of July 2020 refers to a business case version of Oct 2019 but says that estimated cost are not available for commercial confidentiality reasons. It is therefore not possible to comment on the Net Present Value of \$4,496 m and a benefit cost ratio of 1.34 which has been arrived at mainly by measuring and including wider economic benefits. When in April 2023 the NSW Transport Minister of a new government announced a Sydney Metro Review the cost estimate was given as “\$25.32 bn - a cost overrun of at least \$12 bn”, suggesting an original \$13.32 bn. This would mean an increase of 90%. The Public Interim Review Summary by Mike Mrdak of June 2023 did not mention any cost.

It should be noted here that if the final cost estimate is 34% higher than the cost used in the business case of Oct 2019 then this renders the project uneconomic i.e. that costs are higher than benefits.

No sensitivity and risk analyses were done to warn about such a situation. Contracts were signed without knowing the total cost of the project. The new budget papers 2023/24 do NOT contain updated, estimated costs.

The cost history is therefore still shrouded in mystery. Future expenditure is a big financial adventure into the unknown. The real contingencies which usually occur during construction (e.g. clay lenses in hard rock like in Snowy2) would still be ahead.

The root cause for an endless debate about route selection and number of stations is that project objectives are conflicted. A metro by definition has many stops with walkable catchments, around 1 per km and its rolling stock is designed for that type of operation. It is not a fast service. If that is required between the CBD and Parramatta, then a much cheaper rail line should be built on WestConnex and the M4 (like in Perth)

The cause for cost escalation is that too many metro projects have been started at the same time or in tight sequence, possibly with the objective to keep TBMs going. The construction industry is also busy to build apartment towers for new residents who are supposed to fill the very metro trains. Building materials have become expensive because of high cost of energy. Conventional gas production in Victoria has peaked.

The Government of the time wanted perpetual growth of Sydney from immigration instead of the much more important and urgent objective of replacing existing car traffic to oil proof Sydney and to decarbonise the transport sector. Rather than benefits, we got a housing crisis and skyrocketing construction costs. The assumption is that population growth will increase the GDP. But GDP per capita has been going down, not up. The driver of the economy is (cheap) energy. But the era of cheap energy has ended with the oil price shock in 2008 and the need to replace coal fired power plants (double whammy of peak oil/gas and global warming). So there will be no perpetual growth.

Driverless metros in tunnels and deep underground stations are the most expensive and least flexible solution for urban transport. The root cause for selecting driverless metros was the inability of the previous government to establish a proper working relationship with rail unions (party political ideology). To cover this up, a concerted campaign was launched to promote metros even in situations where heavy rail would be better, e.g. to the Western Sydney Airport which one day may mainly be used as cargo port. Metromania has gripped Sydney.

Recommendation

The financial and economic situation of Metro West is so serious that a revised business case should be done immediately by an international rail consultant who would NOT be interested to get future jobs in Australia. Maybe the NSW Audit Office can play a role. ICAC could perhaps also look at it as we have another case of the need to know, this time the cost of a project before it is started. If the BCR is less than 1 all efforts should be directed towards completing e.g. CBD - White Bay. Other works already done could maybe used for an alternative rail project.

Detailed Comments and document links

(a) *The original business case for the project*

I could not find the original business case dated Oct 2019 but the cost allocation:

19 June 2018

In the 2018 Budget, \$28 million will be invested to complete the final business case.

<https://www.sydneymetro.info/article/3-billion-sydney-metro-west>

And then I found:

Final Business Case Evaluation Summary, Sydney Metro West, July 2020

https://www.infrastructure.nsw.gov.au/media/svblsyr/final-business-case-evaluation-summary_sydney-metro-west.pdf

This is table 2 from the above report:

https://www.infrastructure.nsw.gov.au/media/svblsyr/final-business-case-evaluation-summary_s... ☆

Benefit Cost Ratio (BCR)

The following table outlines the estimated benefits for the project:

Table 2: Economic appraisal summary (\$millions)

	\$ millions
City shaping or urban renewal benefits	3,519
Transport benefits	10,279
Productivity or Wider Economic Benefits (WEBS)	3,550
Total benefits	17,348
Net Present Value* <i>*including Productivity Benefits</i>	4,496
Net Present Value* <i>*not including Productivity Benefits</i>	533

Benefit cost ratio (BCR)* <i>*including Productivity Benefits</i>	1.34
Benefit cost ratio (BCR) without WEBS* <i>*not including Productivity Benefits</i>	1.04

Most of the benefits are WEBS = Wider Economic Benefits

(a1) Cost History

There are no calculations which would show how the above numbers were arrived at. In particular, it says "As such, NSW Government has requested that the estimated cost of the program is not publicised in this summary".

It is not easy to establish a consistent cost history. Here are some examples:

June 2017

Cost of new metro line from Sydney CBD to Parramatta set to top \$12.5 billion

The cost of a new metro rail line running mostly through tunnels between Sydney's CBD and Parramatta is set to exceed the \$12.5 billion price of the railway soon to be built under Sydney harbour.

<https://www.smh.com.au/national/nsw/cost-of-new-metro-line-from-sydney-cbd-to-parramatta-set-to-top-125-billion-20170627-gwzd5d.html>

January 2019

But the government has not released the business case and, according to industry and Transport sources, the estimated cost of the line may have jumped to as high as \$25 billion after land acquisition around station sites was factored in.

Leaked documents from 2018 show that Transport for NSW had estimated the cost of Sydney Metro West at \$13 billion to \$18 billion. This did not include the cost of a CBD station. The documents state that the estimate depends on the route chosen.

<https://www.smh.com.au/national/nsw/with-costs-climbing-to-20b-metro-west-business-case-runs-behind-20181228-p50olv.html>

18/11/2020 Work has officially started on the Sydney Metro West mega project

<https://www.sydneymetro.info/article/metro-west-construction-underway>

The most detailed yet from the SMH:

8 February 2021

The NSW government was warned last year that the cost of building its flagship rail line between central Sydney and Parramatta risked ballooning to almost \$27 billion – nearly \$3 billion more than earlier internal estimates – and opening three years late.

The forecast for Metro West was made about eight months ago, before the government committed to an extra station at Pymont, which will add hundreds of millions to the final cost of Australia's largest transport project.

Confidential documents which contain modelling by Sydney Metro reveal for the first time the estimated cost of the project and that the government has been scrambling to find ways to reduce costs.

Sydney Metro, which is delivering the project, estimated the underground rail line would open to passengers in early 2033, three years later than the government has said publicly.

The documents show NSW Treasury has put pressure on Sydney Metro to rein in costs. Early last year, a cash restraint was imposed on the project as Sydney Metro revised the delivery strategy for the rail line, including the cost which it estimated at the time at \$26.6 billion. The documents state that this was an increase of nearly \$3 billion.

Unlike other new rail lines, the government has not released an expected cost for Metro West, which is the third stage of a metro rail network.

The documents show the estimated cost of underground stations alone for Metro West range from about \$640 million for the CBD and \$600 million for North Strathfield, to about \$390 million for the Bays Precinct at Rozelle and \$350 million for Five Dock. The figures include so-called escalation costs.

Transport Minister Andrew Constance said the government would not have the final price for Metro West until the last contract was signed.

The Metro West documents show the cost of building the underground line will be significantly greater on a per kilometres basis than the City and Southwest project, and the Northwest rail line from Rouse Hill to Chatswood which opened in 2019.

The bigger bill for Metro West is blamed on factors such as the higher cost of acquiring land along Sydney's east-west spine and the central city, which will run into billions of dollars.

The documents also show the government intended to build a station at Zetland, south of the CBD, as part of a 30-kilometre line stretching to Westmead.

But Zetland was dropped from the Metro West project by 2019, and the rail line shortened to about 24 kilometres. The last stop at the eastern end will be a station under Hunter Street in Sydney's CBD, which will require an underground turn-back for trains to be built.

A spokesperson for Mr Constance declined to say why Zetland would not form part of Metro West, but said the initial focus was on relieving pressure on trains to western Sydney.

Plans for a second station in the CBD – most likely near the existing Central railway station – were also dropped by 2019, the documents show.

<https://www.smh.com.au/national/nsw/warning-that-sydney-s-biggest-rail-project-risks-costing-27bn-and-opening-late-20210201-p56ye6.html>

Note that even the Minister [Constance] did not know in Feb 2021 what the costs would be but had already done the business case end 2019. Normally you should not start a project before the business case is approved.

13 April 2023

Sydney Metro West is estimated to cost \$25.32 billion – a cost overrun of at least \$12 billion.

<https://www.nsw.gov.au/media-releases/sydney-metro-review>

This following review does not contain any cost estimates:

23 June 2023

Sydney Metro Independent Review

Interim Report Summary

<https://www.transport.nsw.gov.au/system/files/media/documents/2023/Sydney-Metro-Independent-Review-Interim-Report-Public-Summary.pdf>

16 Aug 2023

The underground rail line was announced in 2016 by the former Coalition government with a price tag of \$16 billion.

<https://www.abc.net.au/news/2023-08-16/nsw-metro-west-parliamentary-inquiry/102733792>

19 Sep 2023

Budget 2023/24 papers

Metro West expenditure

\$7.2 bn so far to June 2023 and future \$13.7 billion over four years (plus yet unknown amounts for 2027-2033). We see that estimated total cost is not given in table 2.15

https://www.budget.nsw.gov.au/sites/default/files/2023-09/2023-24_01_Bu...

Table 2.15: Key Sydney Metropolitan Transport projects continuing in this Budget

Project	Estimated total cost	Expenditure over four years to 2026-27
Sydney Metro West Delivering a new underground Metro line connecting Greater Parramatta with the Sydney CBD. The line will include metro stations at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and Hunter Street in the Sydney CBD, linking communities to rail services. Note, this project is being considered in the comprehensive review into Sydney Metro projects.	n.a.	\$13.7 billion

Project Description	Location	Start	Complete	Estimated Total Cost \$000	Est. Expend To 30-06-23 \$000	Allocation 2023-24 \$000
Sydney Metro						
Major Works						
Works in Progress						
Sydney Metro West	Westmead - Sydney CBD	2017	2030	n.a.	7,221,093	2,863,774

https://www.budget.nsw.gov.au/sites/default/files/2023-09/2023-24_01_Budget-Paper-No-3-Infrastructure-Statement_infrastructure-statement.pdf

(a2) Discount rate not disclosed

The discount rate which must have been used for NPV calculations has not been disclosed, a fundamental flaw. According to a 2010 Productivity Commission paper titled “Valuing the Future” this rate is between 3% (the rate at which the Australian Government can borrow) and 10% (the marginal productivity of capital in a high risk environment)

https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/FlagPost/2018/October/Discount-rates

A higher discount rate means that future benefits have a lower net present value.

(a3) Comparison with Metro City and Southwest

For the Metro City and Southwest a 7% discount rate was used. Interestingly, the BCR was 1.3 (conventional benefits) and 1.7 including WEBS.

https://www.infrastructureaustralia.gov.au/sites/default/files/2019-06/Sydney_Metro_City_Southwest_Summary.pdf

	Metro City & Southwest	Metro West
BCR conventional benefits	1.3	1.04
BCR incl. Wider Economic Benefits	1.7	1.34

This means that the Metro West has problems to achieve the benefits calculated for the Metro City & Southwest

(a4) No sensitivity analysis

There is no sensitivity analysis in which usually various assumptions are made and their impact assessed. These would usually refer to

- cost escalation
- patronage
- discount rate and foreign exchange rate
- source and cost of financing and its phasing
- coordination/integration with other projects
- construction timelines
- supply chain issues
- political interference
- other yet unknown events and risks

If such an analysis had been made, it would have predicted most of the problems which have popped up now.

(a5) No killer assumptions

In particular and in addition to (a3) no killer assumptions are listed. I refer to the standard planning tool “Logical Framework” https://en.wikipedia.org/wiki/Logical_Framework_Approach

A killer assumption is an assumption which – if not met – leads to project failure.

I therefore logically conclude that formally there is no valid business case in place. It is entirely possible that any revised and proper cost benefit analysis (CBA) may result in a BCR lower than 1. In this case serious thought is needed on which parts of the works can be rescued.

(b) The establishment of the route and selection of station locations

The route and station selection is marred by conflicting objectives:

(b1) fast service CBD - Parramatta with few stations

(b2) increase of catchments with more stations but slower travelling times to CBD-Parramatta

And here another fundamental flaw comes to light. The lack of understanding what I call the urban rail hierarchy:

1. Heavy rail express services (stops every 10-15 min, regional or intercity reach)
2. Heavy rail all stopper or limited stops services (stations every 2.5 kms, long distance commuting)
3. Metros (stations every 700-1,000 m, shorter distance commuting, connecting walkable catchments and serving heavy rail hubs or interchanges)
4. Light rail (stops every 700 m, shorter distance commuting)
5. Hybrid metro/light rail



Light rail tram train entering Metro tunnel in Frankfurt. This is the most economic and flexible solution. In the light rail sections cargo trams could be used between industrial estates as part of the decarbonisation of freight transport.

6. Trams (stops ever 500 m, short distance commuting)
7. Hybrid light rail/ trams

The previous government had no idea of the above. It confused the different functions of heavy rail and metros and even down graded existing heavy rail to metro (Chatswood – Epping tunnel and now also Sydenham - Bankstown) thereby reducing operational flexibility of the heavy rail system e.g. being able to run Newcastle express trains via the ECRL if that was needed.

If the objective was just to provide a fast rail service to Parramatta and Sydney's West then a rail line should have been integrated into the West Connex and M4 tollways, thereby directly REPLACING car traffic and forcing Transurban (which now sits on \$34.3 bn drawn debt) into a new, sustainable business model. In Perth, a rail line was built on a freeway, thus demonstrating that this can work.



Transperth

I proposed this solution during the public consultation of the M2 widening in 2010 to Peter Colacino as a new business model for Transurban which he ignored. Peter later worked for the 2021 Australian Infrastructure Plan.

(c) The cause of blowouts in project cost and timelines

The cost blow outs are due to

(c1) Sydney infrastructure projects exceeding capacities of the construction industry which at the same time is also busy building apartment towers along the North West - CBD metro, Parramatta and elsewhere.

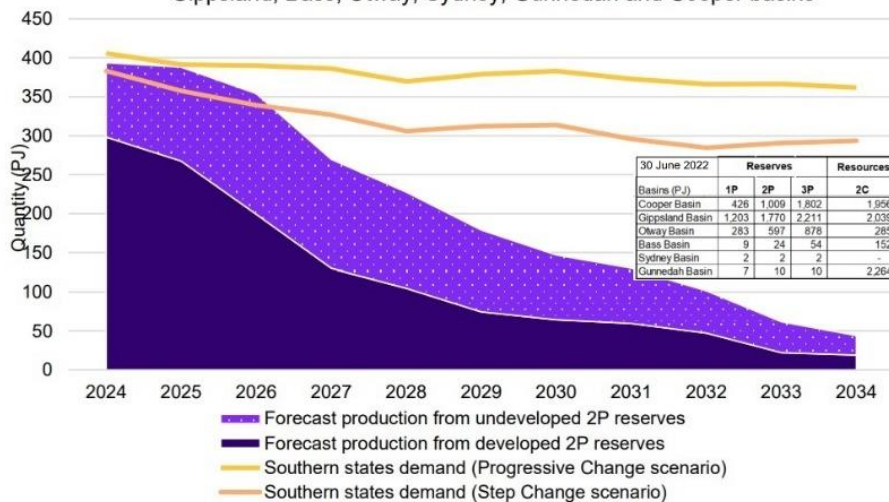
(c2) Disturbances from Covid

(c3) Higher cost of energy for materials like cement and steel (disregard for peak oil, peak gas and aging coal plants). This problem will NOT go away, it will get worse.

acc.gov.au/system/files/Gas%20Inquiry%20-%20January%202023%20interim%20report_1.pdf

Chart 5.5: Forecast supply and demand in the southern states, 2024–34

Gippsland, Bass, Otway, Sydney, Gunnedah and Cooper basins



Source: ACCC analysis of data obtained from gas producers as at August 2022 and domestic demand from AEMO's March 2022 GSOO

Peak conventional gas in Victoria will have consequences governments have not understood yet

(d) Whether the Minister at the time considered any other consequential benefits that could be achieved from the project

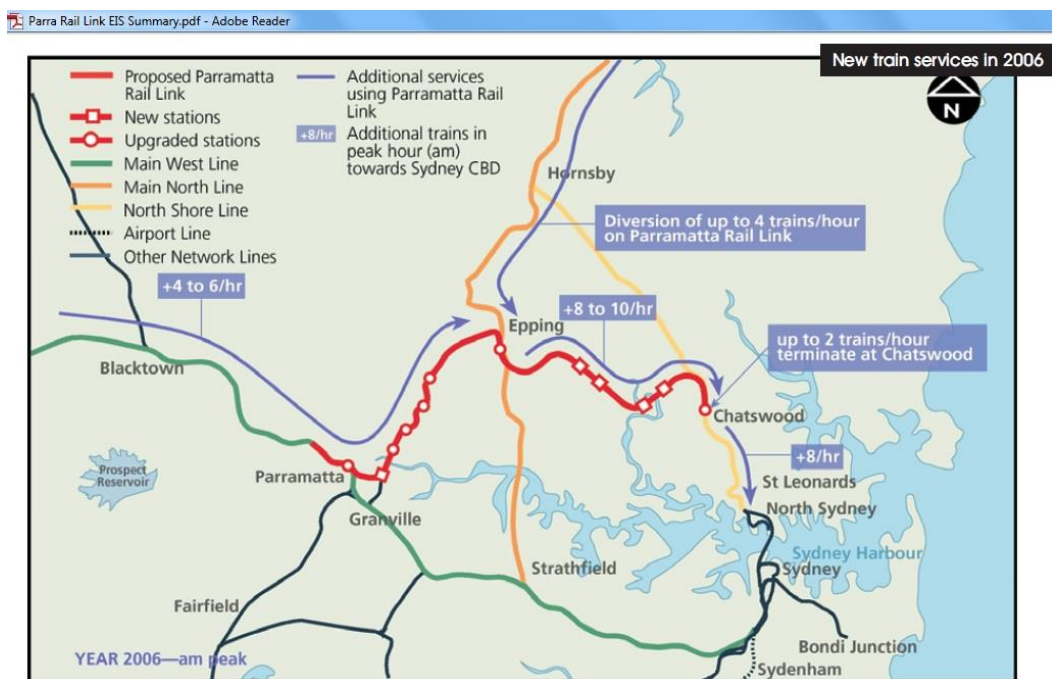
3 Mar 2019

"[Transport Minister] Constance said the new line needed to be built in light of the projection that the existing T1 Western Line would be at capacity in the next 15 years, and 450,000 moving into the new rail corridor in the next 20 years."

<https://www.smh.com.au/politics/nsw/nsw-premier-says-construction-of-metro-west-line-to-begin-2020-20190303-p511g6.html>

The Strathfield – CBD rail corridor had a problem already in 2006 and that is why in the 1999 EIS of the Parramatta Rail Link (by ERM Kinhill) it said:

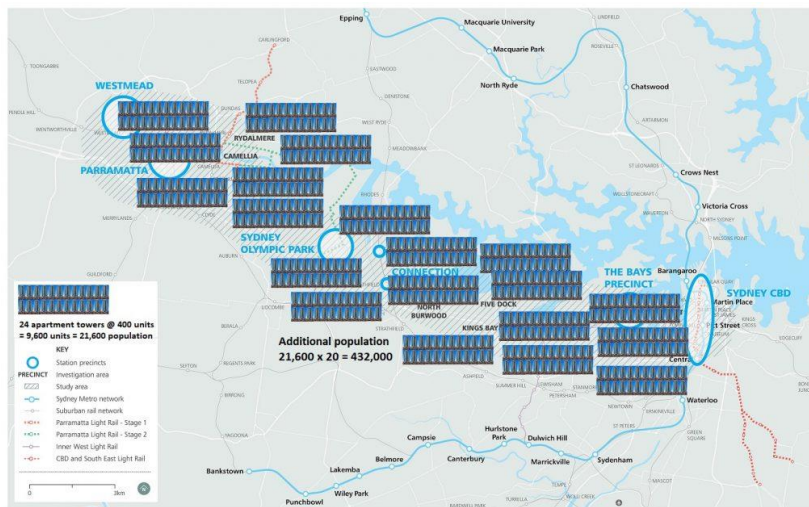
"By providing a new route from the west and north to the Sydney CBD, it will relieve congestion between Strathfield and the Sydney CBD on sections of the network which are projected to reach capacity by 2006." (p Executive 4, Vol 1)



Treasurer Costa cancelled the Epping – Parramatta leg in 2003. It would have cost \$ 2.6 bn (\$2,100 m Federal and \$500 m State) in 2011. At a rate of 5% pa this would be around \$ 5bn in today's dollars, only 1/5th of the cost of the Metro West.

The Minister [Constance] thought that a potential 450 K population in the Metro West corridor would be a benefit. As fertility rates in Sydney are low this means the Metro West is an immigration, not a transport project. Make no mistake what that means.

11/3/2019 Sydney's Immigration Metros (Part 1)

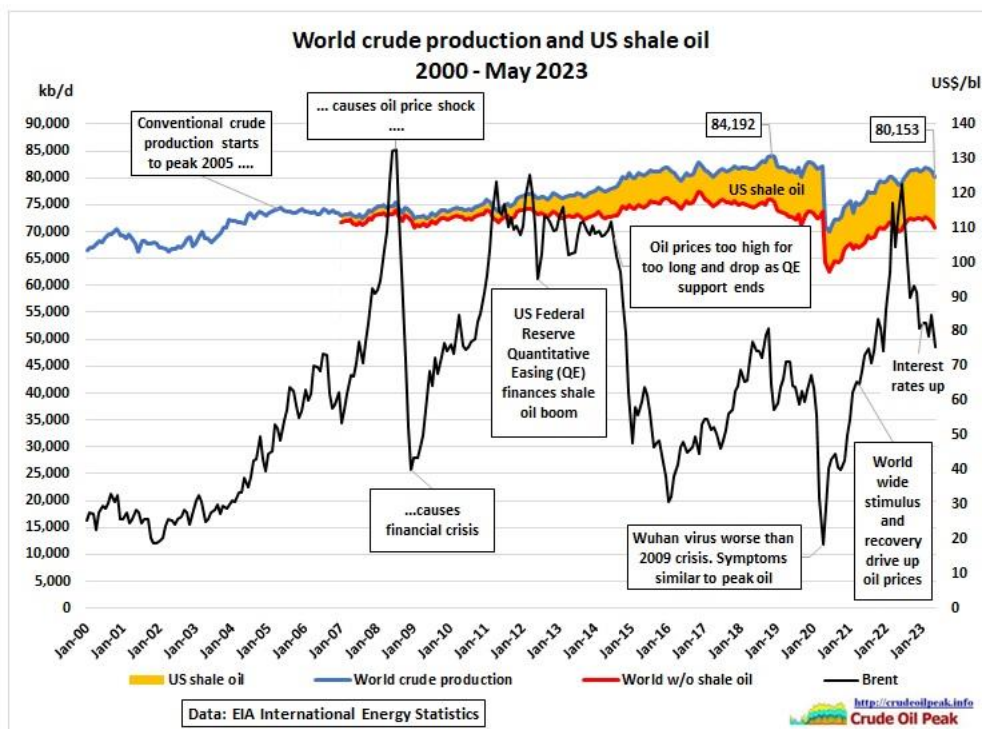


In this graph all additional population is crammed into Opal size towers
<http://crudeoilpeak.info/sydneys-immigration-metros-part-1>

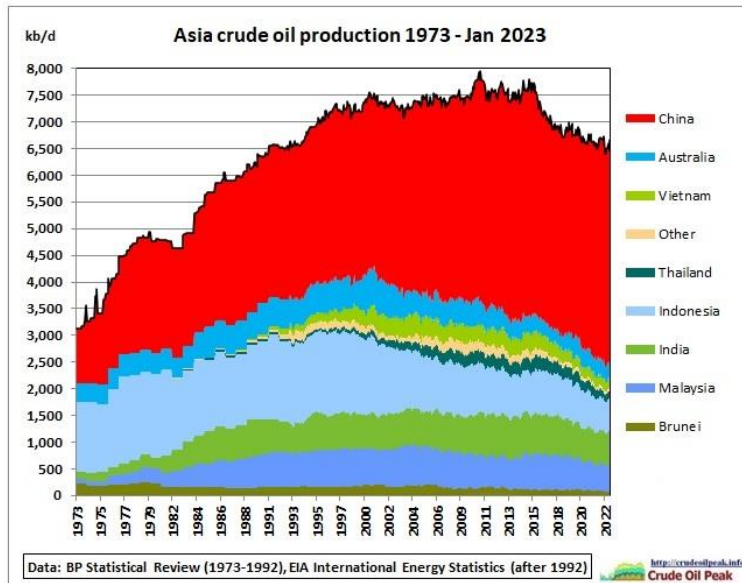
(e) Other matters relevant to the Sydney Metro West project

Further on a related matter, it is not clear how metro trains are removed quickly from a very long tunnel in case of an accident and when the traction power is down. I have been trying to get this information from Transport NSW for the Tallawong – Chatswood operation but was unsuccessful. The ramps north of Epping station (which could be used by bi-modal rescue vehicles) are disabled by track removal (southbound) and with a heavy buffer stop (northbound)

Appendix

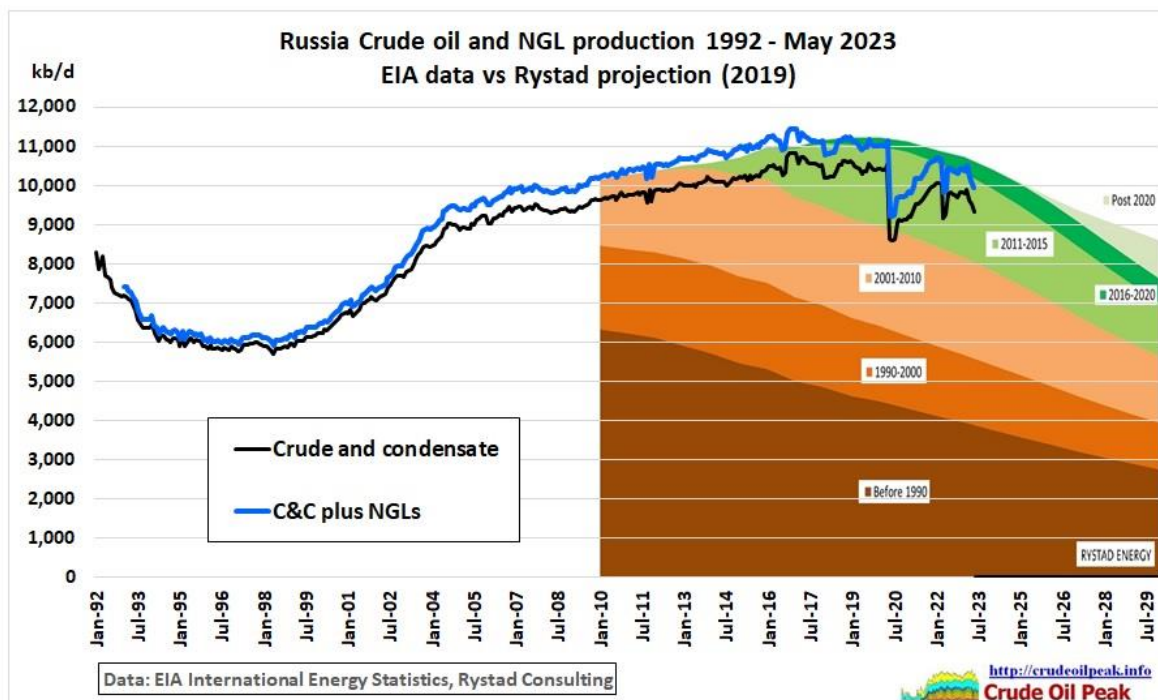


The world is in peak oil mode. In order to oil proof Sydney hundreds of kms of simple light rail would be needed, not metros moving new immigrants.



17/7/2023 Peak Oil in South East Asia and India – Part 1 Production and Consumption - Update 2022

<http://crudeoilpeak.info/peak-oil-in-south-east-asia-and-india-part-1-production-and-consumption-update-2022>

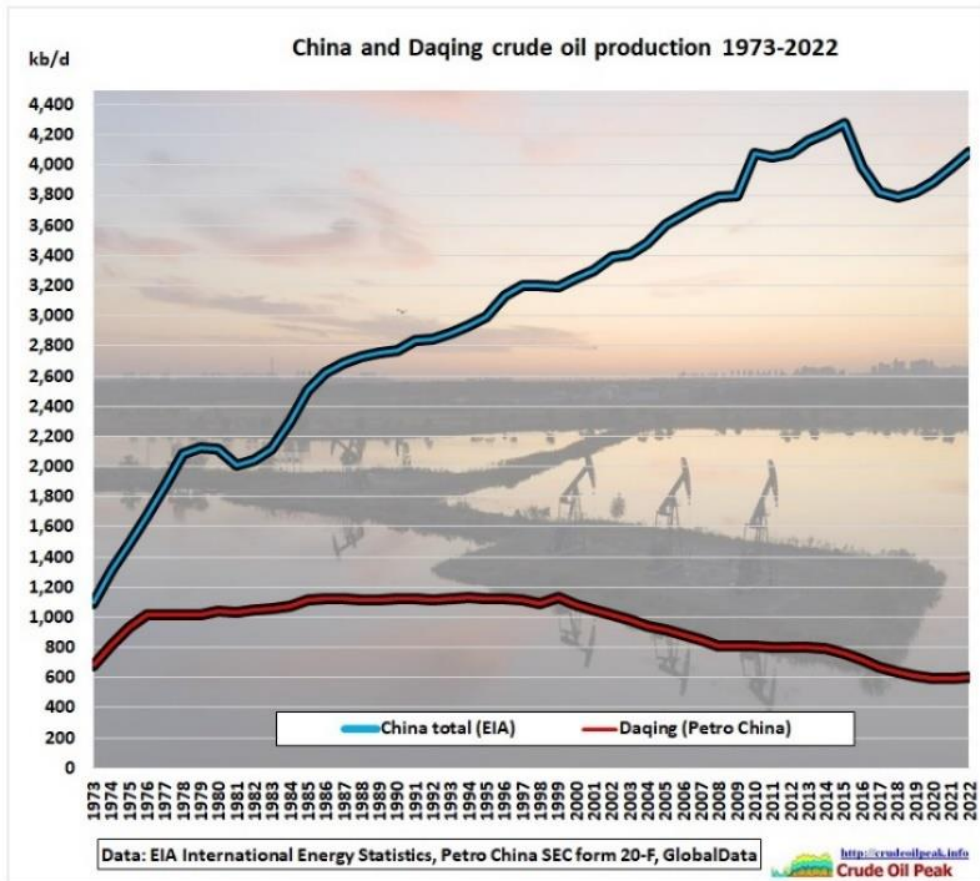


Russia's production cuts follow the decline path after the 2nd and last oil peak. The 1st oil peak in the mid 80s caused the collapse of the Soviet Union (i.e. Russia could not supply enough oil to its East European SU countries).

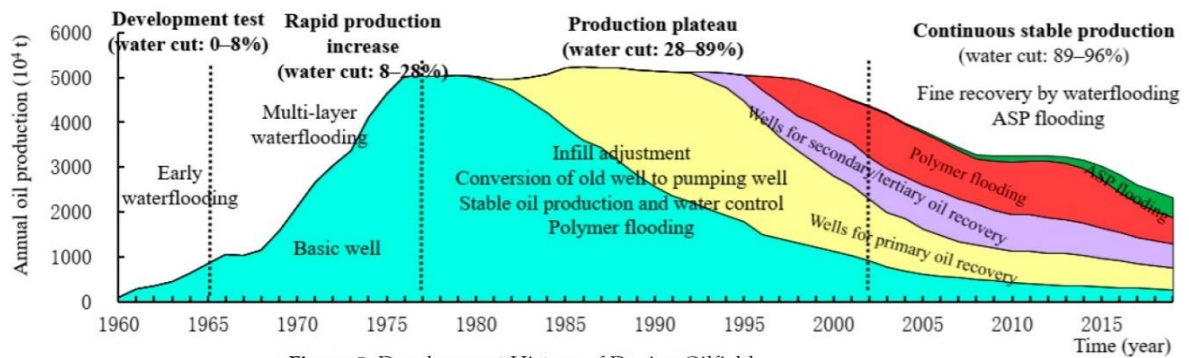
4/10/2010

Russia's oil peak and the German reunification

<http://crudeoilpeak.info/russia%E2%80%99s-oil-peak-and-the-german-reunification>



Chinese oil production peaked in 2015. Production has recently recovered but how that will continue depends on the decline rates of aging fields like Daqing. It is safe to say that Chinese production is on a bumpy plateau of around 4 mb/d since 2010.



Daqing has used all tricks of the books to maintain oil production but is in decline since 1999.

Governments still look away from oil statistics.

Appendix C: 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

Rail hierarchy table which I also had included in my Metro West submission. Sydney introduced double decker all stoppers in lieu of building new rail lines in the 1980s.

Prepared by Matt Mushalik (MEng) 19/9/2023