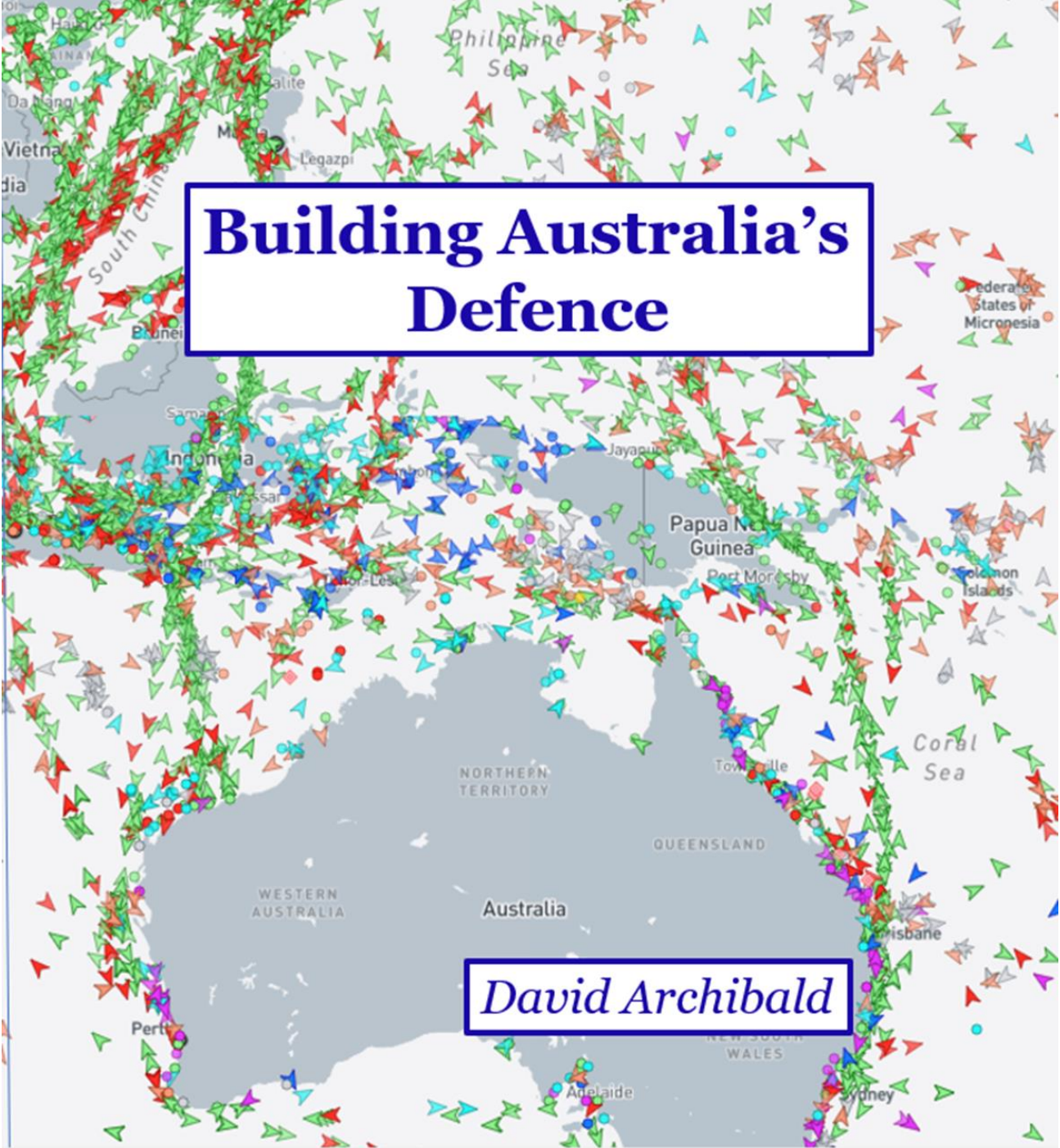


A map of Southeast Asia and Oceania, including parts of China, Vietnam, the Philippines, Indonesia, Papua New Guinea, and Australia. The map is covered with numerous small, colored triangles (red, green, blue, orange, purple, grey) pointing in various directions, suggesting a vector field or data points. The triangles are most densely clustered around the Indonesian archipelago and the Philippines. The title 'Building Australia's Defence' is centered in a white box with a blue border. The author's name 'David Archibald' is in a white box with a blue border at the bottom right.

Building Australia's Defence

David Archibald

Building Australia's Defence

David Archibald © 2026

15th September, 2026

Table of Contents

	Page
1 Introduction	4
2 The Moral Rot	5
3 Name Your Enemy: China	11
3 Army	37
4 Royal Australian Air Force	44
6 Royal Australian Navy	48
7 Strategy	52
8 Industrial Base	55
9 The Nuclear Imperative	69
10 Minerals in Defence	71
Appendices	
1 Submission to the Senate Inquiry into Australia's national civil preparedness and resilience	75
2 The Weird Psychology of Two Liberal Party Takers	102
3 The F-47	104
4 The Chicom Circumnavigation of Australia	109

1.0 Introduction

There is not much time left to get things right. Two major wars are raging at the moment and neither show any sign of ending soon. China has promised to attack a major democratic country and kill a large number of its people. Japan will join in that war on the side of the victims because a Chinese win would ultimately result in Japan's extinction as a people. The country we have fought and bled with for the last hundred years and more, the United States, has decided to go rogue and renege on many of its commitments under treaties, pacts and understandings; as well as threatening Greenland with invasion. Further complicating things, the psychopathic elites in the West are in contempt of their own peoples and set out to deliberately degrade their lives and the lives of subsequent generations. First there was the import of people with third world cultures to lower their standard of living followed by the development of a virus that would make their lives sicker and shorter. There was also the adoption of global warming as the state religion in most Western countries to make us poorer. At the same time, the economic underpinning of our civilisation, oil supply, is peaking and will be followed by the decline of the other fossil fuels.

The forces at play outside Australia are bad enough. On top of all that, in this Country we are now led by politicians who can't define what a woman is and persecute those who can, who have lowered the standard of living of many by making housing unaffordable, who are delegitimising Australia as a country by putting Aboriginal names on everything and thus making it not worth defending, who are waging a culture war against good, inspirational Australians such as Ben Roberts-Smith and Kirralie Smith, who are destroying industry on the altar of global warming, who are deliberately squandering money on the National Disability Insurance Scheme to blow out the national debt and leave our Country hobbled. At the same time, they show a form of higher intelligence in the ability to hold two contradictory ideas in their heads at the same time. In this case it is the notion that they can destroy Australia's industrial base with Net Zero while building a defence force for the troubled times ahead. It is more likely that they simply don't care.

To even survive as a people we have to wrest control of the Country from these self-loathing degenerates and take Australia in the right direction. For that to succeed, we need to know where we want to be and the path to take to get us there. That is the purpose of this policy document on defence.

2.0 The Moral Rot in the Australian Defence Force

We need to prepare for the war that China will force on the civilised countries of the world. Those preparations should include replacing the higher leadership of the Australian Defence Force as a matter of urgency. As to why that's necessary, let's start with an example of what is now going on in the Australian Defence Force. This is a headline from the Daily Mail on 14th July, 2023:

Non-binary Australian Defence Force captain now allowed to wear female uniform as the army overhauls policy after their request: 'I can wear make-up now, my fingernails are painted'



Figure 1: Captain Jesse Noble of the Combat Signals Regiment of the 1st Brigade, Darwin

Senior officers backed a bid by a male Army captain that he be allowed to wear a dress to work. That means that those same senior officers are social engineers who would rather remake society in their own image than be combat-effective. A captain runs a company of about 100 soldiers. In the life and death business of soldiering, soldiers put their trust in their officers to do the best by them, or not if the officer is a bloke in a dress. None could take him seriously. The high command would also be suppressing normal people and promoting their own kind instead.

The importance of trust in having an effective army is mentioned by long time defence analyst Paul Dibb:

The dearth of professional non-commissioned officers means that totalitarian armies are unable to fight effectively because NCOs provide the vital link between officers and soldiers about battlefield decision-making. Military command and control culture boils down to trust, including at the operational level.

You may think that just because a bloke wants to wear a dress to work doesn't necessarily mean that he thinks he is woman trapped in a man's body. Which, if that were the case, would be a bad thing because it would mean he has gender dysphoria. This is the worst mental illness to have because it has the highest suicide rate – 50%. He may look pretty in his dress, and he may feel pretty, but looks can be deceiving. So if he doesn't have gender dysphoria, what particular condition might it be? A possibility is transvestic fetishism as described by the American Psychological Association:

Transvestic fetishism is a psychiatric diagnosis applied to men who are thought to have an excessive sexual or erotic interest in cross-dressing; this interest is often expressed in autoerotic behaviour. It differs from cross-dressing for entertainment or

other purposes that do not involve sexual arousal. Under the name transvestic disorder, it is categorised as a paraphilia.

Whatever it is, expecting normal people to put up with it is poking them in the eye with a burnt stick. The high command of the Australian Defence Force would have been squealing with glee in forcing a cross-dresser on the lower ranks. If it makes you feel any better, it is not just the Australian Defence Force that is afflicted. Until recently West Point, where the cream of the U.S. Army officer corps start their careers, had a course entitled "Uniformed Perspectives: The Evolution of Cross-Dressing in the Military and Gender Norms".

The next piece of evidence that the high command of our Australian Defence Force is unfit for command is the fantasy fiction of a Canberra sociologist, a Dr Cromptvoets. It's a small literary niche--the high command's need for lurid stories about how unspeakably beastly Australian special forces are. But it pays well. According to the previous defence minister Dutton, Dr Cromptvoets was paid \$6 million over a few years. It started in 2016 when General Angus Campbell commissioned a secret report on SAS culture.

Members of the SAS, past and present, were encouraged to contact Dr Cromptvoets anonymously and tell tales of what went on in the regiment. Some of the lurid tales were included in her report as fact. For example:

'The inquiry has found that there is credible information that junior soldiers were required by the patrol commanders to shoot a prisoner, in order to achieve that soldier's first kill, in a practice that was known as 'bleeding'. Throwdowns would be placed with the body, and a 'cover story' was created for the purposes of operational reporting and to deflect scrutiny. This was reinforced with a code of silence.'

As several thousand Australian troops have rotated through Afghanistan, you would expect at least several hundred of those to have undergone the 'bleeding' initiation. But none were named in the subsequent Brereton Report which repeated some of Dr Cromptvoets' other fantasy fiction. Take this example from page 120 of the Brereton report:

- c. Clearance Operations. Dr Cromptvoets was told that, after squinters were 'dealt' with, Special Forces would then cordon off a whole village, taking men and boys to guesthouses, which are typically on the edge of a village. There they would be tied up and tortured by Special Forces, sometimes for days. When the Special Forces left, the men and boys would be found dead: shot in the head or blindfolded and with throats slit.

The implication was that there are a lot of villages in Afghanistan with only women and girls left because Australian soldiers killed all the males. But no such village was named in the report. And none have been found since. Yet the high command of the Australian Defence Force believed these fairy tales. Nobody even raised the possibility that these stories could be fabrications. Presumably they read what they wanted to believe, that ordinary Australian soldiers are sadistic murderers.

The fact that the Department's senior management believed the Brereton Report means that they have no understanding of the troops they are commanding, and

precious little grip on reality otherwise. And most likely loathe the troops under their command.

Brereton couldn't get the stories on atrocities that he wanted until he started paying Afghans to tell them. Basically, Brereton had insufficient mental acuity to understand that if he wasn't getting stories of the atrocities he wanted, perhaps there hadn't been any atrocities. Eventually the Afghans twigged to what Brereton was about and concocted stories in order to be paid for the effort.

The hysteria generated by the Brereton Report has culminated in the persecution of Australia's most decorated living soldier, Ben Roberts-Smith. It is a repeat of the persecution of Cardinal Pell. The Federal Government is engaging in a kulturkampf against all that is good and noble in this country. On 28th May 2026, PM Albanese said "Look, I'm not engaging in culture wars here" which means that he thinks of in terms of culture wars and he is engaging in culture wars. He doesn't like Australian culture and he wants to destroy it.

The moral rot in the ADF is a slippery slope and has been going on for some time. Former army chief, David Morrison, had a predilection for wearing women's shoes in public. In retirement he took \$200,000 per annum to advise Deloitte on diversity. The message to serving officers from the consulting firms hired by the ADF was that if they kept handing out consulting contracts, they too would have a more comfortable retirement. This is a newspaper headline at the time:

David Morrison under fire for 'disgusting' \$200,000-a-year diversity job

A recent head of the Australian Defence Force, Angus Campbell, wanted to strip veterans of Afghanistan of their medals but keep his Distinguished Service Cross. The Distinguished Service Cross is awarded for 'distinguished command and leadership in warlike operations'. Angus Campbell spent his war 1,900 km away from warlike operations at headquarters in Dubai. Unearned valour is intensely jealous of those who earned their bravery medals through actual bravery. Campbell's wife was recently appointed as Australia's 'Ambassador for Gender Equality' by Penny Wong. The Deep State rewards its own.

The high command of the Australian Defence Force is a freak show. But there's more. Apart from the perversions, there is another reason to put adults back in charge at the Department of Defence:

Australian and UK defence commit to joint action on climate

The development of an Australia-UK joint climate action plan as part of AUKMIN's defence and security pillar foregrounds the important role of the two countries' defence ministers and agencies in responding to climate change. Where Australia-UK defence cooperation is aimed at adapting to and mitigating climate impacts via AUKMIN and other

If worshipping the weather gods is your religion, that's one thing, but incorporating it into defence activity is delusional. It means that these people's judgement cannot be trusted on any subject.

Another sign of the moral rot within the Australian Defence Force is the third-world level of higher ranks. It took questioning from Barbara Pocock, a Greens senator from South Australia, to winkle this information out of the freak show:

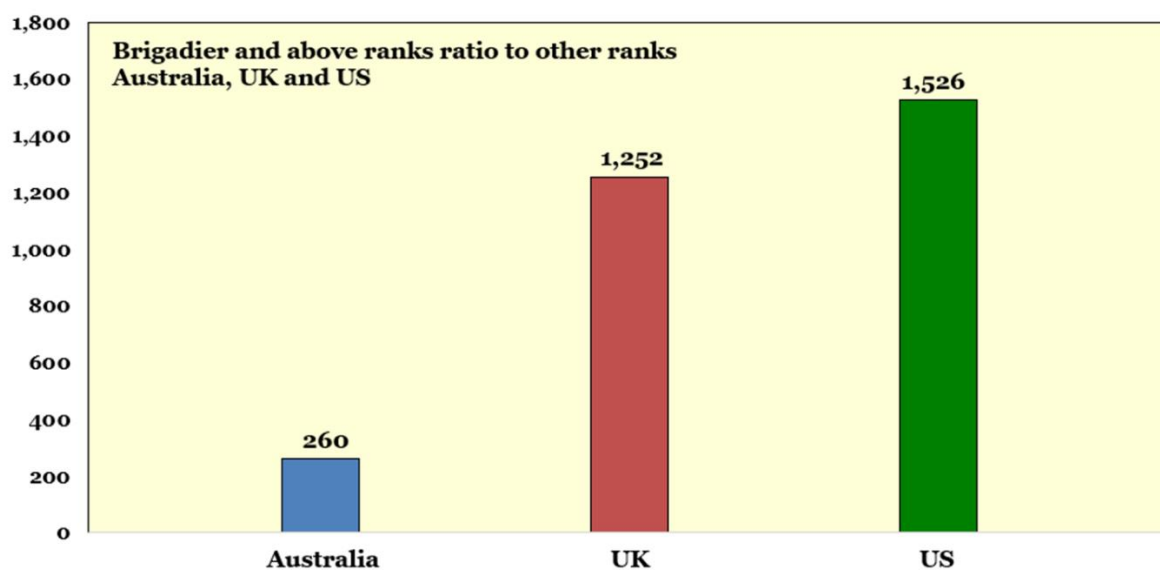


Figure 1: The Australian Defence Force command structure is bloated with useless people.

As at December 2023, Australia had 219 brigadiers and equivalents (commodore and air commodore) and above ranks. We only need 44 relative to what the UK has. It's only an extra hundred million per annum odd to pay for our excess of some 200 brigadiers and above ranks but we could be paying their pensions at that level until late in the century. There hasn't been adult supervision at the Australian Defence Force for decades so they have spent their time building bureaucratic empires.

Another sign of the moral rot is the number of consultants, two battalions' worth of consultants from the Big Four accounting firms alone:

**Consultants who hold a yellow pass to ADF Headquarters
who are "almost full time physically with us" according to the ADF**

KPMG	823
PwC	232
EY	367
Deloitte	469
Total	1,891

God knows what they all do at a cost likely to be of the order of \$1 billion per annum. This is enough to stand up a combined arms brigade. And it explains the mystery of why Deloitte would want to give David Morrison \$400,000 in retirement to encourage this arrangement to continue. There is big money involved in achieving nothing and being hopeless.

Beyond incompetence is yet more derangement, as evidenced by what happened to the Taipan helicopters. In 2004, the Army wanted Black Hawk helicopters but then PM, John Howard, opted for the Airbus offering instead because Airbus promised \$1 billion in offsets which never materialised. Called the Taipan in Australian service, we ended up with 45.

Twenty years later, the Army is getting Black Hawks. The second-hand Taipans would have been worth \$20 million each and thus \$900 million for the lot. Instead of selling them for \$900 million or giving them to Ukraine, the Army pulled the rotors off and buried them in a pit. Which is the same as the fate of the F-111s of the RAAF. Apparently the spares were worth a further \$450 million so the whole exercise cost us some \$1,350 million.

In psychological terms, this is an example of an Antisocial Personality Disorder based in spitefulness and malicious compliance. If the Australian Army didn't want them, nobody else was going to get them. Everyone in this saga up to the Prime Minister is complicit. Would you put your trust in anyone who maliciously squanders \$1,350 million? The upper ranks of the Australian Defence Force are a seething mass of psychoses.

Normally, with working equipment, you park them up in a shed. With 43 Taipans taking up 400 square metres each, a shed at \$1,650 per square metre to house them would have cost \$26.4 million.

Now let's compare the relative seriousness of nations with this graphic of Australia versus South Korea:



Figure 2: The relative seriousness of nations: South Korea and Australia

South Korea lives in a mean neighbourhood so it is serious about defence. South Korea wanted to develop tactical ballistic and cruise missiles 20 years ago but were held back by the United States which didn't want to aggravate North Korea. South Korea was limited to missiles with a range of 300 km. North Korea went on to develop nuclear weapons anyway with the last test having a yield of 250 kilotons. That's close to the optimum size of a nuclear warhead of 400 kilotons. So South Korea is now developing a family of missile systems and building 10,000 of them. The majority of the South Korean public are now in favour of having nuclear weapons. We should offer South Korea an abandoned underground mine to test its nuclear weapons in.

In comparison, the Australian Defence Force worries about what its dogs think.

All the stupidity, psychoses and perversions end up taking its toll on retention and recruitment. One soldier who didn't sign up again said it was because he 'didn't join the army to salute a bloke in a dress'. As Voltaire said, 'anyone who can make you believe absurdities can make you commit atrocities.' As a consequence, the Australian Defence Force is now 4,000 people short of their recruitment target. So they have decided to make the situation worse:

ADF to axe 14 health entry requirements to boost number of recruits

May 25, 2024 - 12:50PM [skynews.com.au](https://www.skynews.com.au)

some mental health challenges will no longer prevent recruitment.

Australian army to allow recruits from foreign nations

Figure 3: The combination of these lower standards will result in an Australian Defence Force manned by mentally ill, pudgy foreigners sucking on inhalers.

Standards go out the window. Hiring mercenaries has shades of the decline and fall of the Roman Empire. Unit cohesion and effectiveness will suffer. The idiots running the Australian Defence Force have no idea. Morale continues to plummet. A workplace experience survey in 2024 found that Defence personnel are losing faith in their senior leaders, with fewer than a third of soldiers and sailors now rating their commanders as effective. The survey found just 29 per cent of army and 32 per cent of navy personnel felt their senior leaders were effective, down from 34 per cent and 42 per cent three years prior to that.

There is a solution to our problem as demonstrated by an inspiring event from Australian military history. Australia needs a repeat of the 1940 Canberra air disaster but with more dead. At 10.15 am on 13th August, 1940, an RAAF Hudson bomber crashed on approach to Canberra Airport, killing all 10 on board.

The dead included the Chief of the General Staff, two Ministers of the Crown and other notables. Australia had entered WW2 a year before on 3rd September 1939 and our operational conduct had been poor. New people were appointed to replace those who died in the crash and Australia's conduct of the war improved appreciably.

Now, 87 years later, the higher ranks of the Australian Defence Force have been captured by a self-perpetuating clique of social-justice warriors who rank global warming as a bigger threat than China. They actively discriminate against anyone who does not have the same mindset. The system won't reform by itself. It requires a decapitation event.

3. Name Your Enemy: China

An admiral in the US Navy said recently, in preparing for China's war, that the Chinese are not ten feet tall. This analysis supports that view. The eminent geostrategist, Edward Luttwak¹, wrote:

Deluded over the centuries by their great material superiority over the nomads, mountaineers, and jungle dwellers who lived around them, educated Chinese became convinced—and still are—that all foreigners are stupid, naïve, greedy, and easily deceived, and that all it takes to defeat them in war are clever tricks.

Luttwak had coined the term 'great state autism' to describe China. China has the mentality of an autistic child who sees the world as they want to see it and can't comprehend how others think.

China has a lot of structural problems that make it a fragile state and potentially a future failed state. A number of statistics suggest that China peaked in 2015. It was easy enough to predict that the Chinese real estate bubble would burst, which it has now duly done, wiping out all the capital growth since 2010. The debt that financed that remains though. As some observers have pointed out, the end of the growth story for China means that the Chinese Communist Party will likely lose the Mandate of Heaven that justifies its dictatorship. In turn that might drive them to doing something

irrational such as attack the rest of the world when they rely upon the rest of the world for nearly half of their food supply.

China under Xi Jinping is determined to have its war, no matter how poor their chances of winning are. Shakespeare said that:

In cases of defence 'tis best to weigh
The enemy more mighty than he seems.

This is one instance in which it would be wrong to take the Bard's advice, just as it was wrong to expect Russia to roll over Ukraine. Russia turned out to be a puffed-up bully with rotted tyres on its trucks which meant it couldn't get far at all in the Ukrainian mud. Russia's campaign suffered from corruption. Corruption in the People's Liberation Army has been on a far greater scale. A couple of years ago it was discovered that the lids on the silos of a ballistic missile field couldn't move far enough to allow the missiles to be launched. On top of that the fuel tanks of the missiles were filled with water. The most lauded aircraft of their air force is the J-20 fighter. It turns out that, amongst other things, that the engines of the J-20 need servicing after perhaps only 1,200 hours of flight compared to 4,000 hours on comparable Western aircraft. The designer of the J-20, Yang Wei, was feted as a national hero in China. He has recently been disappeared and is possibly dead. It appears that factual reports on the J-20 have finally reached the Politburo which would be displeased that 500 of their frontline aircraft are duds.

President Xi's own character may have hobbled the People's Liberation Army. Early in his regime, Xi started an anti-corruption campaign as a cover for purging his political rivals. Tens of thousands of officials were given jail sentences or executed. Xi's extended family was worth some US\$700 million prior to his becoming president. The family has made a vast fortune since. An indication of how that was achieved is the arrangements for Venezuela's oil sales to China prior to Maduro's arrest by the United States. Sales to China were given a US\$20 per barrel discount by the Venezuelan Government. At the same time they were giving the Swiss trading company Vitol a US\$5 per barrel discount, which is a more commercial number. The Chinese rights to buying oil from Venezuela were given to Xi's elder sister who sold the oil on to Chinese refiners at the full price. On this one arrangement, the Xi family was netting about US\$14 million per day.

China's former chief military officer, General Zhang Youxia who had acquitted himself well in the war with Vietnam in 1979, had been a Xi supporter until they had fallen out over Xi's plan to invade Taiwan. A couple of years ago, General Zhang began to fear for his life. Xi even had a retired Premier of China, Li Keqiang, assassinated in Shanghai on 27th October, 2023. In his farewell remarks, Li Keqiang had said, "While people work, heaven watches. Heaven has eyes." This was taken as a criticism of the Xi regime. Li Keqiang had been popular with the Chinese people. In 2020 he had said that 600 million Chinese people had a monthly income of only US\$140. The Stockholm International Peace Research Institute estimate for China's actual military expenditure in 2026 is about US\$349 billion. If China's defence budget was spent instead on the bottom half of its population, it would increase their income by a third. Xi ordered the head of the Ministry for State Security to have Li Keqiang assassinated, which was achieved by adding a heart-stopping drug to a glass of water beside the pool at a state guesthouse in Shanghai.

The intensity of factional politics at the apex of the Chinese Communist Party is indicated by an assassination attempt in 2006. In 2003, Hu Jintao of the Communist Youth League faction replaced Jiang Zemin of the Shanghai faction as President of China. Jiang retained considerable influence over the military though. In May 2006, he ordered the commander of the North Sea Fleet to assassinate Hu. This was done by having Hu on a destroyer reviewing the fleet in the Yellow Sea. Ships on both sides of the destroyer opened fire on its bridge, killing several sailors. The destroyer sped up and Hu escaped death.

A couple of years ago, General Zhang started talking to party elders about having Xi replaced as President of China, and all his other titles. But the party elders never had the gumption to pull the trigger and get it done. Xi eventually outmanoeuvred them. Through his control of the Ministry of State Security, he had General Zhang ambushed with his security detail overpowered. It is not known if the General is dead or alive. General Zhang was popular with the troops and his arrest has caused enormous resentment within the Peoples Liberation Army, enough to affect its likely efficacy as a fighting force.

All this is not to say that defeating China will be easy. They have a large budget, an enormous industrial base, a population inured to hardship but time, geography, logistics and many other factors are against them.

Population

In his 1966 book *Tragedy and Hope*², Carroll Quigley noted that the Chinese communist regime in the 1950s was insanely aggressive. The Nationalist government they replaced had been just as expansionist. A Nationalist fishing boat set out to claim the South China Sea in 1947, even as they were fighting the Communists. Then Mao's policies kept China very poor for decades. Their only attacks were on India in 1962, the Soviet Union in 1969 and Vietnam from 1979 to 1991.

Then China became wealthy again and its bloodlust rose. It built some bases in the South China Sea, starting attacking India, and baited Japan. China wants desperately to depose the United States as the number one country on the planet and to be acknowledged as superior by every other country. The Politburo's chief ideologue, Wang Huning, has said that the mere existence of a democracy anywhere on the planet is a threat to the Chinese Communist Party.

Mao also left a time bomb in China's demographics. Back in 1959, President Ma of Beijing University had suggested that China adopt population control to keep the country's population at 600 million. Mao believed that history favoured the big battalions and banished Ma to the countryside. Mao thought that no matter how many Chinese died in a war, there would be plenty left to continue fighting.

China had to wait 25 years until Mao died before trying to bring their population growth under control. Their population is now thirteen hundred million. Those saying that China's population is now well under a billion are plainly wrong; China is still eating for 1.3 billion people.

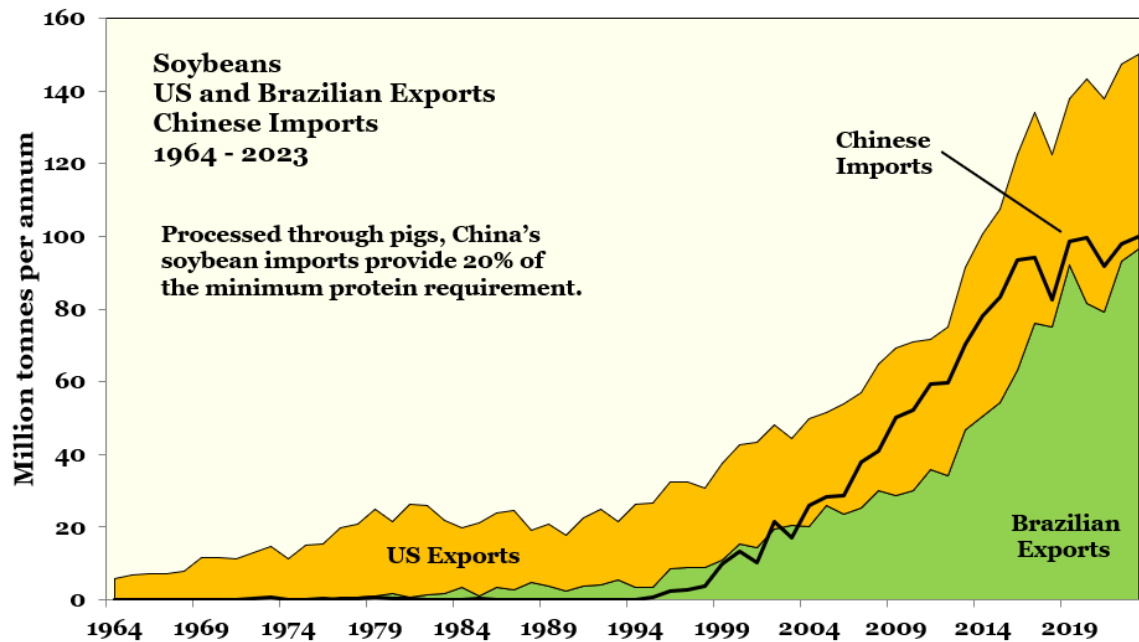


Figure 1: Chinese soybean imports relative to US and Brazilian exports

Most of the meat eaten in China starts as soybeans grown on the plains of the United States and Brazil, from where it starts a long sea voyage across the expanse of the Pacific – some 19,000 km. When China's war starts there will be plenty of opportunity to interdict this trade and the Chinese people will revert to being involuntary vegetarians.

But what do all those people do? About three hundred million live in the few coastal provinces that make things and trade with the wider world. It will be those three hundred million we will be fighting, not the whole thirteen hundred million. Another four hundred and twenty-five million are agricultural workers, a third of the population. This means the average Chinese agricultural worker only feeds himself and two other people. Bear in mind that in Western countries about 2% of the population works in agriculture and feeds the other 98%; each Western farmer feeds 50 people on average.

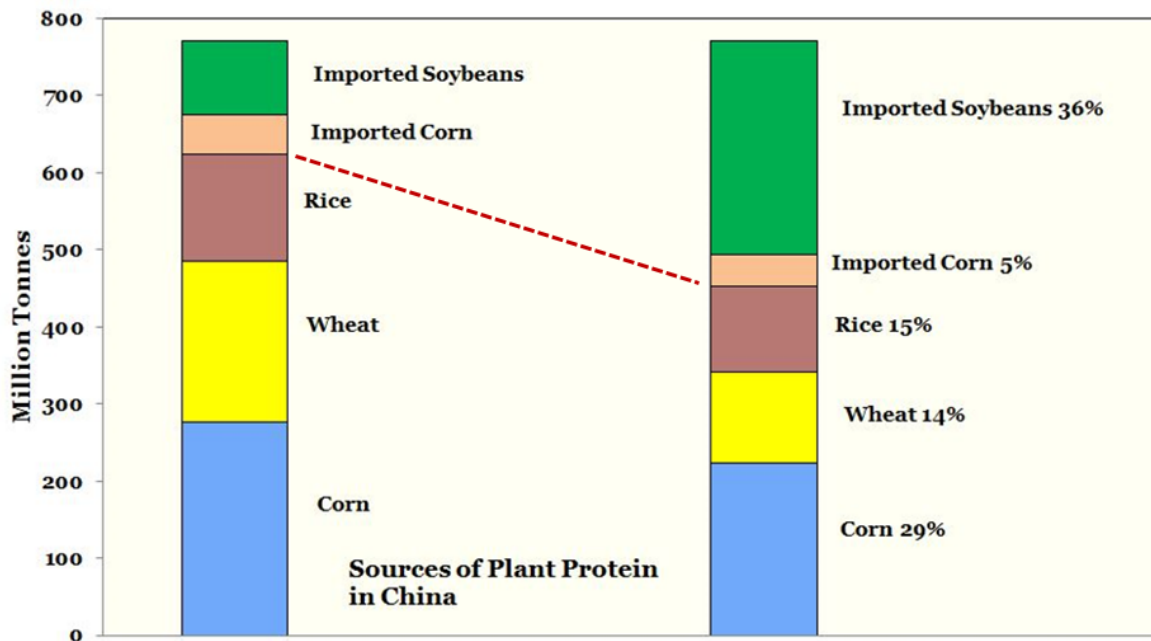


Figure 2: Sources of plant protein in the Chinese agricultural system, tonnage and percent contribution

Imported plant protein now contributes 41 percent of the input to the Chinese agricultural system. If this disappears due to a blockade of China then the bulk of China's population will become involuntary vegetarians.

By comparison there are farms in Western Australia that produce 40,000 tonnes of wheat per year with three full time staff. Each of those workers feeds about 25,000 other people, which is 10,000 times more than the average Chinese agricultural worker. That level of productivity allows the potential for a higher standard of living. Almost the entirety of the Chinese milled rice production of 145 million tonnes is planted by hand, with a lot grown on terraces that can't be mechanised.

The Chinese have the choice of either keeping a quarter of their population in poverty, planting grain by hand, or watching their grain production fall by a third. China is a structurally poor country that no amount of high-speed railway will fix. In fact, the reverse is true; most of the high speed-rail network runs at a loss. It is still being expanded though at a cost equivalent to US\$80 billion per annum, simply increasing the annual loss of the whole system. Building can't stop though because of the employment effect.

China doesn't produce enough to feed itself as it is. Up to 20 years ago China was a nation of involuntary vegetarians. In an account of the lives of coal miners in northern China in the 1990s, it was said that they ate meat twice a year. Last year China imported 147 million tonnes of grain and soybeans in order to put meat on the table in the form of chicken and pork. Those imports will end when their war of choice starts and meat will become a fond memory.

This begs the question of what China's population should be if it wanted to be able to feed itself from its own efforts with fully mechanised grain production. China's milled rice production is enough to feed 430 million people. If the rice terraces can't be mechanised then the total population that can be supported drops to 870 million, from

1,300 million, if you want all agricultural workers to have a high standard of living. The efficiency of pigs and chickens in converting plant protein into animal protein is 25%. For a balanced diet, 40 percent of grain production should be converted to animal protein through chickens and pigs. The final result is a population of 600 million.

The Chinese Central Economic Work Conference was held in Beijing from 16th to 19th December 2022 and produced eight tasks for delegates. Task 5 included:

We have to ensure that the country's farmland remains at or above the red line of 120 million hectares by strictly prohibiting the urbanization of farmlands and balancing farmland requisition and compensation.

From that, 120 million hectares supports 1,300 million people on a vegetarian diet. That works out at 862 square metres per person, which is a square of land 29.4 metres across. To get to its necessary land productivity, China applies fertiliser at the rate of 428 kg/hectare, almost four times the world average rate of 115 kg/hectare. The highly fertilised runoff from fields is a big contributor to river pollution.

China with a population of 600 million would have a lot more free cash flow, and be a lot more dangerous, than the China we face with over two times that number. The part of China we will be fighting is the coastal provinces with a population of 300 million that do the bulk of China's manufacturing for export. Those 300 million have to divert a lot of their effort to make sure the other 1,000 million are fed and clothed, and don't riot.

There is another major division in Chinese society which, while completely unfair, allows it to function at all. This is the hukou system instituted in 1958 under which the entire population is classified as holding either "agricultural household registration" or "non-agricultural household registration" and requires official authorization before any move from the countryside to the city. Currently almost half of the total population has an urban household registration with the balance rural, but 300 million of the latter exist in urban areas as delivery drivers, labourers etc. without the benefit of urban registration. This includes a pension system in which the urban-registered receive a pension that is 17 times that of people in rural areas with similar disparities in education and health support.

The hukou system had a rocky start. The 1958 regulations were followed by the Great Famine of 1959-1961. Combined with the forced labour system, a rationing system tied to registration status and a custody-and-repatriation system for those who left without authorisation, rural residents were locked in place and prevented from moving to cities or to neighbouring provinces in search of food. The hukou restrictions did not cause the famine but determined who died from it. Urban hukou holders were provided with state grain rations and largely survived. Rural hukou holders had no comparable ration entitlement. Once compulsory procurement stripped the countryside of grain, those left without food starved. The death toll of some 40 million fell overwhelmingly on the rural population immobilised by the hukou system.

China exported 9.6 million tonnes of grain over the three years 1958 to 1960. This would have been enough to feed some 30 million people over those three years. The Chinese Communist Party leadership were well aware of the rural starvation, which

included instances of cannibalism, but preferred to have the income from exported grain.

A couple of years ago President Xi rescinded China's one child policy in order keep their population at a seemingly formidable 1.3 billion. The official figure for China's population is 1.4 billion but this is derived from adding up numbers provided by the provincial governments which overcount to receive a bigger allocation from the central government. Rescinding the one child policy was a big mistake, based on a false world view. He is locking China into a low standard of living and state fragility. If, that is, the Chinese people respond to his directive by breeding to order.

Xi Jinping's reaction to the Ukraine War confirms that he is taking China to war. Prior to that war he had been thinking that the Chinese invasion of Taiwan would be over quickly and that trade would go back to normal soon after. Xi now realises that China could be blockaded for years. He is desperately trying to expand China's grain production by 50 million tonnes per annum because the Ukraine War has shown that China will be blockaded and cut off from the imported grain and soybeans it has come to rely upon. In a move that harks back to the Great Leap Forward when Mao said "Take grain as the key link", eighty thousand rural inspectors have been hired to cut down orchards and anything else taking up space that could be used to grow grain. Hillsides have been deforested for the same purpose.

How do we know definitely that China is going to attack? Seven billion dollars had been spent building a green belt around the city of Chengdu in western China. That greenbelt was bulldozed soon after completion with 40,000 hectares converted back to farmland. War is China's number one project and everything is being sacrificed to that end. Those 40,000 hectares will produce a quarter of a million tonnes of grain per annum. Ripping up that green belt confirms that China will be attacking us. They are making considerable sacrifices to be able to do so.

Xi Jinping wants to go down in history as the equal of the Yellow Emperor, Huang-Di, who ruled from 2697 BC. To that end, China, under his direction, has to defeat the United States in battle with China being recognised as the most powerful country on the planet thereafter.

The founder of the US defence company Anduril, Palmer Luckey, has a succinct interpretation of the situation:

"Can we outmanufacture them? No. But we don't need to outmanufacture them to make a Taiwan invasion infeasible. There's a world where they have a hundred times more ballistic missiles than us and we still have enough between us and our allies to deny them access to Taiwan.

If they take Taiwan, history and the words out of Xi Jinping's own mouth show they're immediately going to hop over to Okinawa, part of the Philippines, maybe part of Vietnam. Xi Jinping is going out saying, 'I was in our national archives reading about the Ryuku Islands — 650 years ago they sent a gift to us, that means they're a tributary state.'

He's not saying this because he loves wandering the national archives. They are constructing a national narrative that would allow them to convince their people to start with Taiwan and end with a lot of our Pacific allies."

Chinese Diplomacy

The false history of China that is told in social media is that China has been peaceful and just wants to happy and make things for the rest of world. The real history of China is that they have alternated between bullies invading their neighbours and being invaded themselves by tribes from the steppes. The furthest south China came was their invasion of Java in 1,293 which thankfully was defeated by the Javanese. This is the same distance achieved by Japan seven centuries later.

The communist regime has gone to a great deal of effort to build resentment in the Chinese population to their century of humiliation which is the 110 years from the start of the Opium Wars in 1839 to the end of the Chinese Civil War in 1949. In particular, they have made Japan the focus of their hatred. For example, following is one of the many museums of the century of national humiliation. The Chinese regime likes to keep picking at the scab on their psyche to keep the wound fresh.



Figure 3: Entrance to the September 18 Historical Museum in Shenyang
September 18, 1931 is the date of a false flag incident by Japanese forces at Mudken in Manchuria to justify the Japanese invasion of Manchuria.

How China conducts its diplomacy in the lead up to their next war was described by Robert Martin, and administrator in Hong Kong, in 1847:

The finite capacity of man, and his consequent fallible judgement, render experience a safe guide in mundane affairs, particularly in national intercourse, for the character

and ruling motives of a nation are less liable to change than those of individuals. If then we find, that in the intercourse of China with foreign countries for more than 2000 years, submission has been met with arrogance, and quiescence rewarded with oppression, that resistance has been treated with respect, and force alone procured concessions to justice, - we have a guide, when pursuing an upright course of policy, for our conduct towards China.

Coal and Energy

The Chinese industrial miracle of the last 20 years was based on cheap and abundant coal, which continues to power just about everything in the country. In energy terms their current coal consumption rate is equivalent to 55 million barrels per day of oil. And in getting this far, this fast, they have burned through half their original coal endowment in the eastern provinces of the country. According to resource depletion theory, once you have extracted half of your reserves of something then operating costs start rising inexorably. Movable coal reserves in Xinjiang Province, 3,000 kilometres inland, may be a few hundred billion tonnes on top of what remains in the eastern provinces.

The cost of power from coal plants in China used to be four US cents per kilowatt hour. It is now eight US cents per kilowatt hour in many provinces. The energy cost advantage of the Chinese economy is fading. And what have the Chinese traded tens of billions of tonnes of coal for? The free cash flow generated by their economy was converted to apartment blocks. There are now 65 million unoccupied dwellings in China, representing 20 percent of the housing stock. And those apartment blocks might have a life of fifty years. Like the solar panels we are installing, they will be obliged to tear them down at the end of their lives and convert them to landfill. So that coal endowment will leave little of lasting value. Because of China's low birthrate, it is said that each grandchild of the current generation will inherit four apartments.

In 2023, China produced 4,400 million tonnes of coal and imported a further 437 million tonnes. They wouldn't have imported any coal at all if they could have produced it themselves, suggesting that peak coal for China is now in the rear vision mirror. Now past peak production, the cost of mining coal in China will rise inexorably. So will the cost of everything produced using energy from that coal including solar panels and wind turbines. Production of polysilicon in China, used for making solar panels, has already moved to the province of Xinjiang because that is where the cheapest coal is, and also the cheapest slave labour.

China's oil consumption is now 16 million barrels per day of which they produce 4 million barrels per day. China is now the biggest oil importer on the planet. When the oil price starts rising due to resource depletion, the oil price will respond. At US\$110 per barrel, it becomes economic to convert low grade coal to liquid fuels by hydrogenation.

China's coal reserves of 130 billion tonnes in the eastern provinces are only 100 tonnes per capita. Each Chinese person is burning through that endowment at the rate of 3.4 tonnes per annum and importing another 336 kg of coal. By comparison, Australia's black coal reserves of 159 billion tonnes equates to 5,900 tonnes per capita, with an equivalent amount of brown coal as well.

No matter what happens to energy supply, a source of carbon is needed to make plastics and petrochemicals. China currently uses coal to make its fertiliser. But once China is out of coal it will not have any source of carbon within the country. They could rely upon biomass to some extent though that will compete with food production.

The only source of power that could replace coal in China at scale is nuclear and Chinese utilities have been doing a good job of building nuclear reactors, though the current build rate of six to eight reactors per annum won't be enough to replace coal-fired generation as it declines. China would rather apply its cash flow to attacking neighbouring countries instead.

Back to Stalinism

Like Putin in Russia, Xi in China yearns for China's Stalinist past. He is taking China backwards by increasing state control of industry. His Stalinist tendency is a big productivity killer. Private sector employees tend to have three times the productivity of state sector employees. One of the biggest productivity killers in China would be his directive for all party members, students and military personnel to spend half an hour per day studying Xi Jinping thought. And those forced to study his inane insights can't fake it - there are questions at the end of each online study session. The life of a Chinese Communist Party member should be long lunches and unbridled corruption. Those study sessions would be taking a lot of the joy out of life.

This will also have a military consequence. Chinese soldiers will not think for themselves, but will stick to the plan even when it is going hopelessly wrong.

Organ Harvesting

Wait times for obtaining vital organs in China are among the shortest in the world, often just weeks for organs such as kidneys, livers, and hearts. Cardiac transplants can only come from deceased donors, so how can the hospital match a patient with a potential "deceased" donor weeks in advance? China has made an industry out of killing prisoners to feed its international transplant tourism. The sequence is to give a prisoner a suspended death sentence and then when enough of his organs have been presold to transplant tourists, undertake the death sentence. Once China started prosecuting the Falung Gong, kidney transplants shot up, more than doubling.

A medical procedure called extra-corporeal membrane oxygenation allows Chinese surgeons to harvest up to four organs from one individual. Anybody buying anything made in China is supporting this barbaric practice. The blood of innocents is on their hands. That blood stains their soul.

Attacking the Neighbours

China's biggest problem is their felt need to attack other countries and take control of the planet. There is a parallel with Japan's opening up after Commodore Perry's visit to Japan in 1853. Ten years after that visit the Japanese cabinet discussed invading Korea. They began their first attack in 1875, a scant 22 years after the Perry visit. It's been 24 years since China's industrial expansion gained pace.

The Japanese world view was that the emperor had a divine responsibility to rule everything under heaven. The Chinese version of that is called Tianxia, under which they rule the whole planet and foreigners send them tribute. But all that moral theorising is just an excuse.

At its simplest, their real *casus belli* is that for the Chinese to be able to feel better about themselves, they need to attack another country and subjugate a lot of foreigners, which is the correct way of stating they want to start a short, sharp war in which they emerge victorious. Specifically, they need to defeat the United States to knock that country off as No. 1 on the planet. The United States is the only country they respect.

Let's step back a bit and look at China's problem of which country to attack first. If they attack Russia, as the Japanese did at Khalkhin Gol in 1939, the Russians will whack the invading forces with nukes. That leaves invading Taiwan by sea or Vietnam by land, neither of which is a good choice. The best sort of country to attack is one with a long border and plenty of flat, grassy plains for tanks to manoeuvre on – like Russia's invasion of Ukraine.

China's biggest problem is that the evolution of electronics over the last 20 years has favoured the defence. China has built a big navy but the cost of the missiles and aircraft required to sink a naval vessel is just five percent of the cost of building the ship. China can't go anywhere without putting their troops in metal containers - ships and aircraft, which are easily tracked on the modern battlefield. To sink the Chinese fleet, you don't need to build your own fleet or have tens of thousands of naval personnel.

The most effective way to defeat China is to go asymmetric - overmatch them with anti-ship ballistic and cruise missiles fired from aircraft launched from island bases. After all, nobody feels the need to set foot in China. Realistic war games of a Chinese invasion of Taiwan result in China losing and the Chinese navy sunk – all of it. But for that to happen we do have to make the necessary investments in asymmetric capability.

The US Marines came to that conclusion and parked up all their main battle tanks in favour of having small detachments on islands flinging missiles at the approaching Chinese warships.

There is little evidence from satellite imagery that China has laid much concrete for an invasion of Taiwan, not even one new helipad on the coast opposite. However, they have laid plenty of concrete for another invasion of Vietnam, which they have been invading since 111 BC. This includes artillery pads right on the border, and a big complex of sheds and barracks just 10 km from the border. Chinese military strategy puts a big emphasis on deception and a surprise attack to start a war, which they call a defensive pre-emptive strike.

Consider the Chinese situation in the South China Sea. They claim all of it but there are 41 Vietnamese bases in the Spratly Islands which make a mockery of the Chinese claim. So, their plan will be to move armoured divisions up to the border at night and keep them out of sight of satellites in the warehouse buildings, conduct a glorious quick thrust into Vietnam and then refuse to withdraw until Vietnam gives up their bases in the South China Sea.

It is likely that Vietnam will be the first to bear the brunt of Chinese military aggression. In 1946, Ho Chi Minh, in discussing the Vietnamese strategic situation, said that it would be “better to smell French shit for five years than Chinese shit for one thousand years”. That is our choice too. It is not a difficult choice to make, either morally or in execution.

One further thing to consider in doing battle with China. It is evident that all Chinese ships and fishing boats have been issued handheld lasers to blind enemy troops. In one example, a Chinese navy vessel in Australia's economic zone north of Darwin lasered an RAAF patrol plane. Fighting China will be like Perseus fighting Medusa, looking at the reflection. Everyone in the battle zone should be issued laser-proof sunglasses.

China's Incapabilities

In running a country you can have either productivity or control, but not both at once. China under Dictator Xi has reverted to type and have opted for control. They are favouring state-owned enterprises at the expense of privately-owned companies. Capitalism is a far more efficient allocator of capital than any other system. As long as there is a shortage of labor, people in capitalist countries will have the highest standard of living possible for human societies.

China's growth over the last 30 years during its partially capitalist phase appears to be a miracle but it is also a parasitic growth on the West. Now the mutant has grown outsize and the body must reject it to improve the West's chance of survival. This process is called decoupling. Australia bungled an opportunity to decouple from China when China banned Australian coal, wine, barley, meat and cotton. Apart from wine, all those things soon found other buyers. The ban on coal was ill-considered given the high proportion of Australian coal in China's coking coal imports. China ended up paying a premium of about US\$6.4 billion to obtain coal from other countries, suggesting that not everything they do is wise. We won't be selling anything to China when we are at war with them, so the sooner we switch from them as a customer, the better.

The Chinese communists are aware that their culture of control weakens their ability where it matters to them most – in waging war on their neighbours. Thus, Peoples Liberation Army writings in 2015 started referring to the Five Incapables which is the inability of officers to ‘(1) judge the situation, (2) understand the intention of the higher up authorities, (3) make operational decisions, (4) deploy troops, and (5) deal with unexpected situations. Just as the workers of state-owned companies have only one third of the productivity of the workers at private companies, Peoples Liberation Army forces are likely to be far less effective than troops able to think for themselves, a situation enhanced by the technological advances of the last 30 years.

The Chinese military-industrial complex with its civilian-military fusion is not as formidable as it appears from a distance. A large part of the structure is hollow. But we only make our on task more difficult by feeding it. Everyone should avoid buying Chinese goods as much as humanly possible. Every dollar that avoids the Middle Kingdom will contribute to saving an Australian life.

Industry insiders in China have identified 11 sectors in which China is heavily reliant on Japan.

1. Semiconductors, in which the photoresist market is 90% dominated by Japan, with Dupont and BASF following. Without Japanese photoresist, Chinese high-end semiconductor manufacturing would cease within a few weeks. Photoresist can't be stockpiled.
2. 12 inch silicon wafers. Japan supplies 70% of the 12 inch silicon wafer market in China. China cannot supply for production of chips under 14 nanometres.
3. Electronic specialty gases.
4. High purity hydrogen fluoride at the one part per trillion level.
5. Packaging substrates.
6. Semiconductor testing equipment for detecting defects in EUV chips.
7. Organic light-emitting diode (OLED).
8. Ceramic capacitors with Japan dominating the automotive ultra-miniature market.
9. Surface acoustic wave filters.
10. Precision reduction gears.
11. Digital cameras.

China just doesn't have the culture for fine precision manufacturing the way Japan does. China set out to establish a domestic aircraft industry and developed the C919 as a passenger aircraft copied from the Airbus A320. The effort failed.

China's Border Disputes

Japan

In the East China Sea, China claims the Senkaku Islands. Chinese academics have put forward a case that China is also the rightful owner of the Ryukyu chain right up to Kyushu. China has built a ten-pad expeditionary helicopter base in the Nanji Islands for the attack on the Senkakus as well as an airbase on a ridge on the mainland.

Chinese people have never lived on the Senkakus. Japanese living on the islands peaked at more than 200 prior to World War 1. The Chinese claim does not have any foundation whatsoever.

Japan is far better off fighting China in concert with the Southeast Asians than alone. That is why Prime Minister Abe pushed through the change to the Japanese constitution allowing Japan to come to the aid of another party. The other party in this case will be the Philippines, with which Japan has concluded basing arrangements. Japan is too proud to accept subjugation by China. China can't back down. It seems that war is inevitable.

How can Japan be sure that it is going to be attacked by China? Well, China keeps telling Japan that it will do just that. Consider this detail from Beijing's military parade on 3rd September 2015:

The military parade thus started with the People's Liberation Army (PLA) National Flag Guard marching 121 heavy steps to the flag pole at the centre of Tiananmen

Square, reminding Japan the number of years the Chinese have been in waiting since 1894 for “appropriate” reparations and for an expression of regret.

China keeps picking at the scab to keep the historical wounds fresh. Further, from the then head of US Pacific Command, Admiral Harry Harris:

the Chinese Coast Guard continues to build a mammoth ‘cutter’ displacing 12,500 tons — a quarter more than a US Arleigh Burke destroyer — with a bow reinforced for ramming. Since the Chinese Coast Guard has played aggressive bad cop to the PLA Navy’s good cop in disputed waters, the construction of such a ship suggests Philippine, Vietnamese, or Japanese coast guard vessels are going to take some hard hits in the near future.

Emboldened by President Obama’s acquiescence to China’s seizing of Scarborough Shoal from the Philippines, China prepared for a “short, sharp war” to seize the Senkaku Islands from Japan. They are building specialised equipment to that end. From then US Naval intelligence officer Captain Fanell, before he was fired:

Size matters in confrontations at sea, especially between coast guard vessels. As China has sought more of its neighbours’ maritime sovereignty, it has built ever-larger coast guard ships. These are intended to enable its civil maritime forces to carry out China’s campaign more aggressively (having the biggest ship on scene), and to conduct them at increasing distances from China’s coastline. As such, China has demonstrated its commitment to have the largest coast guard vessels in the Asia Pacific region. In 2014, China commissioned the largest coast guard cutter in the world, at 12,000 tons, the *Zhongguo Haijing*. This cutter first went to sea for the first time in May 2015 and is subordinated to the East China Sea area of responsibility. A second ship of the class, CCG 3901, was completed and made ready for operations in January 2016. The Communist Party’s People’s Daily made the purpose of these ships crystal-clear, stating they were designed to have “the power to smash into a vessel weighing more than 20,000 tons and will not cause any damage to itself when confronting a vessel weighing under 9,000 tons. It can also destroy a 5,000-ton ship and sink it to the sea floor.

Note the combat assault mission of these Chinese Coast Guard ships. Normally coast guard operations are directed at saving lives in peril on the sea, instead of sinking ships.

Sinking ships by ramming is a throwback to the way triremes did battle in the Mediterranean. It also tells us China’s likely plan to start its war. The super-sized Chinese coast guard ships will ram and sink Japanese coast guard vessels. When the Japanese Navy responds by sinking the Chinese coast guard ships, the PLA Navy will come over the horizon with amphibious assault ships. China will claim to be the aggrieved party and offer to end hostilities, leaving it in possession of what it seized.

The Chinese have been doing some dry runs for the conflict to come. Around midday on August 5th, 2016, some 200 to 300 Chinese fishing boats swarmed into the contiguous zone around the Senkaku Islands of Kuban and Uotsuri, followed by 15 Chinese coast guard vessels by August 9th. Come the real battle, there will be thousands of Chinese vessels to be sunk, much like plinking tanks in the deserts of the

Middle East. Most of China's deep sea fishing fleet weighs about 500 tonnes per boat. The warhead weight required to sink a 500 tonne vessel is considered to be 50 kg.

Actually, China's baiting of Japan in the Senkakus serves a useful purpose - it is the heartbeat of war in Asia. The Japanese Foreign Ministry plots up Chinese incursions into waters around the Senkakus:

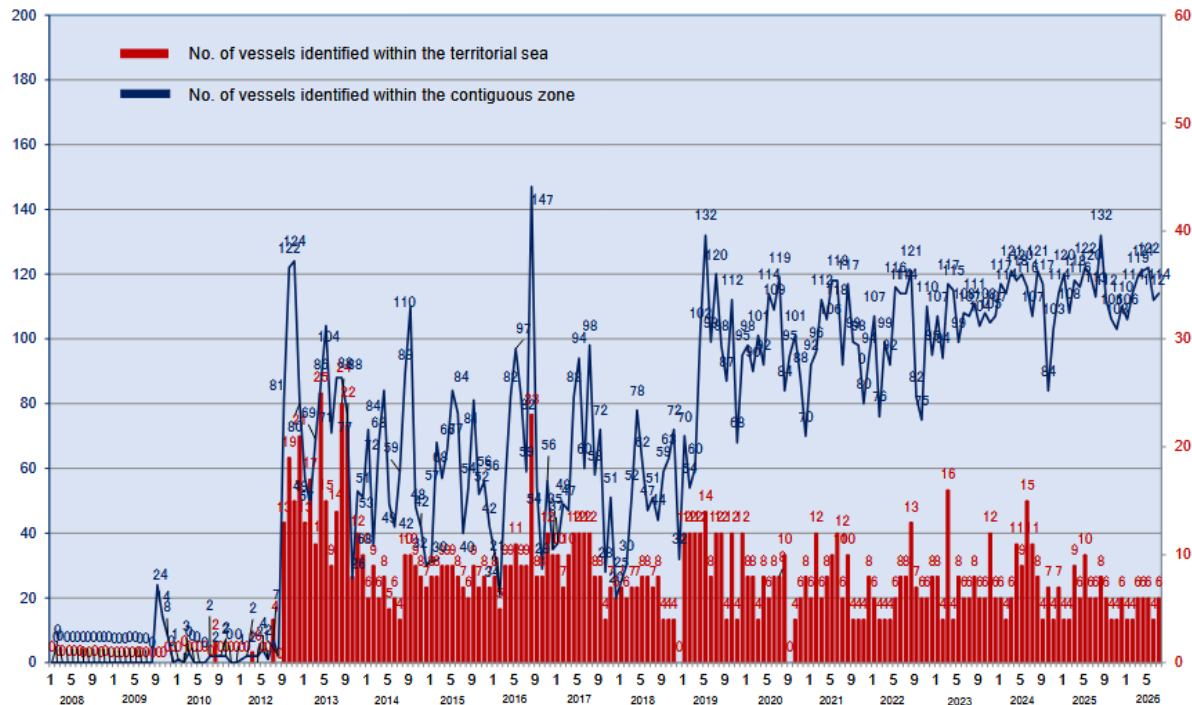


Figure 4: Chinese incursions in Japanese waters around the Senkaku Islands 2009 - 2026

China's baiting of Japan started immediately after Xi Jinping's accession to the throne in 2012. There was a ratchet to a higher level of activity in 2019. Until the activity on this chart drops to zero, war is coming to Asia.

China has a particular animus against Japan. Part of that is due to Japanese atrocities in WW2 and part due to less corruption in Japan making them more capable of building things like railways in early 20th century Manchuria. In 2014, due to Chinese influence, President Obama made Japan hand back 330 kg of weapons-grade plutonium that Japan has been lent by the United States in the 1960s. More recently the Biden regime, no doubt controlled by Obama, dilly-dallied in renewing Compacts of Free Association (COFA) with three island nations in the Western Pacific: Palau, the Federated States of Micronesia and the Republic of Marshall Islands. The COFAs give the United States the legal authority to operate freely and to keep other nations' militaries out. In other words, military access and control. A big difference between WW2 and for a war in the Western Pacific is that WW2 started with Japan in control of the former German territories in the Western Pacific which stretched down to the Equator. The Allies had to fight through those islands to get to Japan. If the COFAs hadn't been renewed then China might have moved to fill the vacuum, effectively leapfrogging the first island chain. High level staffers in the Biden regime State Department were retreads from the Obama regime and spent the years of the first Trump presidency in a consultancy called WestExec Advisors. WestExec's major client

was China. Treasonous behaviour is a better explanation for what would otherwise be considered extraordinary incompetence.

In November 2024 China took away some large steel buoys it had installed near the Senkakus in 2013. On the face of it, this might be interpreted as a sign of the rise of a peace faction in the Chinese Communist Party. But one astute China watcher says it's the opposite – an attempt to lure Japan away from the United States. He says further:

One of the classic CCP tricks in dealing with adversities is “fenhua wajie”, which can be translated into “divide and demoralise”, or “split up and disintegrate”. This trick is used when the major adversary is strong and has powerful allies so that the CCP needs to weaken the alliance by being nice to some adversaries so as to hit the chief enemy harder. This is only the first half. It's followed by “ge jipuo”, which means “destroy (your enemies) one by one”.

Philippines

One of the Filipino bases in the Spratly Islands is the *Sierra Madre* on Second Thomas Shoal. This is a World War 2 tank-landing ship that the Philippine Navy ran up on the reef in 1999. It is manned by a dozen Filipino marines. As a Filipino naval asset, an attack by China on the *Sierra Madre* would trigger the US-Philippines Defence Treaty. China keeps two of its coast guard vessels circling the reef in an attempt to stop resupply of the base. The Philippines has resorted to air-dropping supplies to the *Sierra Madre*. This has been going on for a few years now. Apparently China is somewhat miffed that the Philippines hasn't given up yet.

Part of Obama's baleful legacy is that during the Scarborough Shoal Incident of April to June 2012, the Filipino President travelled to Washington to ask Obama for U.S. support. Obama didn't offer support, no operational support followed and China read that as the signal to seize territory from a U.S. ally. As is the usual pattern, the consequence of not dealing forcefully against a minor aggression will lead to a much bigger war down the track.

The Chinese leader who organised the seizure of Scarborough Shoal, Xi Jinping, became a national hero. It gave him enough political momentum to see off rivals to become president of the People's Republic of China the following year. As retired US Navy captain James Farnell noted, while in the West the Scarborough seizure was treated as a minor fisheries dispute, Chinese scholars recognized the significance of Xi's template for mooting U.S. alliances by undercutting confidence in defence agreements, calling it the 'Scarborough Model'.

The Philippines has acquired the Brahmos supersonic anti-ship missile system from India. Each Brahmos missile has a good chance of sinking a Chinese warship when the war starts. The Brahmos system is derived from the Soviet-era Oniks missile. It was the Oniks missile which prompted the US Navy to give up on close-in weapons systems, such as the Phalanx, to interdict incoming cruise missiles and use short range missiles instead.

Indonesia

China claims part of the South China Sea that is Indonesian territory. In January 2020 the Indonesian president visited the Natuna Islands, accompanied by four F-16s, prompted by Chinese fishing boat encroachment into Indonesian waters north of the Natuna Islands. Indonesia is also now acquiring Brahmos anti-ship missiles from India.

Malaysia

China's claim over the South China Sea includes Malaysian territory on both the east and west sides of the South China Sea.

Vietnam

Vietnam understands what is at stake in the South China Sea. China claims 90% of the South China Sea as part of its city of Sansha, headquartered on Woody Island in the Paracel Islands. Once enforcement is established, ships and aircraft wanting to cross the South China Sea would have to ask China's permission first. Vietnamese ships sailing from Haiphong would have to hug the Vietnamese coast almost all the way down to the equator before heading east to avoid the zone. It would add 3,500 km to the shipping distance between Haiphong and Japan, for instance. What was open sea to their east will become a Chinese lake. It will be a great insult and impediment to the Vietnamese people. That is the precise intention of the Chinese claim to the South China Sea – to humiliate its neighbours.

With respect to Vietnam, for instance, China intends to bottle up the Vietnamese Navy and fishing fleets to within 80 km of the Vietnamese coastline, which is 1,600 km long facing the South China Sea. To paraphrase Orwell, the future that China is working towards is one in which they have their boot stamping on the Vietnamese face – forever. They are not just picking on the Vietnamese. Everyone else will get the same treatment and Asia will become a much darker place with enormous resentment towards China.

But the South China Sea will become a “kill box” for Chinese ships and aircraft, because their positions will be known constantly from hundreds of kilometres away. Hopefully Vietnamese radars on the western side will hand contacts over to U.S. radars on the eastern side and vice versa.

An online video shows what China's last attack on Vietnam in the Spratlys, in 1988, was like. It shows unarmed Vietnamese soldiers standing on South Johnson Reef and being machinegunned by the Chinese (for the purists, it is more likely 20 mm cannon fire). The Chinese killed 64 unarmed Vietnamese.



Figure 5: Chinese army base built for the invasion of Vietnam (Google Earth image)

Not much concrete has been laid for an invasion of Taiwan but plenty of concrete has been laid for an invasion of Vietnam. This is a satellite image of a PLA army base 10 km north of the border which will hide armoured units from satellite coverage prior to the attack.



Figure 6: Chinese attack routes of the 1979 invasion

China has been attacking Vietnam since 116 BC. The attack routes for the next invasion will likely be the same ones used in 1979. China kept shelling Vietnam up to 1991.

Taiwan

China claims Taiwan and continues to threaten to attack. In early July 2020 the PLA Navy conducted an amphibious assault drill in the Paracel Islands. The ships were combat-loaded so that the exercise could be switched to assaulting and capturing Pratas Island, a Taiwanese-owned island that is 400 km southwest of Taiwan. The United States sent two carrier groups to the South China Sea to head off the Chinese attack. China recently built some jackup barges to aid in beach landings on the muddy sandflats of Taiwan's west coast. Deployment of them though requires three different-sized barges nested in sequence for the landing. If the rate of potential failure of any one component is 30%, then for a three-component system it becomes 66%. That, and their plan to use Y-20 aircraft to drop paratroops, suggests that their planning is based on everything working perfectly. As long as Taiwan puts up some resistance, China's invasion is likely to fail with enormous losses.

India

China occupies 38,000 sq km of Indian territory on the Tibetan Plateau called Aksai Chin. China also claims that it is the rightful owner of the Indian provinces of Arunachal Pradesh and Ladakh. In June 2020 Chinese troops made an unprovoked attack on a group of Indian soldiers one third their strength, using clubs made from star pickets with bits of steel welded to them. The Indian soldiers seized a lot of the clubs and made a counterattack into the Chinese camp, frightening the Chinese with their ferocity. Indian dead amounted to 20 soldiers. The official Chinese death toll was four; the real number is understood to be close to 100.

Some evidence suggests the Chinese government had planned the incident, potentially including the possibility for fatalities. For instance, several weeks prior to the clash then Defence Minister Wei made a statement encouraging Beijing to "use fighting to promote stability." Just over two weeks before the incident, in another potential indication of Chinese leaders signalling their intent to escalate tensions, an editorial in China's state-owned tabloid Global Times warned that India would suffer a "devastating blow" to its trade and economic ties with China if it got "involved in the US-China rivalry." Satellite images depicted a large Chinese buildup in the Galwan Valley, including potentially 1,000 PLA soldiers, the week before the deadly skirmish.

Bhutan

As a peace-loving nation and self-proclaimed 'happiest country on the planet', Bhutan doesn't have a defence treaty with any other country. It is paying the price. China has been building roads into Bhutan with villages up to 30 km into Bhutan's territory. China is white-anting Bhutan and treating the Bhutanese with utter contempt.

Russia

India's border with China is 4,032 kilometres long. Russia's border with China is a little less at 3,622 kilometres. Apparently President Putin was dismayed by the Galwan Valley incident of 2022, because he would know it is only a matter of time before China switches its neighbourly love and attention to its northern border. The last time that Chinese troops killed Russian troops was on March 2, 1969 when Russian border

guards were ambushed on Zhenbao Island in Far East Russia. Russian losses from the incident were 58 killed and 94 wounded.

China claims 160,000 sq km of Russian territory including the port of Vladivostok. At one of their meetings, President Xi asked President Putin to give Vladivostok to China.

South Korea

China hates it when countries are better able to defend themselves against Chinese attack, and thus the Chinese bullying reaction to South Korea's ballistic missile defence installation.

Tajikistan

China claims the Pamir Mountains in eastern Tajikistan.

Australia

In another echo of WW2 when Japanese fishing vessels scouted northern Australia in the lead up to war, a couple of years ago a Royal Australian Navy patrol boat came across an alleged Chinese fishing boat. It was actually a survey boat that had been mapping the northern reaches and the Great Barrier Reef.

The Economic Correlation of Forces

China would like to defeat other countries in detail, that is sequentially, one by one. If the countries that China wants to attack provide mutual fire support then China is not up to the task. China does not have any friends. China's share of international merchandise trade has hit a ceiling of 15% and is now likely to contract as companies pull out of China and relocate to Vietnam, India and Mexico. Also, 30 percent of China's economy has been erecting apartment buildings, a civilisational fetish that will end at some stage.

From a 'correlation of forces' perspective, this is how the economic blocks of the world line up:

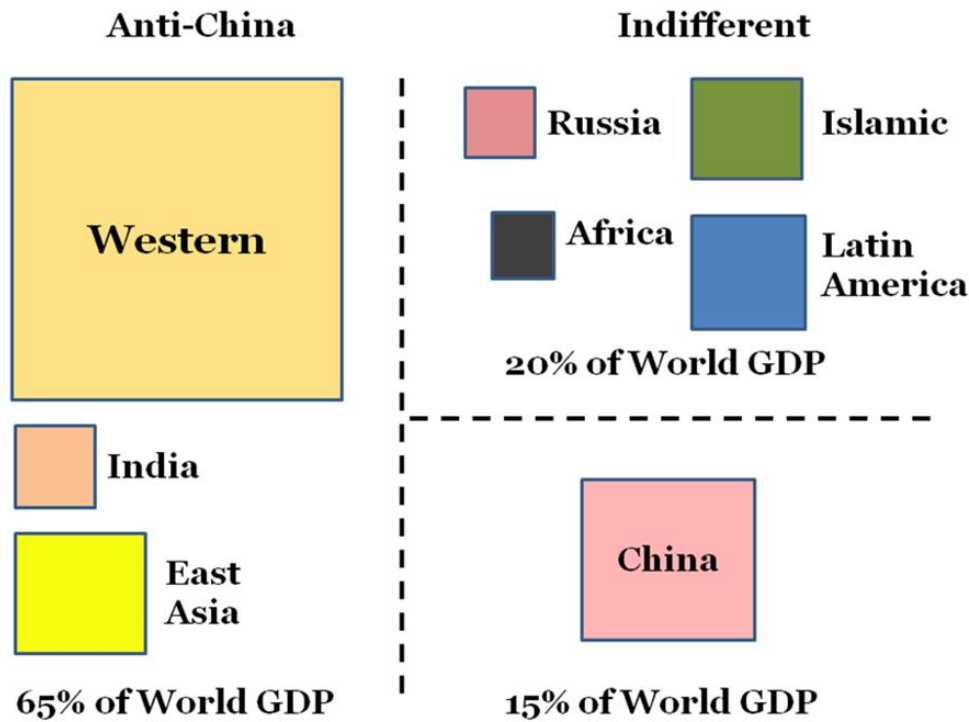


Figure 7: China in the context of the world

The anti-China grouping is at least four times larger than China in economic heft.

If we concentrate on the economies in the Asian region then this is the result:

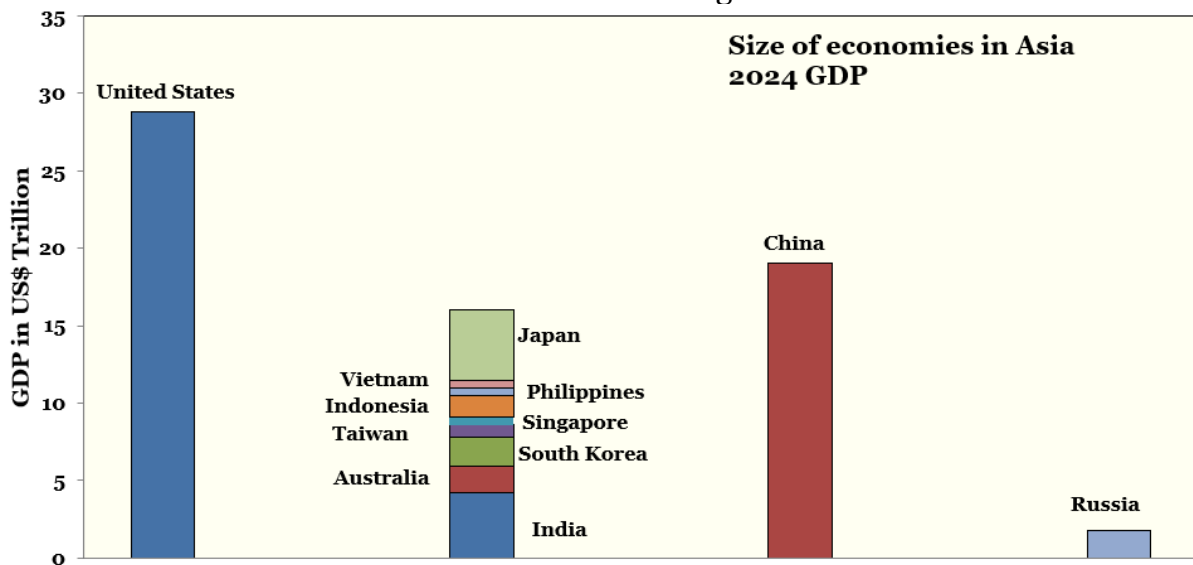


Figure 8: Size of economies in Asia in 2024

A rule of thumb in military matters is that the attacking force has to be at least three times the size of the defending force to have a chance of prevailing. In terms of economic heft, China's economy is less than half that of the countries it wants to attack. One consequence of the Ukraine War is that the Russian Army is too battered to piggyback on an opportunistic attack in Europe during China's war. So that there will be no second front and no forces need be held back as a contingency for that possibility.

China adopts a nuclear warfighting stance

As described in *Tragedy and Hope*, the Chinese Communist regime in the first years after its founding was “insanely aggressive”. The Chinese reverted to type about twelve years ago and went back to ‘snarl diplomacy’. Only being poor had kept them from trying to impose their will on others. Now China has regressed further. For decades China had a nuclear arsenal of about 300 warheads which is credible for a retaliatory strike in response to a nuclear attack on its territory.

In the late 1960s, 330 kg of weapons-grade plutonium was sent from the US and UK to help Japan start their plutonium breeder reactor program. That program was cut short but the weapons-grade plutonium stayed. Weapons-grade plutonium has under 7% Pu²⁴⁰ with the balance being Pu²³⁹. Pu²⁴⁰ has a high rate of spontaneous fission which means that bombs made with too much of it tend to explode early and produce a fizzle. Commercial reactors designed for making electric power produce plutonium with a Pu²⁴⁰ content of about 20% by the time the fuel rods are switched out, making it useless for nuclear weapons. President Carter banned reprocessing of nuclear fuel to stop nuclear proliferation. He need not have bothered.

Making a bomb using 6 kg of plutonium will give you a yield of 20 kilotons with that doubling to 40 kilotons with a tritium booster. A further increase in yield would be achieved by adding an enriched uranium tamper. So that 330 kg of weapons-grade plutonium that Japan had would be good for 55 warheads of at least 40 kilotons each.

That is the past tense because China made itself upset over Japan being in possession of weapons-grade plutonium that would help Japan defend itself against Chinese aggression. China prevailed upon the Obama regime to get Japan to send that parcel of plutonium back, which happened in 2016. Which is ironic because China is now expanding its nuclear arsenal at least five-fold, from 300 warheads to beyond 1,500. To that end, China is building two breeder reactors to make weapons-grade plutonium on Changbiao Island in Fujian Province.

One reactor under construction since 2017 reportedly began producing electricity in late 2023 and the second is set to go online in 2026. Russia's Rosatom nuclear agency delivered 6.5 tons of uranium for the first reactor and the reactors are being built with Russian technical assistance.

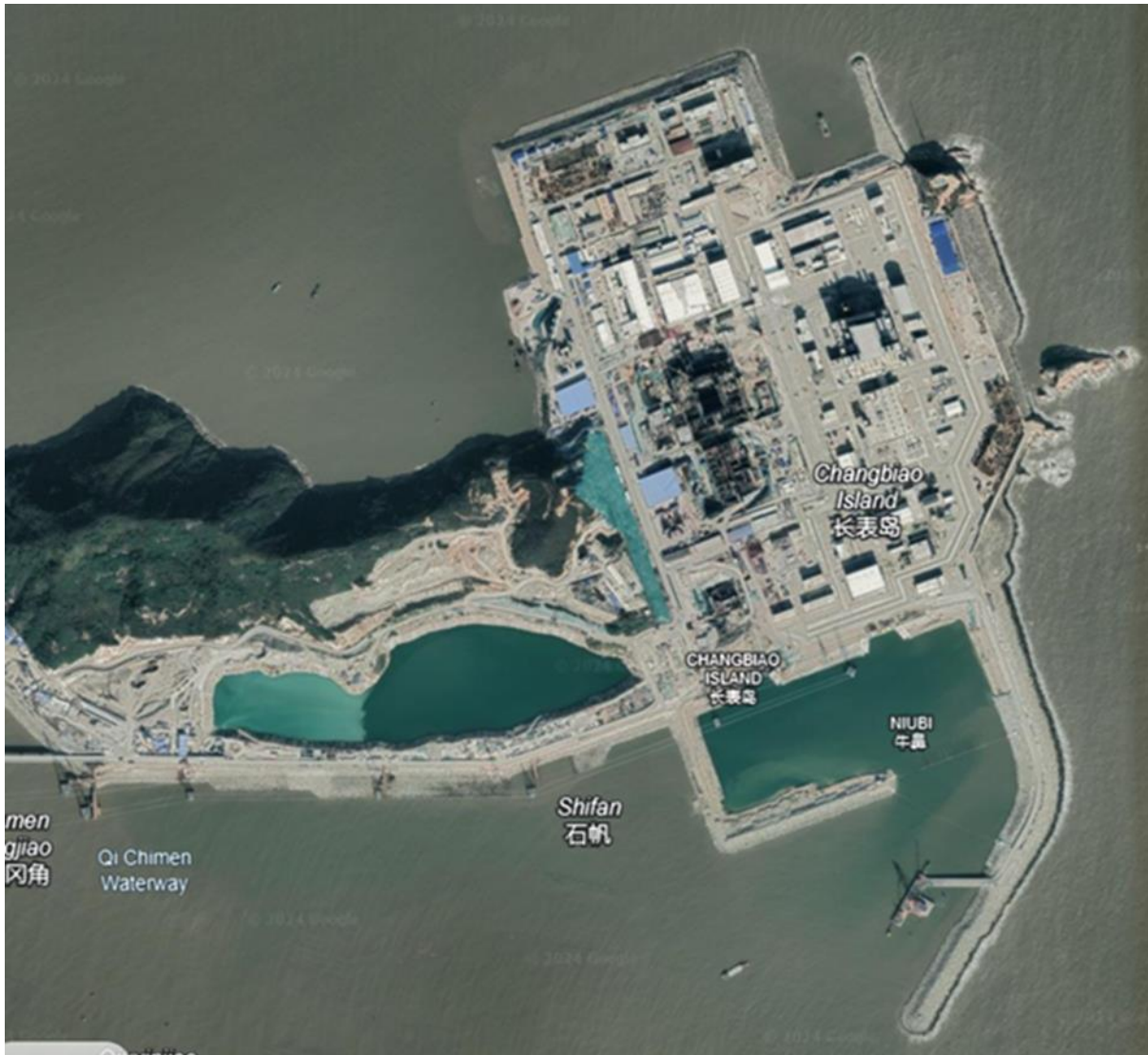


Figure 9: Reactors for breeding weapons-grade plutonium under construction on Changbiao Island, Fujian Province in 2022 (Google Earth)
 Google Earth is largely staffed by Chinese engineers who speak to each other in Mandarin in the office. The Google Earth image of Changbiao Island is now obscured by whiteness to make it difficult to track construction progress.

In July 2021, China used an online video to threaten to nuke one Japanese city per day if Japan comes to the aid of Taiwan. Japan sees Chinese control of Taiwan as an existential threat and will come to Taiwan's aid if China attacks. The United States is not committed by treaty to defend Taiwan but it does have a treaty commitment to defend Japan if that country is attacked. With the consequence that if China does attack Taiwan, the United States will become involved or have all of its treaties rendered worthless. Obama did all he could to make the United States weaker and making Japan send the plutonium back contributed to that. President Trump has been making noises about weaselling out of defending Japan. What will actually happen on the day is open to conjecture.

Unfortunately, the Biden regime spent its last three years signalling that it was afraid of nuclear escalation which just means that a nuclear-armed enemy will threaten to go nuclear at the first opportunity. To head that off, the Trump administration needs to

signal some resolve. The cheapest and fastest way of doing that would be to send that plutonium back to Japan - and lend them some warheads until they have made their own. That would complicate China's war planning, help stop the coming war from going nuclear and may even stop a war over Taiwan in the first place. As the Russians say, escalate to de-escalate.

Fortunately, China's nuclear war fighting capability has had a few setbacks. An inspection of missile silos built in the western desert found that they couldn't open their lids far enough for the missiles to be launched. Some of the missiles had water in their fuel tanks instead of fuel, likely because the water used for hydrostatic testing of the tanks had not been replaced with fuel. In 2023, a nuclear submarine in the Yellow Sea killed its crew with noxious fumes from its oxygen generator and in 2024, a dual nuclear-diesel submarine built in Wuhan sank tied up to a dock after launch. Apparently a hatch had been left open.

Regime Fragility

China is an open-air prison in which the warders are afraid of the inmates. Two stories illustrate this. In May 2024, a statue of Li Zicheng was removed from a traffic roundabout in Beijing. Li Zicheng was a peasant leader who overthrew the Ming Dynasty in 1644. China's communist regime is afraid of the example of the overthrow of a repressive regime by peasant leaders, because they are now the repressive regime. The Chinese Communist Party has become the pigs of Orwell's *Animal Farm*.

The second story is told by Edward Luttwak on the consequences of China's one child policy on how military actions might be run:

"The extreme case here is China, with its fertility rate of 1.1 (Chinese women on average have 1.1 children, well under the 2.1 children needed for replacement). President Xi is, by all accounts, a bellicose man who enjoys threatening war against Taiwan. And yet, curiously, in 2020 he took eight months to reveal that one PLA officer and three soldiers had died during the fighting on India's Ladakh frontier. During that period of official silence, the families of the four were re-housed and provided with welfare payments or better jobs; the officer's wife who taught piano in a village school was elevated to the Xi'an Conservatory of Music, with a new house to go with it. Each of the four also became the subject of dedicated media campaigns, which portrayed the youngest as cinematically good-looking and the officer as so conscientious that, up in cold Tibet, he would wake up before his soldiers to prepare hot-water bottles for them. Later, the names of the four were added to many highway bridges to remind all of their sacrifice.

Why the grand acts of remembrance? The answer is demographic. Thanks to China's one-child policy, imposed in 1980 with the abundant use of forced abortions, the four deaths extinguished eight family lines.

The good news, then, is that because of China's low birth rates, the post-heroic syndrome makes it unlikely that Beijing will act on its pugnacious threats. Given the regime's most elaborate response to four combat deaths, how could it cope with the 4,000 that might be lost in one day in a war for Taiwan?"



Figure 10: Removal of the statue of Li Zicheng from Beijing in May, 2024
The statue was too frightening for the regime.



Figure 11: Chinese state media portrayal of Japanese Prime Minister Sanae Takaichi

Peace Settlement

The war with China has been a long time coming. American geopolitical analyst Robert Kaplan wrote an article entitled *How We Would Fight China* in the June, 2005 edition of *The Atlantic* magazine. China has been doing all the things a country would do to prepare for war – stockpile oil, build its gold reserves, start to wean itself off food imports, create hostility in its population against Japan, build a national narrative about the inevitability of war, sell its US treasury bonds, build a grain stockpile. China will have its war and then there will be a subsequent peace. All the countries that will be fighting China would be best served by writing the peace settlement now so we know what we are working towards, and publish it.

This will be done without the United States. Taiwan was not mentioned in the US *National Defense Strategy 2026*. Given that China's attack on Taiwan is likely to be the biggest conflict in Asia this century, this omission is beyond bizarre. The omission is to provide flexibility. President Trump has referred to Taiwan as a bargaining chip. He suspended arms sales to Taiwan prior to his May 2026 visit to Beijing. In an interview on the Fox Network, Trump said that US farmers "will lose a lot money" if Chinese nationals don't buy their land. He also said that not letting 500,000 Chinese students come to the US every year and attend colleges "would be a very insulting thing to say to a country [China]" and many US colleges would have to declare bankruptcy. It is clear that President Trump has sold his soul for the idea of a grand bargain with China. China will take advantage of this naivete and then attack the US anyway, when the US hasn't any friends at all in the world.

This is what is likely going on in President Trump's brain. He wants Greenland. He thinks that big countries should have the right to swallow small countries near them. Thus he approves of Russian invasion of Ukraine and has been helping Russia as much as possible. And approves of China invading Taiwan. Those invasions make seizing Greenland seem like the natural course of things. There was the problem that a great chunk of the world's high end semiconductor production came from Taiwan. But that has been mitigated by the new fabrication plants being built in the US. When Taiwan's facilities are destroyed in the Chinese invasion, that will make the US plants more valuable.

In mid-January this year, at the time of the Minnesota riots, the 11th Airborne Division in Alaska prepared for a possible deployment of 1,500 troops to Minnesota as the official destination. This seemed strange as there were other units that were much closer. The 11th Airborne specialises in Arctic warfare. The real target was Greenland. So Denmark with some help from France moved in a few troops and a couple of ships to defend Greenland. Once it was apparent that there would be body bags from attacking a NATO ally, the 11th Airborne was stood down on 3rd February, 2026.

Planning for the war with China should be done on the basis that the US will not honour its treaties, just as it did not honour its undertakings under the Budapest Memorandum of 1994 to protect Ukraine from invasion. China will start the war with a missile barrage on Taiwan and Japan and avoid hitting US bases. The Allied response will be led by Japan. All the Allied forces have to do is sink China's ships. China wouldn't be able to do anything except a land attack on Vietnam. The mountainous

terrain of north Vietnam will make a Chinese attack difficult and costly, even more than it was in 1979. Australia's role in the war will be to:

1. Sink as much of Chinese shipping and fishing fleets as possible in the Indian and Pacific Oceans.
2. Contribute to the attack on Chinese bases in the South China Sea.

As to the peace settlement, in the South China Sea, China has three big bases with 3,000 metre runways – Fiery Cross Reef, Subi Reef and Mischief Reef, and a number of smaller bases. Vietnam will get Fiery Cross Reef and have the Paracel Islands returned to it. Japan will get Subi Reef and the Philippines will get Mischief Reef. Tibet will become an independent country again. The linguistically distinct regions of southern China will also become independent.

Ideally, China will share Russia's fate of being much diminished after it set out to destroy a neighbouring country and absorb its territory. This may stop both countries from attempting to do it again.

3.0 Army

The Army is too small, has the wrong structure and the wrong equipment. If our one combined arms brigade, the 3rd Brigade in Townsville was sent into battle in the Ukraine War, it wouldn't last a day. In fact it wouldn't get to the front line. What is happening in Ukraine is that when the Russians decide to make an armoured assault, they start forming up 30 km from the front line. The Ukrainians see this and start attacking them with drones. None of the Russian tanks and armoured vehicles make it to the front line. The Ukrainians then pick off the infantry on foot. There are now eight Russian dead for each Ukrainian loss.

Instead of just one armoured brigade theoretically capable of battlefield manoeuvre, the 3rd Brigade, Australia needs at least two divisions of five brigades each. A brigade is 3,000 all ranks which equates to one soldier for every 9,000 Australians which of course is not enough. A total of 10 brigades capable of battlefield manoeuvre would improve the situation to one soldier capable of battle for every 900 Australians. This is still far short of ideal but a step in the right direction. For comparison, Australia had 15 divisions in WW2 when our population was a quarter of what it is now. In fact, in WW2 one in seven Australians was in uniform.

Any enemy attacking Australia first has to get past the RAAF and RAN before it can meet the Australian Army on Australian soil. It might be the case that spending money on the RAAF and the RAN is more cost-effective in stopping the enemy force before it has landed rather than after it has landed. But we can have both - long range interdiction and a larger land force. Defence is the most important national consideration and we can divert funds from things that are far less important. The benefit of having a larger army is that the enemy, to prevail, has to land and supply a force at least three times larger than ours. In turn this makes it easier for the RAAF and the RAN to degrade the invading force and make the invasion fail. A large army is a good backup contingency in case our naval and air force weapon systems fall short of what is needed.

Why the divisional structure? One thing that the Ukraine War has shown is that air defence for army units needs to be organic to the formation. One brigade can hold 20 km of the frontline and have a depth of 60 km. Five brigades make a division and thus a division could hold 100 km of frontline. To survive in the current environment, military formations need a layered defence from aerial threats, from fighter aircraft and bombers down to drones. This means that each division needs its own organic surface-to-air missiles system. To protect the whole division, this would take a Patriot-sized battery with an effective range of 160 km or more. Currently the Army's air defence unit is the 10th Brigade based in Adelaide. To train with our one armoured manoeuvre brigade, one or the other has to drive 2,600 km.

Let's move on to the subject of equipment. To tell the story of drones, let's start with the second last transformation of the battlefield. In its 2006 invasion of Lebanon to retaliate against Hezbollah, Israel lost a number of tanks to Kornet tandem-warhead anti-tank guided missiles (ATGMs) supplied by Russia. The first, smaller warhead would defeat the first layer of protection of the Merkava tanks to allow the shaped charge of the second warhead to penetrate the steel hull. Israel's response to that was to develop two methods to defeat ATGMs. One was the Trophy system for tanks and the other was Iron Fist for other vehicles. In both systems, a radar on each corner of the vehicle detects ATGMs approaching at 300 metres per second and calculates the time to impact. In the Trophy system, a charge is fired to create a small cloud metal that shreds the ATGM when it is about five metres away. The system weighs about a tonne and costs about US\$1 million per tank. Israeli tanks haven't been bothered by tanks since. The Iron Fist system weighs a little less than the Trophy system. It fires a round that is all explosive so that there are no fragments that might hit troops nearby. The United States failed to develop its own active protection system and ended up fitting the Trophy system to some of its tanks. The Russian version is called Arena-M and is effective against ATGMs. Nevertheless, the Ukraine War started with virtually no tanks on either side equipped with active protection systems and ATGMs caused large losses on both sides.

It was thought that the Trophy and Iron Fist systems would also protect against first person view (FPV) drones. Israeli tanks had been much bothered by ATGMs or FPV drones in their incursion into Gaza but then in early 2026 they went back into Lebanon and Israeli light vehicles and parked equipment were promptly chewed up by Hezbollah FPV drones. The building and vegetation cover of southern Lebanon provided plenty of opportunity for short range ambushes. For tanks, it turns out that the active protection systems against ATGMs had software written to treat anything approaching at less than 70 km per hour as nonthreatening. And despite the four years of the Ukraine War as an example of what to expect, there had been no change in Israeli doctrine in anticipation of Hezbollah's use of FPV drones. The Russian Arena-M system has successfully intercepted FPV drones but the system's magazine contains six munitions on each side of the tank's turret for a total of 12 munitions. Once the munitions have been depleted on at least one side of the tank, it becomes defenceless against FPV drones.

Ukraine has said that it takes an average of 20 FPV drones to destroy a tank equipped with Arena-M. That is a cost of the order US\$10,000 to destroy a tank worth US\$2 million. Because of the low survivability of Russian tanks currently, some tank units

are being disbanded to send the crews into combat as infantry in 'meatgrinder' assaults.

The situation in the Ukraine War is that Ukraine is now making and using 20,000 drones per day, amounting to some seven million per annum. The base price is around US\$500 per unit with more for infrared imaging, fibre optic control and other enhancements. FPV drones now cause 90% of the casualties in that war. The use of FPV drones by both sides has caused the war to stalemate. Ukraine is on the defence to save manpower. The grey zone, what used to be called no man's land between the combatants, is up to 30 km wide. Russia is on the attack to gain ground for political purposes and is using meatgrinder tactics in that attempt. Robert Brovdi, the commander of Ukraine's Unmanned Systems Forces, has said that the cost of a Russian combat death by FPV drone is US\$918. The cost of an FPV drone is close to that of a 155 mm artillery shell but with the benefit of being precision-guided. But the cost can mount. There is a video of a Russian soldier being chased across the battlefield in which it took 20 FPV drones to eliminate him.

Eventually the amount spent on drone countermeasures will equal what is spent on drones. But what will that countermeasure system look like? Nothing has worked so far. The problem with laser systems is that they are badly affected by fog, rain and smoke and the power for the laser system takes up a high proportion of the space in the vehicles being protected. Similarly, microwave systems are large, advertise their location by their emissions and take up the whole vehicle being protected. That said, there is likely to be a role for laser systems in the 20 to 30 kW range for destroying enemy surveillance drones.

The solution will be similar to Trophy in having a radar on each corner of every vehicle supplemented by infrared and visible light cameras which will help determine what are valid targets. The system will be based on belt-fed shotgun shells with an effective range of 100 metres or proximity-fused 30 mm shells with effectiveness beyond 200 metres limited by the accuracy of a short barrel of perhaps 30 cm. A sound location net on the vehicle will allow the system to operate passively, that is without its location being broadcast by its radar emissions. Another option to overcome the problem that each radar on the battlefield is also a location beacon is to have an emitting radar further back from the frontline and radars operating passively on each vehicle. Every vehicle within 100 km. of the front line will need to operate with this type of system fitted. Ukrainian, battery-powered, fixed-wing drones with artificial intelligence to recognise targets are now operating 100 km into Russian-controlled territory. Similarly, the Russians are using fixed wing drones devoted to finding and striking propane tanks using artificial intelligence.

Traditionally armies would use a lot of artillery to reduce the effectiveness of frontline positions and then follow that with an assault led by tanks. Russia has responded to the FPV drone-dominated battlefield by replacing tube artillery with GPS-guided glide bombs launched by fighter aircraft. These are 500 kg to three tonnes in weight with a glide range of 70 km which means they could be launched 30 km behind the frontline and hit a target 40 km beyond it. A recent Russian innovation is to add a small turbojet to glide bombs to extend their range to 150 km.

Instead of assaulting with armoured formations led by tanks, the Russians have gone in the other direction with attacking infantry reduced to two-to-three-man groups,

hoping to get past the Ukrainian FPV drone surveillance by having the smallest signature possible.

Whoever is able to develop and deploy a cost-effective anti-FPV drone system on all its battlefield vehicles will regain the ability to manoeuvre on the battlefield and dominate it. The Australian Army hasn't adapted yet to the previous revolution in land warfare which was active protection systems against ATGMs. Australia is currently acquiring 75 new Abrams tanks which are fitted for, but not with, Rafael's Trophy system. This means that the mounting brackets are on the tanks but without the system to protect against ATGMs. The tanks are likely victims of the AUKUS submarine procurement in that the Government decided to buy their heart's desire, nuclear-powered submarines, but not increase defence funding to pay for them. Instead, a great number of other abilities were sacrificed with the effect of creating a hollowed-out force. With respect to the tanks, this doesn't matter because until each tank has its own anti-FPV drone system fitted, it is not going to survive on the current battlefield anyway. The opportunity exists to combine anti-ATGM and anti-FPV drone capabilities in one system. That will be the price of entry for armoured vehicles on the battlefield.

Until the FPV drone problem is fixed, Metallica's song title 'nothing else matters' applies. We also need to make our own FPV drones to stress the enemy's force and probe for gaps. To make the FPV drones we will need to make all the components which includes the rare earth magnets for the electric motors, the electronics, the plastic for the body and the propellers, the explosives for the warhead, the cameras, fibre optic line and everything else. Australia has the same population as Ukraine which is making and using 20,000 drones per day. While their war is mainly a land war and ours, in the best case, will be an air – naval – land war in that sequence, we should aim to produce 10,000 drones per day. We can stockpile some of the prewar production and send the balance to Ukraine or whatever war is going on at the time. If we had our own people on the ground in Ukraine, we could keep up with ongoing drone innovation on the battlefield.

The next thing to effect is to move artillery, both rocket and traditional tube-launched artillery, as far back from the frontline as cost-effectively as possible. What we have at the moment is some traditional towed artillery and some tracked self-propelled howitzers. In the Ukraine War, the enemy's radar detects the location of the firing position almost instantly and counter-battery artillery arrives within three minutes. This is less time than is needed for a towed artillery piece to be hitched to a truck. So Ukraine moved more to self-propelled howitzers. These come in two types – tracked and wheeled. What Ukraine found is that the tracked howitzers didn't move as fast as the wheeled variety and broke down more often. To be repaired, they had to be loaded on low loaders. Wheeled howitzers are the most cost-effective artillery on the battlefield at the moment. Ukraine has been supplied with French, Swedish and Czech wheeled howitzers firing 155 mm rounds. It also makes 40 per month of its own Bodhana system with 80% indigenous content.

For its towed artillery, Australia has responded to the rapid counterbattery fire demonstrated in Ukraine by changing its doctrine. Instead of moving off as rapidly as possible, which for the Australian Army has been as much as 15 minutes, Australian gunners have been instructed to dig a trench and wait out the counterbattery fire in it.

That in turn means that the enemy will send FPV drones to attack troops in the open trenches and kill them all quite easily because they will know where to look.

The solution to our tube artillery problem is to make our own wheeled self-propelled howitzer. We already make the Boxer eight-wheeled armoured reconnaissance vehicle in a Rheinmetall factory in Brisbane. An artillery version of the Boxer, called the RCH155, was recently developed. It has a 52 calibre barrel (calibre refers to the length of the barrel divided by its diameter) with a range of about 40 kilometres using standard rounds. The greater the length of the barrel, the higher the range of the artillery piece. The RCH155 has a crew of only two.

The next thing to do is to increase the range of the rounds fired. In WW2, Germany experimented with strakes on artillery shells at its Peenemunde range. Strakes are long, thin fins down the length of missiles that increase lift by generating controlled vortices, converting kinetic energy into glide distance. Applied to shells fired from 230 mm barrels, the addition of strakes resulted in a range of 130 km. The normal dispersion with range applied so the development was militarily useless. Modern electronics allows the concept to be revisited. A number of countries have developed a precision guidance kit (PGK) for artillery shells. This is a fuse that includes two small vanes that spin in the airflow past the shell and generate electric power for it. The PGK is programmed to hit a set of coordinates with 50% of shells landing within 10 metres of the target. This dispersion is constant with range. The practical result is that far fewer shells are required to service a target. The combination of these two technologies has the promise of putting our artillery well beyond the range of enemy counterbattery fire, at least until they copy it. With respect to 155 mm artillery tubes, it would involve putting strakes 25 mm wide on a 105 mm shell. One problem is that the current supplier of PGK fuses to the Australian Army, American company Northrop Grumman, charges US\$15,000 per unit for something that weighs 1.5 kg. The real price, and would allow plentiful use of life-saving artillery, would be under \$1,000 each. General Ridgeway, commander of UN forces in the Korean War, observed that the bigger your pile of artillery shells, the smaller the pile of your own dead soldiers.

With respect to the supply of artillery shells, Australia has made a nearly completely useless token effort. A plant in Maryborough, Queensland is making about 40,000 shell bodies per year. These are sent to Germany for filling with explosives, fitting primers and fuses. We also don't make the bags of propellant needed to use artillery shells in battle. Even the steel the shells are made of is not made in Australia. It is imported from Germany as seven-metre-long, square-section billets. Steel for high fragmentation artillery shells is optimised for forging, heat treatment, launch stresses and fragmentation behaviour. It is a very stupid arrangement that would be useless in war. Does that need to be said or isn't it obvious to a casual observer? The Maryborough plant is currently being prepared to produce the US M795 projectile.

The role of artillery is to deliver high explosive to the enemy. The weight of a 155 mm shells is 55 kg of which 11 kg is explosive. If an artillery round was pure explosive then the blast energy would rapidly dissipate against atmospheric pressure. The role of the artillery shell is to fragment with the fragments accelerating to Mach 3, increasing the area serviced by the shell. Some 80% of the weight of the fragments produced by a 155 mm artillery shell are between 5 and 6.5 grams. The optimum airburst height for a 155 mm shell is seven metres which creates a lethal radius of 50 metres.

Beyond traditional tube artillery, the other way of cost-effectively delivering high explosive on the battlefield is with rockets. The HIMARS system that Australia is adopting had its origin in the US inspection of the battlefields of the Yom Kippur War of 1973. The US was surprised at the speed of advance in some battles and the consumption rate of artillery. So HIMARS was developed as an assault-breaker delivering cluster munitions with a range of 30 km. Their role was killing the supporting infantry of tank assaults. It would protect the traditional tube artillery from being overrun. The weight of each missile was two thirds propellant and one third payload. That was in the days before GPS. Now all the missiles are precision-guided and the system can be used to snipe targets of opportunity up to 120 km away with one launcher being able to service 240 km of the front line. Within the limit imposed by the 4.0 metre tube length of the installed base of launch vehicles, range can be increased by increasing the diameter of the missile or reducing the weight of the warhead. Thus in the PrSM missiles Australia will be making, the warhead is 91kg, 11% of the total 816 kg missile weight for a range of 500 km. The efficacy of the blast-fragmentation warhead is increased by making its shell of pre-formed tungsten. The specific gravity of steel is 7.9 whereas tungsten has an SG of 19.3, increasing the efficacy of converting blast energy into shell fragment kinetic energy.

The other way of increasing the efficacy of rocket artillery is to include a glide component into the trajectory. An attempt at this was made by combining rocket motors from HIMARS missiles, left over after having their cluster munition warheads removed, with small diameter bombs. The small diameter bomb was developed because the F-35B couldn't take off with the 2,000 pound bomb that the rest of the F-35 fleet was designed around. The combination is called the ground-launched small diameter bomb.

Once the threat of enemy drones is mostly neutralised, manoeuvre warfare is going to come back with a vengeance because the modern battlefield, up to 30 km from the frontline, is depopulated due to the drone threat. If you can counter the enemy's drones while retaining full utility of your own drones, armoured forces will have few manned positions to deal with. So what sort of tank should we have for our manoeuvre elements? Currently we are getting 75 M1A2 Sepv3 Abrams tanks weighing 67 tonnes each. The biggest problem with the Abrams is that it has a gas turbine engine with twice the fuel consumption of a diesel. It takes 20 litres of fuel just to start. The Abrams has twice the fuel load of a Leopard 2 tank, for example, to achieve the same range. The big impact is on logistics. The biggest vulnerability of a tank is its fuel supply.

While traditionally tanks are needed to be able to fight the enemy's tanks, the battlefield has become far more transparent with fewer surprises. Enemy tanks can be engaged well before they can bring their guns to bear. For a tracked vehicle in the tank role, Australia would be better off with the CV90 infantry fighting vehicle fitted with a 120 mm cannon and weighing 38 tonnes.

Back in the 1960s, Australia bought some 800 of the M113 armoured personnel carrier for battlefield transport of our infantry. That was when we had a population of 12 million. In 2004 a project was started to replace them with 1,100 infantry fighting vehicles that would have thicker armour and heavier armament. I attended a briefing on this acquisition 20 years ago at which it was apparent that the Army was set upon having its own special vehicle instead of buying something that was already in production and already proven to work. Many years passed and the Redback infantry

fighting vehicle from the Korean company Hanwha was eventually selected. Hanwha designed the Redback to meet the conditions of the Australian Army tender.

Then in 2023 the incoming Labor Government used the excuse of a strategic review to delay production and cut the order to just 129. This works out to one infantry fighting vehicle for every 209,302 Australians. This is not enough. We need at least ten times that number, as per the original intent in 2004.

On 30th March 2026, the Australian National Audit Office released a report on how the Redback acquisition is going. The report is 94 pages of gobbledygook and doesn't even tell us what the unit cost of a Redback is. It does tell us that the selection process was structured to effectively ignore existing types of infantry fighting vehicles so that the Army would end up with something special that no one else had.

From other sources, the unit cost of a Redback is \$29 million for 40 tonnes of vehicle. The best alternative would have been the CV90 made by BAE with the same capability, 30 years of operating experience and a unit cost of \$15.6 million. The Koreans aren't bothering to make the Redback themselves. They think it is too heavy and Hanwha's alternative weighs 28 tonnes. The Redback is an orphan class which no other country will ever buy. Only 129 of them might ever be built. After that contract is completed, we will still need another thousand or more infantry fighting vehicles to have an army with some substance to it. We would be better off switching to the CV90 and giving the Redbacks that do get built to an Army Reserve unit.

With respect to helicopters, the Army is buying Apache helicopters for ground attack, replacing the Tiger helicopters it never liked. At the same time, Japan is phasing out its Apache helicopter fleet and its Cobra anti-tank helicopter squadrons. The reason is that it is now too dangerous for helicopters to come near the front line. Helicopters are too easy to shoot down. There are plenty of manpads (man portable air defence systems) on the battlefield to snipe at passing helicopters. Russia lost 100 helicopters in the first month of the Ukraine War; now it is losing only one per month because most of their helicopters have already been shot down. Even helicopters well behind the front line are not safe. In the Bryansk Patriot Ambush on 13th May, 2023, Ukraine used a Patriot SAM battery to shoot down five Russian aircraft in five minutes. These were a Su-34 fighter bomber, a Su-35 fighter aircraft, two Mi8 electronic warfare helicopters and another Mi8 helicopter. They were from eight to 50 kilometres from the border with Ukraine. Our Apache helicopter crews are very brave indeed because their role is near suicidal.

4. Royal Australian Air Force

The beginning of the Ukraine War vindicated traditional airpower theory. Russia's larger and more technically advanced fighter force shot down the smaller and older Ukrainian force over three days, as predicted by theory. Since then though neither side has been able to overfly the other side due to the proficiency of their SAM systems. As at September, only one Russian fighter aircraft has been shot down so far this year by a Ukrainian fighter. Ukraine used a baited ambush to lure a Su-35 closer to the front line; it wasn't air-to-air combat as such. Both sides mainly use their fighter aircraft in a ground attack role, dropping glide bombs.

In the Iran War, Israel and the United States destroyed most of the Iranian air force on the ground and their SAM systems early in the conflict. Iran has been able to shoot down or damage US F-15s and F-35s though using infrared-based SAM systems. These are passive and give no indication to the aircraft that it has been engaged. More advanced infrared-based systems provided by the German company Diehl Defence have been quite effective in shooting down Russian drones in Ukraine. These use the Iris-T air-to-air missile in a ground-launched role. The implication is that a network of infrared sensors could passively locate and engage enemy aircraft without revealing the location of any component of the system.

Another development is the increasing range of air-to-air missiles. The longest-range air-to-air missile used in the Ukraine War is the Russian R-37 with a range of 400 km against non-maneuvring targets and 200 km against a manoeuvring target. The United States recently repurposed a ground-launch missile, the SM-6, as an air-to-air missile with a likely range of 640 km based on its 640 kg weight. This is without the booster of the ground-launched version. That was followed by the AIM-424 weighing 680 kg with a similar range. The US Air Force has stated its intention to field an air-to-air missile with a range of 2,000 kilometres. This may already exist with the AIM-424 being the upper stage of a two-stage missile. This development suggests that targeting will be provided by a satellite system providing near continuous coverage of the Earth's surface.

The US Air Force is buying the F-15 again after a gap of 25 years. The F-15 first flew in 1972 making the design over 50 years old. Since 2001, the production line has been kept going by sales to countries in the Middle East. The current version is called the F-15EX and is equipped with an electronic warfare system that copies radar waves impinging on the aircraft and transmits them with a slight delay that cancels out the enemy's radar. The effect is described as 'entering a black hole'. How good the effect is compared to stealth achieved by aircraft shaping and coatings is not generally known. The French Rafale fighter has been using a similar system, called Spectre, for years. More recently Saab developed a radar-cancelling system called Arexa for its Gripen E fighter. The Luftwaffe is trialling Arexa on some of its Typhoon fighters.

The most recent Iran War started Israeli F-15 aircraft firing two-tonne, air-to-ground Blue Sparrow missiles with a range of 2,000 kilometres.

All these developments are very positive for Australia. Our current protection from air attack is provided by a small force of F-35s and half that number Super Hornets. We were originally to get 100 F-35s. The order was cut to 72 and the Australian public was never told why. It is most likely because the thing is too expensive with an operating

cost of US\$48,000 per hour. By comparison the operating cost of the F-15 is US\$25,000 per hour. The Gripen-E costs US\$10,000 per hour while being a far better fighter aircraft than the F-35. In the last Federal election in 2025, the Liberal Party's whole defence policy was simply to buy another 28 F-35 aircraft to take the fleet to 100. It seems they did not bother to ask the F-35 pilots in the RAAF what they thought of it.

The F-35 has many deficiencies. Of those deficiencies, at least six are showstoppers. It will fail in its assigned role as an air superiority fighter for the RAAF:

1. The F-35's engine has been failing at a high rate. The engine is derived from the F119 engine of the F-22 but was optimised for the vertical take-off role of the F-35B, making it flimsy and running too hot.
2. The F-35's requirement for an 8,000 foot runway limits its use to just five runways across northern Australia. It requires a 10,000 foot runway for training, putting it in the league of the heavy bombers.
3. The F-35s in service with the US Air Force have a full mission capable rate of only 28%.
4. Being designed as a light bomber, the F-35 is less manoeuvrable than fighter designs up to 50-years-old and will be shot out of the sky by modern fighter aircraft.
5. The F-35 uses its fuel for cooling its electronics. The aircraft won't start if its fuel is too warm, making deployment in summer in northern Australia problematic.
6. The F-35 has a logistics system that requires an internet connection to the United States. If this link is down, the aircraft can't fly even if there is nothing wrong with it. It is bizarre that Australia would even contemplate operating an aircraft under this arrangement.

The RAAF's F-18 Super Hornets are even less capable than the F-35s. The Super Hornet was developed by the US Navy to replace its E-6 Intruders which were being retired. With no money to develop a completely new aircraft, the solution adopted was to increase the size of the F-18A by 25%. As with the F-35, its role was to be a light bomber and it is completely inadequate as a fighter aircraft. Israel uses its F-35s for heavy reconnaissance. It uses its F-15 in the air-to-air role and its F-16s for ground attack.

Australia can't be invaded unless PLA Navy ships make it to Australian shores. Thanks to the technical developments of the last few years, the RAAF can take on the role of sinking Chinese ships as far from our coastline as possible. Arming an aircraft with a range of 2,000 km with an antiship missile with a range of 2,000 kilometres means that aircraft taking off from Darwin could sink ships in the Taiwan Strait and everywhere in between.

As to choice of aircraft, we should emulate Brazil in building the Gripen E under licence in Australia. The Gripen E has half the capital cost and a fifth of the operating

cost of the F-35. Its inner wing hardpoints can carry up to 1.4 tonnes each. Australia is now making the PrSM missile with a ground-launched range of 500 km and weighing one tonne. PrSM Increment 2 is designed to sink ships with a passive radio frequency seeker and infrared image matching. An air-launched version should have a range of the order of 1,000 kilometres. We should also take whatever F-15EX we can get. The US Air Force recently doubled its F-15EX order to 263 aircraft. Israel has ordered 50. Another thing we should do is to arm passenger aircraft with air-launched missiles as they will not be threatened by enemy fighter aircraft at their launch distance from the ships targeted.

Every Chinese ship and fishing vessel will be a combatant and there will be thousands of them to be sunk in the Pacific and Indian Oceans. This will be most cost-effectively done by weapons tuned to the size of the target. For example, sinking a 500 tonne vessel, a typical size for the Chinese deep sea fishing fleet, will take a 50 kg warhead. These could be launched as glide munitions from unmanned aircraft under the control of a P-8 Poseidon or E-7 Wedgetail.

The development of the Ghost Bat aircraft appears to be a dead end. It was originally designed to be completely unarmed, somehow helping the F-35 which itself is only lightly armed with four air-to-air missiles carried internally. The Ghost Bat was designed to have some manoeuvrability but then that was negated by giving it a small engine. It isn't a particularly stealthy design and is too expensive to be a sponge for enemy missiles. It is almost completely useless. We are told that the next iteration will be 25% larger.

But at least it was a start. Australia is 300 fighters short of an effective fighter aircraft force when the world's production lines are flat out. The production line of the Rafale in France is now booked out for the next eight years. There is a great need for aircraft to sink Chinese ships in the Pacific and Indian Oceans and to bomb their bases, including perhaps their stations in Antarctica. There is no need for all of them to be manned. Australia needs to develop two types of unmanned aircraft. Where aircraft might be subject to enemy radar, the stealthiest shape is that of the X-47B. We would use our version of that to drop glide bombs and fire ballistic missiles so that the aircraft wouldn't have to overfly the target. This would be useful in bombing the Chinese bases in the South China Sea.



Figure 1: X-47B

In areas where there is no danger of being detected by enemy radar, an aircraft shape optimised for lift to drag should be used. Glide bombs could be carried externally. Carrying bombs internally takes up twice the volume of the bomb carried so there is no decrease in drag. Range is increased by having long, narrow wings like those of a glider which would have plenty of room for hardpoints to carry glide bombs. Our P-8 Poseidons and E-7 Wedgetails could have a couple of such collaborative aircraft either side of them to service targets that are detected. This is a generic shape of what such an aircraft would look like:

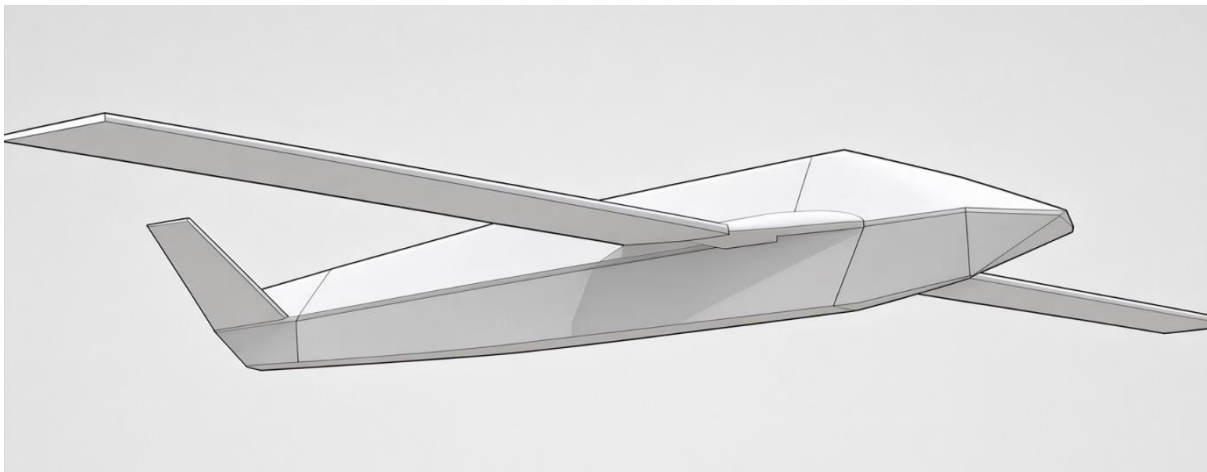


Figure 2: Conceptual unmanned aircraft optimised for range

On the subject of bases, Australia is blessed with great strategic depth with the potential for aircraft to be dispersed at hundreds of airfields in a 3,000 kilometre-wide arc across the north of the country. Unfortunately the choice of the F-35 means we can't use that blessing. Our F-35s need to go back every night to their air-conditioned hangars at RAAF Tindal in the Northern Territory with the result that the PLAAF

knows where to find them. Damage the runway at Tindal and that force is negated. In WW2, the RAAF had a secret bomber base 40 km southwest of Marble Bar in Western Australia. From there, bombers attacked as far away as Java. The Japanese searched for it but were never able to find it. In a world moving to pervasive satellite coverage, aircraft need to be parked undercover. We need several hundred hardened aircraft shelters across the north and as far south as Alice Springs.

7. Royal Australian Navy

The US military has traditionally put a lot of effort into the study of war and has done that well. China has tended to slavishly copy what the US has done. The People's Liberation Army Navy (PLAN) has copied the force structure that the US Marine Corps built up for assaulting islands in the western Pacific. In 2020, the then commanding officer of the Marine Corps decided that the Corps' main role is supporting the US Navy and that the best way to do that would be to fling missiles from island bases against the approaching Chinese warships. To that end the Marine Corps have parked-up their main battle tanks and most of their artillery, dropped a couple of amphibious assault ships from their inventory, and is now simply concentrating on stopping the Chinese ships. This is what we should also do.

The Houthis had adopted the same approach in Yemen. Even though they were firing missiles in a desert region, their launch sites were hard to find and they managed to stop most of the traffic flow through the Red Sea. The Houthis, not even a nation state, were able to hit a moving ship at sea using a ballistic missile. Australia has yet to acquire that capability. The Western Pacific and Indian Oceans are now like the Mediterranean during WW2. Ships are constantly at risk of attack by land-based aircraft and shore-based missile batteries. It is better to have the land-based aircraft than the ships.

The Ukraine War has shown that you don't need a navy to sink the enemy's navy. Ukraine has driven Russian warships to Novorossiysk, 900 km from the nearest Ukrainian-controlled coastline.

What that means is that if we don't have much of a navy in terms of a surface fleet, it doesn't matter too much. It won't change the outcome. It doesn't matter that the new frigates we are getting only have 32 vertical launch cells instead of 90 or any other number, because they are still floating targets that will soak up missiles. Until there is a new way of shooting down missiles, ships exchanging missile salvos until one of them runs out of surface-to-air missiles is a mug's game. The most cost-effective way of sinking Chinese ships is with air-launched ballistic missiles, not using our own ships to attempt that.

On the subject of vertical launch cells, the United States has finally realised that perhaps they aren't such a good idea. That is because when the vertical launch cells are 'winchester', that is all out of missiles, the ship must go to port to reload which might take a month for the round trip.

Taiwan, South Korea and Japan have all developed antiship cruise missiles. We should pick a couple of these designs and produce them under licence in Australia, as well as take all the ones already on order from the United States.

It is also said that a missile hitting a ship above the water line lets the air in while a torpedo hitting below the water line lets the water in. Torpedoes are the main offensive weapon of submarines. We had Oberon class submarines from the 1960s up until the last one was retired in 2000. A competition was held in the 1980s to replace the Oberons. Thyssen Krupp was expected to win and to keep them honest, Saab was included in the competition. Until then Saab had only produced small submarines suitable for the Baltic Sea. But the Australian navy officer in charge of the process tilted the selection process in favour of the Saab offering. He retired soon after and was rewarded with a consulting job with Saab, though that didn't last long because of the outcry. The outcome was the Collins class submarines, of which there are six. The first one was commissioned in 1996. At 30 years old, the Collins class submarines should be being replaced by now.

What happened in the last 30 years was dithering and stupidity, and possibly worse. As prime minister, Kevin Rudd didn't want to be seen to be weak on defence so he announced that his government would build 12 submarines as Collins class replacements. When questioned about this, naval officers would laugh and laugh, because Rudd had no intention of funding new submarines. Rudd was replaced as prime minister by Tony Abbott who opted for 12 of the Japanese Soryu class which was the best possible choice for a conventional submarine. No contract had been signed by the time he was rolled by Malcolm Turnbull as prime minister, however. Mr Turnbull did his best to destroy any positives in Abbott's legacy.

What happened next is why we are taught Shakespeare in school. From *Henry V*:

Were all thy children kind and natural! But see thy fault! France hath in thee found out. A nest of hollow bosoms, which he fills with treacherous crowns.

Suddenly it was announced that Australia would be buying French submarines instead, and particularly stupid ones at that. The Barracuda nuclear-powered class would be converted to diesel propulsion which meant that the whole thing would have to be redesigned. This would produce an orphan class which only Australia would have. As soon as it was announced it was decried as being idiotic. The French made sure a contract was signed before the next election. Yet that project took many years to die.

The nuclear submarine programme that replaced it, AUKUS, is good in part. The good part is that Australia will be getting two US Virginia class submarines with 20 years of life left on the clock with the potential for up to three more. There is no doubt that the United States is serious about this as it is the carrot that gets them basing for US submarines in Australia. Unfortunately taking on the nuclear submarine programme without increasing the defence budget has hollowed out the rest of the defence force. For the next ten years, the shares of defence capital spending for the services are 57% for the RAN, 24% for the Army and 19% for the RAAF.

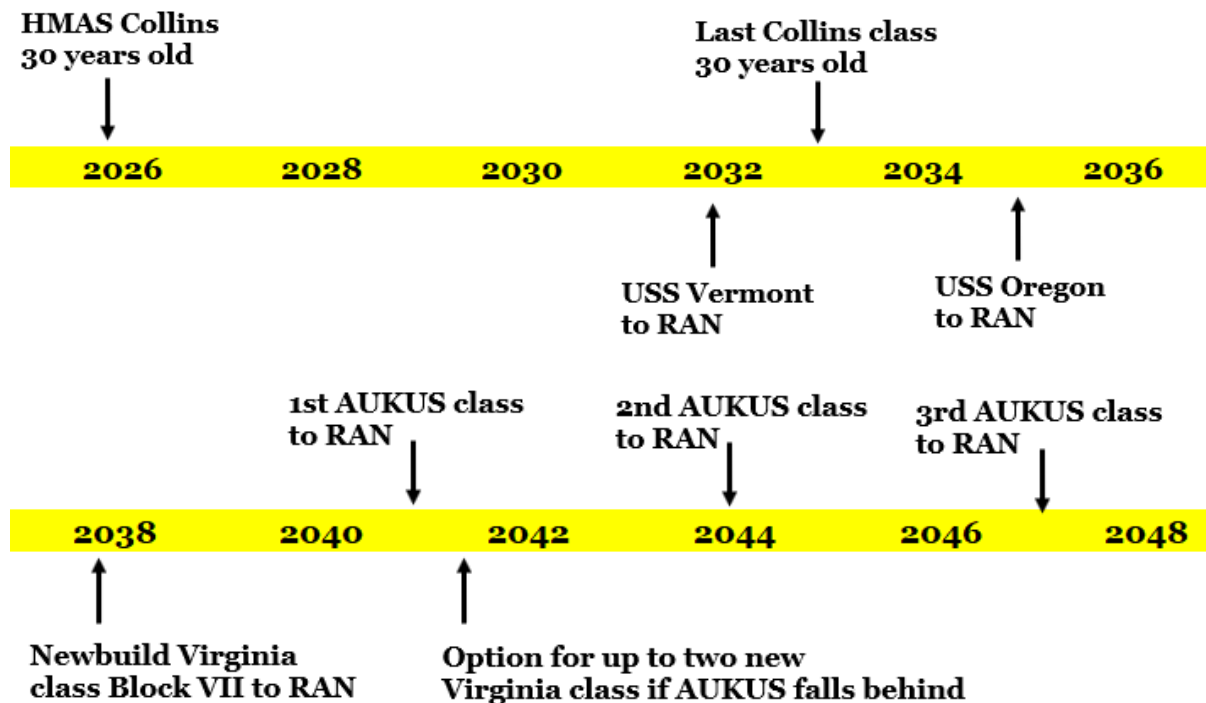


Figure 1: AUKUS submarine acquisition timeline

The UK part of the AUKUS agreement is unlikely to work simply because the UK elite hate ordinary British people and there is serious talk of a civil war in the UK. It is idiotic to reply upon a country that has a good chance of having a civil war. The reason why the Royal Navy would be keen on AUKUS is that defence in the UK has been starved of funds for decades. The Royal Navy wouldn't be able to develop another class of submarine by itself to follow the Astute class once it wore out.

The main armament of the RAN's future Virginia class submarines will be the Mark 48 torpedo which has a range of 38 km at 100 kmph, and 50 km at 74 kmph. With a load of 26 torpedos, a single Virginia class submarine could tear apart a Chinese invasion fleet. The thermocline is the boundary between the body of warmer water on top of the ocean and the underlying mass of the ocean body. The thermocline tends to reflect sound waves. So a submarine firing its torpedoes below the thermocline can set them to travel below the thermocline until just under the target ship. The target ship is unlikely to hear the torpedo until the last few hundred metres of its track and so will have no time to react.

While that capability is being developed, Australia will be squandering funds on keeping the Collins class submarines going. In fact, keeping the Collins class going will cost much the same as buying new Japanese submarines. So much time has passed that the Japanese are on to their next submarine class – the Taigei class. After a conventional submarine is launched, the normal procedure is to perform a refit every ten years for a total life of 30 years. The cost of a refit is considerable, equivalent to half the cost of a new submarine. Japanese operating philosophy is that design evolution is faster than 30 years so they perform only one refit on a submarine for a total life of 20 years. This way their fleet is kept up to date with technology at not much expense. The US Navy exercises with most of the world's navies and consider that the Japanese submarines are the world's best conventional submarines.

If you think that characterisation of the management of the Royal Australian Navy as idiotic is too harsh, consider what is revealed in the Auditor-General Report No.33 Defence's Collins Class Submarines Life of Type Extension — Planning and Implementation. First consideration of extending the life of the Collins class submarines beyond their normal 30 years was in 2009. A RAN study in 2014 found that replacing major systems — such as the main motor, diesel generators, and power conversion and distribution system — would require design work comparable to that of a new submarine build and a funding profile consistent with a new acquisition.

The French submarine contract was announced in 2016 and later designated the Attack class in December 2018. In 2019 it was decided to use the refit of the Collins class to reconfigure them some equipment commonality with the Attack class submarines. In September 2021, government also announced the approval of up to \$6.4 billion to extend the service lives of all six Collins class submarines. This is much the same cost as new Taigai submarines. We could have had new Japanese submarines while waiting for new French submarines to arrive.

The design contract for refurbishing the Collins class was awarded in February 2022 for \$125 million. So far the contract has been amended 53 times and blown out to \$813 million. The French Attack class was abandoned in 2021. The attempt to incorporate Attack class features into the Collins class wasn't abandoned until May 2026. Even now, we would be better off abandoning the Collins class refurbishment and acquiring new or used Japanese submarines instead.

If we ask Japan nicely and pay up front, Japan could perform a second refit on Soryu class submarines instead of retiring them and possibly increase their production rate of Taigai class submarines as well. With the best will in the world, and no further stupidity, it would still take years for significant progress and China's war could be two years out from now. In contrast to Australia's decades of agonising on submarines with no result, Taiwan recently launched a submarine that they designed themselves with no fuss, no stupidity, no agonising.

While submarines are a good backup capability, aircraft are far more cost-effective at sinking Chinese ships. A Taigai submarine would have a capital cost in excess of one billion dollars, and if wildly successful on the battlefield might fire 20 torpedoes in a one-month cycle. A converted, second-hand Boeing 767 converted to a bomber might have a capital cost of \$20 million and perform one sortie per day to deliver 10 cruise or ballistic missiles. Which works out at fifteen times the productivity for one seventieth of the capital cost, let alone crewing and pensions in retirement. That is potentially one thousand times the cost-effectiveness of submarines.

There will be a surface fleet, ideally of frigate-sized ships optimised for antisubmarine work. At the moment when our ships are sunk and aircraft shot down over the open ocean, there is no way of quickly plucking the survivors from the ocean surface. Many will die from exposure. The best solution to that end is the navy acquiring a fleet Grumman Albatross amphibious aircraft. In WW2 the Albatross was the successor to the Catalina. Fortunately, a company in Darwin has been set up to produce the Albatross with modern turboprop engines.

In the area of patrol boats, the Department of Defence's distaste for things that might kill our enemies reached full flower in the Arafura class of offshore patrol vessels. These weigh 1,640 tonnes, have a crew of 40 and are armed with only one single 25 mm gun. The Redback infantry fighting vehicle, weighing 42 tonnes and with a crew of three, is more heavily armed. Its main gun is 30 mm, plus a couple of antitank missiles. The Department of Defence doesn't like the idea that it is in the business of killing people who want to kill us. This isn't healthy for the Australian people.

With respect to navy basing, the experience of the Ukraine War demonstrates that our bases need to keep our vessels under reinforced concrete or steel structures to stop cruise missiles and FPV drones. HMAS Stirling, for example, is six kilometres across open water from the town of Rockingham. There are multistorey apartment buildings on the beach at Rockingham which would be perfect launch sites for FPV drones with shaped charge warheads. Currently all the submarines tied up at HMAS Stirling could be sunk within minutes of China starting its war. Ukraine was able to swim an underwater drone into the Russian base at Novorossiysk, 900 km from the nearest Ukrainian-controlled territory, and sink a Kilo class submarine tied up to a jetty. So multiple layers of underwater barriers are needed as well.

To paraphrase a line from another of Shakespeare's plays, *Macbeth*, the story of the Royal Australian Navy over the last few decades is 'a tale of idiocy, full of dithering and incompetence, producing nothing of significance'. There hasn't been adult supervision of the Department of Defence for decades.

7. Strategy

Australia is in a very favourable strategic position. We are on our own, with thousands of kilometres of ocean to the west, south and east. On the main threat axis from Asia, there is a 300 kilometre-wide moat between ourselves and the island of Timor. Nobody else on the planet has such a favourable location for self-defence.

We used to rely upon being under the nuclear umbrella of the United States. The past tense is used because the United States has recently been tested and found wanting. The United States used to be dependable. For example, its response to Iraq's invasion of Kuwait in 1990 meant that good triumphed over evil and the world took note of the example. That was under George Bush Snr. as president. Things started going bad under his son as president. This included invading Iraq in 2003 to do some regime change, just for the sake of it, and staying in Afghanistan to do some nation-building.

President Obama set out to weaken the United States as much as possible. Early in his regime he entertained the notion of not renewing the tritium bottles in the US's nuclear weapons, which would have effectively negated their nuclear arsenal. One major lapse was Obama not supporting the Philippines when China seized Scarborough Shoal in 2012. This encouraged China to keep pushing against most of its neighbours. The Deep State ensured that President Trump's first term was mostly wasted. And the world started falling apart during the Biden regime, effectively Obama's third term.

The international situation a quarter of the way through the 21st century, in the words of analyst Jessica Berlin, is this:

“Russia needs to lose and lose badly. Russia needs to crawl out of Ukraine on their knees, begging for mercy. That’s what the Chinese need to see. That’s what the Saudis need to see. That’s what every dictator on the planet needs to see to ensure they don’t get any ideas themselves.

Because if what they see is, oh, Russia is allowed to invade a democratic European country, literally on the borders of NATO, to butcher senselessly tens of thousands of people, to threaten global food security, to cause refugee crises, to cause the kind of destruction we haven’t seen on this continent since World War 2.

If they are allowed to get away with this in the 2020s and then get back to business, well that’s not going to stop the Chinese from attacking Taiwan or pressing forward in the South China Sea, etc. because NATO will have shown that we cannot even keep the peace in our own front garden.

And that is much more dangerous than internal political chaos in Russia. The implications of this war are truly global. This war, this conflict, shapes our century. And what we do or don’t do will determine the rest of our geopolitical arrangement for the next generations.”

The big test that the United States failed was not honouring its undertakings under the Budapest Memorandum of 1994. That Memorandum encouraged Ukraine to give up its nuclear weapon stockpile in return for the United States providing protection by from invasion. It doesn’t matter what the exact form of the words used was, what is important is intent. Russia invaded Ukraine on 22nd February, 2022. The United States supplied Ukraine with enough war material to keep Russia at bay for three years but deliberately never enough to win. It seems that the Biden regime was more interested in Russia not falling apart than saving Ukrainian lives. Hundreds of thousands of people were killed and maimed as a consequence of that policy stance of the Biden regime. Arguably the Trump regime has been worse – blaming Ukraine for starting the war and pulling all support. Trump has criticised countries, such as Japan, that have decided to increase their aid to Ukraine.

During the election campaign for his second term, Trump said that he would stop the war in 24 hours once he was elected. Trump decided that one side should win and the other side should lose. He chose Russia to be the winning side and is doing all that he can to effect that outcome. Trump has combined that moral bankruptcy with thuggish demands of mineral rights from Ukraine. Russia is exhausted from the war and Trump is snatching defeat from the jaws of victory. It may be hard to comprehend, but the Trump strategy in the Ukraine War is petulant and infantile, absolutely infantile.

It doesn’t matter that Biden has been replaced by Trump, because the conservative side of politics in the United States also has some strange ideas. And the people who ran the Biden regime behind the scenes could be back at some time. It also doesn’t matter because nuclear weapons can be relatively cheap. The whole point of Australia’s relationship with the United States is that they would attack China with nuclear weapons if China attacked us with nuclear weapons, as China has threatened to do so. That is now in doubt because of the United States’ failure to act at the requisite level

in Ukraine, made worse by a publicly expressed fear of escalation. Which actually makes nuclear war more likely because it would have encouraged China to make nuclear threats earlier than it might otherwise do in a war.

To deter Chinese aggression, what should happen in Asia is what happened in Europe 60 years ago. The United States transferred nuclear weapons-making technology to the United Kingdom and France in order to complicate Soviet nuclear war planning. Decades ago, Trump said that he would understand if South Korea and Japan acquired nuclear weapons. South Korea and Japan are both now in the process of making their own nuclear weapons.

That is our strategic circumstance. What should our strategy be? The optimal result from China's war is such a resounding defeat that China forswears war for generations. We need them to give up on ideas about building an empire, just as peace in Europe requires Russia to give up on the idea of recreating the Russian empire. There is a complication in that South Korea has said that it will opt out of a war in which it is not directly attacked by China. Japan on the other hand knows that any successful Chinese invasion of Taiwan or any other country will ultimately lead to China attempting to assault Japan up the Ryukyu island chain.

Our strategy should be that if the United States opts out of participating in China's war, Australia will act with Japan and other countries in the region to defeat China. Australia is well placed to interdict Chinese shipping from Africa across to the Marianas. Our focus should be on defeating China in the South China Sea. China's bases in the Spratly Islands are precarious. The South China Sea could be turned into a kill box for Chinese forces. China will waste an enormous amount of effort to protect their bases in the Spratly Islands, which will take pressure off Allied forces further north. Australia is best positioned to apply that pressure. To that end, Australia should have a base on one of the southern islands of Palau and another base on an island off the southern end of Palawan in the Philippines.

Our part of the arrangement with the United States is that we supported them in most of the military expeditions they have undertaken for the last 100 years. That is how we earned our place under their nuclear umbrella. Now, if we want others to support us in our hour of need, we have to be seen to be supportive of others when they are being monstered. A great swathe of Eastern Europe has been very supportive of Ukraine and would not doubt appreciate others who also assist. By comparison, Australian support of Ukraine has been desultory and disinterested. We should have stepped up 155 mm artillery shell production. We still should and supply that production to Ukraine to build their stocks, even if peace breaks out. And all sorts of other ordnance and trucks and fuel tankers. We should have paid for Redback infantry fighting vehicles from the South Korean production line and sent them straight to Ukraine to be battle-tested. We have a lot of catching up to do.

It is worth restating that the evolution of electronics over the last 25 years has favoured the defence, which is what we will be doing. Also, small countries have prevailed against seemingly impossible odds. For example, in the 1960s, Israel, with a then population of three million, held off 300 million Arabs hell bent on slaughtering them. China may have a population that is 50 times the size of Australia's, but in economic terms they are only 10 times larger, and they would have to fight through 3,000

kilometres of seas and islands to get here, being whacked by ballistic missiles the entire way.

Nobody has to set foot in China for China to be defeated. We only have to blockade them and wait them out; they will starve. We should also plan for what the peace will look like. The Paracel Islands should be returned to Vietnam. China's seven artificial islands in the Spratlys need to be given to others; Vietnam, Philippines and Japan would be the natural owners along these lines:

Fiery Cross Reef	Vietnam
Subi Reef	Japan
Mischief Reef	Philippines
Cauteron Reef	Japan
Gaven Reef	Vietnam
Hughes Reef	Philippines
Johnson Reef	Vietnam

10 Industrial Base

In 1898, the Polish banker Jan Bloch published his book *Future War and its Economic Consequences* which predicted that war would become a duel of industrial might, a matter of total economic attrition. His prediction of war as a clash of industrial systems came to pass 16 years later with the outbreak of WW1.

It is just as true today. China, with civil-military fusion and chopping down orchards to grow grain, is remaking itself for its war of choice. To survive that war, and if surviving, minimise our casualties, we need to have the healthiest economy possible. Of course, that clashes with Net Zero which is continuing to raise operating costs in Australia for no good reason. In fact, the business closures due to lack of competitiveness are continuing as predicted in Brian Fisher's *Economic consequences of Labor's Climate Change Action Plan*, published in May 2019. One of the major operations closing due to the burden of Net Zero is Alcoa's Kwinana alumina refinery, with 1,200 unemployed as a result.

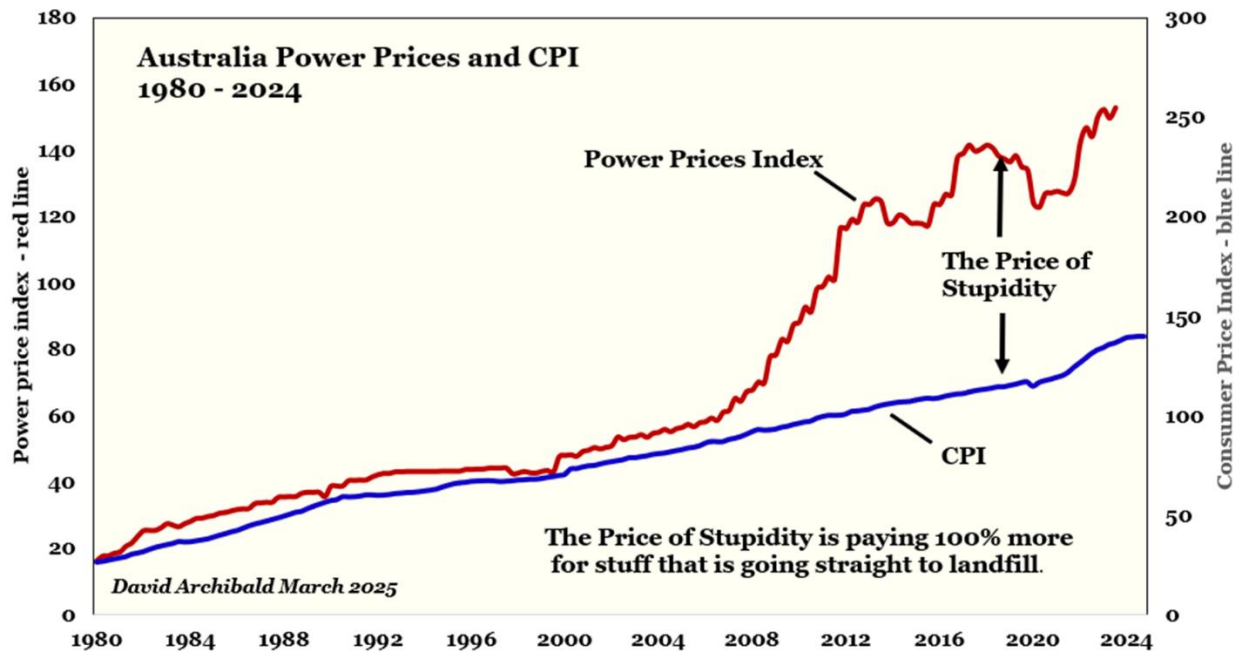


Figure 1: Net Zero – the burden of stupidity that is killing Australian industry

Figure 1 shows what the infatuation with Net Zero has cost us in power prices. They are now 100% higher than they need be and would have been if sanity had prevailed. Of course, that results in closure of factories which in turn weakens our ability to make our own defence needs. A further consequence is that there will be more Australian dead and maimed in our next war and our continued existence as a Nation is at greater risk.

Mr Fisher found that Labor's then target of a 45 percent reduction in emissions by 2030 would lead to a contraction of the entire economy and cause particular pain to the manufacturing sector. He predicted a 15.8 percent contraction in the manufacture of chemicals, rubber, and plastic and a 9.3 percent reduction in the manufacture of non-metallic goods. He forecast a loss of 336,000 jobs economy-wide.

Anybody promoting or in favour of Net Zero had better have good scientific reasons for doing so because it is putting us at risk of defeat in China's war. And they don't because global warming caused by carbon dioxide is a theory without a solid basis in science. Carbon dioxide is tuckered out as a greenhouse gas. From the current level of 428 ppm, each 100 ppm increase in the atmospheric carbon dioxide concentration will raise the temperature of the atmosphere by only 0.1° C. Digging up and burning all the stores of carbon we have been endowed with by Nature will only get us to about 600 ppm, thus only good for another 0.2° C temperature increase. Plant growth will dramatically increase at the same time. Increasing atmospheric carbon dioxide is effectively giving free fertiliser to the Third World, at no cost to ourselves. Only the morally bankrupt could be against doing so.

The next thing to do is secure our supply of liquid fuels from our own resources. The remaining power stations in the Latrobe Valley would be a good place to kick start that process. They still produce power at a few cents per kWh, and thus would produce some of the cheapest hydrogen on the planet via electrolysis. This would eliminate the need for including steam reforming of part of the process stream to produce hydrogen with a concomitant reduction in plant complexity and capital cost. Hydrogen

production could be maximised overnight and stored in floating roof gasometers to even out the power demand.

After that it is simply a case of getting on with it in terms of all the things we need to produce in the country now. The Federal Government has recognised the need to make missiles in Australia. It is not difficult. Missiles are tubes of metal with chemicals in them, a few moving parts and some electronics no more complicated than a mobile phone. The Palestinians in Gaza were able to make missiles from steel water pipe they dug up. Iran has an economy a fifth the size of Australia's and has produced a plethora of missile types. North Korea has a GDP per capita of less than one hundredth of Australia's and yet has produced ballistic missiles that reach well across the Pacific, and the nuclear warheads to be carried in them.

Unfortunately, the Federal Government has Lockheed Martin and Raytheon involved in running our missile-making programme. This is like putting the fox in charge of the hen house. All the Federal Government has to do is choose the missiles we want, negotiate the licence terms and put contracts to make individual types of missiles out to tender.

One small manufacturer of high-quality precision tools in Perth makes an electrically powered tool weighing 4.0 kg at a cost of \$250 per unit. This is \$65 per kilo. Missiles, as a battlefield consumable, shouldn't cost more than this on a per kilo basis. Yet they cost vastly more despite just being mainly tubes of chemicals. The silver price is currently US\$2,100 per kg. Many types of missiles, both US and European, are a multiple of that on a per kg basis. The world's greatest ever scientist, Isaac Newton, wasted some of his life trying to convert base metals into precious metals. Today's missile makers are getting a multiple of the silver price for most of their offerings.

Australia needs to start making more types of missiles. The fastest means to that end would be to produce a number of foreign designs under licence. The Department of Defence has to start the process of awarding contracts, then the industrial base will respond and expand as fast as the contracts are awarded.

The quantity awarded under a contract affects the manufacturing approach. The bigger the production run, the more effort is put into tooling for injection moulding. Injection moulding casts a near-net shape in aluminium or plastic which is then machined to the final shape. The longest delay in getting into production is the making of the injection moulds with this usually taking three or four months. With testing of samples this process could take six months to the first production copy. For most parts, injection moulding followed by machining is a cheaper production method than 3D printing.

Then a design engineer has to set up the rules for assembly of all the parts, that is the sequence in which the parts will be added to assemble the missiles.

Russia's experience in its Ukraine War is instructive. In the Soviet period, 20% of GDP was spent on defence. Vast amounts of weapons and munitions were put into storage. In the post-Soviet period, Russia preferred to spend no more than 5% of GDP on defence. Its industrial base atrophied. The war has chewed through most of the stored weapons and munitions and Russia is rebuilding its industrial base. Making weapons is mostly machining pieces of metal on Computer Numerically Controlled (CNC)

machine tools. This is shown by the work distribution in making Intercontinental Ballistic Missiles (ICBMs) at the Krasnoyarsk Machine-Building Plant (Krasmach) in Russia:

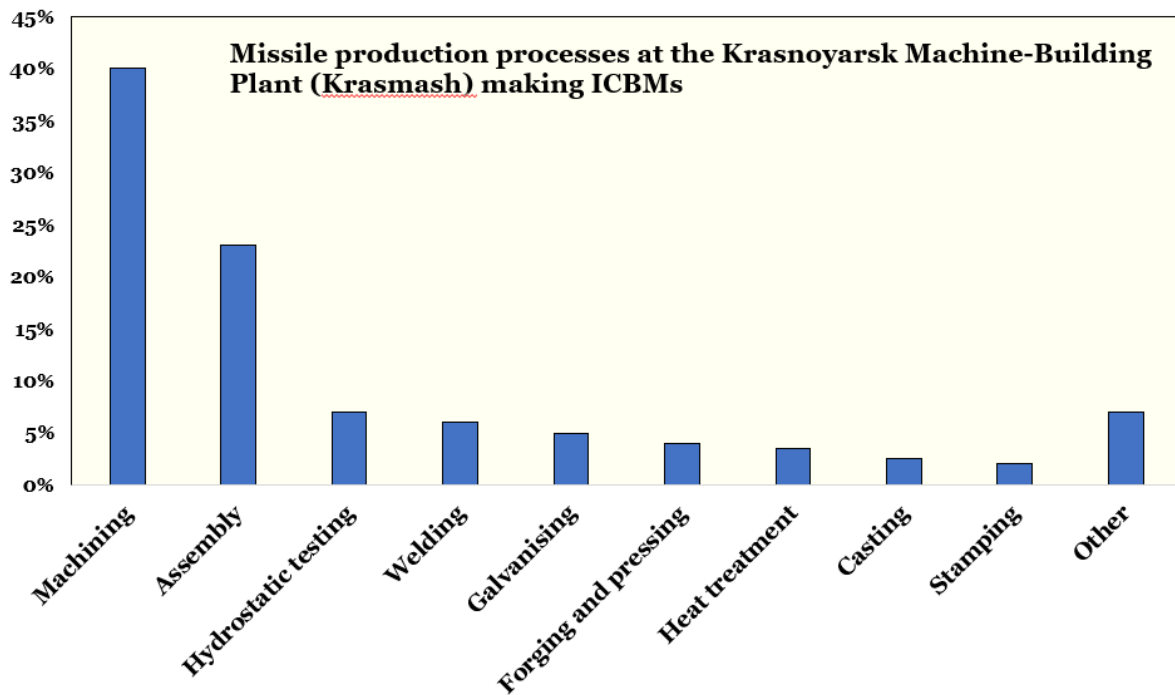


Figure 2: Missile production processes at the Krasnoyarsk Machine-Building Plant (Krasmach) making ICBMs

Machining and assembly constitute 60% of the work involved. This is repetitive work that doesn't require skilled labour. In fact Russia imported 1,000 Ugandan women for weapons assembly. You do need CNC machine tools though, and a lot of them.

Australia can boot up military production quickly with largely semi-skilled labour if we have the right CNC machines and software.

Missiles consist of a warhead, the propellant, casing, guidance system etc. What's involved in making all that? A missile weighing one tonne will have a warhead at about 20% of its weight so that is 200 kg. The warhead might be 100 kg of fragmentation steel, 50 kg of explosive with the balance casing and guidance system. One popular choice for the explosive is composition B, which is RDX and TNT in a 60:40 ratio. Of the balance of the missile, 750 kg will be propellant, with that being 70% ammonium perchlorate, 14% polybutadiene binder and 16% powdered aluminium.

Ammonium perchlorate has the formula NH_4ClO_4 and is produced by the reaction of ammonia with perchloric acid. Australia has a number of ammonia plants operating, mostly for the manufacture of ammonium nitrate as explosives for the mining industry. The hydrogen for the process is supplied by steam reforming of natural gas. Ammonia production in China is coal-based and has twice the capital cost of natural gas-based steam reforming.

As the price of natural gas can be expected to rise to the oil price in energy-content terms in an oil-constrained world, we might as well base our hydrogen supply on electrolysis of water instead of steam reforming of a fossil fuel. A scoping study for the

expansion of an existing ammonium nitrate plant near Moura, Queensland found that a 30 MW electrolyser capable of producing 3,500 T/y of hydrogen operating at an 80% load factor with 16 hours of hydrogen storage could feed a 20,000 tonne per year, small-scale ammonia plant. The electrolyser would consume 208 GWh of power, translating to 59.4 kWh per kg of hydrogen production. The often-quoted price for the cost of electrolytic hydrogen is that power at \$0.05 per kWh will produce hydrogen at \$7.00 per kilo. With the operating overhead of the plant being \$4.00 per kilo, this does translate to \$7.00 per kg.

The nitrogen would be produced by cryogenic fractionation of air. In the Haber-Bosch process to produce ammonia, hydrogen and nitrogen are combined at a pressure of 450 bar and 450 °C in the presence of an iron-based catalyst. The new ammonia plants should be located in the Murray Basin and a long way from the coast. The Albury region would be ideal. Supply security will be achieved by making plants at the inflection point in the capital cost/tonne of product to operating cost per tonne plot. Normally, doubling the size of a plant will reduce the capital cost per tonne of capacity by 30%.

To make the perchloric acid is a bit more complicated. A concentrated solution of salt (sodium chloride) is electrolysed to produce sodium chlorate and hydrogen. Sodium chlorate is NaClO_3 . It is electrolysed again to add another oxygen atom to make sodium perchlorate NaClO_4 . The next step is reacting that with concentrated sulphuric acid to make perchloric acid. Making sulphuric acid requires a source of sulphur. That is produced from either smelting sulphide ores or sulphur imported from oil refineries processing heavy crudes. It is also possible to use iron pyrite as the source of sulphur and there are large deposits of pyrite in Australia. The sulphuric acid so produced would be trucked and railed to the Albury region. Ammonium perchlorate starts decomposing at 130 °C.

The next step is making the polybutadiene to serve as the binder for the solid rocket fuel. This starts with steam cracking of pentane (C_5H_{12}) at 850 °C with butadiene (C_4H_6) as one of the products. The pentane would be a byproduct of the Bergius plants we need for producing our own fuel. The next step is polymerisation in which butadiene molecules are linked together to produce long polymer chains. This is done by using an organic solvent such as hexane or toluene as the reaction medium with neodymium, cobalt or nickel catalysts. For every tonne of ammonium perchlorate produced, we need 200 kg of polybutadiene.

The third component of our solid rocket fuel is powdered aluminium. This should be easy. Australia has four operating aluminium smelters which produce 1.5 million tonnes per annum. If all that was applied to making powdered aluminium for solid fuel rockets of a tonne each, that is enough for 12.5 million missiles. There is a catch. Those four smelters consume 10% of the electric power in the National Electricity Market on the east coast. The cost of power has doubled because of the leap of stupidity that is Net Zero, and so keeping the smelters open requires them to be heavily subsidised.

Perhaps sanity might return before more permanent damage is done. But in a world that has abandoned reason, hope is not a plan. In the case that all the smelters close as a result of Net Zero, perhaps scrounging up aluminium from used beverage cans can provide a stopgap source until a smelter is reactivated. Most of the aluminium cans currently collected as scrap are used as an oxygen-getter in steelmaking.

Powdered aluminium is made by melting aluminium to above its melting point of 660°C and pumping it through a high-pressure nozzle with an inert gas such as nitrogen. This produces spherical powder particles.

In essence, our ability to fling missiles at our enemies is determined by our ammonium perchlorate production. Roughly, a one tonne missile would take 525 kg of ammonium perchlorate. So if we produced 1,000 tonnes of ammonium perchlorate per day we could fling 2,000 missiles per day at our enemy.

Next up is the warhead which we assume weighs 200 kg, including the electronics. The active part will be 100 kg of steel containing 50 kg of composition B. The steel will be patterned to fragment upon detonation. A warhead is not solely explosive because if it was just explosive then the expanding ball of gas from the explosion would slow down rapidly in pushing against the surrounding air. By enclosing the explosive with steel, most of the force of the explosion is transferred to the steel which combines hardness with a high specific gravity. The steel fragments are accelerated to Mach 3 and are able to do much more damage than an explosion that is just expanding gas.

If we were producing 1,000 missiles per day of one tonne each, that would take 100 tonnes of forged steel per day. The blast furnaces at Port Kembla produce 13,000 tonnes of iron per day, so steel supply should not be a constraint.

Explosives for defence are made in two facilities run by the Australian offshoot of the French firm Thales. One is located in Mulwala, 50 km west of Albury, and the other in Benalla, 100 km southwest of Albury. Most of the explosives produced are combinations of RDX and TNT in the range of 60:40 to 80:20, with some formulations including powdered aluminium. RDX has a higher detonation velocity than TNT, 8,750 metres per second compared to 6,900 metres per second, so it has a high brisance, the ability to shatter things. Combining RDX with TNT lowers the sensitivity of the explosive and TNT's melting point of 80°C allows it to be melt-poured into shells and warheads. The company Orica, headquartered in Melbourne, produces bulk explosives for the mining industry, some of which could be adapted for military use.

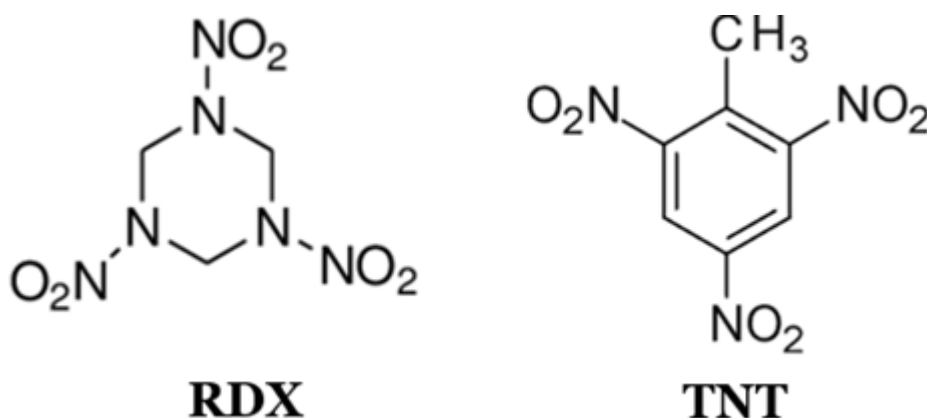


Figure 4: The chemical structure of RDX and TNT

With respect to guidance systems for our missiles, we need to make our own silicon chips, because a large chunk of the world's production capacity will be taken off line when China attacks Taiwan. Ukraine has also come to the realisation that it needs its

own supply of semiconductors and has priced a facility to make 180 nm, 130 nm, and 110 nm chips at US\$1 billion. Our guidance systems will need to combine GPS, inertial navigation, infrared imaging and terrain-matching modes as applicable.

Our number one priority in missiles is to make our own air-launched ballistic missiles with a maritime seeker head to target Chinese ships. These would use GPS with inertial navigation backup to guide them to where the target is. Then infrared image matching and radio-frequency location, in effect using the enemy ships' radar to locate them, would find and lock on to the target. The story so far is that Australia contributed to the development of the PrSM missile, including Increment 2 to target ships, and will be making those missiles in Australia in a Lockheed Martin facility.

As a ground-launched missile, PrSM has a range of 600 km for its 91 kg warhead. PrSM Increment 2 was test-fired from Palau in May 2024 against ships at sea. The problem is waiting for enemy ships to come closer than 600 km before we can target them. If air-launched, the range will likely double to 1,200 km. Then the total range is only limited by the range of the launching aircraft. If that was 3,000 km, then the total range of the system is 4,200 km. An aircraft taking off from Darwin could attack ships in the Taiwan Strait. The experience in Ukraine is that cruise missiles such as the Russian Kh-101 are relatively easy to shoot down, and that may also be true of the cruise missiles we have in stock. A ballistic missile plunging vertically down on a ship at Mach 3 would be harder to defeat. In fact most ships have a radar blind spot six degrees wide vertically above the ship.

We also need an air-launched ballistic missile larger than the PrSM. The centreline hardpoint of the F-15EX is good for up to 2.25 tonnes. A missile of that size might have a range of 2,000 km. The experience in Ukraine is that the longer the range of your missiles, the further away you push enemy forces. American missiles tend to be hobbled by either the length of the installed base of MLRS launchers of four metres, or the length of the F-35 bomb bay which is also four metres. Australia needs to break free of that to achieve greater range. To make logistics as easy as possible from here, we should make a family of missiles tuned to carriage and launch from 20-foot containers. This will allow the civilian truck fleet to be used as launch platforms.

There is an existing two tonne missile that is proven in battle. Israel started the latest war with Iran using F-15s to launch Blue Sparrow missiles against a hardened target in Tehran. The Blue Sparrow has a range of 2,000 km and comes down vertically on its target.

Two more things are needed to put our missiles together. Planetary mixers and solid fuel rocket motors. Planetary mixers are required to mix the high-viscosity solid rocket fuel evenly. The Hezbollah underground rocket-making facility in Syria destroyed by Israeli commandos in 2024 included planetary mixers. In solid fuel missiles, the fuel burns from the centre of the missile outwards towards the casing with the burn time likely being about seven seconds. The role of the rocket nozzle is to direct the exhaust gas flow to maximise thrust. This is usually made of graphite which has plenty of potential sources in Australia. The solid fuel rocket motors would be best made in a dedicated facility and then shipped to the missile assembly plant.

Beyond blast/fragmentation warheads, we also need thermobaric and cluster munition warheads. Thermobaric warheads can be cost-effective when you have a soft target that can't be serviced by a fragmentation warhead, such as troops in trenches. Half the weight in high explosive is the oxidant. If you can use oxygen from the air

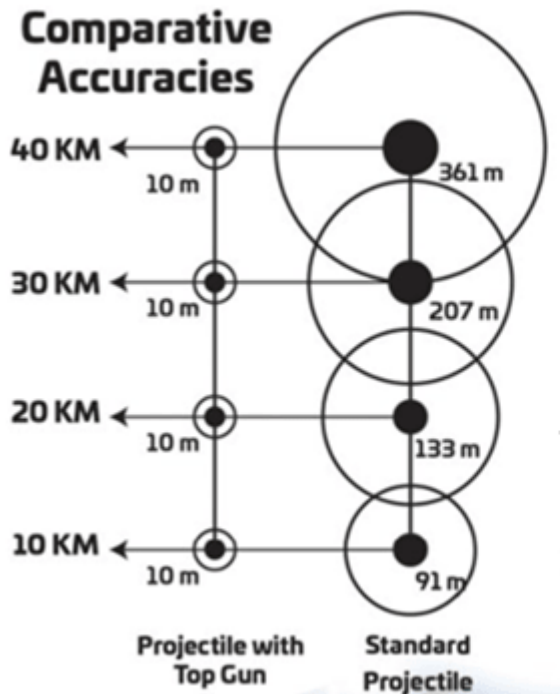
instead, that doubles the explosive force for the same weight of warhead. An over-pressure of 5 psi will cause serious injuries and lung damage. Thermobaric warheads also provide an extended over-pressure duration. The area of a 5 psi over-pressure or more will be 50% larger for a thermobaric warhead than a high explosive warhead.

A thermobaric warhead might detonate at a height of 5 metres and produce a cloud composed of 80% heptane and 20% propyl nitrate as a volatiliser, which is then ignited by a secondary charge. To make propyl nitrate, propanol is mixed with concentrated nitric acid and concentrated sulphuric acid cooled in an ice bath. The organic layer that separates out is dried over anhydrous magnesium sulphate. Heptane (C_7H_{16}) will be produced by the Bergius plants we will be building for our fuel supply.

Cluster munitions were adopted in the US Army as a consequence of the Yom Kippur war of 1973, which showed the potential for rapid armoured breakthroughs. Missiles with a 30 km range and a cluster munition warhead were developed as an assault breaker weapon to stop enemy tanks from overrunning the artillery line, by eliminating their accompanying infantry. Originally cluster munitions had a purely mechanical arming mechanism, which had a high dud rate. These days they have an electronic arming system with a zero dud rate. Nevertheless, the US Army developed a non-cluster Alternate Warhead (AW) with 180,000 tungsten pellets. The AW variant only services an area a quarter of that of the cluster munition warhead and so is only a quarter as effective for the same cost. Militaries that are serious have cluster munitions, both missile and artillery-delivered. Ukraine uses cluster munition artillery shells to hit crews that have abandoned armoured vehicles disabled by FPV drones. We could make our own cluster munitions under licence from South Korea or Turkey.

We also have a lot of work ahead of us in getting our tube artillery ready for the next conflict. What Ukraine has shown is that wheeled artillery systems are better than tracked systems, such as the K9 Thunder we are acquiring, which in turn are better than towed systems such as the M777. The reason for the hierarchy is that the Ukraine War has shown that enemy counter-battery radar and artillery can return fire within three minutes of your own tube artillery firing. Wheeled artillery systems can move off far faster and further than tracked systems. They can also usually drive themselves to repair shops in the rear whereas tracked systems will need to be loaded on a low loader.

The rise of drones means that systems will be located as far back from the front line as possible. To remain effective, the range will need to be increased. This can be achieved by making subcalibre rounds, such as 105 mm rounds for a 155 mm barrel with the addition of staves out to the 155 mm diameter of the barrel. The staves convert the kinetic energy of the round to lift, greatly extending the range. German experiments at Peenemunde in WW2 with staves on rounds in 230 mm barrels achieved a range of 130 km. Back then the normal dispersion of rounds with distance meant that this development was militarily useless. These days there are GPS/inertial navigation system-guided fuses that can get rounds to land within 10 metres of the target no matter what the distance and the wind conditions.



Above: Israeli Top Gun course correction fuses on 155 mm shells

Left: Top Gun dispersion with distance relative to a standard projectile

Figure 5: Israeli Top Gun course correction fuse

There are a number of wheeled, 155 mm self-propelled howitzers made in Europe now, including the French Caesar, the Swedish Archer, the Czech DITA, and the Ukrainian Bohdana. Australia's best bet may be to make the Caesar under licence. Experience in Ukraine is that the Caesar has twice the availability of the Archer. The latter's automatic loading system breaks down more often.

Australia has made a half-hearted start to artillery shell production. In 2022, a joint venture between the German company Rheinmetall and Queensland company NIOA Munitions commissioned a plant making 40,000 155 mm artillery shells per annum with the potential to go to 100,000 shells per annum on three shifts. The steel to make the shells is imported from Germany and we only make the shells. We don't make the fuses, the explosive fill, the propellant charges or the primers. As is, the setup is useless militarily. The empty shells are sent to Europe for load, assembly and pack. While we send empty shells to Europe, the Army's 155 mm needs are imported from South Africa, a country that might cease to function soon.

We are building a similar factory at the Benalla Munitions Facility, which will start making 15,000 shells per annum from 2028, expandable to 100,000 shells per annum. The necessary propellant charges and fuses might also be made at Benalla. The propellant charges are mostly nitrocellulose with supplementary nitroguanidine and nitroglycerine. Nitrocellulose is made by reacting cotton with a nitric acid/sulphuric acid mix at about 30 °C. The process replaces the hydroxyl groups on the cellulose with nitrate groups. Explosive quality nitrocellulose starts from 13% nitrogen. Fortunately Australia produces a lot of ammonium nitrate, for mining explosives and fertiliser, and makes several hundred thousand tonnes of nitric acid per annum to that end. Nitric acid is made by oxidising ammonia over a platinum-rhodium gauze.

A complete shell is made of 36 kg of steel for the body, 11 kg of TNT as the energetic filler and a fuse of 1 kg or so. Thus, the explosive is a quarter of the total weight.

With respect to the scale of what is required, if we had 10 combined arms brigades, each with 30 tube artillery pieces that fired an average of 20 155 mm rounds per day, that amounts to 6,000 rounds per day which equates to 2.2 million per annum. To produce that many shells would require at least a ten-fold increase in our possible production rate. We would be best served by producing flat out now to build stocks.

By comparison, in 2023 Ukraine's 300 artillery pieces fired about 7,000 shells a day, an average of 23 per gun per day. They would have fired a lot more if more shells had been available. At the start of the Ukraine War, Russia was firing up to 60,000 shells per day.

To provide 6,000 shells to the troops each day would require 216 tonnes of steel for the shell bodies, 66 tonnes of TNT per day for the explosive fill and 48 tonnes per day of nitrocellulose in 2 kg bags for the propellant.

If a country liked its own troops and wanted the best for them, the troops would be provided with plentiful artillery so that the artillery did most of the work on the battlefield and the troops didn't have to do anything excessively dangerous.

To give an idea of the scope of requirements for war with China, we need to build towards these rates of the industrial basics as soon as possible:

Ammonium perchlorate	1000 tpd	solid rocket fuel oxidiser
Polybutadiene binder	220 tpd	solid rocket fuel binder
Powdered aluminium	220 tpd	solid rocket fuel energy source
Heptane	200 tpd	thermobaric warhead, 80% of
Propyl nitrate	50 tpd	thermobaric warhead, volatiliser, 20% of
Nitrocellulose	200 tpd	tube artillery propellant
RDX	300 tpd	Component of Composition B explosive, 60%
TNT	200 tpd	Component of Composition B explosive, 40%
Steel	1000 tpd	Casing for warheads and bombs

To give context to that requirement totalling 3,300 tonnes, in 2024 Australians bought an average of 3,300 new cars per day. At an average weight of two tonnes, that is six thousand tonnes per day of complicated machinery with up to 50,000 individual parts per car, down to the smallest screws. The most basic metric of our warfighting ability, of our continued existence as a sovereign nation, is our production of ammonium perchlorate.

Australia doesn't have to make its own CNC machines; we just have the right ones installed and operating before the war starts, and fund the buildup of finished stock in the meantime. There is one Australian CNC machine maker, ANCA based in Melbourne, that has supplied to the Russian defence industry. ANCA specialises in making machines that produce cutting tools for other producers' CNC machines. Amongst other Australian companies, Tekcel makes CNC routers, Multicam Systems makes CNC routers, BlueCarve CNC makes CNC routers, lasers and plasma cutters.

As the following graphic shows of the relative size of CNC machine exporters in 2019, Germany and Japan are biggest suppliers due to the quality of their product and ease of use:

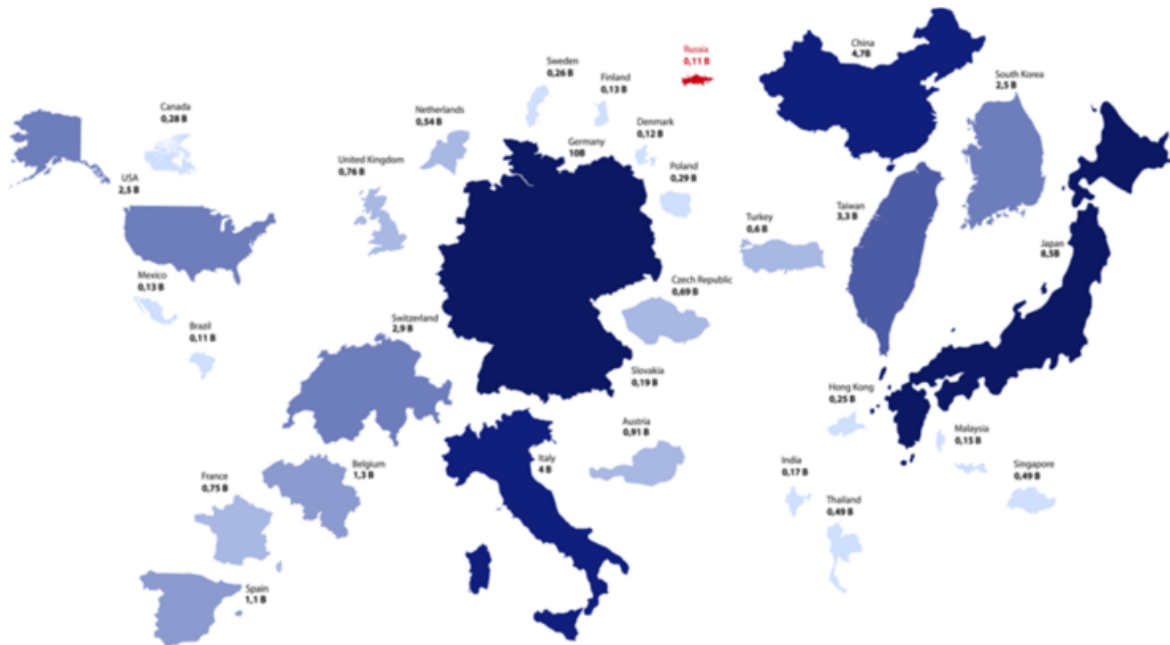


Figure 6: Relative size of CNC machine exports by country in 2019

The fate of the Russian defence industry after the start of the Ukraine War illustrates the need to be prepared before the war starts. Prior to the dissolution of the Soviet Union in 1991, the Slavic communists were spending 20% of their GDP on defence, largely funded by their oil production of 11 million barrels per day. After the dissolution, Russia preferred to limit its defence spending to 5% of GDP. The failure of Ukraine to collapse has forced Russia to go to a war economy that is taking 50% of GDP. It has also had to rebuild its defence industry.

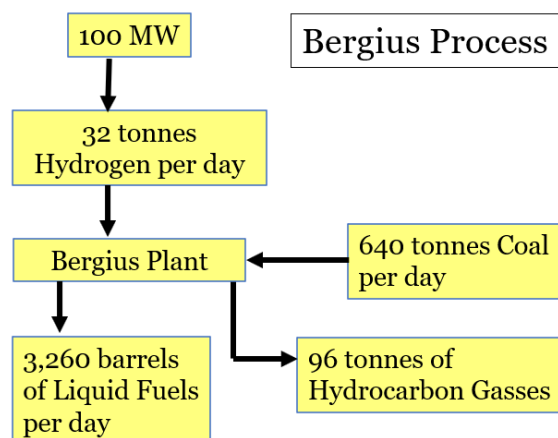
In 2021, Russia imported 2,865 CNC machines, with 43% of these from China. By 2023, CNC machine imports had risen five-fold to 15,329, with 76% of these from China. Recently Russia has been scouring China for twenty-year-old Japanese CNC machines to bulk up its industrial base. Traditionally the Russians had shunned Chinese CNC machines because they lacked the capability of the German and Japanese equipment.

3D printing of components can be a solution but parts are more expensive than if near-net-shape parts are made in an injection moulding machine and then finished on a CNC machine.

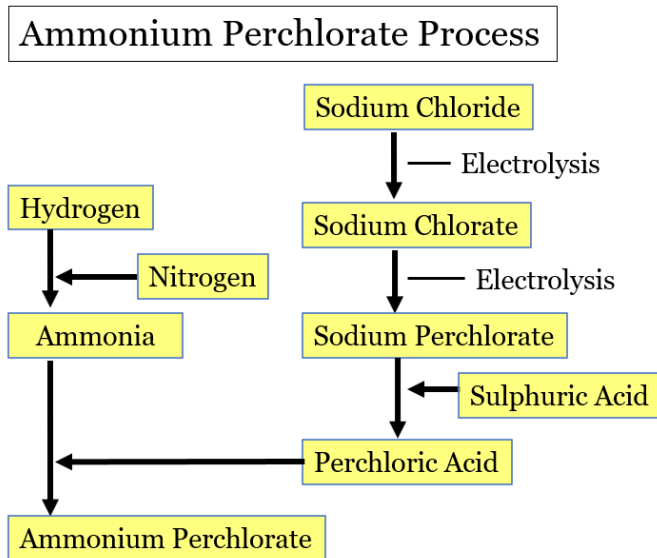
Following is a list of battlefield consumables we should be making now. It is a guide; it is not meant to be an exhaustive list:

	Units per day
GPS/INS chips for guidance systems	30,000
Small turbojet engines for cruise missiles	500
Microjet engines for short range missiles	500
Cluster munitions	20,000
Thermobaric warheads	300
GMLRS missiles	500
Air-Launched maritime strike missiles	200
Antitank guided missiles	500
Man-portable air defence missiles	200
Antitank Mines	1,000
Ground-launched glide munitions	500
Course correction fuses for 155 mm artillery	5,000
Drones FPV	1,000
Drones AI target acquisition	1,000
Thermal cameras	500

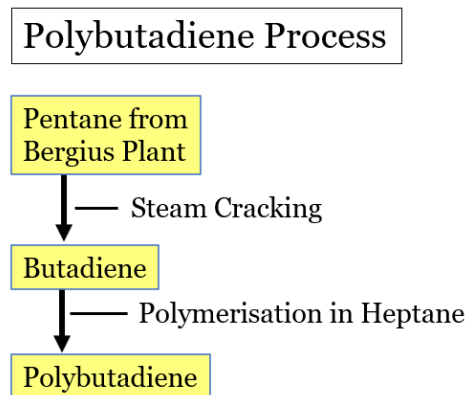
Chemical Processes in the Defence Industrial Base



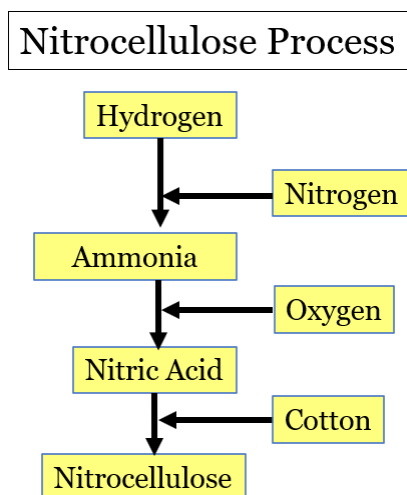
The Bergius plants Australia needs to build, primarily for diesel and petrol, will supply feedstocks to other processes.



Ammonium perchlorate production quantifies our ability to make missiles. At the moment Australia has none to speak of.

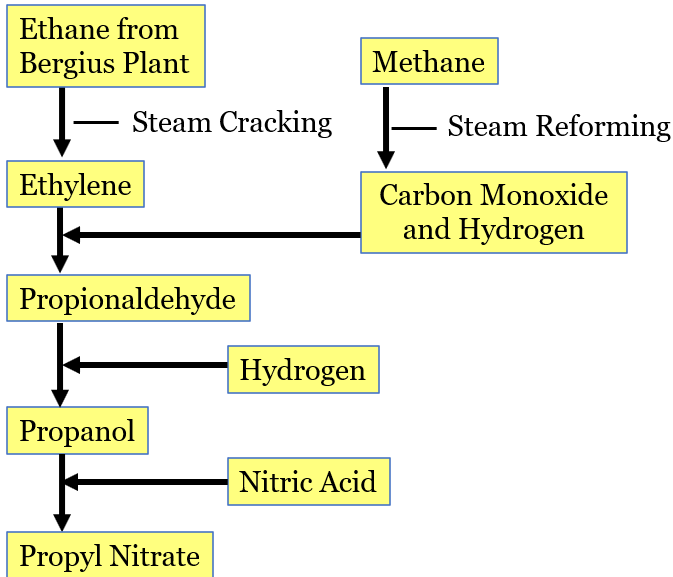


Polybutadiene production will use a byproduct from the production of liquid fuels by Bergius plants.

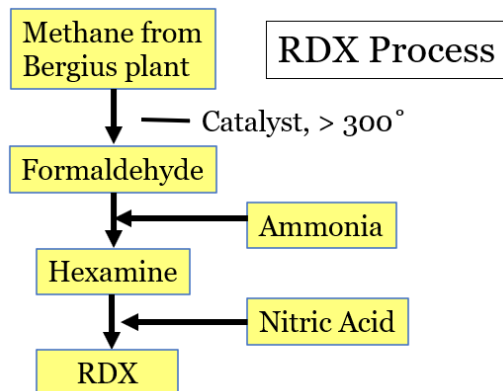


The production of nitrocellulose would make Australia self-sufficient in making propellant charges for tube artillery.

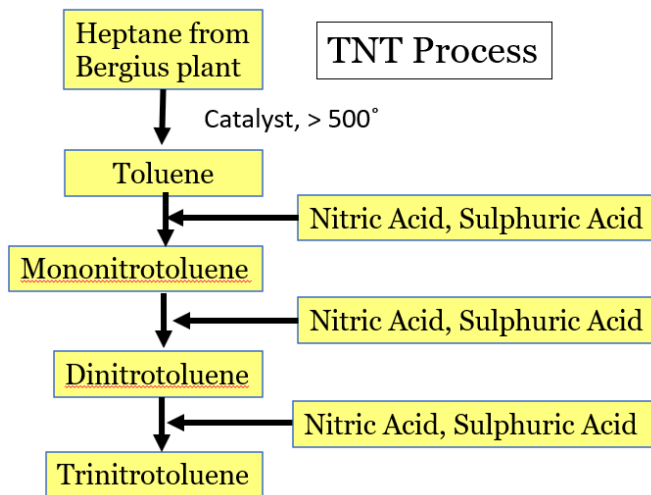
Propyl Nitrate Process



Production of propyl nitrate would enable Australia to make good quality thermobaric weapons. It would use both ethane and methane byproducts from Bergius plants.



The production of RDX uses either silver or an iron-molybdenum catalyst.



TNT is another energetic material that starts as a byproduct from the Bergius plants we need to build for our fuel supply.

11. The Nuclear Imperative

Under the Nuclear Non-Proliferation Treaty of 1968, a party to the Treaty is allowed to develop and field nuclear weapons if it has been involved in the development of nuclear weapons previously. Australia assisted the UK in its nuclear weapons program by providing test sites at Woomera and the Monte Bello islands, and so qualifies. The need for Australia to possess its own nuclear deterrence is readily apparent. The nuclear umbrella provided by the United States may be a chimera as that country has not honoured its undertaking to protect Ukraine under the Budapest Memorandum of 1994. China has been threatening Australia with nuclear attack for decades. China is also threatening nuclear attacks on Japan. Russian spokesmen and women have been threatening countries near and far with nuclear attack as a solution to that country's self-inflicted problems.

What is envisioned is modelled on the French approach to nuclear weapons. Their force is called the *Force de dissuasion*. The concept behind the *Force de dissuasion* is countervalue, the capacity to inflict so much damage on a potential (and more powerful) adversary's population that the potential adversary will be deterred from attacking, no matter how much destruction it can inflict. This is mutually assured destruction. The French also describe this as *dissuasion du faible au fort* ("deterrence from the weak to the strong"). Russia was and is France's enemy in this regard. In de Gaulle's words:

Within ten years, we shall have the means to kill 80 million Russians. I truly believe that one does not light-heartedly attack people who are able to kill 80 million Russians, even if one can kill 800 million French, that is if there were 800 million French.

Those numbers are also our numbers. We need to have the means to kill 80 million Chinese. And that might stop them killing perhaps 12 million Australians, which China would do casually if there were no consequences for them.

How to proceed? Several things need to be started simultaneously to make sure the capability is not held up unnecessarily:

1. Ask the United States to loan us warheads under 'distributed deterrence' which is the concept that the United States is better protected if partner countries can contribute to nuclear deterrence, effectively a fourth leg of the US nuclear triad of ICBMs, submarines and bombers. For example, Germany is acquiring F-35s so it can drop nuclear weapons from the US arsenal that are stored in Germany. President Trump once said that he would understand if South Korea and Japan acquired nuclear weapons.
2. Coordinate with Japan if possible. There is anecdotal evidence that Japan is making its own weapons-grade plutonium for nuclear weapons. This will not be publicly announced as China might make a pre-emptive strike. Japan is physically closer to China and could respond to a Chinese nuclear attack with intermediate range ballistic missiles, cruise missiles and submarine-launched missiles whereas Australia, because of the distance involved, needs to have an ICBM-delivered nuclear deterrent. South Korea is also developing nuclear weapons but that country has been captured politically by leftists and is pro-China.
3. We may be able to acquire warheads from the two European nuclear powers. Both of those powers will need access to carbon-based fuel sources for power and industry and Australia could offer guarantee of supply.
4. There is enough corruption in Pakistan for the sale of weapons-grade plutonium to be achieved. Saudi Arabia financed the Pakistani nuclear weapons program and has taken possession of some warheads under that deal.
5. Israel was a partner in the South African nuclear weapon program and by now may have enough excess weapons-grade plutonium for sale. They may have extra motivation in that China, after the 7th October attack by Hamas, has taken an antisemitic stance when previously it had been friendly to Israel. It seems that China thinks that by being antisemitic, it will ingratiate itself with some Arab states and thus ensure oil supply for itself and deny it to others.
6. Build a nuclear reactor for making weapons-grade plutonium. For the fuel for the reactor, there is a laser-based technology in Australia for enriching U235. We should also start reprocessing of used fuel rods in Australia. This would provide the actinides to fuel a molten salt reactor.
7. There are several countries with solid-fuel ICBM technology including Israel and India. India has developed the Agni-5 ICBM with a range of 8,000 km and the ability to carry a payload weight of three tonnes which equates to ten multiple independently targetable re-entry vehicles (MIRV) each with a yield of 300 kilotons. At Beijing's population density, a 300 kiloton airburst will have a 5 psi overpressure area of 70 square kilometres and result in 700,000 fatalities and two million injuries. Assuming that is equivalent to one million deaths and disabling injuries, it would take eight missiles each with 10 MIRVed warheads to kill 80 million Chinese and achieve deterrence.

8. It is 8,000 km from Alice Springs to Beijing and so bases in the Macdonell Ranges would be suitable. The requisite tunnels can be driven in horizontally from the plains.
9. The Agni-5 missiles weigh 55 tonnes and would be carried on, and fired from, transporter-erector-launchers.
10. The whole exercise might cost eight billion dollars. A Brookings Institute study in 1998 determined that the cost of a MX/Peacekeeper missile with armament of ten W87 warheads, each with a 300 kiloton yield, would cost US\$238 million in 1996 dollars. Adjusted for inflation that amounts to some US\$500 million in 2024.

10. Minerals in Defence

War is like greatness, it can be thrust upon you. War is also like a lawsuit; you may not want one but you certainly want to win it. In war it helps to have asymmetric advantages. Thus China has stockpiled 1,200 million barrels of oil because it knows it will be starting a war. A lesson from history is that in wars paper currencies become worthless relatively quickly. It is better to hold a lot of physical gold than foreign countries' bonds or other paper promises. In 1997, the Reserve Bank of Australia sold two thirds of our then gold reserves, leaving 80 tonnes. Gold was considered to be a barbaric relic; it seems that nobody in the Reserve Bank had read a history book. That gold was sold down to US\$306 per ounce. Gold is now US\$4,413 per ounce. It is true that Australia now is producing 330 tonnes of gold per annum. But the average grade of Australia's open cut gold mines is now 1 gram per tonne. The average overburden ratio of the open cut gold mines is four to one. Assuming 90% recovery in processing, that means that producing a tonne of gold requires digging up 5.5 million tonnes of rock from open cut mines. Digging up that amount of rock requires time and diesel, two things that will be in short supply during a war.

Mismanagement of the gold our forebears had put aside for a rainy day is ancient history. Even more damage is done each year now, egregiously and gratuitously, by things including the National Disability Insurance Scheme and the more than \$300 million being spent on trying to find war crimes in Afghanistan. The former is now costing us the equivalent of 200 tonnes of gold per annum. The latter is the equivalent to a one-off 1.5 tonnes of gold applied to self-harm.

In lieu of gold, there a number of other minerals necessary for modern war which Australia could and should produce while few other countries can. In producing and stockpiling those minerals we can make ourselves indispensable to the coalition of good countries that Sanae Takaichi, now Prime Minister of Japan, spoke of a couple of years ago. The elements involved include gallium, gadolinium, indium, tantalum, germanium, rubidium, copper, indium, antimony, bismuth, lithium, neodymium, praseodymium, terbium, dysprosium, samarium and cobalt.

Stopping all the self-harm we are doing to ourselves, such as Net Zero, would free up at least \$100 billion per annum so that answers the question of how the buildout and stockpiling would be funded.

Rare Earths

Australia signed to a critical minerals arrangement with the U.S. in late 2025, which was a good thing. The U.S. went on to sign similar critical minerals and rare earths deals with Thailand, Cambodia, Malaysia and Vietnam. After one such signing, President Trump quipped to reporters “In about a year from now, we’ll have so much critical mineral and rare earths that you won’t know what to do with them.” That is also a good thing because modern war will chew through a lot of rare earth elements. First Person View drones are now causing 90% of deaths and injuries in the Ukraine War with each drone requiring about 20 grams of neodymium and praseodymium to make high strength permanent magnets for the rotors of each drone. Ukraine is now making seven million FPV drones per annum, and Russia likely half that number, for a total annual consumption of 200 tonnes of neodymium and praseodymium. This is about 2% of world production. At the other end of the scale, more than 400 kilos of rare earths are used to make an F-35, three percent of its dry weight.

The composition of rare earth magnets changes with the temperature you want them to be able to operate at. Following is a simplified table of how that works.

Element	Nd/Pr	Tb	Dy	Fe	B	Sm	Co	Ga	Al	Cu	Temp. Limit
Nd/Pr	30%			70%	1%						80°C
Tb/Dy	31%	0.8%	0.2%	64%	1%		0.80%	0.60%	0.80%	0.80%	150°C
Sm Co (1:5)						36%	64%				250°C
Sm Co (2:17)				20%		25%	38%				350°C
Kilo price US\$	\$116	\$1,095	\$237	\$0.60	\$18	\$10	\$46	\$233	\$4	\$17	

The relative cost contribution by element of a magnet using terbium is currently:

Nd/Pr	78%
Terbium	18%
Gallium	1%
Dysprosium	1%
Other	2%

With respect to processing of Australian rare earth ores, Iluka Resources used to sell their monazite production to the French company Rhone-Poulenc which processed it at their La Rochelle plant. That plant closed in 1984, after which Iluka stockpiled their monazite production at their Eneabba operation, in the Eneabba Monazite Pit (EMP). That stockpile, now a million tonnes, provided most of Iluka's equity contribution to a largely federally funded processing plant which will cost \$1,800 million to build and commission.

Praseodymium and neodymium provide most of the revenue for monazite processors and so an onsite plant might concentrate on those two elements and ship everything else off in a mixed concentrate. Iluka is building its plant with a terbium/dysprosium circuit as well to give it the ability or maximise value from its own terbium/dysprosium production. To achieve economies of scale in doing that, it also has to source third party, non-monazite ore sources. To that end it has done a deal with Northern Minerals for access to concentrate from that company's Wolverine Deposit. Wolverine is unique in its high terbium and dysprosium levels in the mineral xenotime.

An amusing detail about Iluka's Eneabba operation is that monazites are between 5% and 12% thorium oxide. Thorium might be used as a nuclear fuel when a reactor technology is commercialised to that end. It is illegal to operate a mine to produce thorium for sale in Western Australia. There is no mention of the fate of the thorium oxide in Iluka's process flow sheet though they will be producing and stockpiling tens of thousands of tonnes of it. It is the element that dare not speak its name. Eventually thorium will sell for the same price as uranium, so Iluka's thorium stockpile will become valuable in time.

The Wolverine deposit of Northern Minerals is south of Halls Creek in Western Australia. From production commencing in 2028, the mine will process 5.9 million tonnes of ore per annum to produce 17,500 thousand tonnes of concentrate containing 4,350 tonnes of rare earth oxides. This will be trucked 2,700 km to Eneabba.

Arafura Resources is developing its Nolans deposit, 135 km north of Alice Springs. It is a characteristic monazite deposit with an element suite dominated by praseodymium/neodymium. The company has stated that the economics of the project will be helped by producing phosphoric acid for fertiliser. It is likely to be too far from any growing areas though. Iluka is not separating out its phosphate though it is relatively close to the WA Wheat Belt.

Lynas Rare Earths' Mt Weld mine, 30 km south of Laverton in Western Australia, started production in 2011. Being a monazite deposit, the element assemblage looks exactly the same as that of Arafura Resources and Iluka's though the value per tonne of ore in the ground is twice Arafura's. Lynas has been shipping concentrate from Mt Weld to its plant in Malaysia. Chinese operatives in Malaysia have been running a scare campaign in Malaysia over the thorium content. So Lynas spent \$575 million to build a processing facility in Kalgoorlie to crack and leach the monazite. The product is a mixed rare earth carbonate which is shipped to the Malaysian plant for separating into individual oxides.

There are plenty of other undeveloped rare earth deposits in Australia. One of the better ones is the Sybella deposit located 20 km south of Mt Isa. This is hosted in a granite amenable to heap leaching with a weak acid solution. The revenue may be of the order of \$40 per tonne of ore with operating costs one quarter of that.

Gallium

Semiconductors based on gallium have many uses in defence and data centres. World consumption is now about 700 tonnes per annum. This is expected to rise to 1,200 tonnes per annum by 2030 with the continued build out of data centres. The current price is US\$233 per kilo. The French company Rhone-Poulenc built a gallium

extraction plant at Alcoa's Pinjarra alumina refinery in Western Australia for \$50 million in 1989. The plant finally closed in 1997. China was growing its alumina production at the time and used predatory pricing in the gallium market to achieve a market share of 98%.

The Australian and U.S. Governments are now contributing US\$200 million and US\$174 million respectively to build a plant at Alcoa's Wagerup alumina refinery to produce a stated 100 tonnes of gallium per annum. The Japanese Government is also contributing to the cost of the plant. The gallium grade of the bauxite feed to the Wagerup refinery is about 50 ppm. Some 70% of the contained gallium is dissolved into the process stream and some of that precipitates out in the alumina product. The process stream is recirculated to process more ore with the result that the gallium concentration rises to between 100 to 150 ppm in the circulating load. The gallium extraction plant will process only 10% of the process stream after alumina precipitation in order to keep the gallium content high enough to be worth processing. The stated production rate of 100 tonnes per annum is 20% of the contained gallium in the bauxite ore. Increasing production at Wagerup would result in a lower gallium yield. Australia has four other remaining alumina refineries after the Kwinana refinery was killed off by Net Zero in 2025. It would be better to build new plants at one or more of these in order to grow production rather than add capacity to the Wagerup circuit.

Antimony

A government package of \$135 million has been provided to the Port Pirie lead smelter to recover antimony from the lead stream. The smelter is owned by Nyrstar, a subsidiary of Trafigura, and has a design capacity of 160,000 tonnes per annum. Antimony production will reach 2,000 tonnes per annum by year end 2026 and up to 5,000 tonnes per annum in 2028, roughly 15% of world supply. The current antimony price is US\$15,000 per tonne.

Appendices

1. Submission to the Senate Inquiry into Australia's National Civil Preparedness and Resilience

As at 28th September, 2026, the Inquiry has not stated that it has received this submission which may or may not be published by the Inquiry.

With particular reference to terms of reference 1 and 3.

Introduction

The foundation of Australia's way of life, our standard of living, our ability to contribute to the common good, and our resilience as a Nation is the abundance and cost of supply of the energy we use, both electric power and transport fuels.

Wars have started due to considerations of oil supply. It drove Japan's entry into WW2 when the US cut off supply. Battles are fought to access oil supply – the Nazi push to the oilfields of the Caucuses. Post-war analysis of the Allied bombing campaign of Germany concluded that if it had just concentrated on bombing power plants it would have been more effective.

In the two major wars being fought at the moment, energy and fuel supply are major instruments of coercion. Ukraine has been attacking Russian oil refineries with the result that Russian drivers are spending days in queues in order to refill their cars. For their part, Russia has been attacking Ukrainian power plants to make the next winter in Ukraine as dark and miserable as possible. The Iran War has settled down to a blockade over oil supply and a mutual standoff with respect to attacks on power plants and desalination plants.

A couple of generations ago the Australian Government understood the importance of being self-sufficient in oil supply. Oil exploration in Australia, both seismic surveys and drilling, was subsidised. When the oilfields in Bass Strait were discovered, they couldn't compete with oil imported from the Middle East so Australian motorists paid a premium in the petrol price, a program called import parity pricing, to get them over the line financially. This paid off in spades during the first oil shock associated with the Yom Kippur War. Australia sailed through that crisis unaffected.

These days the Federal and State Governments are destroying our energy resilience just as effectively as if they were bombing it. The South Australia Government blew up the power plant supplying Adelaide as soon as it was closed when it would have been more prudent to maintain it in reserve while seeing how the new arrangements worked out. The Federal Government and the WA State Government stood idly by while BP destroyed the Kwinana oil refinery even though it was profitable.

Australia's energy supply, and thus our industrial resilience, and in turn our defence preparedness, is based on wishful thinking and assumptions divorced from scientific and economic reality. The greater the departure from reality, the greater the suffering from the cathartic event coming. The Senate is to be commended for its interest in this matter. The faster we correct course as a Nation, the more likely we will survive. And yes, our very survival is in doubt.

Australia's Current Path

There is not much point in describing Australia's attempt to get to Net Zero in too much detail. It will be abandoned at some stage. The only question is how much damage it will do before it is abandoned, how much debt our children and grandchildren will be burdened with and how much poison will be left behind in the soil after the solar farms have been reclaimed for agriculture. There is another question. That is will Australia be defeated in war due to the fact that our industry has been hollowed out by sky-high power prices, and thus can't produce munitions, while those who might attack us aren't burdened by such stupidities? The price of energy isn't just foundational to our standard of living, its price and supply is foundational to our ability to ensure our continued existence as a nation.

Net Zero is built on a lie. That lie is global warming. The theory of global warming is based on a notion that carbon dioxide is a significant greenhouse gas at its current concentration in the atmosphere of 420 ppm. It isn't. The atmospheric heating effect of carbon dioxide is logarithmic. The first 20 ppm of carbon dioxide heats the atmosphere by 1.6°C. The next 400 ppm adds a similar amount. Each extra 100 ppm from the current level increases the temperature of the atmosphere by only 0.1°C. The warming effect of carbon dioxide is real but minuscule. Carbon dioxide is tucked out as a greenhouse gas.

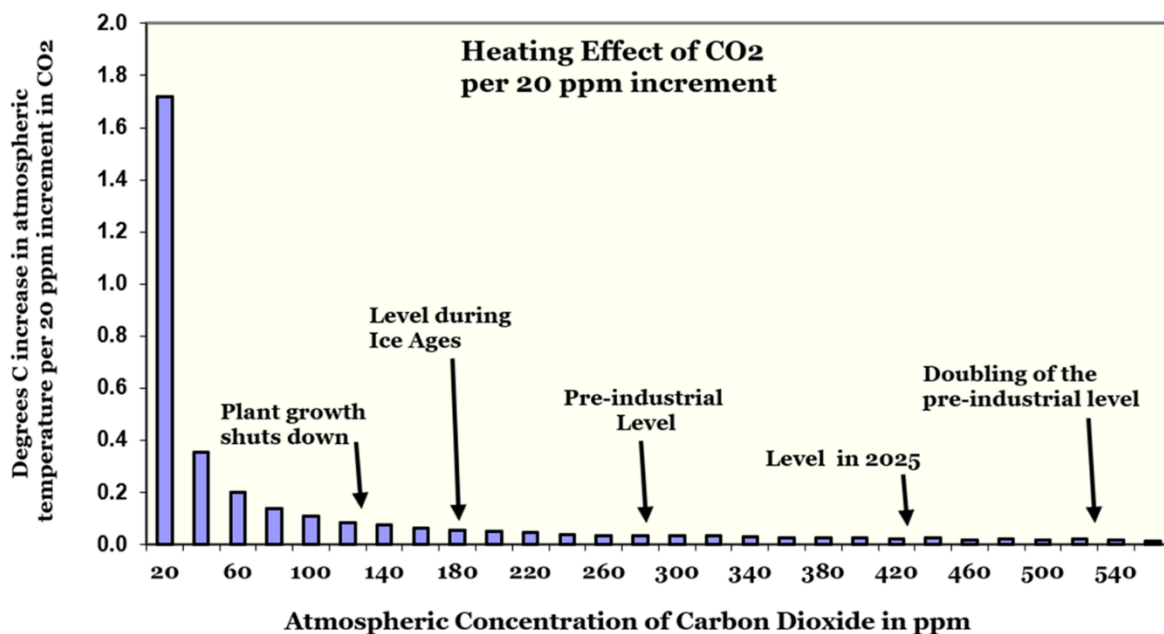


Figure 1: Global warming is the lie that Net Zero is built on.

The plants that are basis of our food supply evolved when the carbon dioxide level of the atmosphere was three times what it is now. During the depths of the last ice age 15,000 years ago, the level got as low as 180 ppm, only 30 ppm above the level at which plant growth shuts down due to a lack of carbon dioxide. The carbon dioxide Mankind is putting into the atmosphere is making life safer for all living things on the planet.

There was a mild warming of the planet in the second half of the 20th century that has been much appreciated. If carbon dioxide didn't cause that, then what did? The Sun has become more active now than it has been for the last eleven thousand years. As it is the Sun that stops the Earth from looking like Pluto, this is the reason for the warming we have experienced.

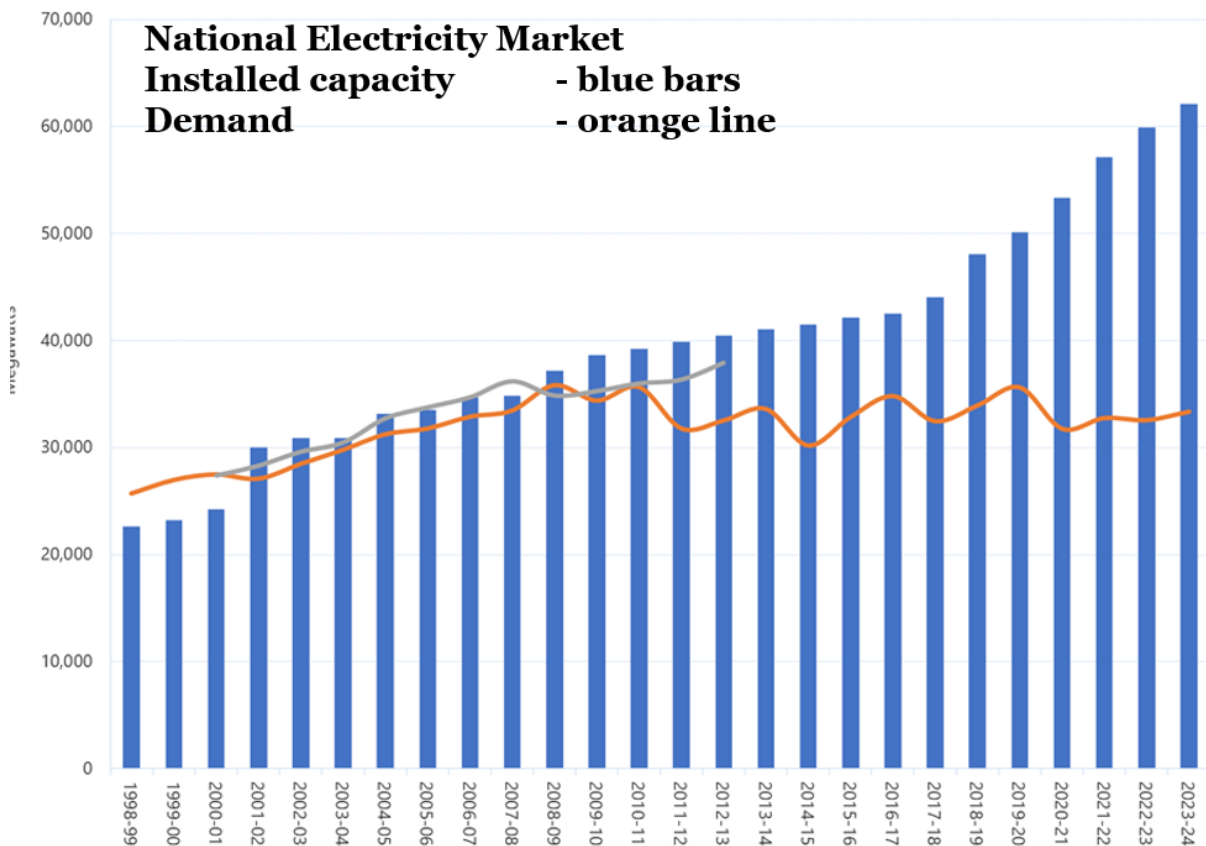


Figure 2: National Electricity Market

The rot began with John Howard as prime minister. He did a deal with the Australian Democrats which include a 2% share for renewables in the National Electricity Market. That opened the wedge that has grown to destroy affordable and reliable power supply. Installed capacity used to equate to demand. It has now grown to be 80% higher than demand in an attempt to offset the unreliability of renewable energy. We have paid for the potential extra supply but don't use it.

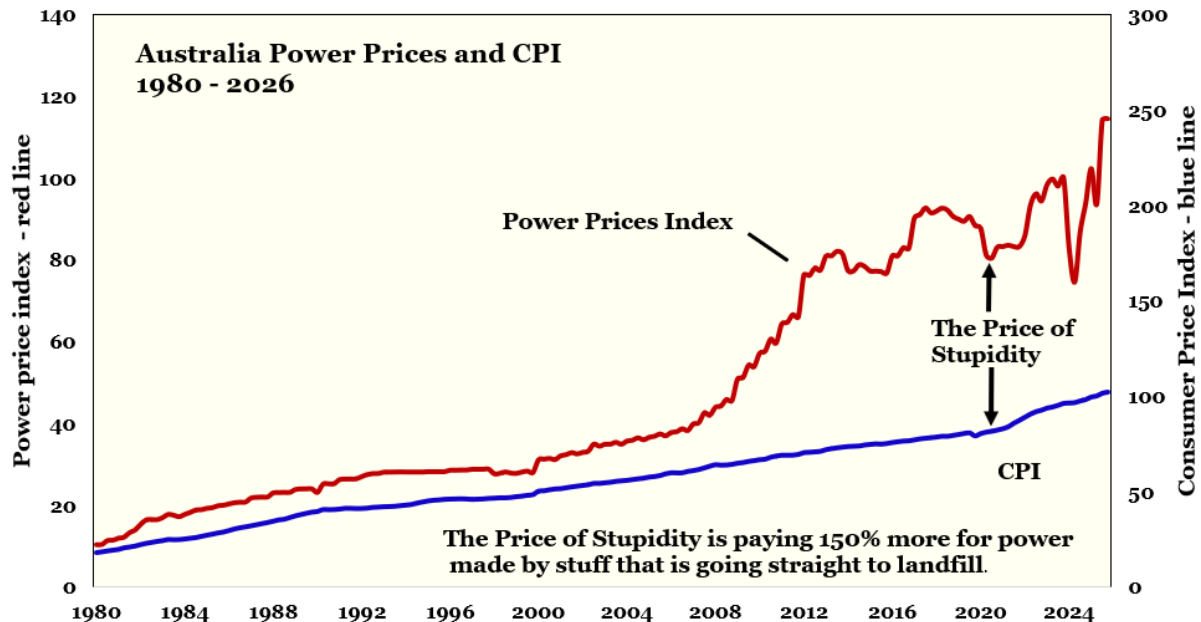


Figure 3: Power Prices and CPI 1980 – 2026

Whitlam's burst of inflation in the early 1970s washed out of the economy by the early 1980s. Everything was good until Howard started meddling in the energy market 20 years ago. We are now paying 150% more for our electric power supply than we should be.

The consequence of paying too much for power for no good reason is that the economy shrinks in response. In May 2019, economist Brian Fisher modelled Labor's then 45% Net Zero target. His work forecast the following shrinkages by sector:

Other mining	-5.8	Non-ferrous metal	-12.9
Food processing	-2.7	Electricity	-13.0
Chemicals, rubber and plastic	-10.6	Construction	-7.2
Manufactures non-metallic mining products	-7.1	Land Transport	-11.3
Other manufactures	-7.4	Water and Air Transport	-8.0
Iron and Steel	-5.9	Services	-4.9

He predicted a GDP contraction of at least 10%. The result of Net Zero is that Australia's economy is shrinking. We have had three years now of declining GDP per capita. We are getting a lower standard of living.

Australia's four remaining aluminium smelters account for 10% of the power demand on the east coast National Electricity Market. Almost all their production is exported. Power is their biggest operating cost. Neville Wran, when Premier of New South Wales, said that 'aluminium is solidified electricity'. So how do the aluminium smelters keep going after doubling the price of power? They are kept going by enormous subsidies paid by taxpayers. With the result that our trading partners view those subsidies as an assault on their economies. Thus the US has applied tariffs on Australian aluminium equivalent to the subsidies. The same has happened to steel made in Wollongong. This hasn't been explained to the Australian public. The jerry-

rigged power market fantasy of Net Zero has been smacked by reality. Net Zero is a house of cards.



Figure 4: The cover of a book on renewable energy in Nazi Germany in 1933

Why are renewables and Net Zero so cursed? One reason might be that renewable energy is an ideology invented by the Nazis in Germany. Renewables was a major plank of Nazi ideology. Figure 4 shows the cover of a book published in Germany in 1933, the year that Hitler came to power. The title says 'Technik und Wirtschaft im Dritten Reich' which translates as 'Technology and the Economy in the Third Reich'.

On page 47 you read "Hydro and wind power can provide up to 80 % of energy. The renewable energy is flowing and free." You read exactly the same thing in today's renewables propaganda. The opposite is true of course. Renewables may cost us everything.

And just like today's renewables freaks, the Nazis were also big hydrogen enthusiasts. On page 60 you read the Nazi plan to use wind power to make hydrogen:

Our mission is to build the new hydro and wind power plants independent of the electrical grid, so they produce valuable storable energy in the form of hydrogen gas. Hydrogen can easily be stored and transported in pipelines.

And why, why are we destroying our economy and the country? Ostensibly it is all about reducing our carbon dioxide output. The following graph shows the carbon dioxide output of China, the United States and the EU since 1850.

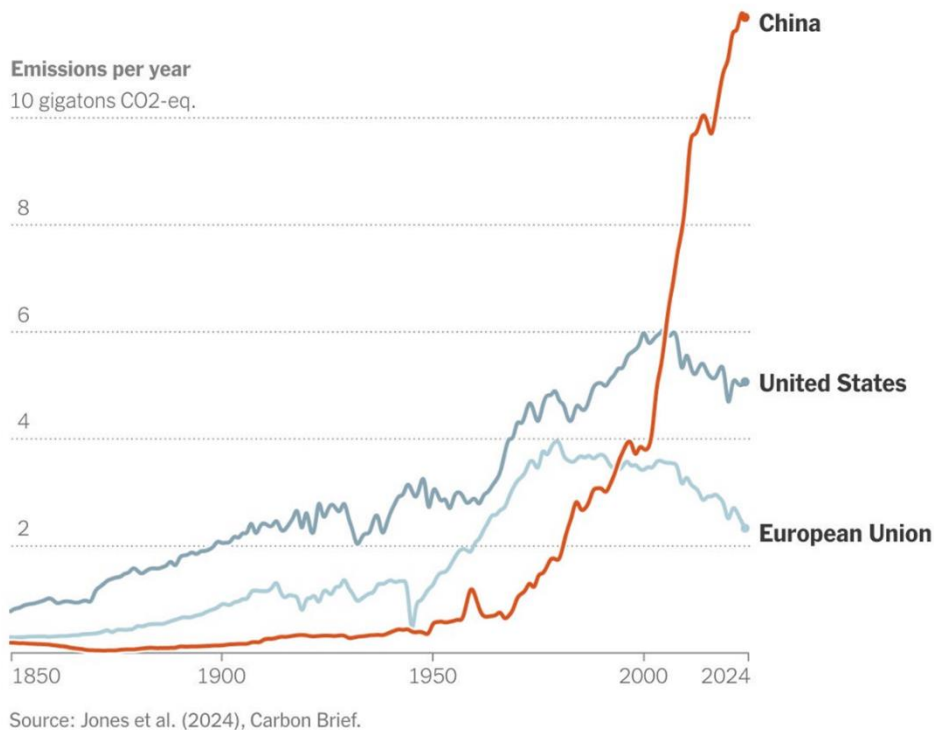


Figure 5: Carbon Dioxide Output of China, the United States and the European Union 1850 to 2024

What you see is China going flat out at putting carbon dioxide into the atmosphere, now outproducing the US and the EU combined. China knows that the carbon dioxide scare is a sham or they couldn't care less, or both. To add insult to injury, we export coal to China but don't burn it ourselves.

In World War Two, former Prime Minister Robert Menzies was known as Pig Iron Bob because he allowed pig iron exports to Japan despite Japan's invasion of Manchuria. We got some of that pig iron back in the form of bombs dropped on Darwin. Next time round we will be getting some of the coal we export to China back in the form of the explosive filler of the bombs China will drop on Darwin.

China uses cheap coal power to make solar panels to sell to us. Solar panels last 20 years before going to land fill. They don't have enough value to be worth recycling and the cadmium loading of up to 10 grams per square metre means that they have to go to an engineered repository. Windmills are the same.

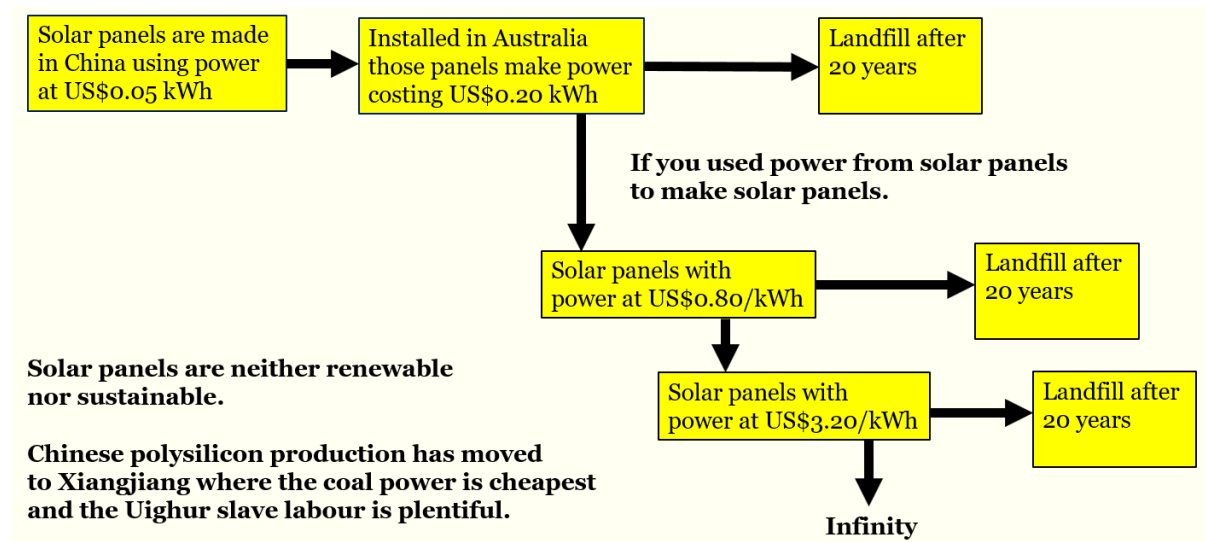


Figure 6: What if you used power from solar panels to make solar panels?

Has anyone thought this through, really? Solar panels are made in China using cheap power from coal at five cents per kilowatt hour. Under the most ideal conditions on the planet, in the deserts of Australia, the same panels produce power at a cost of 20 cents per kilowatt hour. They last 20 years and then the panels go to landfill.

If you wanted to make solar panels using power from that first generation of solar panels, what would be the cost of power from that second generation of panels? It would be at least 80 cents per kilowatt hour and so on to infinity. And all the panels end up in landfill. There is not enough metal value in them to cover the cost of recycling. Solar panels are neither renewable or sustainable. They are simply an artefact of cheap Chinese coal power.

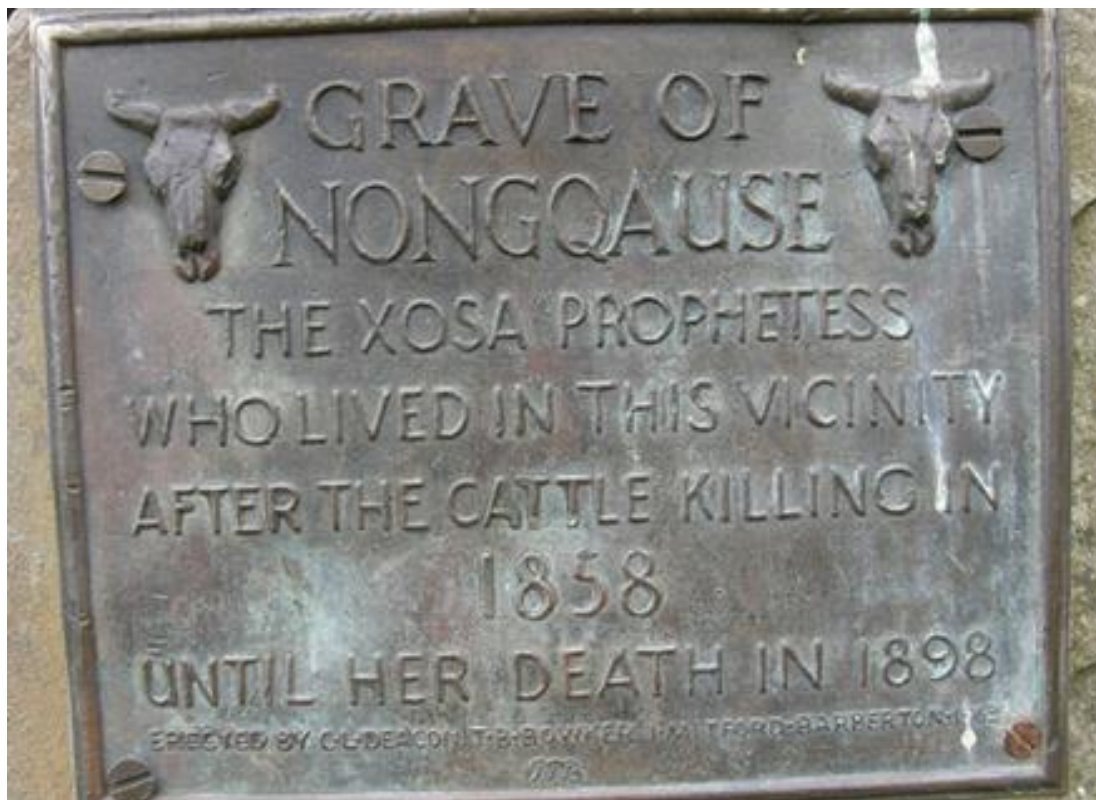


Figure 7: Nongquase's gravestone

Santayana said in 1905 that "Those who cannot remember the past are condemned to repeat it." So what is the best historic analogy that we can draw guidance from in terms of what Australia is doing to itself with Net Zero? That would be the cattle-killing frenzy of the Xhosa tribe of South Africa in 1858.

A teenage girl called Nongquase had gone down to the river to fetch water. When she got back, she told the tribal elders that spirits had said to her that if the Xhosa killed all their cattle, the spirits would replace them with bigger and better cattle. So the Xhosa tribe killed all their cattle and three quarters of them promptly died. These are people who had been farming cattle for thousands of years but it did not stop them from doing something very stupid to their food supply.

We are doing the same with our energy supply and it is within the realms of possibility that the result could be the same with 75 percent of Australians dead. That is because Australia won't be able to defend itself when the economy keeps shrinking due to an idiotic cost burden.

Three hundred years after the Enlightenment, we have chucked over science and gone back to a form of paganism. Global warming has become the official state religion. One benefit of covid is that it has shown that official government science can be a pack of lies. Now, after over 30 years of the global warming scare and nothing happening, if anyone still believes in it they are too stupid to be left in charge of anything, even being on the committee of the local bowling club.

The Nuclear Imperative

Australia has a power crisis that is getting worse. Once we have decided to stop hurting ourselves for no good reason, we may need to build some coal-fired power stations in order to stabilise the grid and stop having blackouts. But burning coal to produce power isn't a good long-term solution. The reason is that world oil production has peaked. Anything that can be converted to liquid fuel will go to the oil price, less the cost of conversion. That includes coal. This effect may start ten to twenty years from now but it will happen. If we are still burning coal to make power in twenty years then it will be like being a third world country now that is using diesel generators for their power.

It is established that power from solar panels and wind turbines can't be used to make solar panels and wind turbines. To make a positive contribution to society, sources of energy need to make over their lives more than five times the amount of energy that it took to make them. Renewables only make a fraction of that and so can't be part of the solution to our energy supply problem. Nuclear power is the only solution. But what sort of nuclear? It should not be the current dominant nuclear technology of U235-burning light water reactors. These have dominated since the original one in the first nuclear submarine, the USS Nautilus of 1956. The technology of nuclear reactors hasn't changed much in the last 70 years. This graph shows why that is such a bad thing:

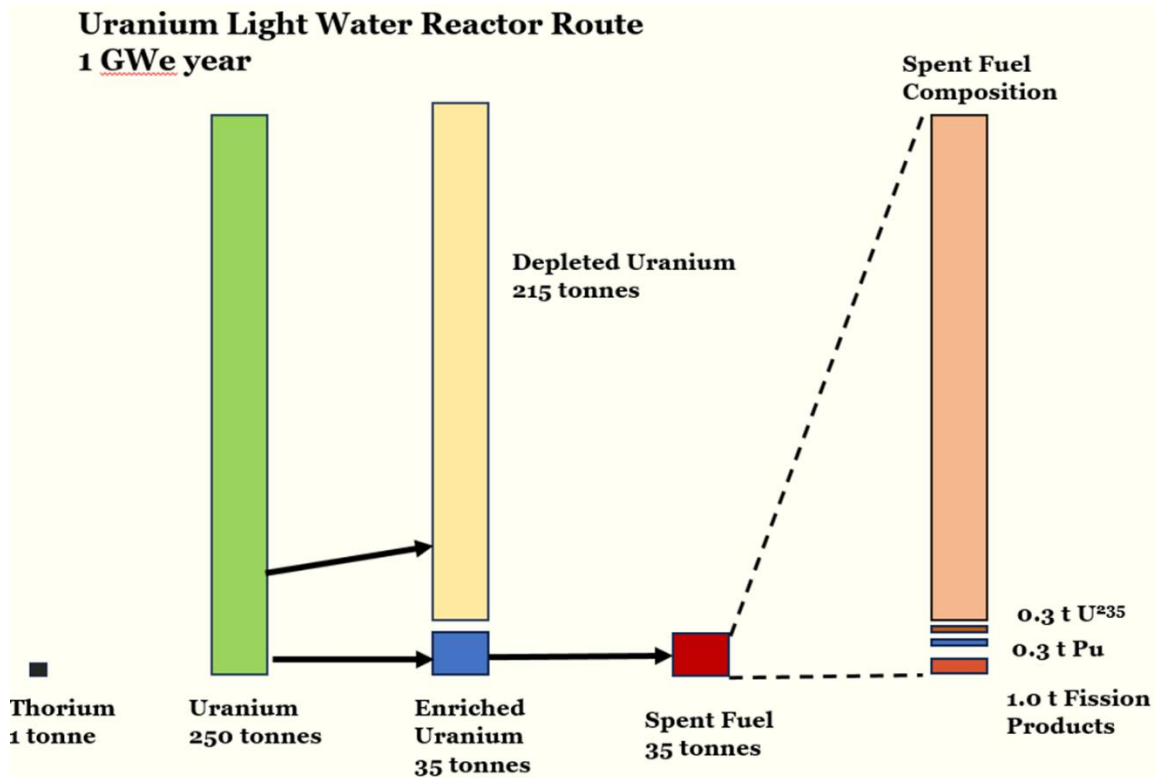


Figure 8: Uranium Light Water Reactor Route

Producing one gigawatt of power continuously over a year requires the fissioning of one tonne of something. To achieve that in light water reactors, you start with 250 tonnes of uranium as mined out of the ground.

You then concentrate the U²³⁵ component up from 0.7 percent to 3.5 percent in 35 tonnes of what you started with. This is done at some expense and relies upon the 1.1 percent mass difference between U²³⁵ and U²³⁸. Nevertheless, 29 percent of the U²³⁵ you started with gets thrown out in the other 215 tonnes of uranium which is then called depleted uranium.

The 35 tonnes of enriched uranium are made up into fuel rods clad in zirconium. After three years in a reactor, they are pulled and put into long term storage. They contain one tonne of fission products, 300 kilos of unburnt U²³⁵ and another 300 kilos of plutonium that has bred from uranium atoms capturing a neutron. By the time the rods are pulled, half the energy being produced is coming from the plutonium created in the rods. The whole process only uses 0.5 percent of the energy contained in the 250 tonnes of as-mined uranium. This is one two hundredth. Nobody could be proud of such a wasteful technology. Thankfully, there is a better way.

Before we get to that, there are two problems with nuclear energy that nobody on either side seem to want to talk about. The big one is that once a reactor has settled down to a continuous power output, seven percent of that power is coming from nuclei that have absorbed a neutron but have yet to split and release energy. They will split, perhaps months or years later. That means you can shut a reactor down by using its control rods but it will still be producing heat.

So a 1,000 MW thermal reactor, which would produce 300 MW of electrical power, will be producing 70 MW of heat from delayed fission reactions. That drops away rapidly but remains significant. If the coolant pipes are broken or the coolant pumps have lost power, or the generators to power those pumps have run out of diesel, then the core heats up and the remaining steam reacts with the zirconium of the fuel rods to produce hydrogen. The hydrogen accumulates in the containment building and explodes.

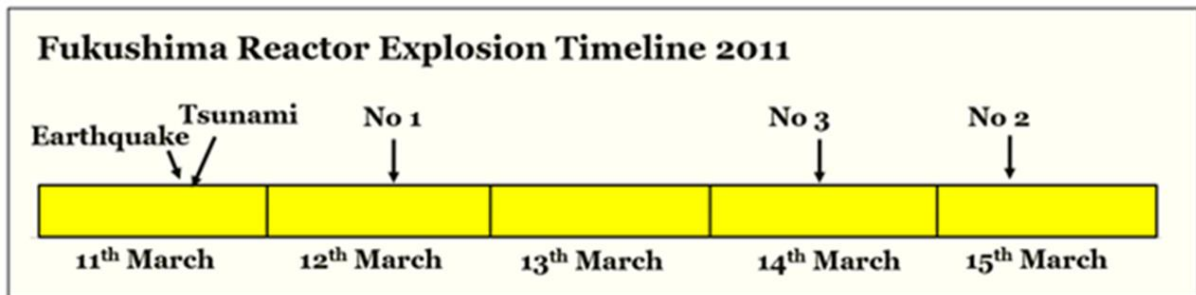


Figure 9: Fukushima Reactor Explosion Timeline

Figure 9 shows what happened to the three operating reactors at Fukushima after the earthquake and tsunami on 11th March, 2011. Reactor No 1 exploded the following day with No2 and No 3 a couple of days later. Making your reactors bigger to achieve economies of scale makes the problem of shedding heat harder to overcome.

Also, most of the spent fuel rods produced each year around the world are not reprocessed. In the United States they are piling up at 2,000 tonnes per annum with the total now at 98,000 tonnes.

There is one reactor type that solves both those problems as well as the problem that the current dominant technology only uses 0.5 percent of our uranium endowment. This is the plutonium-breeder reactor which has successfully operated in Russia for decades, and also successfully put into operation in France. There is no waste. Everything is recycled until it is burnt up. They can be online two years after the concrete foundations have been laid. The economics of plutonium-breeder reactors are competitive with current coal-fired costs.

Adopting plutonium-breeder reactors will unlock an even bigger energy resource. As well as breeding U238 to plutonium, thorium can be bred to U233. Breeding U238 to plutonium has a theoretical margin of 30 percent. That is, under ideal conditions, you will produce 30% more nuclear fuel than you started with. Breeding U233 from thorium has only an eight percent margin which might disappear with neutron losses to the containment vessel and so on. Every spare neutron from nuclear reactors should be applied to breeding from thorium. This means that our nuclear endowment would last 1,250 times longer than if just used the current U235-burning technology.

There is a better future – breeding plutonium from U238, and there is an even better future which is the promise of thorium.

How to proceed? From what we know at the moment, the ideal reactor design will have liquid sodium or liquid lead in the primary coolant circuit, allowing operation in

the fast neutron spectrum necessary for breeding from U238. Sodium has 200 times the thermal conductivity of water which results in a much smaller and cheaper reactor vessel. It can also operate at atmospheric pressure. The secondary circuit could be liquid lead with the benefit that there will be no possibility that liquid sodium and water will come into contact with each other. It may be that individual reactors will have output around 50 MWt so that they can be built on a production line in a factory and shipped out on a truck. Current practice in building nuclear reactors is like trying to build a Ferrari in the middle of a paddock using parts delivered by mail.

Research into nuclear reactor technology in the United States effectively stopped in the early 1970s. The dominant reactor design at the moment is the Westinghouse AP1000 which is effectively a scaled-up version of the reactor on the first nuclear submarine, the USS Nautilus launched in 1956. After a lost weekend lasting 50 years, a nuclear renaissance is now underway in the United States. The Department of Energy is currently negotiating with five companies to supply them with 20 tonnes of weapons-grade plutonium for reactor startups. That is enough plutonium for 4,000 warheads of 40 kilotons each, assuming tritium boosting. The United States doesn't have any reactor-grade plutonium because they don't have a used fuel reprocessing plant. Among Western countries, only France and Japan do. The five companies, plus Aalo Atomics, are listed following:

Nuclear Startup	Development Focus
Oklo	Fuel fabrication using nuclear waste
Flibe Energy Inc.	Liquid fluoride thorium reactor using lithium and beryllium
Exodys Energy	Fast-chloride molten salt burner reactor
SHINE Technologies	Electrochemical processing of waste fuel to make new fuel assemblies for a fast-neutron, liquid-metal reactor
Standard Nuclear	Tristructural isotropic fuel developer – a technological dead end
Aalo Atomics	Sodium-cooled, graphite-moderated 50 MWt reactors transportable by truck

What Australia should do is develop two paths to commerciality simultaneously – a molten salt reactor based on the fuel being dissolved in lithium-beryllium fluoride molten salt and a solid fuel reactor using liquid sodium or liquid lead as the fluid in the primary coolant circuit. Rather than building a large, conventional U235-burning reactor such as the AP1000, developing our own fast-breeder reactor technology would make us completely self-sufficient rather than relying upon foreign supply of fuel rods and technology. This path would take us straight to the ultimate nuclear technology and not waste time on an intermediate stage. Even if that meant that we had to build some coal-fired power stations as an interim measure, it would still be a better solution.

Liquid Fuel Security

Australia's most pressing issue is our supply of diesel, petrol and jet fuel. Australian governments over the last 30 years have let us down badly starting with John Howard who in 2001 stated that it didn't matter if Australia imported most of its liquid fuel supply as long as we remained a net energy exporter, including coal and uranium. That hasn't worked in practice. When you are short of diesel, everything comes to a stop until you have fixed that shortage. Without diesel you can't do anything at all so it concentrates the mind on the most important task. Australia would grind to a halt within a couple of weeks of a war starting in Asia. A lot of Australians would starve to death because there would be no way of moving food about. This is our greatest vulnerability. We effectively have no defence until our fuel supply problem is fixed.

Anthony Albanese was Minister for Transport in 2009 when the department's research arm was about to release Report 117, which is 474 pages on the subject of long-term oil supply. Albanese pulled the report just prior to printing. Another report on aircraft was relabelled as No 117 to bury the crime. At the time Gillard was bringing in her carbon tax, so a report saying that the real problem was the opposite would not have helped her. What did we miss out on when we were denied the 474 pages of Report 117? This is summarised by this figure from page xxix:

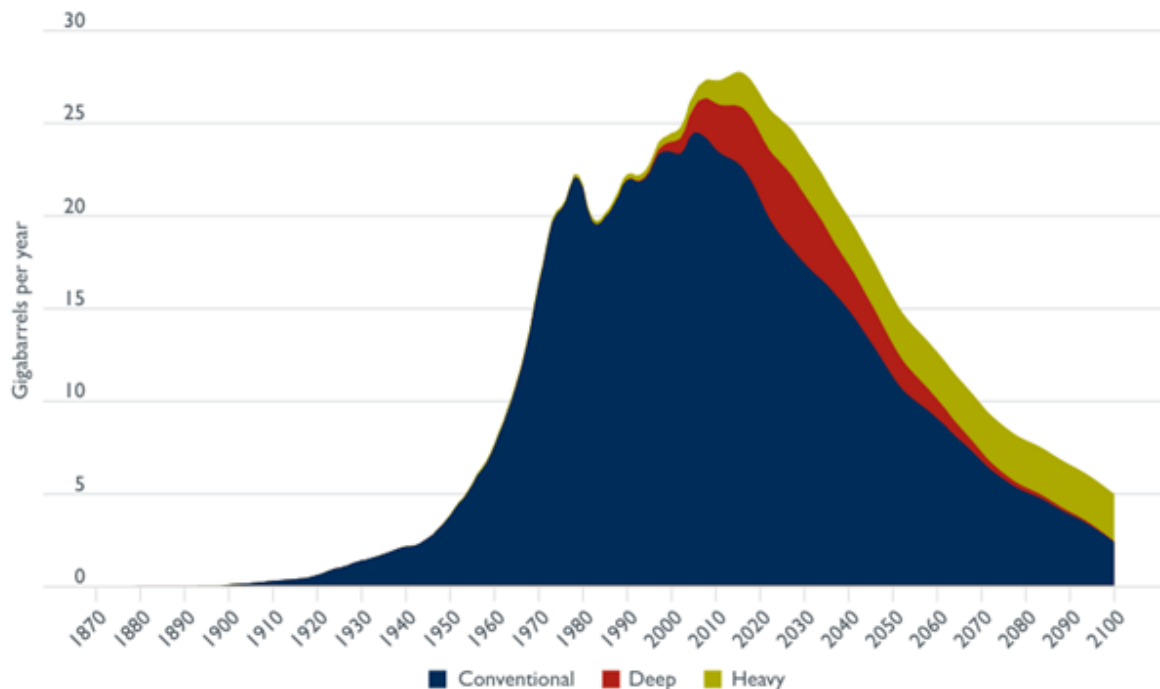


Figure 10: Oil supply history and outlook from Report 117 in 2009

That figure, made in 2009, is of world oil production from 1870 with a projection to 2100. It has world oil production falling out of bed right about now.

The next politician to let us down was Tony Abbott in 2013. His bureaucrats told him that the efficiency of international trade meant that there would be no interruption to Australia's fuel supply in the event of a war. There are a number of problems with

that idyllic view of how the world works. Most of the diesel and petrol we consume starts its journey in the Middle East, a region with plenty of its own problems. On the outbreak of a war in Asia, China will sink oil tankers going to other countries in Asia. The Asian countries fighting China will blockade the oil tankers heading to China. Then supposing some oil tankers make it to Japan, South Korea and Singapore where the oil supplying us is refined, the oil won't be able to be refined because the refineries will have been destroyed by ballistic missile attacks. Ukraine has been able to destroy nearly half of Russia's refineries in the second quarter of 2022 by using slow, propeller-driven drones. Ballistic missiles will destroy most Asian refineries in the opening days of the war. Then supposing some oil does get processed by any remaining refining capacity, plenty of countries in Asia would be clamouring for fuel and also beginning to starve – between us and where the fuel would be coming from. The implausibility of supply from the refineries that traditionally supply us means that we need to make alternative arrangements immediately.

The next politician to fail us was Angus Taylor as Minister for Energy from 28th August, 2018 to 23rd May, 2022. He talked a big game on energy security, but in the end he did the opposite. Being in contempt of its own voter base, the Morrison regime bought some oil to be a strategic reserve but didn't tell the Australian public the quantum involved. It was a token effort to placate its supporters. To make things worse, it was stored in the salt caverns of the US Strategic Petroleum Reserve in Louisiana. We didn't find out how much was involved until later, after it had been sold. In one of his last acts as Energy Minister, Angus Taylor sold the whole of our strategic oil reserve of 1.7 million barrels in March, 2022. That amount of oil would have lasted us 1.7 days, if it ever made it to Australia.

Australia's political leaders have not always been such fools when it comes to liquid fuel security. In 2005, Kim Beazley, while Leader of the Federal Labor Opposition, asked, in an address to the Australian Institute of Company Directors,

As Australians queue for petrol at around \$4.00, \$5.00 potentially up to \$10.00 a litre further down the track, the question will be: how did our government not see the writing on the wall?

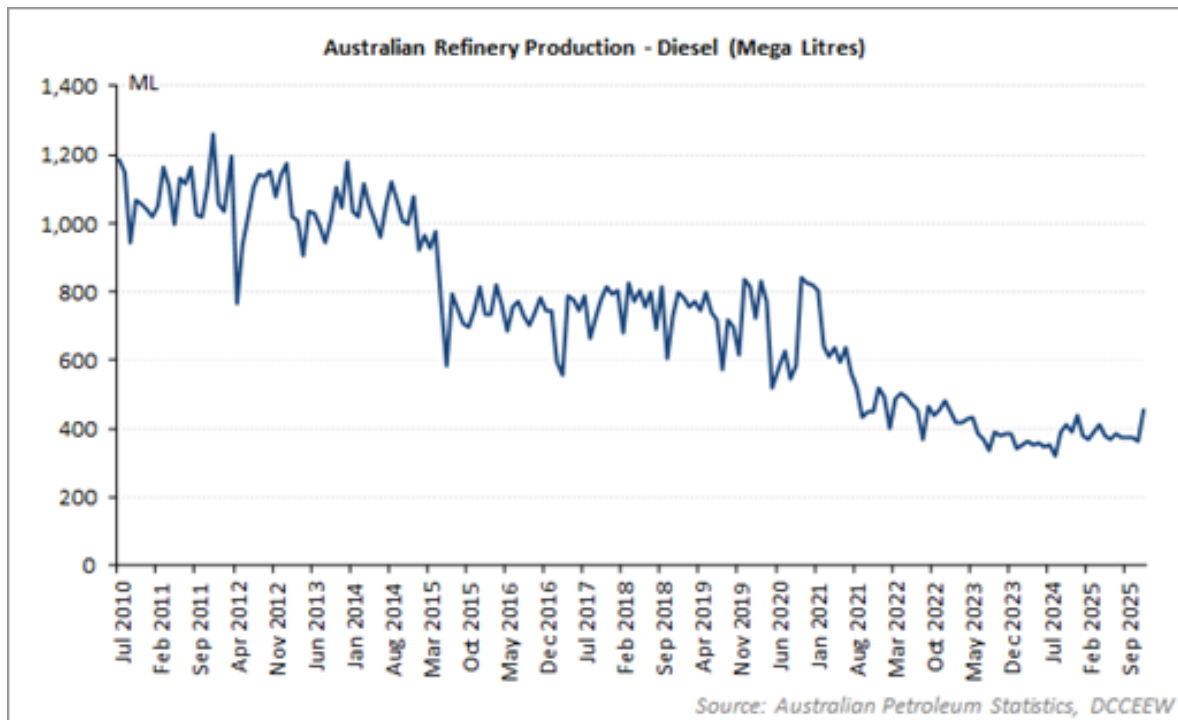


Figure 11: Australian monthly refinery diesel production in millions of litres per month (source Scott Ashton)

Monthly refinery production of diesel, assuming we can get supply of heavier crude oils, is a third of what it was 15 years ago. The production fall in 2021 was the closure of the Kwinana refinery, an unforced error.

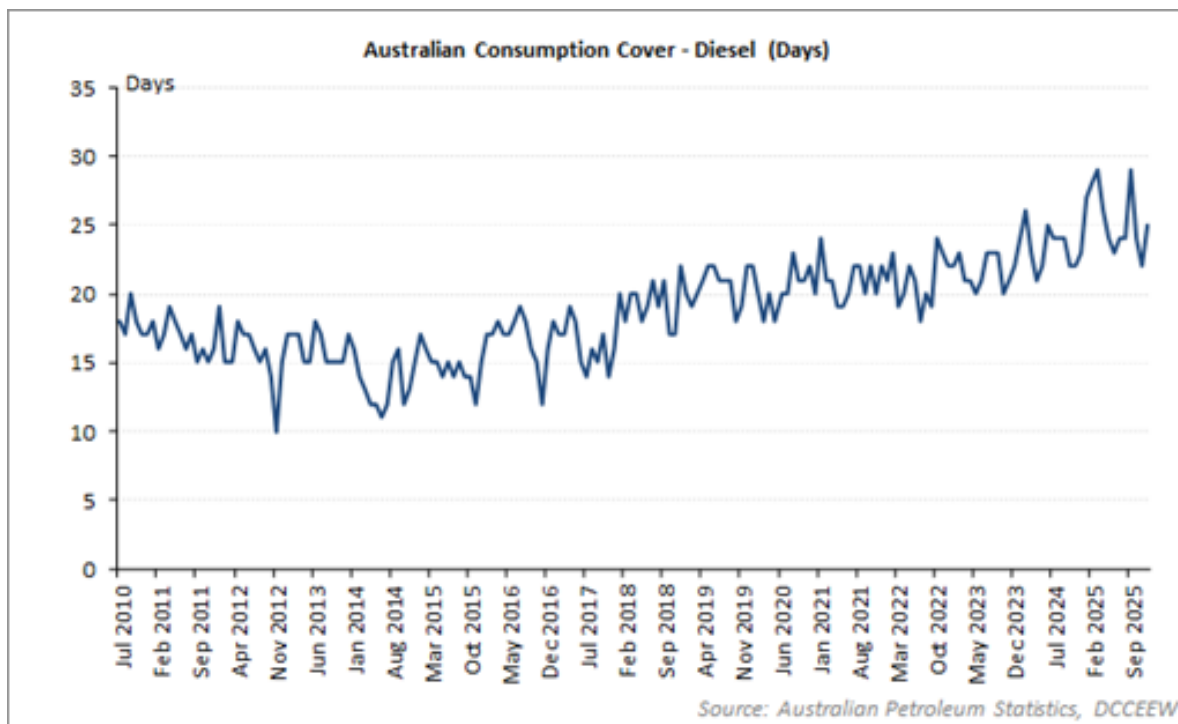


Figure 12: Australian diesel consumption cover in days (source Scott Ashton)

Australia is delinquent with respect to our obligations to store liquid fuels as a signatory to the International Energy Agency. We are the only country to be delinquent. We are also the most diesel-intensive economy in the OECD. Anecdotally, some Middle Eastern crudes with high middle distillate contents, such as Omani, are trading at a significant premium to Brent.

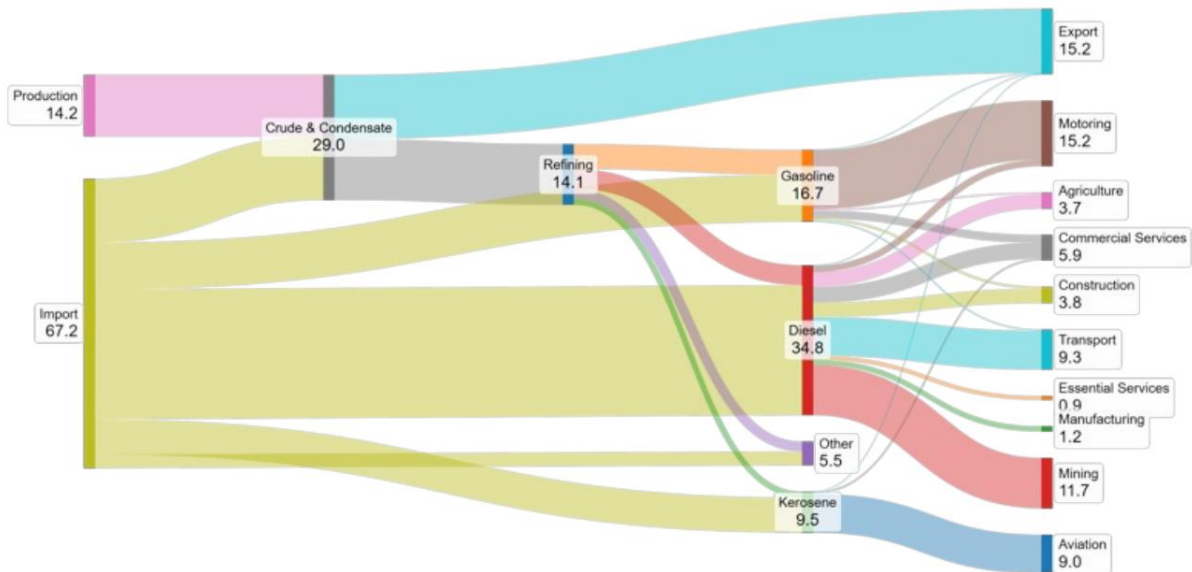


Figure 13: Australian fuel flows in 2015 in billions of litres per annum (source Morgan Stanley)

Australia's fuel supply situation is worse than it appears to be. We do produce 21% of the inputs into our liquid fuel supply situation but we export the same amount. That is because most of our domestic liquids production is on the west coast where we don't have any refineries. And most of that produced on the west coast is condensate which the remaining refineries on the east coast aren't configured to process. So we are effectively 100% reliant upon imported crude oil and imported refined product.

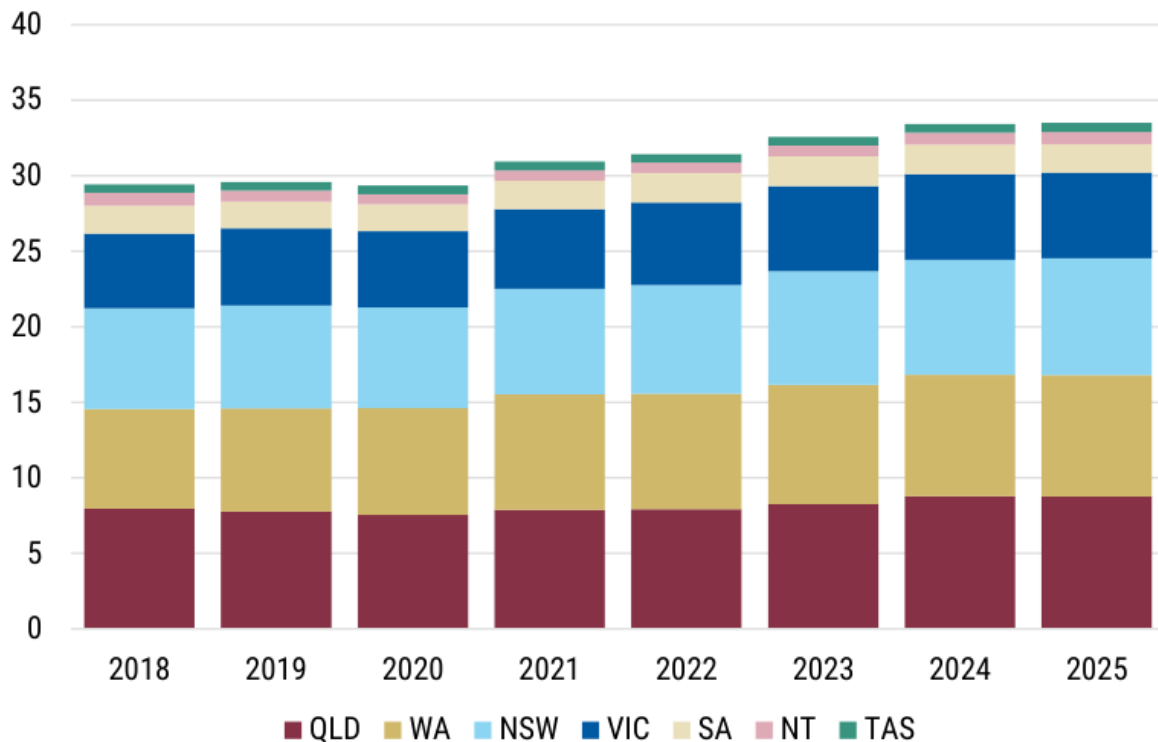


Figure 14: Australian diesel consumption by state in billions of litres 2018 - 2025

Diesel is the economy. Half of the Country's diesel consumption is in two states, Queensland and Western Australia, which combined have a quarter of our population. To paraphrase Chairman Mao, take diesel as the key link.

In comparison to Australia's profligacy, China has stockpiled 1,200 million barrels of oil because they are preparing for a war. China's war of choice will involve Japan. Japan's stockpile is 470 million barrels. The latest news from our north is that Xi Jinping had wanted to attack Taiwan in 2024 but was held up by opposition from the military. He spent the last two years purging the Peoples's Liberation Army (PLA) of anyone opposed to his war. Starting that war is not constrained by considerations such as the state of the Chinese economy or the PLA's ability to successfully conduct it. Xi is messianic about it.

The first thing to do to fix our fuel problem is to utilise the oil and condensate we are producing but not refining. Onshore and offshore, Western Australia produces 50,000 barrels of oil and 250,000 barrels of condensate per day. The condensate is a byproduct of gas production for the LNG plants 1,300 km north of Perth.

There used to be an oil refinery run by BP at Kwinana but that was closed in 2021. It had a capacity of 140,000 barrels per day. It was running at a profit and didn't need upgrading. At the time, BP was run by a bloke called Bernard Looney who "became CEO in February 2020 and served until September 2023, during which time he spearheaded a strategic pivot toward renewable energy and set net-zero ambitions." In effect, the Kwinana refinery was sacrificed on the altar of global warming. As a modern refinery with the ability to handle a range of crude types it would have a replacement cost approaching \$6 billion. The WA and Federal Governments could

have stopped the refinery's closure but they both worship at the same altar of global warming.

The nearest refinery is the Viva refinery in Geelong, 3,300 km to the east.

The solution is simple. Install distillation columns to take the diesel, petrol and jet fuel out of the condensate and export the remainder. As a rough guide, the product yield will be:

Petrol	40%
Jet Fuel	20%
Diesel	20%
LPG	5%
Light Naphtha	15%

The whole 300,000 barrels per day of oil and condensate would yield 120,000 barrels per day of petrol. West Australian petrol consumption is 23,000 barrels per day so the balance of 100,000 barrels per day could be shipped to the east coast.

We have 300,000 barrels per day to process and we need to get that organised by the time that Xi Jinping starts his war. For a simple condensate splitter/topping refinery, the capital cost would be \$1.2 billion for a capacity of 50,000 barrels per day and \$2.0 billion for 100,000 barrels per day. Unnecessary fuel specifications should be relaxed to reduce capital costs. Sulphur specs, for example. Most Australian soils are sulphur-deficient and the more sulphur that falls from the sky, the better. Nothing is achieved by requiring low-sulphur diesel in the middle of nowhere.

The solution starts with a 50,000 barrel per day refinery near Karratha with the balance of 250,000 barrels per day piped south in a 28 inch diameter pipeline at one metre per second. At US\$60,000 per inch-kilometre, the pipeline cost would be \$3.6 billion. Western Australia consumes 126,000 barrels per day of diesel. To make that from 250,000 barrels per day of condensate feedstock requires oligomerisation/hydroprocessing of some of the naphtha component. The refinery to do this at that scale would cost of the order of \$12 billion.

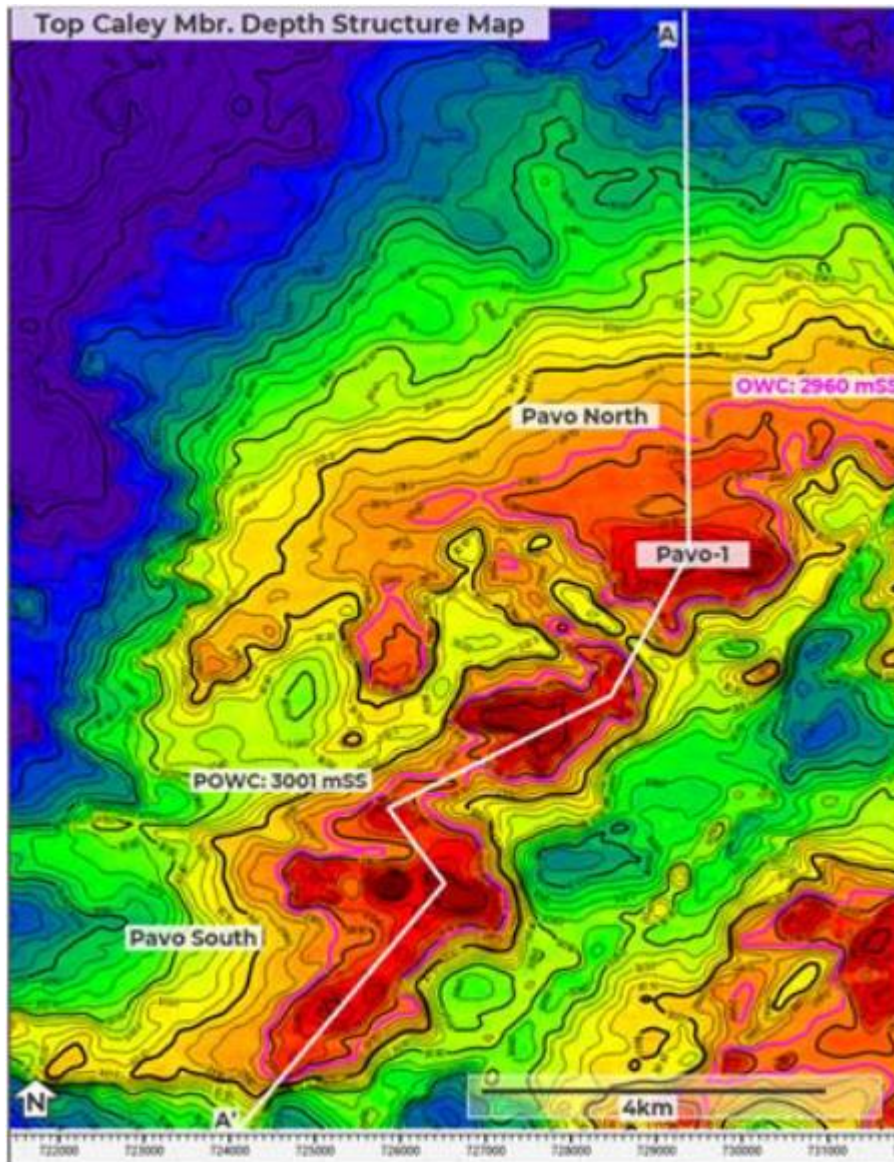


Figure 15: Pavo Oilfield structure map on the top of the Caley Formation

The next thing to do to secure Australia's fuel security will be to develop the Pavo oilfield which is located 100km off Port Hedland. This is a 109 million barrel oilfield discovered in 2022. Before Pavo-1 was drilled, the prospect was judged to be a 100 million barrel target. Once it was discovered, it was proclaimed to be a 43 million barrel discovery because the well had drilled the northern culmination of the prospect and there is a big saddle between it and the southern culmination. The southern culmination is rated as a 66 million target for a combined 109 million barrels. There is a high probability that the 109 million barrel number is real because there is a paleo oil-water contact 41 metres below the current oil-water contact, meaning that both culminations were filled at the same time. The situation is explained in the following cross section which is the line A-A' in Figure 1 above:

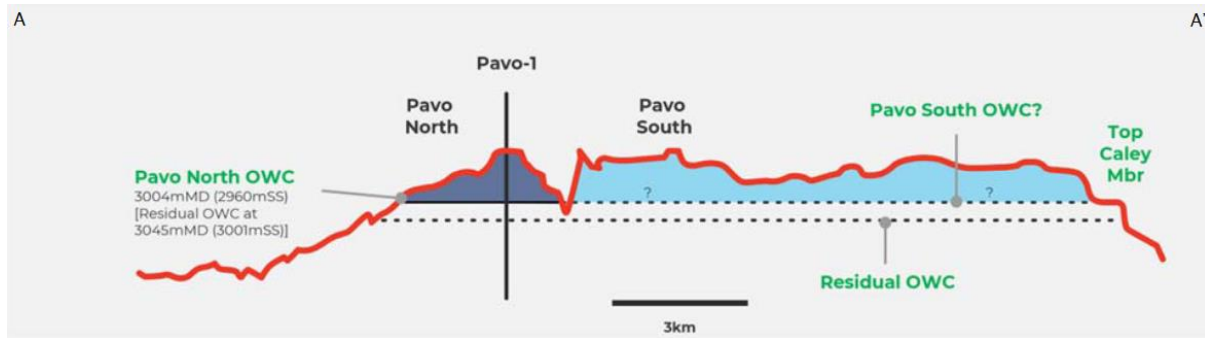


Figure 16: Pavo Oilfield cross section

The situation with Pavo is that the equity interests are Santos 80%, Carnarvon Energy 10% and OPIC (owned by the Taiwanese state oil company) 10%. The Pavo discovery was preceded by the Dorado discovery in 2018. This is a big field at 162 million barrels of oil (half of Australia's annual consumption) with 748 BCF of gas. The gas meant that it was going to be an expensive development with a capital cost of US\$2.5 billion and initial production of 100,000 barrels per day of oil. With the discovery of Pavo, that was going to be processed through the Dorado facility from year three of production as decline left room for other fields to be tied in.

Santos dragged its feet, then, instead of plucking a number like 100,000 barrels per day out of the air, the Dorado project was re-sized around the actual characteristics of the field. The answer came out at initial production rate of 60,000 barrels per day and a capital cost of US\$1.7 billion. Which is fine but, because of the complications of the development, initial production is still five years away at best. And because of the lower production rate, initial production from Pavo as a feed-in to Dorado is another five years after that. So the Nation may not get the benefit from Pavo production until the late 2030's at this rate. Australia needs the Pavo oilfield online tomorrow. Pavo is a national security issue now.

Pavo is a simple, uncomplicated development. It is in 88 metres of water and has a low gas to oil ratio. It has the same API gravity (a measure of oil density) as the Dorado field of 52° which means that they came from the same source kitchen. The reason why Pavo has a low gas to oil ratio is that the methane and ethane components were washed out by passing groundwater. This the cause of the paleo oil-water contact which is an artefact of the maximum extent of the field before the gas-washing began.

One of the partners in Pavo, Carnarvon Energy, has bid Santos for its equity in the field. Carnarvon believes it can develop Pavo for a capital outlay of US\$300 million with initial production of the order of 25,000 barrels per day. The proposed production rate is driven by reservoir support considerations. Pavo South-1 won't be drilled prior to the Pavo jacket installation. Enough drill slots will be incorporated into the platform to optimally develop Pavo South, saving perhaps \$60 million on an exploration well. Incorporating Pavo South into the development would like lift the production rate towards 60,000 barrels per day. Once Pavo has been developed, small discoveries in the region could be tied back to it and brought online quickly.

Carnarvon has structured its prospect inventory on the basis of clusters around the largest, most prospective prospects. If the large prospects come in as discoveries, all the prospects around it get rerated and become potential feed to its development. This is Carnarvon's assessment of the prospectivity of the area around Pavo:

Prospect Name	Gas Mean BCF	Oil Mean Mbbls	BOE Total Mbbls	Success Risk	CVN Equity	Gas/Oil BCF/Mbbl	Riskd BOE Mbbls
Torin	15	58	61	0.38	0.2	0.26	23.2
Ortona	181	105	137	0.1	0.2	1.72	13.7
Taurus	102	5	23	0.38	0.1	20.40	8.7
Diachi	4	15	16	0.54	0.2	0.27	8.6
Gurbani	73	42	55	0.1	0.1	1.74	5.5
Tucana	30	18	24	0.22	0.2	1.67	5.3
Sum	405	243	315			1.67	
Pavo South	10	66	68	0.64	0.1	0.15	43.5
Cluster Total	415	309	383			1.34	108.6

What the table means is that development of the Pavo oilfield is expect to unlock a further 108 million barrels (oil equivalent) in the average case.

For Western Australia, the proposal outlined above totalling \$24.4 billion is the best possible near-term outcome. For the three million residents of the State, the per capita cost is only \$8,814 and well worth it for things that will operate with a positive cash flow. When the oil and gas fields run out, as they will, liquids production can switch to applying the Bergius liquefaction process to the lignites that exist in a belt from Salmon Gums, north of Ravensthorpe, wrapping around the Yilgarn Craton towards the South Australian border. When the lignites run out, as they will, the feedstock for the Bergius plant will switch to the eucalypts of the high rainfall forests of the southwest. Ideally this conversion from useless wood to precious liquids will be powered by breeder reactors.

Choices are more constrained on the east coast. There is no easy oil and gas left but there are plenty of coalfields from Cape York to the southern margin of the continent and then around into South Australia. There is also plenty of oil shale, in Tertiary half grabens such as the Gladstone deposit and the Cretaceous Toolebuc Formation in a sheet covering a big chunk of north Queensland.

The solution for the east coast is installing Bergius coal liquefaction plants. There is plenty of coal that is too low grade for export, either due to ash content or water content, which would be ideal because it is next to worthless. There was a Japanese Bergius research plant in the Latrobe Valley which operated up to 1991. Victorian brown coal has a high reactivity and thus a low residence time in the process chamber. This Japanese effort determined a price hurdle of US\$40 per barrel for development in 1991 dollars (oil was US\$24 per barrel at the time). That equates to US\$95.20 in 2026 dollars which is less than the current Brent price. To quote a line from the movie *Aliens*, the *readouts are all in the green*. There are no impediments to Australia becoming completely autarkic in liquids fuel production, and also petrochemical precursors and LPG, and ammonium sulphate for fertiliser. Well, no impediments apart from the current State and Federal Governments.

The current diesel price in one of the suburbs of Perth is \$2.92 per litre which equates to \$464 per barrel, which is US\$325 per barrel. Besides getting out of the way, there is something positive the Federal Government should do. There is a \$0.537 per litre levy on retail diesel and petrol, equating to US\$58 per barrel.

Some people are expecting the oil price to fall after the current problems of the Middle East are resolved. We know that because the quote today for the oil price futures market for December 2026 is US\$85 per barrel. The big, positive contribution the Federal Government could make is to apply the fuel levy towards price support for all oilfield and Bergius plant developers selling into the domestic market, with a price floor of, say, US\$105 per barrel. That would cover developers down to US\$47 per barrel and take most of the risk out of these projects. Funds raised from the fuel levy currently go into general revenue. If the oil price support mechanism was triggered, the funding for that could be taken out of the NDIS and nobody would actually be any worse off.

The contretemps in the Middle East is masking a big development in the world's oil supply. US tight oil production has peaked and tipped over into a decline which should be just as steep as the rise. At the county level, the first sign of what was to come was Howard County in Texas:

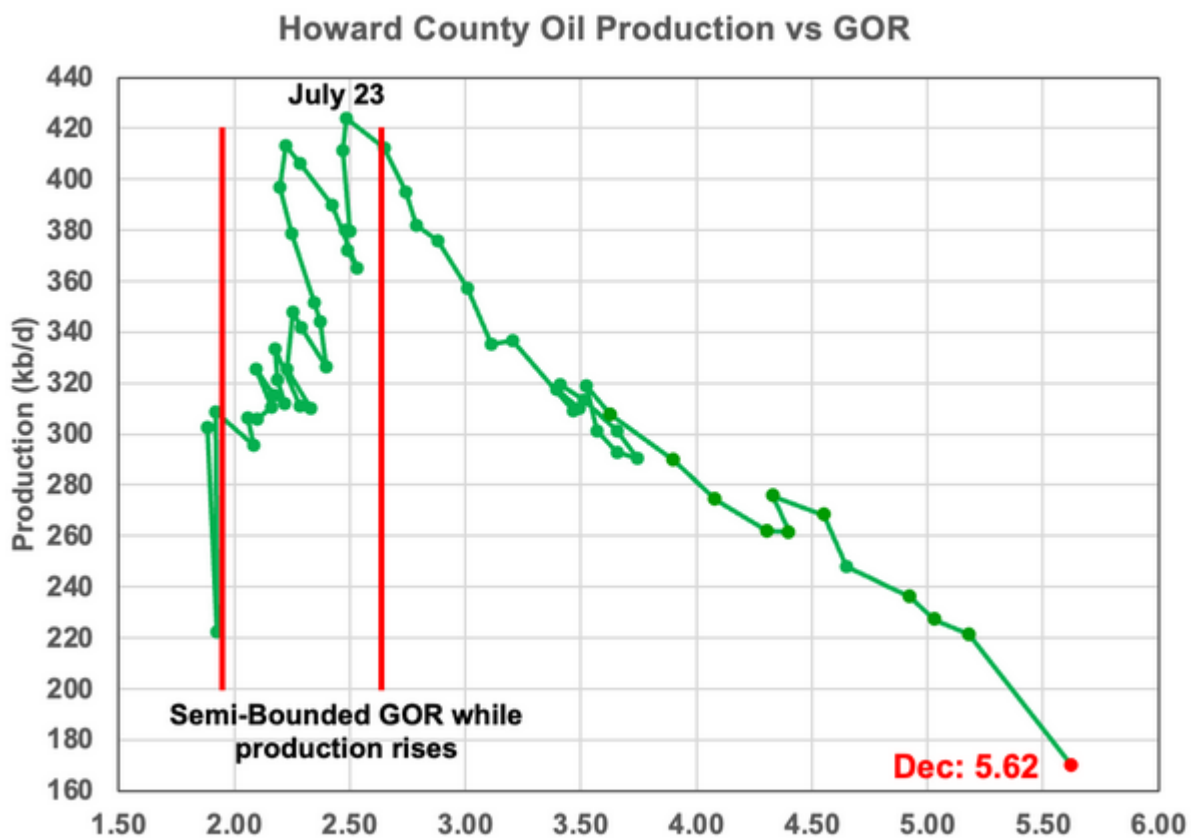


Figure 17: Howard County, Texas oil production versus gas/oil ratio

Production from Howard County peaked near 420,000 barrels per day July 2023. Little Howard County with an area of 2,341 square kilometres produced well in excess of Australia's effort in that year. Then the reservoir pressure dropped below

the bubble point and oil production followed. It is now down 60% in the two and a half years from that peak. The rest of the Permian Basin of Texas and New Mexico will mimic Howard County to some extent. For example, following is District 8 of Texas:

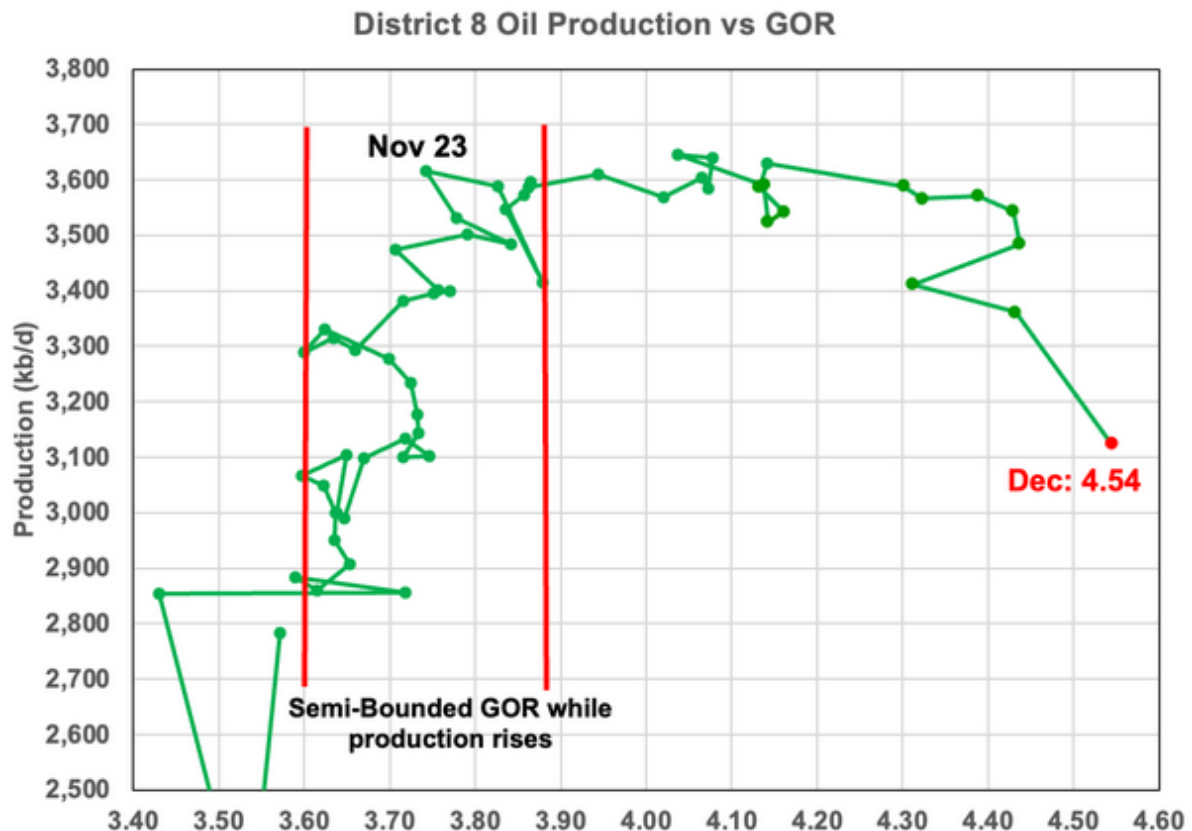


Figure 18: District 8, Texas oil production versus gas/oil ratio

Oil production from District 8 got to 3.6 million barrels per day, equivalent to some large Middle East producers, in November 2023. Production went sideways for almost two years while the gas to oil ratio blew out but then started dropping rapidly in late 2025. The tightening of the world oil market due to declining Permian Basin production is well in train. How fast will the decline be? The following graph is a pointer as to what to expect:

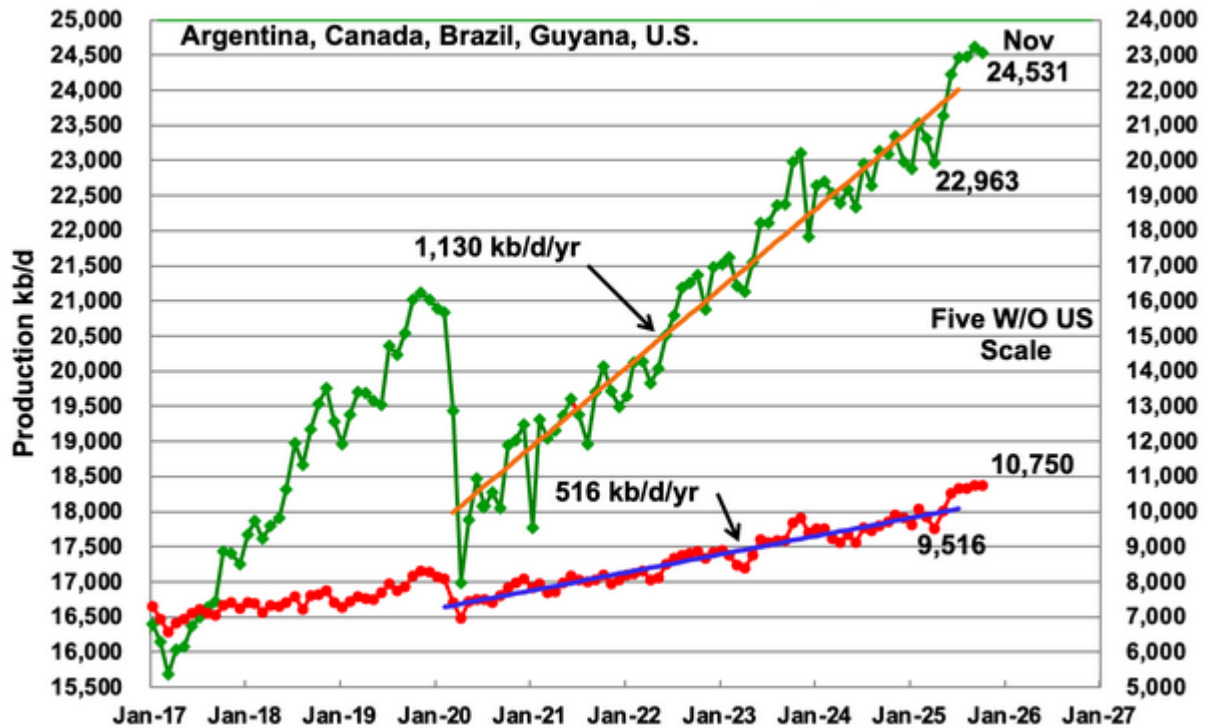


Figure 19: Five countries that provided production growth over the last 10 years

The red line is production from Argentina, Canada, Brazil and Guyana over the last 10 years. The green line includes those countries with the addition of the United States. Be aware that the two lines have different scales. US production growth added a consistent 600,000 barrels per day to world oil production. According to resource extraction theory, falling US production will now take 600,000 barrels per day from world production, each year for the next 10 years.

The future is coal liquefaction by the Bergius process. How it works is shown in this graphic from Friedrich Bergius' Nobel Prize acceptance speech in 1931:

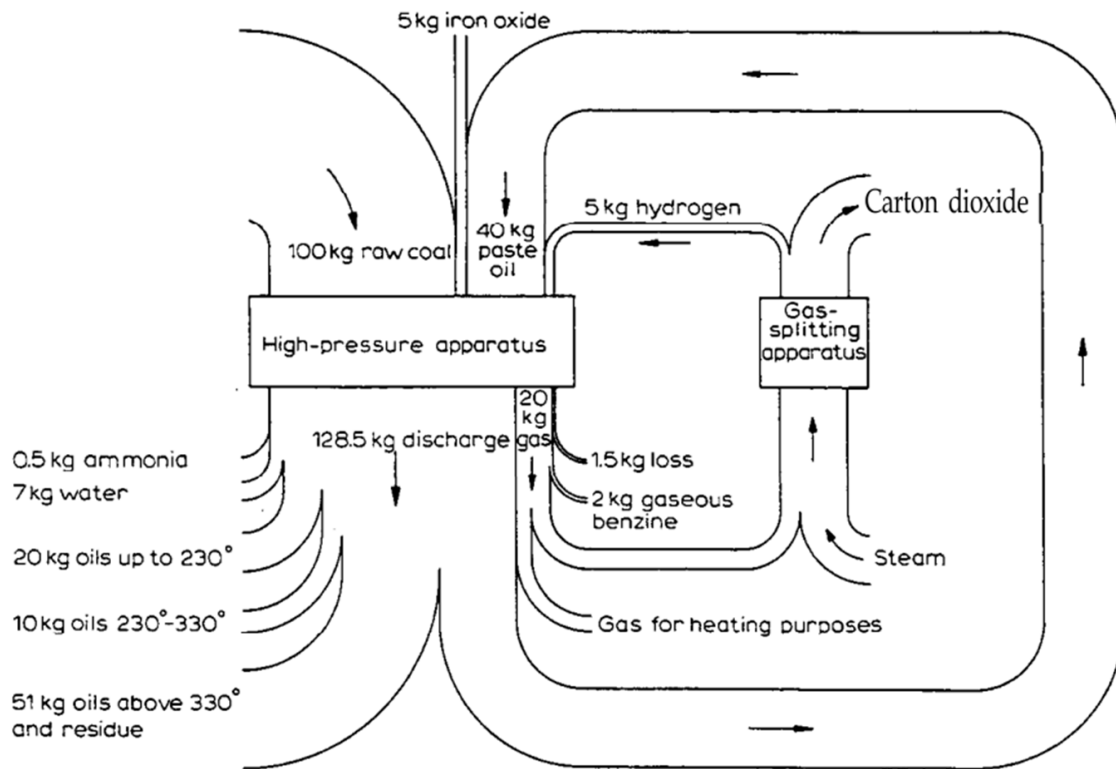


Figure 20: Mass balance diagram for the Bergius process

Addition of 5 kg of hydrogen to 100 kg of coal turns it from a low value solid into precious liquids. The hydrogen is made by steam reforming of part of the gas stream. Oil has a specific gravity close to 0.8 so 100 kg of coal converts to 71 kg of oil which has a volume of 90 litres. On that basis, one tonne of good quality coal will convert to 5.6

barrels of oil. Lignite, with a 40% water content, would produce 40% less. The process conditions are 250 atmospheres of pressure (3,500 psi) and 300 °C. Hydrogen causes embrittlement of carbon steel above 200 °C and so stainless steel needs to be used. How much stainless steel? A length of stainless steel pipe 50 metres long, 900 mm in diameter and with a wall thickness of 10 mm will allow a one hour residence time to produce 5,000 barrels per day.

How much will that cost us? A Bergius plant consuming 5,000 tonnes per day of bituminous coal with 10% ash and 10% moisture will produce 28,000 barrels per day of liquid fuels, plus some LPG. The product split will be:

Petrol	10,000 barrels per day
Jet fuel	4,000 barrels per day
Diesel	14,000 barrels per day

That's a rough guide; hydrotreating can change long chain molecules into more valuable short chain ones. The cost of the plant is US\$3.2 billion, which is A\$4.5 billion. Costs on a per litre basis will be:

Coal at US\$142/tonne	\$0.43
Operating costs	\$0.13
Depreciation over 10 years	\$0.26

Profit margin	\$0.39
Total	\$1.21

Lower grade coal could be used for a considerable cost saving. Ash and water don't impair the process, they only take up space in the reactor vessel which has a one-hour residence time. The total cost of \$1.21 per litre equates to US\$135 per barrel, which, after transport and refining costs, is close to the international diesel price at the moment. The cost of \$2.50 per litre at the pump equates to \$400 per barrel which in turn is US\$262 per barrel.

The wholesale price is affordable. What about the capital cost per consumer? The drive-away price of a Toyota Corolla Hybrid is \$37,000. Its fuel consumption rate is 25 kilometres per litre. If the vehicle does the normal 20,000 km per year, that is 800 litres to get there. The capital cost of a litre of annual production is \$2.63. If we multiply that by the 800 litres of fuel consumption per annum, the Corolla's share of the cost of the Bergius plant to supply it is \$2,100. This is 5.7% of the drive-away price, less than the cost of a refrigerator or some TVs, and a fraction of the \$8,000 you can pay for extra trim for the Corolla. Car buyers should be given the option of buying a perpetual fuel supply for their vehicles.

It is the same story with wheat-growing. Medium-rainfall country in the WA wheatbelt is currently selling for \$7,500 per hectare. Each hectare is expected to produce 2.5 tonnes of wheat per hectare, using 15 litres of diesel per tonne in no-till cropping, equating to 38 litres per hectare.

At the moment, that diesel supply is on a hand-to-mouth basis. The farmer might get his crop in, but will there be diesel for sale come harvest? To reduce risk he could buy in the diesel for harvest at the time of planting and keep it in tanks on the farm. Better yet, he could guarantee supply in perpetuity by paying \$2.63 per annual litre of production from a Bergius plant for an outlay of \$100 per hectare, increasing his capital outlay by 1.3%. The cost of disruption is far, far greater than the outlay for fuel supply to the farm. The same is true for mining, trucking and all the other activities of productive people.

How much coal do we have available? Geoscience Australia says we have 65 billion tonnes of measured resource of brown coal in the Latrobe Valley, part of a total of 489 billion tonnes of brown coal in the country. Assuming a product yield of 3.5 barrels per tonne of lignite, our brown coal resource would convert to 1,637 billion barrels. This is over six times Saudi Arabia's oil reserves. Beyond that is our black coal resource of 130 billion tonnes of course. There is also a substantial oil shale resource in the Toolebuc Formation of Queensland and some other, lesser oil shale deposits.

For self-sufficiency in liquid fuels, we need 33 Bergius plants each producing 30,000 barrels per day at a cost of \$4.6 billion per plant, for a total outlay of \$152 billion. Somehow we have run up a national debt of \$1 trillion in the last 25 years and have nothing to show for it. Building the coal liquefaction plants we need will be an enormous benefit by comparison. We can do it. Figure 12 following shows what that would look like:

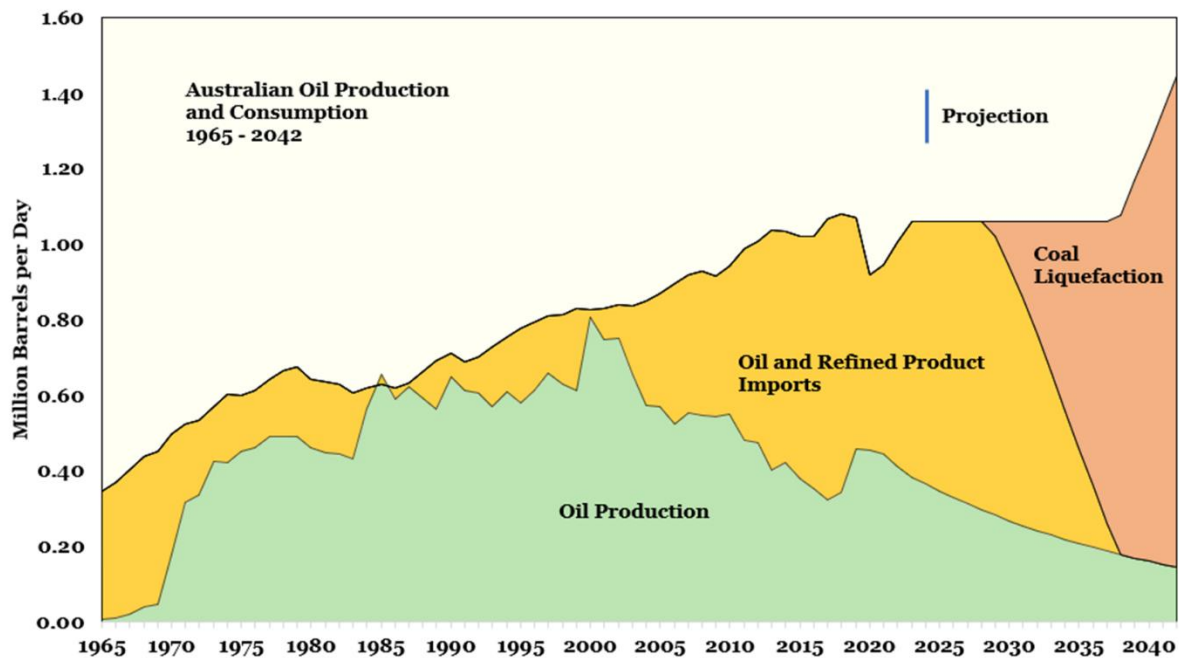


Figure 21: Australian Oil Production and Consumption 1965 – 2042

After we have built enough Bergius capacity to satisfy our own needs we could keep going and help supply friendly neighbouring countries in the Pacific region. Replacement of oil imports and beginning refined product exports will give a big boost to our terms of trade.

Similarly, once we have our breeder-technology nuclear reactors sorted out, we can keep building reactors to power electrolyzers to supply the hydrogen for the Bergius plants. This will increase the net energy from our coal reserves by 20%. Scaled to our current power demand and its daily demand swing, this is what it would look like:

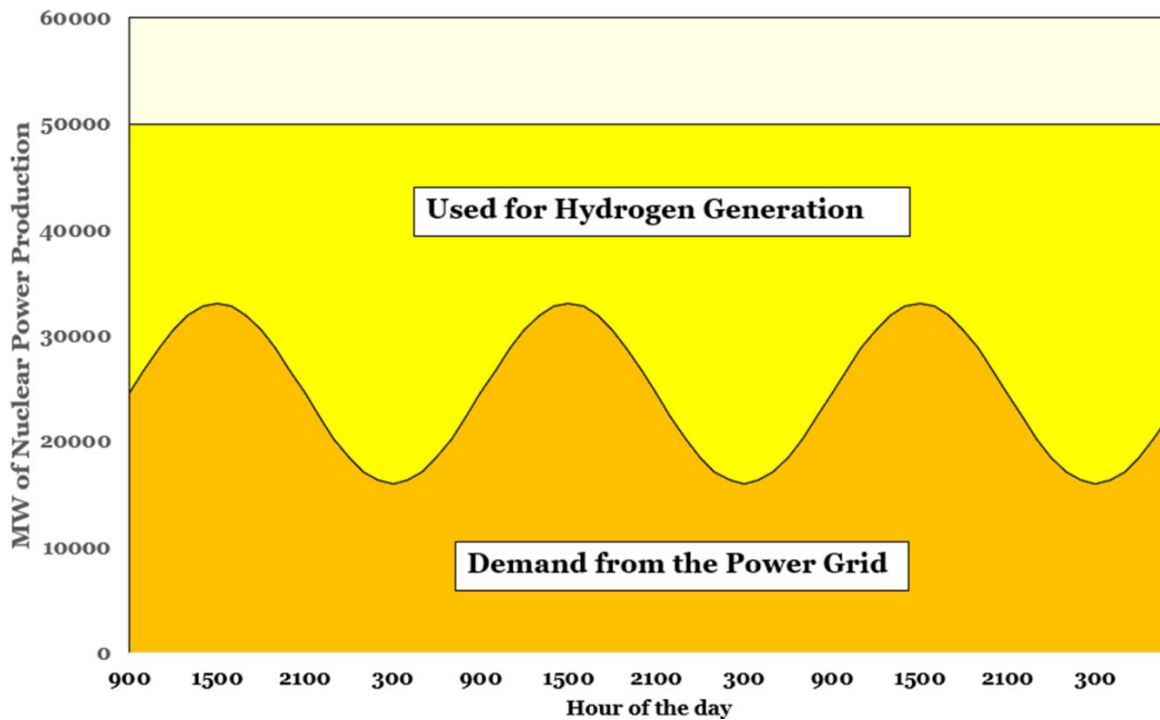


Figure 22: Demand split between the power grid and hydrogen electrolysis

Electrolysis to produce hydrogen for the Bergius plants will allow the nuclear power plants to operate at permanent full power. Electrolysers can be turned down to 25% of rated capacity without impacting efficiency.

Summary

We are going to Net Zero whether we like it or not because one day we will run out of fossil fuels. Renewable energy is neither recyclable or sustainable. Nuclear is the only energy source that can maintain Australia's standard of living at a high level.

Breeder reactors are the only nuclear technology that will use all our nuclear fuel endowment. Coal should be saved for conversion to liquid fuels, not burnt in power stations. Our motto should be 'Conserve to Convert'.

Hydrogen enables the conversion of electrical energy from nuclear reactors to chemical potential. Carbon is the carrier for hydrogen so that it can be used in high-energy-density liquid fuel at room temperature and pressure. The foundation of our future civilisation will be uranium + hydrogen + carbon.

The sooner we start down that path, the safer we will be.

David Archibald

4th September, 2026

2. The Weird Psychology of Two Liberal Party Takers

Published online on Wentworth Report on 7th July, 2026.

Elon Musk has simplified the political lexicon with the terms makers and takers; no explanation needed. The takers in this instance are the former Army captains Andrew Hastie and Jonathon Huston, members for the Federal seat of Canning and the State seat of Nedlands respectively. Of the two, Hastie is doing the greater damage to the country so we will start with him.

Hastie did not have a glorious war in Afghanistan. His war was one of carelessness, vindictiveness and slight regard for him by his own troops. The carelessness was shown by the fact that two Afghan shepherd boys, 6 and 7, were killed by a helicopter strike called in by him. He may not have communicated directly with the American Apache helicopter involved but he was in command which means he bears responsibility. There is a strict procedure in calling in air strikes to avoid wasting munitions on the wrong targets. The fact that the wrong people were killed means there was laxity in following regulations. Nevertheless the Defence Department was merciful and 'no adverse findings were made against ADF personnel' meaning Hastie.

Hastie has a high opinion of his own moral rectitude so engaged in a lot of performative [rending of garments](#) for his role in killing the [innocent shepherd](#) boys. From those articles:

Hastie said the shooting was a very sad and tragic consequence of war. "It's an incident that I know all involved hold deep regret, including myself," he said.

As I have said previously, not everything goes to plan in any aspect of life, let alone in a high-pressure war zone where people are trying to kill you.

The example reported today of an accidental shooting of two young Afghan civilians from a US Apache helicopter is a very, very sad and tragic consequence of war.

And the tell: I've seen these things and I've had to have the strength of character, integrity and honour to deal with these incidents and serve my country.

It is a truism that anyone who feels the need to talk about their 'integrity and honour' is warning others that the proclaimer may be deficient in integrity and honour. If someone is self-confident in those things, they don't mention them.

The slight regard for Hastie by the troops under his command was shown by the incident in which Hastie, orbiting the battlefield in a helicopter, told his troops to bring back biometric data on insurgents if they could. So two of them cut the hands off a dead Afghan to bring back to camp for the fingerprints, most likely just to freak him out. By his own admission, Hastie never fired a shot in anger in Afghanistan; he was likely not inclined to.

Hastie's vindictiveness is manifest in his decade-long campaign against someone who had a very good war indeed, Ben Roberts-Smith. Ben Roberts-Smith is the

epitome of manly virtue, fearlessness and selflessness. He risked his own life to save his comrades-in-arms more than once. His guidance was appreciated by younger troops. Nobody had a bad word to say about him. Ben Roberts-Smith is the exact opposite of our hapless do-gooder, Andrew Hastie. So why the vindictiveness? The psychological term for it is narcissistic projection. Ordinary projection is a defence mechanism in which someone attributes their own unacceptable behaviours to another person. Instead of acknowledging these things in themselves, they "project" them outward and accuse or criticize others for the very same issues. Narcissistic projection is a more deliberate or manipulative version often seen in personality disorders, where the person accuses others of their own toxic behaviours to deflect blame and maintain a positive self-image.

Toxic behaviour? Most readers will be unaware that Hastie has been a defendant in a defamation case brought by Perth businessman Greg Poland. Hastie was given a recording of a private conversation between Mr Poland and a third party. It appears that Hastie passed the recording on to former State Liberal leader Kirkup, who then passed it on to journalists, who in turn wrote articles defamatory of Mr Poland. Toxic or not, this is not the behaviour of a gentleman. The case is ongoing in the WA Supreme Court.

Hastie is a fabulist. He tells stories to himself often enough that he believes them. In this [article](#), he says he was shamed by the Brereton Report of 2020. If he had any grip on reality, he should have been laughing at it instead because on page 120 the report says that Australian special forces had a habit of surrounding Afghan villages and then tying up and torturing all the men and boys before slitting their throats. Not one such village has been named or found despite the more than \$300 million spent on trying to find war crimes in Afghanistan. You can't take seriously anyone who takes the Brereton Report seriously.

In this [article](#), Hastie admits to making things up saying that his "observations, along with what he had heard and been told over the years, formed a "mosaic" in his mind that Mr Roberts-Smith had committed a war crime killing at Syahchow". Hastie has accused Ben Roberts-Smith of murdering six Afghans. One peculiarity of all these claims is that there is not one photo of any of the dead Afghans. In another [article](#), Hastie alleged that Ben Roberts-Smith "blooded" a rookie soldier by ordering him to murder an unarmed Afghan. One problem with that story is that the word rookie is an Americanism. No Australian of the sort that would join the SAS would use it in conversation. The fable of 'blooding the rookie' was likely dreamt up in Canberra.

The clearest evidence that Hastie's animus against Ben Roberts-Smith is driven by narcissistic projection is when he said in court that 'Mr Roberts-Smith was a hypocrite, because "bad stuff had happened in Afghanistan, and yet the outward-facing picture of Mr Roberts-Smith was at odds with his battlefield conduct". Hastie could have been describing himself because after 11 years of pretending to be a conservative, earlier this year he outed himself as a taker, that is a leftie, in [this article](#) with this headline:

Andrew Hastie reveals unlikely friendship with Malcolm Turnbull

In the article, Hastie is quoted as saying that “he was open to possible changes to the capital gains tax discount, negative gearing and a windfall profit tax on gas exports.” It is spooky that he anticipated what happened in the budget a couple of months later. He is so in tune with Labor Party thinking. Yet more repulsive is that Hastie spoke of a father-son dynamic with Malcolm Turnbull. In defence circles in Canberra, Hastie is considered to be an arrogant lightweight. He will not be missed.

The other troubled soul, former Captain Huston, resigned from the Liberal Party so he could advocate for higher royalties on mining companies operating in WA. And he also believes that Ben Roberts-Smith was responsible for five murders in Afghanistan for which there are 21 witnesses, but strangely no photographs, not a single one.

David Archibald is the author of [*American Gripen: The Solution to the F-35 Nightmare*](#)

P.S. It appears that Hastie now regrets trying to destroy Ben Roberts-Smith's life, not because it was a nasty, unchristian thing to do but because it has ruined him politically. This [article](#) has this headline:

Liberal MP Andrew Hastie is trying to move on from Ben Roberts-Smith. The world won't let him

The Perth politician says he has been targeted for his 'very small' involvement in the accusations against the Victoria Cross awardee by a funded online campaign.

Hastie had previously boasted of his role in the persecution of Ben Roberts-Smith. It mostly sprang from his imagination.

3. The F-47

Published online on the Wentworth Report on 26th March, 2025.



Above is some artwork released with the announcement of the USAF decision to proceed with the Next Generation Air Dominance fighter (NGAD). We can interpret it in the context of the history of US fighter aircraft to determine the likely attributes of the F-47.

Firstly, it is likely to be a single engine fighter. If it were a twin engine aircraft, the canopy would be just too large relative to the size of the aircraft. At one stage the NGAD development was going to cost US\$300 million per aircraft. As aircraft costs have been US\$4,000 per pound, that implies an aircraft weight approaching 30 tonnes. By comparison, the F-22 weighs 19.7 tonnes and the biggest fighter ever built, the Tu-28 of 1964, weighed 24.5 tonnes. The USAF can't afford such an expensive fighter so the notion of a low-cost version was floated a couple of years ago.

Low cost means one engine which is fine. Back in the 1950s and 1960s, jet engines used to fail a lot. These days more fighter aircraft are lost due to bird strike rather than engine failure. Relative to the same power output, a second engine increases the capital cost of an aircraft by 20%. As operating costs are usually twice the capital cost over the life of the aircraft, having a second engine is a cost penalty equal to 40% of the capital cost of the aircraft. So, you have to have a good reason to need a second engine.

This is the first fighter aircraft to have noticeably dihedral wings, which means that the wings are angled up from the horizontal. This shape is suggestive of a hypersonic glide vehicle, obtaining a lot of lift from the fuselage. In turn this means that the aircraft is optimised for high level flight without much prospect of violent manoeuvring. Drag decreases with height as the air gets thinner so this is a way of increasing range.

The biggest benefit from the dihedral wings would be its effect on radar signature. The ventral surfaces of the wings and the fuselage have the potential to be absolutely flat and thus most radar energy would bounce off at a low angle. At the same time, the upsweep of the dihedral wings would put the fuselage in a radar shadow. It is a very promising shape in terms of low radar signature.

Dihedral wings also contribute to lateral stability in what is likely to be a tailless design. Tails are a source of drag. They can be removed from the design if your software can manage the flaps correctly to maintain stability. This may also explain the canards as another way of controlling yaw.

The last time the USAF had the opportunity to adopt such a stealthy design was the flyoff between the YF-22 and the YF-23 in 1990. The YF-23 was intrinsically stealthy from its shaping. One of the selection criteria was a combat range of 1,000 km. The YF-22 won the competition but in development was found to need tonnes of radar absorbent material (RAM) spackled onto its skin to meet its radar signature requirement. This in turn reduced its combat range to 700 km. Maintaining the RAM on the USAF's F-22s is half the hourly maintenance cost of US\$85,000 per hour. What was initially to be a fleet of 750 aircraft was stopped at 187. In effect, the F-22 was killed off by its own RAM. The wrong choice was made back in 1990 because of not thinking through the consequences of particular choices. By comparison, the F-47 is not going to need much RAM at all, if any.

The F-22 was followed by another debacle, the F-35 which was supposed to be the low-cost supplement to the F-22. Once again, the F-35 is hobbled by the choices that were made to make it the winner of the flyoff competition. After those two failures, the USAF got religion and did the design work for the NGAD itself, from first principles.

It is likely that the F-47 has a dorsal air inlet rather than inlets under the wings. This would bring two advantages. Firstly, it would leave the ventral surfaces of the aircraft absolutely flat to minimise radar signature. Secondly, it would minimise the volume of the air duct to the engine, which in turn would reduce the surface area of the aircraft. That in turn would reduce drag and thus have lower fuel consumption, and reduce the radar signature. Traditionally, fighter aircraft have had their air intakes under the wings because pitching up, otherwise, reduces the airflow to the engines and may cause them to stall. The Su-27 and the rest of the flanker family have been performing the cobra manoeuvre for decades, though, without that happening. A dorsal intake also eliminates the potential for foreign object damage to the engine by things flung up from the runway while taxiing. It also allows for the optimum management of the real estate under the fuselage between the needs of the landing gear and the missile bay.

Next up is the weapons system. This is likely to be the AIM-174 which is the air-launched version of the SM-6 missile. The SM-6, mostly used as an air defence weapon by ships at sea, was created by mating the active radar seeker from the AIM-120 air-to-air missile with the body of the SM-2 Block IV missile. Ground-launched it has a range of 400 km. Air-launched, without the booster, it has a range of 600 km.

The F-47 armed with the AIM-174 is in the ethos of the Mitsubishi G4M (Betty) bomber of WW2. Japan built 2,435 of these with a return range of 3,000 km and armed with one torpedo. Allied ships that thought they were safe from land-based aircraft would be suddenly surprised by the appearance of a Betty bomber attacking them.

President Trump said that the fighter named after him has a speed of '2'. He means Mach 2. The first single engine fighter to reach Mach 2 was the Lockheed F-104 Starfighter in 1958. Its top speed was Mach 2.2 or 2,335 kilometres per hour. The F-47 is also the slipperiest fighter aircraft since the F-104 and this would contribute to range and top speed.

There may be a new engine for the F-47 or the USAF could just as well use an existing one. Using the F119 engine from the F-22 would mean an aircraft as large as the F-35. Its main sensor would be its infrared search and track (IRST). IRST only provides a bearing though, no information on distance. Using two F-47 in a flight of two would provide range data by triangulation. The F-47 is in a new subtype of fighter aircraft termed 'penetrating counter-air' which means it will be able to approach enemy SAM systems and aircraft close enough to snipe at enemy aircraft with long range missiles. In particular, it could be expected to push enemy AWACS and tanker aircraft well back from the front line. The USAF expects the F-15EX to perform traditional fighter work up to the front line but not be able to enter the coverage of enemy SAM systems.

The F-47 could also launch long range antiship missiles, such as the PrSM Increment 2, against Chinese ships. The total range of the system in that case would be 3,000 km. X-47s could take off from Guam, top up their fuel tanks over the Philippine Sea and go on to sink Chinese invasion barges in the Taiwan Strait.



The design heritage of the shovel nose of the X-47 likely starts with a Northrop experimental aircraft called Tacit Blue, shown above. Tacit Blue flew from 1982 to 1985. Note also the dorsal air intake, likely also copied in the X-47.

More recently, Scaled Composites, now owned by Northrop, produced an experimental aircraft called the Model 401 in 2017:



The slope angle of the dihedral wings is close to that of the X-47. Also note the dorsal engine air intake. This aircraft was likely made to test concepts for the NGAD program.

The combat role of the X-47 is the same as China's new J-36 fighter. That is to fly high and fast, try to remain undetected and fling missiles at long range targets. The J-36 has three times as many engines though, likely weighs three times as much without much of an increase in combat efficacy over the X-47. The J-36 is not as slippery as the X-47 and may have more than three times the infrared signature at the same speed. In which case it may be possible that the X-47's higher survivability more than offsets its lower missile loadout. It is also likely to be more cost-effective in sinking Chinese ships than *Virginia* class submarines.

How many F-47s could the US produce? In the mid-1980s, General Dynamics was producing the single-engine F-16 at a peak rate of 30 per month. The X-47 is about 50% larger than the F-16 but a similar production rate or higher would be eminently achievable.

David Archibald is the author of [*American Gripen: The Solution to the F-35 Nightmare*](#).

4. The Chicom Circumnavigation

Published online on the Wentworth Report on 10th March, 2025.

Fort Denison in Sydney Harbour was built in 1841 to thwart the potential for a Russian attack on Sydney. In those days, the Russians might have been first sighted as they came through the heads. By the time of WW1, the first indication of enemy warships approaching would have been smoke on the horizon from their coal-fired engines. You might be trading shells with them a few minutes later.

These days you see the enemy ships in port in satellite photos. You can follow their progress from satellites. The wakes they make can be hundreds of kilometres long on either side of their passage. If you come across a wake, you can follow it up to find out what is causing it. Sound travels enormous distances underwater. *Astute* class submarines on the eastern side of the Atlantic can hear individual ships leaving American ports on the western side. Individual ships in the same naval class make distinctive sounds which means you can know the name of the ship you are tracking. Ships also stand out against the ocean on infrared and synthetic aperture radar.

Modern AWACS aircraft can detect a jetski on the ocean surface from 200 km away. It is said that the rise of drones is depopulating the front lines in land warfare as survival means hiding all the time. It is worse on the open ocean because there is nowhere to hide. The world's oceans are like the Mediterranean in WW2. There is no sanctuary because ships can be attacked by land-based aircraft all the time. The bigger and more powerful the ship, the sooner it will be found, tracked and targeted. The Russians have demonstrated this in the Black Sea where their surviving ships have been driven to the eastern end of it by a country without a navy.

Recently the People's Liberation Army Navy sent three ships for an excursion south of the Equator:

Ship	Tonnage	Armament
Type 054A frigate <i>Hengyang</i>	4,000 tonnes	32 VLS cells
Type 055 destroyer <i>Zunyi</i>	11,000 tonnes	112 VLS cells
Type 903 oiler <i>Weishanhu</i>	23,000 tonnes	

The two armed vessels have a one-way range of 9,300 km at 12 knots which is 22 km per hour. From Hainan Island without the tanker, they could have got as far as Port Hedland before having to turn around. So to make their trip possible, they were accompanied by a tanker that could supply them at sea.

Which means that if their unarmed tanker was sunk, they would immediately have to turn around and head back to China. In effect, most of the combat effort of the flotilla would have to be applied to protecting the tanker. Some 81 of the 112 vertical launch cells of the Type 055 destroyer are devoted to surface-to-air missiles (SAM). Once those are depleted, the ship is defenceless. The range of the SAMs is up to 200 km. Antiship cruise missiles are now being priced down to US\$0.15 million per copy. So,

in theory you could stand off more than 200 km and fling 81 antiship cruise missiles at the Type 055 destroyer, with a build cost of US\$1 billion, and render it defenceless for an outlay of \$12.5 million. It could happen with less effort than that as US Navy tests have found that swarming tactics work. If you fling five to seven missiles at a time, at least one will get through on average and hit the ship.

Even a decade ago it was realised that the cost of sinking a ship is about five percent of the cost of building it. It gets better in that once the VLS cells are depleted, the ship has to return to a friendly port to reload them. From the middle of the Tasman Sea where the Chicom ships conducted their live fire exercise, that is 15,000 km back to Hainan Island. That would take them 28 days at 12 knots. The flotilla could have fired 40-odd cruise missiles, being the non-SAM portion of their VLS loadout, at targets in Australia but it would have been a kamikaze mission.

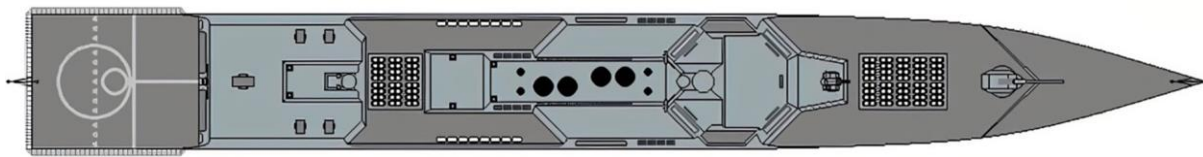


Figure 1: Artist's impression of the view of a Type 055 destroyer from a PrSM Increment 2 missile on final approach at Mach 3

This year Australia will be doing some final assembly of PrSM missiles with a ground-launched range of 620 k. There is an Increment 2 version of the PrSM missile that has been successfully tested hitting ships at sea. That was from Palau last May. It can't be spoofed because it finds its target by infrared imaging combined with homing in on the target's radar emissions. It is said that the radar of the Type 055 destroyer can detect aircraft up to 500 km away which in turn means that the location of the destroyer can be determined from twice that distance.

You don't have to wait for a Chinese ship to get within 600 km of the Australian coastline before you fire at it. Air-launching a ballistic missile doubles its range. Strapping a PrSM Increment 2 to an aircraft means that the range is only limited by the range of the aircraft. In theory, Australian aircraft with a 3,000 km return range, taking off from Darwin, could sink Chinese ships in the Taiwan Strait and thus contribute to the defence of Taiwan.

The Ukraine War has also shown that air-breathing cruise missiles are easily shot down. Ballistic missiles like the PrSM though travel at 50 km altitude. There is no existing Chinese SAM system that has a chance of intercepting them until their final dive on the Chinese ship. And intercepting a missile that is coming down vertically at Mach 3 is difficult.

All we need to ensure that Australia is never invaded is having enough air-launched, antiship ballistic missiles. Having the aircraft to launch them from would be helpful too.

David Archibald is the author of [*American Gripen: The Solution to the F-35 Nightmare*](#).