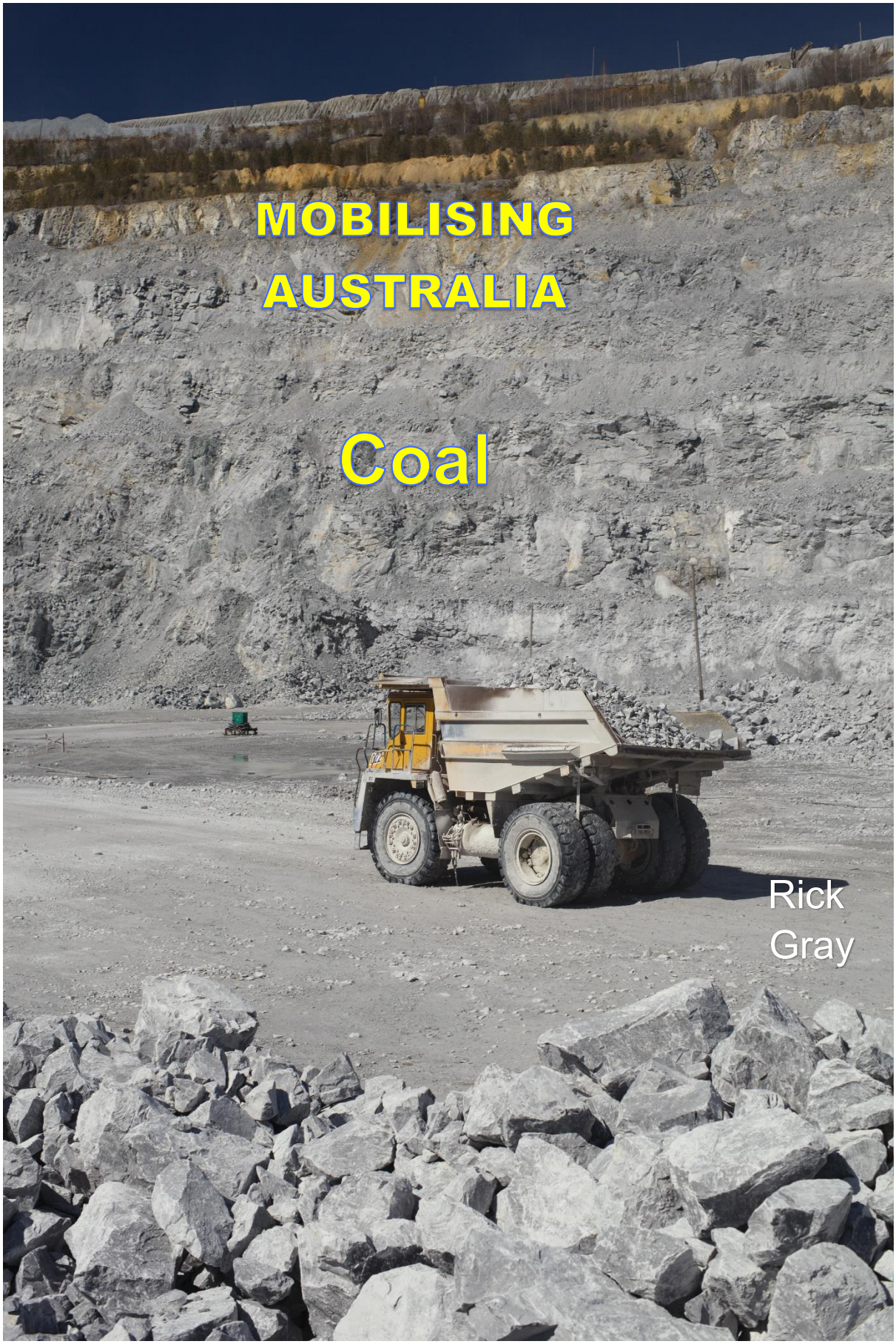
MOBILISING
AUSTRALIA
Coal
Rick
Gray

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COAL

Coal, a fossil fuel, originates from plant remains dating back millions of years. Over time, layers of plant debris were subjected to intense heat and pressure, triggering a transformation process. This process involved the consolidation and compression of plant matter between other rock layers, transforming it into a dense, carbon-rich substance we now identify as coal. The formation of coal seams results from this prolonged geological process, known as 'coalification', and the rank and quality of coal are determined by the degree of change undergone.

Coal is classified into four main types: ***lignite, sub-bituminous, bituminous, and anthracite***. Bituminous and anthracite coals are commonly called hard coals, while lignite is known as 'brown' coal. Sub-bituminous coal is a rank between hard and brown coal, sharing characteristics of both. The "rank", or quality, of coal is determined by the degree to which the original plant material has been transformed into carbon. The more extensive the transformation, the higher the coal's rank.

Historically, low-cost, abundant brown and black coal powered Australian industry, particularly in Victoria. As coal-fired power has declined under the renewable energy agenda, manufacturing has also declined, again particularly in Victoria. In the 1960s, manufacturing accounted for about 25% of the Victorian Gross State Product; in 2026, it is about 5%.

The International Energy Agency's (IEA) annual coal report finds that global demand is on track to rise by 0.5% in 2025, reaching a new record of 8.85 billion tonnes.

Australian coal is considered high-quality by global standards, particularly its premium metallurgical (coking) coal and export-grade thermal coal, which are cleaner and higher-energy than those of many competitors.

Primary Energy Mix

To appreciate the importance of coal, we need to understand how much it drives the national economy. The primary energy mix refers to the sources of the world's and Australia's total energy supply, including electricity, transport fuels, heating, and industrial energy. For 2024, the primary energy mix was approximately:

Primary Energy	Global	Australia	Aust Electricity
Oil	34%	41%	2%
Coal	**28%**	**25%**	**45%**
Natural Gas	25%	25%	17%
Nuclear	7%	0	0
Renewables	6%	9	36%

Fossil fuels dominate the world's energy supply. Oil remains the largest energy source, closely followed by coal. Renewables account for a relatively small share of total primary energy. The energy mix differs from the electricity mix. Renewables make up a much larger share of electricity generation than of total primary energy.

To put it simply, coal is fundamental to global and Australian prosperity and to the modern world. Coal is indispensable and irreplaceable to the economy. Australia still runs on coal. Coal should change its name to – ***Black Gold!***

> ***It is an inconvenient truth that Australia runs on coal.***

Despite coal's importance to Australia, there is strong opposition to it. Most political parties support phasing out coal-fired power plants, and the Greens are committed to banning all forms of coal use.

Perhaps the greatest irony is that Australia is guilty of the most outrageous hypocrisy in energy policy, worthy of an Olympic gold medal for posturing and sanctimony. On the one hand, we demonise coal, gas, and nuclear power, yet on the other we are one of the world's largest exporters of coal, gas, and uranium ore.

> ***Apparently, Australia is happy for other countries to destroy the planet with our coal, gas, and uranium ore - as long as we can posture against all three on the world stage – whilst making a handy dollar out of it!***

Data

Global

- The largest coal consumers are China (53%), India (9%), Indonesia (9%) and the US (8%).
- Southeast Asia is expected to increase its coal demand by more than 4% per year through at least 2030. India leads the way, with coal demand forecast to rise by 3% per year on average.
- Globally, 611 GW of new coal plant capacity is planned or under construction. By comparison, Australia's total capacity is about 23 GW.
- Coal provides a process material or an energy fuel for:
  - 90% of the world's cement.
  - 70% of the world's steel.
  - 61% of the world's aluminium.

Australia:

- **Global rankings** (Energy Institute, 2024).
  - Black coal reserves: 4th. (about 9%).
  - Brown coal reserves: 2nd. (about 23%).
  - Reserves overall: 3rd.
  - Black Coal Production: 5th (about 7%).
  - Largest Exporters: 2nd (25%).

- **Coal exports:**
  - Coal is the second-largest export after iron ore.

- Around **70% of production is exported**, mostly to Asia.
- Export earnings from black coal were $103 billion in 2022–23.
- Coal represents about 61% of energy exports (energy.gov.au).
- Coal remains a major pillar of Australia's export economy, but its share has dropped from nearly 20% of exports to just over 11% in 2024–25 due to various factors.
- Coal is NSW's single biggest export and one of its largest employers.[RG1]

- **Coal production:**
  - Australia has more than 300 known coal deposits.
  - There were 100+ operating coal mines in 2023, of which only 3 are brown coal.
  - Australia's largest coal mine (by production) is the Loy Yang Mine (Victoria). It supplies Brown coal to the Loy Yang A power station. It is scheduled to operate until 2048.
  - Nearly all of Australia's recoverable brown coal is in Victoria, with more than 90% located in the Gippsland Basin (Latrobe Valley).
  - 99% of all black coal production is concentrated in QLD and NSW.
  - There are two main types of black coal products: metallurgical and Thermal coal.
  - **Metallurgical coal.** Also called met coal or coking coal, is primarily used for steelmaking and other industrial processes. Australia is one of the world's top suppliers of premium metallurgical coal, essential for blast-furnace steelmaking. Its quality advantages create a natural competitive edge that is difficult for other countries to replicate and is required for high-grade coke production. This is why Japan, Korea, India, Taiwan, and Southeast Asia rely heavily on Australian met coal, and why mines like Kestrel in Queensland command multi-billion-dollar valuations.
  - **Thermal coal.** Also called steaming coal, is used to generate electricity. Australian thermal coal exports have several geological and processing advantages that make them highly attractive to utilities in Japan, Korea, India, Vietnam and China.
  - About 90% of Australia's black coal production is exported.
  - Heavy industry and mining rely on coal for heat and process energy.
  - Australia hosts 23 GW of coal-fired plants, about 1% of the world's capacity.
  - It is planned to shut down the nation's largest coal-fired power plant at Eraring, NSW, by 2027; to phase out 90% of coal-fired generation by 2035; and to shut down the last coal-fired plant by 2038.
  - There are 10 coal-fired plants in the national market scheduled to remain open beyond 2030, with 3 in NSW, 6 in QLD and 1 in Vic.
  - All of Victoria's coal-fired power stations are scheduled to close, with Yallourn and Loy Yang A set to shut by 2035 and Loy Yang B by the mid-2040s.
  - As these plants are on the chopping block, owners have no intention of upgrading facilities. As a result, maintenance-related outages are increasing, and the plants may well close much earlier than planned. Such an eventuality would cause both the NSW and Victorian electricity grids to collapse.

Production and Trade

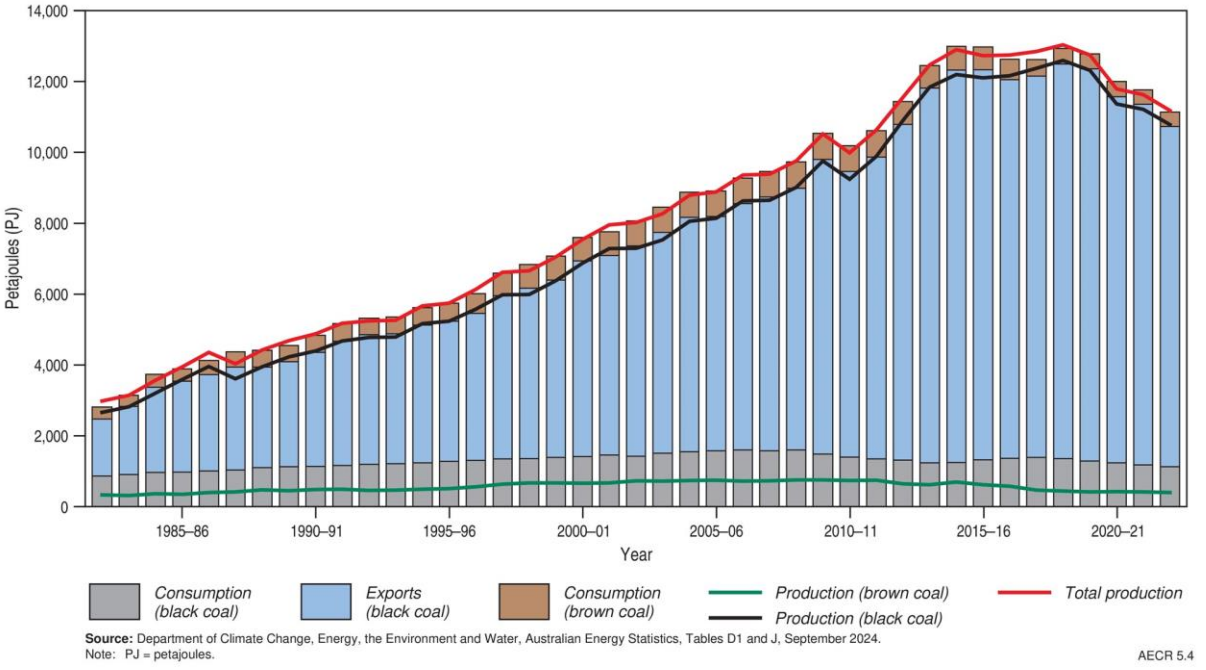


Figure 1. Australia's coal production, consumption, and exports, 1982 - 2023.

Electricity Generation

Coal is vital to global electricity generation, providing 36% of the world's electricity and 45% of Australia's electricity. It is projected to remain significant, with predictions that it could still account for 22% of global electricity by 2040 (IEA), reinforcing its position as the leading single power source worldwide.

Australia's latest national energy statistics show that coal provides more than half of electricity generation in the three eastern coal-dependent states, while it is almost absent in the remaining states (DCCEEW, 2024).

- **NSW** 56% Coal-dominated
- **QLD** 56% Coal-dominated
- **VIC** 56% Brown coal-dominated
- **SA** 0% Mostly renewables + gas
- **WA** Low (gas 59%) Coal now minor
- **TAS** 0% 95% renewable
- **NT** 0% 83% gas

Major power stations

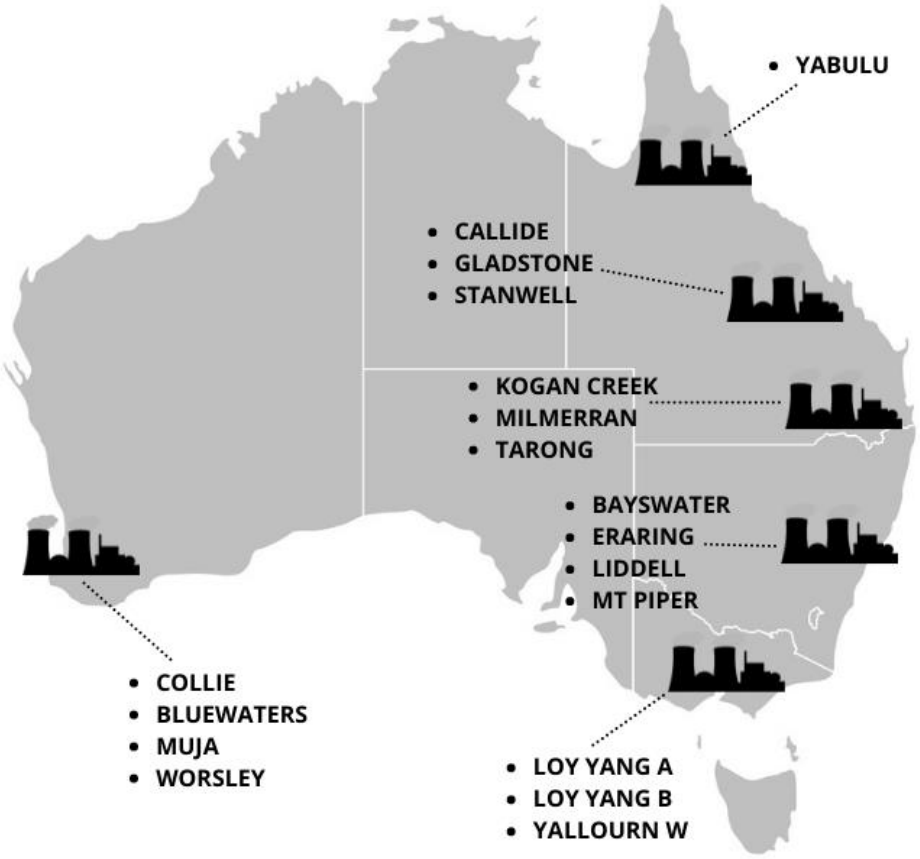


Figure 2: Major Power Stations.

Coal power station closures

Australia's coal-fired power stations now have publicly announced closure dates or AEMO-projected retirement windows. Below is the state-by-state coal closure timeline, which combines official announcements with the latest AEMO 2024 Integrated System Plan (ISP) projections.

• **NSW**	2026–2038	Last coal unit closes ~2038
• **QLD**	2028–2034	All coal gone by ~2034
• **VIC**	2028–2035	Yallourn 2028, Loy Yang A 2035
• **WA**	2027–2029	Collie 2027, Muja D 2029
• **SA**	Already closed	No coal since 2016
• **TAS**	Already closed	No coal
• **NT**	Already closed	No coal

If there are concerns about ***efficiency and emissions*** from old coal-fired power stations, they can be replaced with new high-efficiency, low-emission technology that delivers at least 30% improvements in both criteria and is widely used overseas.

If emissions reductions are the top priority and reliability and affordability are secondary, high implementation and ongoing costs are inevitable, and public subsidies are essential to shield the power industry and consumers from these real costs. This is now the case.

The unintended consequences of this policy include passing costs on to consumers, increasing the cost of living, deindustrialising the nation, and significantly contributing to the national debt. What could possibly go wrong?

USES OF COAL

Heating

In many countries, coal is used for residential heating during the colder months, supplied by district heating systems powered by coal-fired power and heat plants. Therefore, while the focus is often on electricity generation, coal's contribution to the global heat supply is also significant.

Coal plays no role in household heating in Australia; it is used almost exclusively as an industrial fuel for electricity generation and steelmaking, with residential heating supplied by electricity and gas.

Hydrogen

The conversion of coal to hydrogen is an innovative application of coal abatement technologies. It helps coal-dependent nations achieve their development goals and decarbonisation ambitions. By 2050, hydrogen is projected to account for 14% of the world's anticipated energy demand.

China operates the world's largest coal gasification operation, but it produces syngas for chemicals, not pure hydrogen for energy markets.

Hydrogen Energy Supply Chain Project (HESC)

HESC aims to establish the world's first end-to-end hydrogen export supply chain from Australia to Japan. In 2022, the HESC Pilot successfully produced liquid hydrogen from Latrobe Valley coal (with some biomass) and shipped it to Japan, demonstrating the end-to-end supply chain. Coal-to-hydrogen is considered more viable because electrolysis is currently more expensive at scale.

Hydrogen was produced via coal gasification. The commercial phase would use Coal Capture and Storage (CCS). A decision on commercial viability is under review. If approved, commercial operations are targeted for the 2030s.

Large-scale hydrogen production projects, both globally and in Australia, have been driven more by ideology and politics than by real-world economics. Despite the rhetoric, there are no large-scale, commercial hydrogen projects operating at full capacity. Every major project is either at the pilot or demonstration stage, under construction, or awaiting a final investment decision. The barriers to progress are high costs and political efforts to phase out coal, not the repurposing of coal.

Agriculture

On 28 February 2026, Israel and the US attacked Iran, and shipping through the Straits of Hormuz quickly ceased, precipitating a global oil crisis. Another direct impact was

on the fertiliser supply, as much of it also passed through the Strait. Australia was quickly affected by restrictions on oil and fertiliser deliveries, followed by increases in petrol, diesel, and fertiliser prices.

Fertiliser shortages are delivering a second blow to Australian farmers already struggling to secure the diesel needed to keep their machinery running. Australia relies almost entirely on imports of popular fertilisers, and 60% of its urea imports pass through the Strait of Hormuz. With some 24,000 grain farm businesses contributing $23 billion to Australia's gross value of production, the flow-on impact on farms, regional communities and the national economy is significant. Evidence suggests Australia has only 1-2 months of fertiliser reserves on hand if supply chains are disrupted.

Australia has some of the most ancient and nutrient-deficient soils on Earth. Without the application of phosphate-based "starter" fertilisers and subsequent "top-dressing" with urea, Australia's estimated yields could drop by 40 per cent.

Fertiliser feeds the world (FAO, 2021). Over the past 50 years, global crop production has tripled. This increase has largely been driven by higher yields per unit of land and crop intensification through multiple cropping and/or shorter fallow periods. The expansion of arable land for crops has played a less significant role in production growth.

Improved productivity stems from a range of management practices, including plant variety improvements, pest and disease control, and nutrient management. It is estimated that 30-50% of crop yield is attributable to commercial fertiliser inputs (Stewart, 2005).

The main fertilisers used in global agriculture are the three primary nutrients: Nitrogen (N), Phosphorus (P_2O_5), and Potassium (K_2O) - collectively known as NPK fertilisers. These account for virtually all inorganic fertilisers worldwide. These nutrients are continually exported from farms in plant and animal products. To sustain productivity, they must be replenished with fertilisers.

- **Nitrogen (urea, ammonium nitrate).** Australia imports almost all of its nitrogen fertilisers and is heavily reliant on Middle Eastern sources. A disruption would have severe consequences, including immediate impacts on grain and pasture yields, price spikes, reduced application, and food price inflation. This poses an extreme risk to Australia and represents a structural vulnerability.

- **Phosphates.** Australia has significant phosphate resources but has historically had limited commercial production. Supplies are now dominated by Morocco, Saudi Arabia, and China. The consequences of disruption are severe. Less critical than nitrogen but essential for sustained productivity; delays at sowing are costly.

- **Potassium.** Derived from potash ore, potassium is not produced in Australia and is entirely imported from Canada, Russia, Belarus, and Germany. The consequences of disruption are high. Short-term buffering is possible via stockpiling.

All fertilisers ultimately come from **three geological or industrial feedstocks**:

- **Nitrogen fertilisers:** from Air + energy to Urea, Ammonium products.
- **Phosphorus fertilisers**: from Phosphate rock to Phosphate products.
- **Potassium fertilisers:** from Potash ore to potash products.

Coal can be used to produce nitrogen (N) fertilisers and indirectly to produce phosphorus (P) fertilisers, but it cannot produce potassium (K).

Coal to Fertilisers

Coal supports agriculture in two significant ways that help reduce reliance on nitrogen fertilisers, cut costs, minimise waste and pollution, and support food production.

- To produce ammonia via gasification, which serves as a nitrogen source for plant growth. Over the past 50 years, ammonia fertiliser production has surged.
- Humates are used as a source to supplement soils. This practice is widely used, especially in Asia.

Coal to Ammonia.

The ammonia and urea synthesis steps are essentially the same as in gas-based plants. Coal can replace natural gas at the front end (hydrogen production). The process chain is essentially as follows:

Gas/Coal → Gasification → Hydrogen + CO_2 → Ammonia → Urea**.**

Coal-to-ammonia, then urea, is more carbon-intensive than gas-based routes, and the global trend is therefore shifting towards gas- and green hydrogen-based fertiliser production rather than coal-based production.

However, in countries without cheap natural gas, such as China, coal gasification is used to produce ammonia, urea, and NPK fertiliser precursors. China produces a large share of its ammonia and urea from coal because it is coal-rich and gas-poor. Around 78% of China's urea output is coal-based, making it by far the largest coal-to-urea producer globally. India and South Africa also have coal-gasification-based chemical industries, but coal-based ammonia/urea production is limited compared with China.

Australia does not currently produce ammonia or urea from coal. All major fertiliser plants use natural gas (CSBP, Incitec Pivot). Coal-to-urea has been considered for Victorian brown coal from Latrobe Valley lignite; however, no project has proceeded because of higher CO2 emissions, capital costs, and policy direction. The Victorian government does not support coal-to-ammonia/urea, as it does not align with Victoria's decarbonisation trajectory.

Coal to ammonia/urea would:

- use Australia's vast coal reserves;
- use low-risk mature technology;
- develop a strategic industry; and
- provide for fertiliser security.

Coal to Humates

Humates are concentrated, carbon-rich organic substances formed through the long-term decomposition of ancient plant and animal material. They primarily act as soil conditioners and bio-stimulants, not as conventional fertilisers. Their composition is typically 50–60% carbon, with oxygen, hydrogen, and nitrogen making up the remainder. Humates improve soil through physical, chemical, and biological mechanisms:

Australia's Latrobe Valley brown coal is globally recognised for its high humic content, and its humate products are exported worldwide. The Latrobe Valley contains one of the world's richest deposits of lignite-bearing humic substances, with humic acid concentrations of 60–70% in some seams. This makes the region a globally competitive source of high-purity humates for agriculture, environmental remediation, and water treatment.

As global agriculture shifts towards soil-carbon enhancement, fertiliser-use efficiency, and regenerative practices, demand for humates is rising by 8–12% annually across Asia, the Middle East, and South America.

Latrobe Valley's lignite offers a globally competitive pathway to expand Australia's humate exports, supporting regional jobs and meeting rising global demand for soil-carbon and fertiliser-efficiency products.

Australia's fertiliser supply chain is highly vulnerable to disruption.

Critical Minerals

Coal and coal waste are rich sources of critical heavy metals indispensable to modern life. Coal ash and coal sludge contain essential heavy metals, including aluminium, cobalt, copper, iron, lead, silver, nickel, and zinc. These metals can be found directly in coal or in the surrounding rock layers and are pivotal in numerous applications. Coal ash is also used to reduce the climate impact of cement production.

Australia's Critical Minerals Strategy 2023–2030

Australia's Critical Minerals Strategy 2023–2030 positions critical minerals as an economic and security asset. By 2030, the Government's stated intent is for Australia to be a globally significant producer and processor of critical minerals, outside China.

Construction

Coal plays a crucial role in modernisation efforts across various industries.

- **Steel.** Coal is a key component in steel manufacturing.
- **Cement**. Coal serves as a heat source for cement production.
- **Aluminium.** Aluminium production also relies on coal. Extracting aluminium from its ore requires significant amounts of electricity. To meet this demand, electricity is often generated by coal-fired power plants, notably in India and

China. In 2019, two-thirds of the power needed globally for electrolysis in the sector came from coal.

- **Renewable energy.** Coal underpins the infrastructure for renewable energy sources. For instance, the steel used in wind turbines is made from coking coal. Similarly, the production of solar panels involves high-temperature processes, often powered by coal. Even battery storage technologies, essential for managing the intermittency of wind and solar power, rely on materials that require high-temperature processing, which is often powered by coal.

  While renewable energy technologies are part of the solution to our environmental challenges, their production and operation still rely on conventional energy sources, including coal. This underscores the need to continue improving the efficiency and environmental performance of our coal use.

  Coal plays a vital role in manufacturing wind turbines, particularly in China, which is both a leading global coal producer and a leading manufacturer. Each turbine requires 260 tonnes of steel, produced from 170 tonnes of coking coal and 300 tonnes of iron ore.

New Technology Coal Power

Old power plants, built between the 1950s and 1990s, operate at lower temperatures and efficiencies, produce high emissions, and are classified as subcritical. They include plants such as Hazelwood in Victoria.

Modern coal plants are those built or upgraded with ***high-efficiency, low-emissions*** (HELE) technologies. These plants operate at higher steam temperatures and pressures, increasing efficiency and reducing emissions per MWh.

Technology	Steam temp/pressure	Efficiency	CO_2 per MWh	Notes
Subcritical (Hazelwood)	~540°C	32–35%	Highest	1950s–1990s tech
Supercritical (SC)	~565°C	38–40%	↓ 10–15%	Standard modern build
Ultra-supercritical (USC)	600–620°C	41–45%	↓ 20–25%	China, Japan, Korea
A-USC	700°C+	45–48%	↓ 30%	Materials still maturing
IGCC	Gasification + combined cycle	40–45%	↓ 20–25%	Very low local pollutants
Coal + CCS	Any boiler type	Depends	↓ 85–95%	Only a few global examples

A modern USC plant emits ***25–30% less*** CO_2 per MWh than a 1970s-era subcritical plant. About 70% of new plants are being built in China, and almost all are USC. The remainder are mainly in India, Japan, South Korea, the US and Europe. There are no new plants in Australia, and the existing fleet is subcritical, except for Kogan Creek (SC) and Millmerran (SC) in Queensland.

Because of the anti-coal ideology prevalent in Australia, the reliability of existing plants has been slowly degrading, as operators have no incentive to upgrade them. They are being subsidised to the extent necessary to keep them operational until they are replaced by some form of renewable energy.

Modern coal plants are high-efficiency, low-emissions technologies that cut CO_2 per MWh by 25–30% and dramatically reduce local pollutants.

Coal to Oil

Coal-to-oil, or coal-to-liquids (CTL), is technically feasible, has been proven historically, and is still used at an industrial scale in a few countries. However, it is expensive, carbon-intensive, and only competitive when oil prices are very high or when a nation has strategic reasons to secure a liquid-fuel supply.

CTL converts coal into synthetic liquid fuels (diesel, petrol, jet fuel). Two main pathways exist:

- **Direct liquefaction (DCL)** — hydrogenate coal under high pressure to produce liquids.
- **Indirect liquefaction (ICL)** — gasify coal → produce syngas → run through Fischer–Tropsch (FT) synthesis → refine into fuels.

Only three countries have used large-scale CTL:

- **South Africa** (Sasol) is the world leader and produces about 150,000 barrels/day of synthetic fuels. The strategic drive was the apartheid-era oil embargo and a search for energy security.
- **China**. Has multiple CTL plants with a combined output of 100,000–120,000 barrels/day. The strategic drivers are domestic coal abundance and dependence on oil imports.
- **Germany.** Historically, during the latter part of WW2, about 90% of German aviation fuel was produced via CTL using FT synthesis.

The process is only competitive when oil prices are above US$90–100/bbl. Below that, CTL fuel is more expensive than imported crude; however, it is viable for Australia to do CTL, as it has:

- High-quality black coal.
- Existing gasification expertise.
- Strong engineering capability.
-

The strategic drivers would be:

- Wartime mobilisation.
- Severe oil-supply disruption.
- Strategic fuel-security planning.

CASE STUDY: BROWN COAL

Photo: AGL Loy Yang.

Brown coal stations are much larger than their black coal counterparts. There are two main reasons:

- The energy content of Latrobe Valley Brown coal is only about 20-40% of that of Bowen Basin black thermal coal.
- The main difference between brown and black coal is moisture content. Brown coal can contain up to 70% moisture, compared with black coal's 8-10%. Brown coal has been described as "wet dirt".

Because of its high moisture content, brown coal must be dried through complex processes before burning. In a black coal power station, most of the coal handling is much less complex and, hence, much smaller.

So why go to all the trouble of mining brown coal? There are two main reasons:

- **It's cheap.** Latrobe Valley brown coal lies near the surface, so little overburden needs to be removed before the coal is exposed. Once uncovered, there's little contamination. 26 years ago, Latrobe Valley brown coal power was among the cheapest in the world.
- **It's plentiful.** It is estimated that there is sufficient for the next 750 years at current usage rates!

Victorian brown coal is an invaluable asset for the State of Victoria and for Australia as a whole. It's cheap and plentiful, and it provides the reliable 24×7 electricity that consumers and businesses have enjoyed since the 1920s. Unfortunately, brown coal is now vilified by ideology. Coal royalties imposed by the Victorian State government were tripled in January 2017, and this undoubtedly influenced the owners' decision to close Hazelwood Power Station.

Australian governments are determined to shut down coal power stations and effectively make electricity unaffordable to consumers.

CONCLUSION

Coal supplies about 28% of global primary energy, 25% of Australia's primary energy, and 45% of Australian electricity. It is indispensable and irreplaceable for the foreseeable future. Almost the entire world recognises the economic and strategic value of coal; however, Australia, driven by self-indulgent ideology, refuses to acknowledge this enormous economic potential.

Australian coal is considered high-quality by global standards, particularly its premium metallurgical coal and export-grade thermal coal, which are cleaner and higher in energy than many competitors' products. Export customers pay a premium for Australian coal because of its consistent quality, reliable supply chains, and world-class rail and port logistics.

Coal is a pillar of the Australian economy and prosperity. It contributes roughly 20-25% of Australia's total export revenue. It is also essentially inexhaustible and represents a strategic asset for Australia that should be exploited to the maximum extent possible. Apart from being the cheapest fuel for electricity generation, it has a number of additional uses that are both commercially viable and strategically compelling. These include the production of fertilisers and oil.

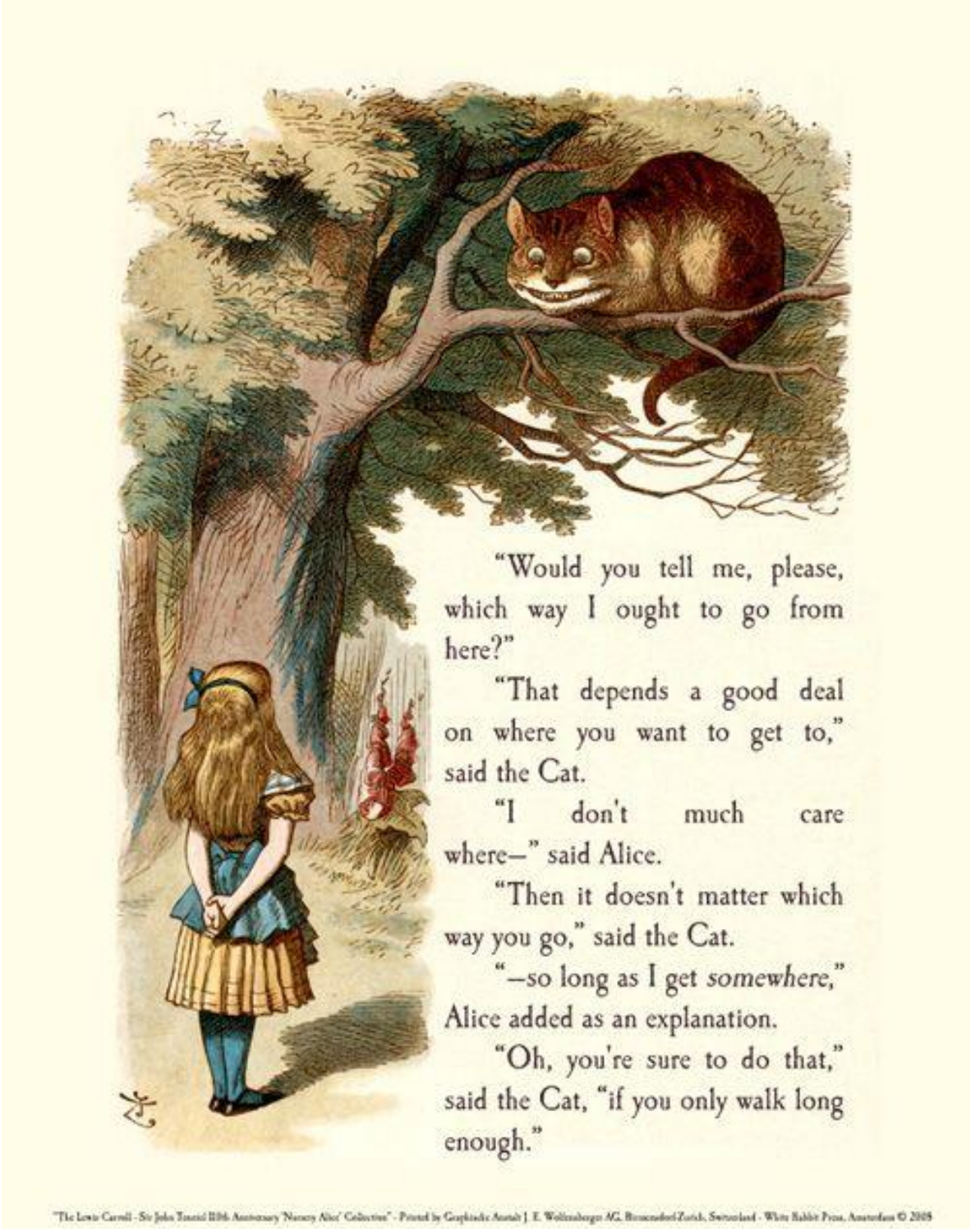
Despite the misguided rhetoric and political posturing - coal is here to stay.

PROPOSALS

1.	**Government.** • Declare the coal industry to be a Strategic asset. • Incentivise investment in the coal industry through tax reform and other financial measures.
2.	***Electricity***: • Declare the electricity industry to be a Strategic asset. • Acknowledge that coal is the cheapest form of electricity. • Revert to coal for base load electricity generation. • Replace existing old coal power generation technology with new high-efficiency, low-emission technology.
3	**Strategic Partnerships.** Seek collaborative arrangements potentially under the AUKUS or QUAD umbrellas for the development of the coal industry.
4.	**Fertilisers.** Develop a sovereign fertiliser industry using coal where feasible. The aims are fertiliser security, commercial and export opportunities, the use of an abundant sovereign resource, and value-adding to existing industries.
5.	**Coal to Liquids.** Develop a CTL industry as a strategic alternative to oil imports. The aims are oil security, commercial and export opportunities, the use of an abundant sovereign resource, and value-adding to existing industries

THE LAST WORD

The last word belongs to Lewis Carroll and his “Alice in Wonderland” - Alice is lost in the forest, meets the Cheshire Cat and asks for directions. It is a perfect analogy for Australia’s present lack of a national vision, strategic planning, and purposeful direction. We are at a crossroads in Australian history.



The only difference between where we are today and what could have been - or what is possible in the future - is a question of national will.

Tomorrow's History Starts Today.

The Author

This paper draws on the author's experience in the Australian Army and in industry, spanning manufacturing and major defence and construction projects across Australia and overseas. He holds academic qualifications in Engineering, Management, and Operations Research. He is retired and lives in Melbourne.

It continues the theme of previous papers, which outline Australia's current economic and defence vulnerabilities and their potential consequences. It will also be followed by other papers focusing on rebuilding the Australian economy, with particular emphasis on the industrial base.

This paper and others are published on ***(rickgray.info).***

He is a passionate Australian who wishes to see Australia remain on the right side of history.

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