Australia's coal outlook in a warming world

Insights from integrated assessment models

REPORT

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Disclaimer

Image Credit

New South Wales coast, December 2020, Malte Meinshausen

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List of acronyms

AEMO	Australian Energy Market Operator
AR6	Assessment Report 6
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCCEEW	Department of Climate Change, Energy, Environment and Water
DISR	Department of Industry, Science and Resources
ETI	Energy Transitions Initiative
IAM	Integrated Assessment Model
IEA	International Energy Agency
IEEFA	Institute for Energy Economics and Financial Analysis
IPCC	Intergovernmental Panel on Climate Change
ISP	Integrated Systems Plan
LT-LEDS	Long-Term - Low Emission Development Strategies
NDC	Nationally Determined Contribution
NEM	National Electricity Market
NGFS	Network for Greening the Financial System
SWIS	South West Interconnected System
UAE	United Arad Emirates
UK	United Kingdom
UNEP	United Nations Environment Programme
US	United States
WOSP	Whole of System Plan

List of Tables and Figures

1 SUMMARY

Record-high temperatures and escalating climate-related disasters underscore the urgency of understanding the pace of coal phase-out needed to avoid the worst impacts of climate change. In 2024, the global mean temperature exceeded 1.5°C above pre-industrial levels for the first time.[1] The past ten years have been the ten warmest on record. The Intergovernmental Panel on Climate Change (IPCC AR6 WG3) [2] and the International Energy Agency (IEA)[3] warn that existing fossil fuel infrastructure alone is enough to exceed 1.5°C warming. To stay within this limit, new coal developments must stop, and existing projects must be retired early.

Global climate action will impact Australian coal production, making it vital for policymakers to understand and plan for this shift. As a major fossil fuel exporter, Australia would be prudent to define a coal phase-out pathway to meet Paris Agreement goals, seize net-zero opportunities, and manage economic risks during the global energy transition.

If fully implemented, current 2030 and 2035 country pledges and long-term targets put the world on track for 1.8–1.9°C warming (best estimate). All countries must submit updated 2035 targets this year, offering a clearer picture of global progress. As of 9 November 2025, submitted targets (covering around 69% of 2019 emissions) in aggregate align with a straight-line path from 2030 to long-term goals. This can be interpreted as confirmation of the global commitment to long-term decarbonisation.

In this study, we analyse the projected impact of global climate action on demand for Australian coal exports, and the impact of the transition in Australia as the aging coal-fired generators are retired. Our analysis of coal exports is based on NGFS (Network for Greening the Financial System) Phase 5 (2024) IAM (Integrated Assessment Model) scenarios. We report findings for scenarios peaking at 1.6°C and 1.8°C.

- The 1.6°C scenarios, often called '1.5°C with low overshoot', generally limit warming in 2100 to around 1.5°C allowing temporary exceedance of up to 0.1°C for several decades.
- Scenarios limiting peak warming to 1.8°C represent very high overshoot and are often labelled 'well-below 2°C' scenarios.

Planning for global action consistent with limiting warming to 1.5°C—with up to 1.8°C overshoot—is essential for meeting Australia's international commitments and guiding sound economic and decarbonisation policy.

According to our analysis, the median projections show that **:**

- **Thermal coal exports decline rapidly:** by 64–78% by 2035 (relative to 2024) in 1.8°C scenarios, and by 96–98% in 1.6°C scenarios, across high and low-demand cases.
- **Metallurgical coal exports fall slightly less rapidly:** by 28–54% by 2035 (relative to 2024) in 1.8°C scenarios, and by 69–80% in 1.6°C scenarios across demand cases.

[1] World Meteorological Organization (WMO). (2025, January 10). *WMO confirms 2024 as warmest year on record at about 1.55 °C above pre-industrial level* [Press release].
[2] Intergovernmental Panel on Climate Change (IPCC). (2022). Climate Change 2022: Mitigation of Climate Change (Working Group III contribution to the Sixth Assessment Report).
[3]For example, IEA, (2021) Net Zero by 2050 https://www.iea.org/reports/net-zero-by-2050, IEA (2022) An updated roadmap to Net Zero Emissions by 2050, https://www.iea.org/reports/world-energy-outlook-2022/an-updated-roadmap-to-net-zero-emissions-by-2050

- **These differing decline rates suggest that thermal and metallurgical coal analyses should be considered separately.** This has regional implications: Queensland supplies around 90% of metallurgical coal exports, while NSW supplies 60–70% of thermal coal.[4]
- **Projected demand shifts vary by export market:** in India, thermal and metallurgical coal demand rises in the short term in 1.8°C scenarios, then declines sharply by 2035. In other major markets, demand for both coal types falls under both 1.8°C and 1.6°C scenarios, though at varying rates.
- **Australia's exports may decline faster than coal consumption in export markets.** The 'low demand' case assumes China and India substitute domestic sources and cut imports, while the 'high demand' case assumes Australia maintains its current market share.
- **Australia's domestic coal demand is projected to decline sharply over the next 5 to 10 years.** Thermal coal demand drops 59% by 2030 and 86% by 2035 (relative to 2024) under 1.8°C scenarios, and 76% by 2030 and 93% by 2035 under 1.6°C scenarios. Using AEMO's Step Change scenario as a reference, recent trends suggest coal retirements may happen sooner due to costs, fuel security, and renewable competition. Metallurgical coal declines more slowly. These projections align broadly with NGFS5 Australia estimates.

Table S-1 and Figure S-1 provide median projections for Australia's exports in the high- and low-demand cases. Figure S-2 shows domestic thermal and metallurgical coal consumption. The estimates reflect median values (50th percentile), but scenario ranges are wide, especially for metallurgical coal. The 13th to 87th percentile range is detailed in Annex 1 figures. Our NGFS5 1.8°C scenario findings show faster decline rates than the Department for Industry Science and Research (DISR) March 2025 projections, which only extend to 2030.[5]

Table S-1: Change in Australia's thermal and metallurgical coal exports (median projection) relative to 2024, derived from NGFS5 scenarios evaluated at peak warming of 1.6°C and 1.8°C

Case	Product	2030	2035	2040	2045	2050
Low Demand Case - 1.6°C						
	Thermal	-81%	-98%	-99%	-100%	-100%
	Metallurgical	-56%	-80%	-90%	-93%	-96%
Low Demand Case - 1.8°C						
	Thermal	-63%	-78%	-89%	-95%	-96%
	Metallurgical	-33%	-54%	-72%	-82%	-87%
High Demand Case - 1.6°C						
	Thermal	-72%	-96%	-99%	-100%	-100%
	Metallurgical	-38%	-69%	-86%	-90%	-93%
High Demand Case - 1.8°C						
	Thermal	-44%	-64%	-81%	-90%	-94%
	Metallurgical	-5%	-28%	-49%	-61%	-71%

[4] Queensland Treasury Coal Royalties: Global Demand (last updated February 2024), https://www.treasury.qld.gov.au/programs-and-policies/coal-royalties/global-demand/ Department of Regional NSW, Future Jobs and Investment Authorities: Issues Paper, May 2024 https://www.nsw.gov.au/sites/default/files/noindex/2024-05/FJIA-issues-paper.pdf; Department of Industry Science and Resources (DISR) Resource and Energy Quarterly, June 2024, https://www.industry.gov.au/publications/resources-and-energy-quarterly-june-2024.

[5] DISR, Resources and energy quarterly: March 2025 https://www.industry.gov.au/publications/resources-and-energy-quarterly-march-2025.

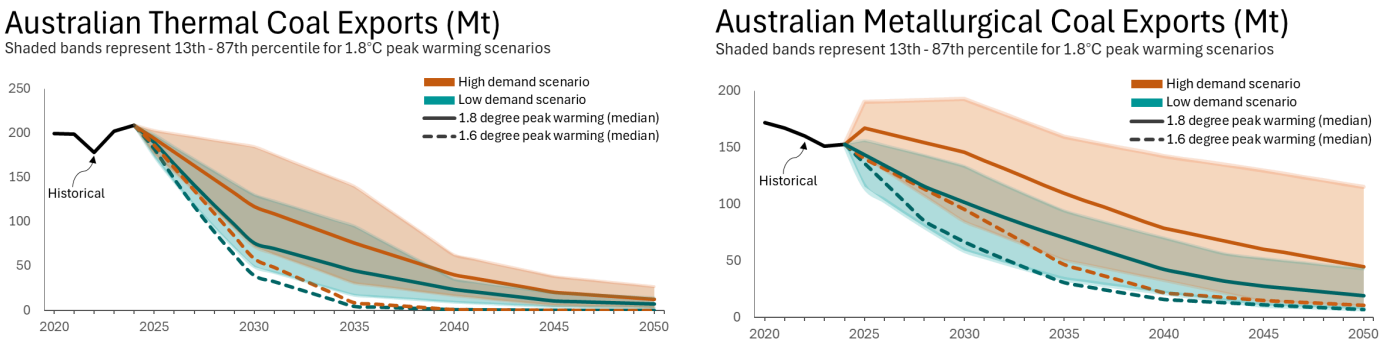

***Figure S-1**: Projected changes (median and the 13th and 87th percentile range) in Australia's thermal and metallurgical coal exports - low and high demand cases - derived using NGFS5 scenarios evaluated at peak warming of 1.6°C and 1.8°C*

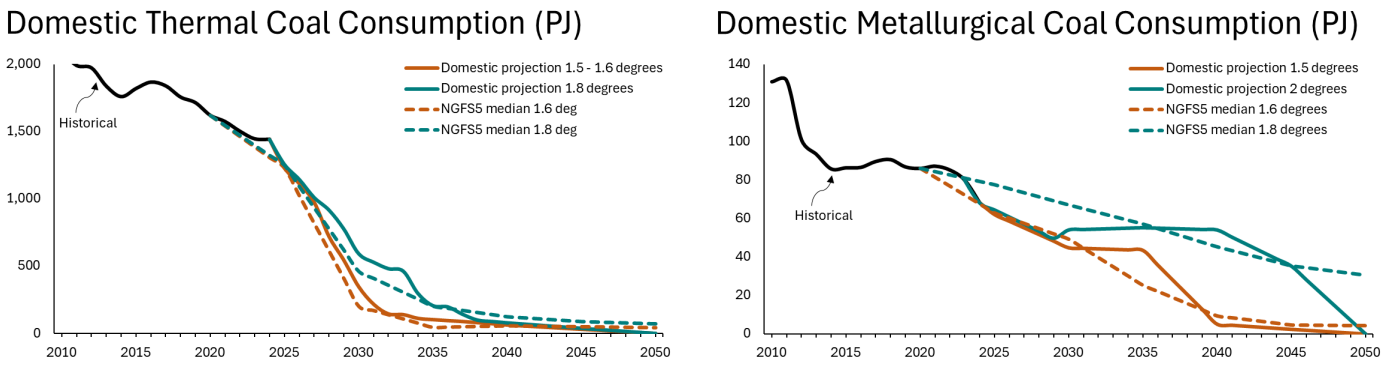

***Figure S-2:** Projected changes in Australia's thermal and metallurgical coal consumption*

2 INTRODUCTION

This study summarises what recent IAM scenarios suggest about how fast demand for Australian coal exports will decline as the world takes action to limit warming in accordance with obligations under Article 2(a) of the Paris Agreement. This requires signatories to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.[6]

Meeting ambitious global climate pathways requires a rapid phase-out of coal consumption. Australia exports about 85% of its coal production.[7] Given this, the change in demand in export markets will dictate the rate of phase-out of Australian coal production, rather than Australian government policy. Government policy can, however, influence the extent to which the Australian economy is well positioned to navigate the global transition away from coal and other fossil fuels, and meet the energy needs of the net-zero emissions global economy.

There has historically been limited science-based analysis of country- or sub-national-level coal production cuts needed to meet the Paris Agreement. IAMs model global transition pathways and report emissions where they occur; so emissions from Australian coal exports are attributed to the importing countries where the coal is burned.

Data from IAM scenarios is now reported with increasing regional and country-specific resolution, and increasing sectoral granularity. Some AR6 scenarios and all NGFS4.2 and NGFS5 scenarios now report data for Australia's key coal export markets. They also report data required for projections of metallurgical and thermal coal consumption in those markets. This provides greater insight into the projected impact on Australian coal exports as the world transitions to net zero emissions. In this assessment, we use the NGFS5 scenarios given that they are the most recent (published in November 2024) and contain the regional and sectoral granularity required.

This report:

- Summarises recent assessments of the warming implied by current global mitigation targets. This is important in informing the scenarios for global coal demand on which Australia's sectoral decarbonisation pathways are based.
- Outlines global coal consumption and Australia's main coal export markets as context.
- Describes what the NGFS5 scenarios show regarding the decline in coal consumption in Australia's key export markets if the world acts to limit warming to 1.5°C with low or very high overshoot under the median (best estimate) projection, and 13th and 87th percentile range of projections. We evaluate scenarios that limit peak warming to 1.6°C (known as '1.5°C with low overshoot' scenarios) and 1.8°C (known as 'well-below 2°C' scenarios).
- Considers what share of these declining coal export markets Australia may secure, and defines a high- and low-demand case for its coal exports.
- Summarises projections for the rate of change in Australia's domestic coal consumption.
- Presents the implications of projected changes in exports and domestic coal consumption, for the rate of phase-out of Australia's coal production.

[6] United Nations Framework Convention on Climate Change. (2015). *Paris Agreement*. UNFCCC

[7] DCCEEW, 2025 Australian Energy Update https://www.energy.gov.au/sites/default/files/2025-08/australian_energy_update_2025.pdf

3 WARMING IMPLIED BY GLOBAL MITIGATION AMBITION

The strength of mitigation action globally and in Australia's key export markets is an important consideration in selecting scenarios that inform Australia's sectoral decarbonisation pathways. If all countries meet their current NDCs and longer-term targets in full and on time (including all conditional elements), our best estimate of the implied warming is between 1.8°C-1.9°C,[8] as illustrated in Figure 1.

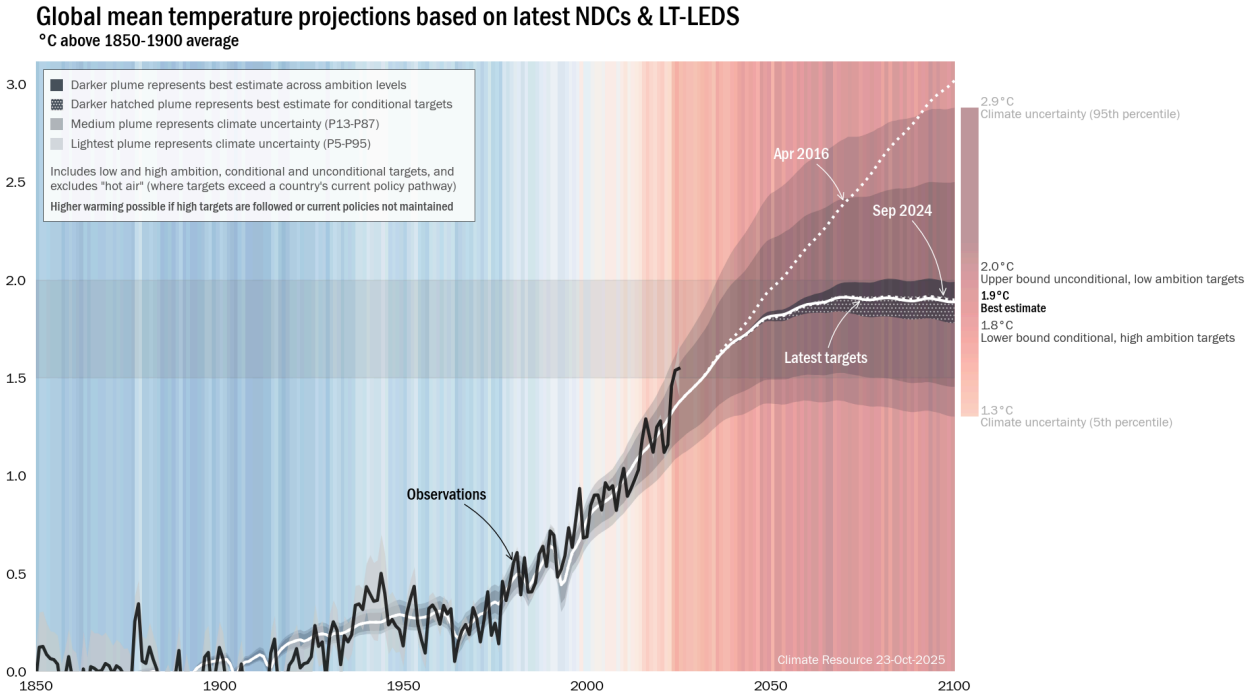

***Figure 1** - Projected warming over the 21st century based on latest NDCs and LT-LEDS (Long-Term Low Emission Development Strategies).[8]*

Our estimates of the temperature rise implied if countries meet their current climate commitments in full are consistent with those published in the numerous studies including the recent UNEP Emissions Gap Report[9], and report by Climate Action Tracker[10], when compared on a like-for-like basis, as summarised in Figure 2 (we continue to update our temperature assessments as countries submit new 2035 NDCs).

[8] Burdon, R., Talberg, A., Spiller, K., & Meinshausen, M. (2025). *Pre-COP30: How are temperatures tracking on the latest climate targets?* Climate Resource. https://www.climate-resource.com/reports/ndcs/2025-10-23_pre-COP30_How are temps tracking_CR.pdf

[9] United Nations Environment Programme (2025). *Emissions Gap Report 2025: Off Target - Continued Collective inaction puts Global Temperature Goal at Risk*. https://wedocs.unep.org/20.500.11822/48854

[10] Climate Analytics (2025). *Rescuing 1.5 °C : new evidence on the highest possible ambition to deliver the Paris Agreement*. Climate Analytics. https://ca1-clm.edcdn.com/publications/Rescuing1.5%C2%BAC.pd

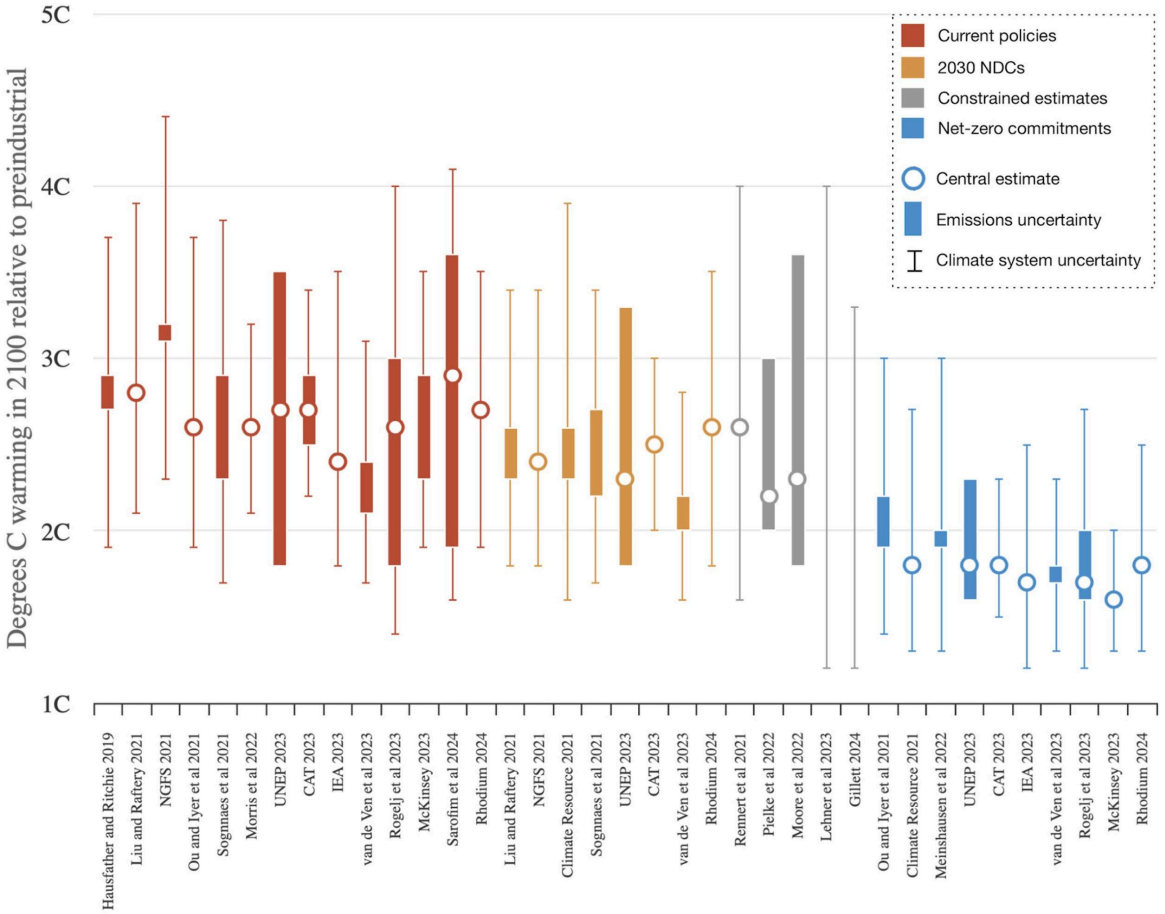

***Figure 2** - Projections of global warming under various scenarios from multiples studies*[11]

These targets offer insight into how strongly nations are committing to the transition toward long-term and net-zero goals. As of 9 November 2025, 104 countries (representing around 69% of global emissions) had submitted 2035 targets, which, in aggregate, broadly align with a straight-line path from 2030 to net zero, though with some variation:

- Some countries are closely aligned with straight-line pathways from 2030 targets to their net-zero 2050 targets, such as Japan and the US (Biden administration).
- Some countries' 2035 targets imply a faster transition, such as Australia, UK and UAE.
- Some countries' 2035 targets imply a slower transition, such as Canada and New Zealand.

Full implementation of country climate pledges limits end-of-century warming to 1.8°C-1.9°C (best estimate) and retains options for strengthening ambition to close the gap to 1.5°C aligned pathways.[12] As long-term targets cover almost 90% of global emissions, projections that include them are most relevant for assessing future coal consumption. These targets significantly lower projected warming compared to scenarios based only on 2030 goals. Without accelerating emissions reductions beyond 2030 targets, warming is projected to be much higher.

[11] Hausfather, Z. (2025). *Exploring newly released estimates of current policy warming*. The Climate Brink https://www.theclimatebrink.com/p/exploring-newly-released-estimates

[12] Burdon, R., Talberg, A., Spiller, K., & Meinshausen, M. (2025). *Pre-COP30: How are temperatures tracking on the latest climate targets?* Climate Resource; UNEP Gap report (2025); CAT, Rescuing 1.5°C (2025).

4 GLOBAL COAL CONSUMPTION, TRADE AND AUSTRALIAN EXPORTS

Approximately 85% of Australia's coal production is exported.[13] Given this, policies and action in Australia's key export markets will determine the pace at which coal production in Australia declines. In this section, we outline:

- The countries that are the main consumers of metallurgical and thermal coal, the extent to which they rely on domestic supplies and imported coal, and the countries that are the principal exporters of thermal and metallurgical coal.
- The main markets for Australian thermal and metallurgical coal exports.

We distinguish between projected demand for metallurgical and thermal coal for two reasons. First, demand for thermal coal may decline faster than demand for metallurgical coal. Second, the decline in demand for thermal and metallurgical coal affects different regions, and therefore has implications for policy responses. Queensland supplies around 90% of Australia's metallurgical coal exports.[14] Approximately 85% of coal produced in New South Wales is thermal coal, of which 80-90% is exported.[15] A decline in metallurgical coal consumption in Australia's key export market will primarily affect Queensland. A decline in thermal coal consumption will mostly affect New South Wales.

However, Queensland is not insulated from rapid declines in thermal coal demand. Despite its dominance in metallurgical coal, around 40% of Queensland's total coal production is thermal coal.[16] This means the state will still face impacts from any accelerated downturn in global thermal coal consumption, regardless of which coal type drives the initial decline.

4.1 Global coal consumption and trade

Coal consumption in major markets and the quantities imported and exported are illustrated in Figures 3 to 6, making clear the importance of China and India as consumers.

Domestic coal resources in key markets may affect the market share that Australia retains as demand for coal declines in strong mitigation scenarios, if countries preference domestic supplies over imports. Of the largest consumers of thermal coal, several have significant domestic production. China consumes approximately 55% of global thermal coal and 65% of global metallurgical coal, and imports around 10% of its thermal and 15% of metallurgical coal consumption. India consumes approximately 15% of global thermal coal. It imports less than 20% of its thermal coal consumption but over 90% of the metallurgical coal that it has consumed in recent years. Japan, South Korea and Taiwan import nearly all the coal they consume.[17]

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[13] DCCEEW, 2025 Australian Energy Update https://www.energy.gov.au/sites/default/files/2025-08/australian_energy_update_2025.pdf

[14] Queensland Treasury. (2022, November). *Queensland's Coal Industry and Long-Term Global Coal Demand*. https://www.treasury.qld.gov.au/files/qlds-coal-industry-and-long-term-global-demand-nov-2022.pdf

[15] Department of Regional NSW (2024) Future Jobs and Investment Authorities: Issues Paper https://www.nsw.gov.au/sites/default/files/noindex/2024-05/FJIA-issues-paper.pdf

[16] Department of Natural Resources, Mines and Manufacturing & Regional and Rural Development (Qld). (2025, May). *Coal*. Queensland Government. https://www.nrmmrrd.qld.gov.au/mining-exploration/community/coal

[17] IEA. *Japan – Coal*. https://www.iea.org/countries/japan/coal; IEA. *Korea – Coal*. https://www.iea.org/countries/korea/coal; IEA. *Taiwan (Chinese Taipei) – Coal*. https://www.iea.org/countries/chinese-taipei/coal; IEA (2025). *Coal Mid-Year Update 2025*. IEA https://iea.blob.core.windows.net/assets/1e9f8356-4ec9-4c7d-9673-beaea204b44d/CoalMid-YearUpdate2025.pdf

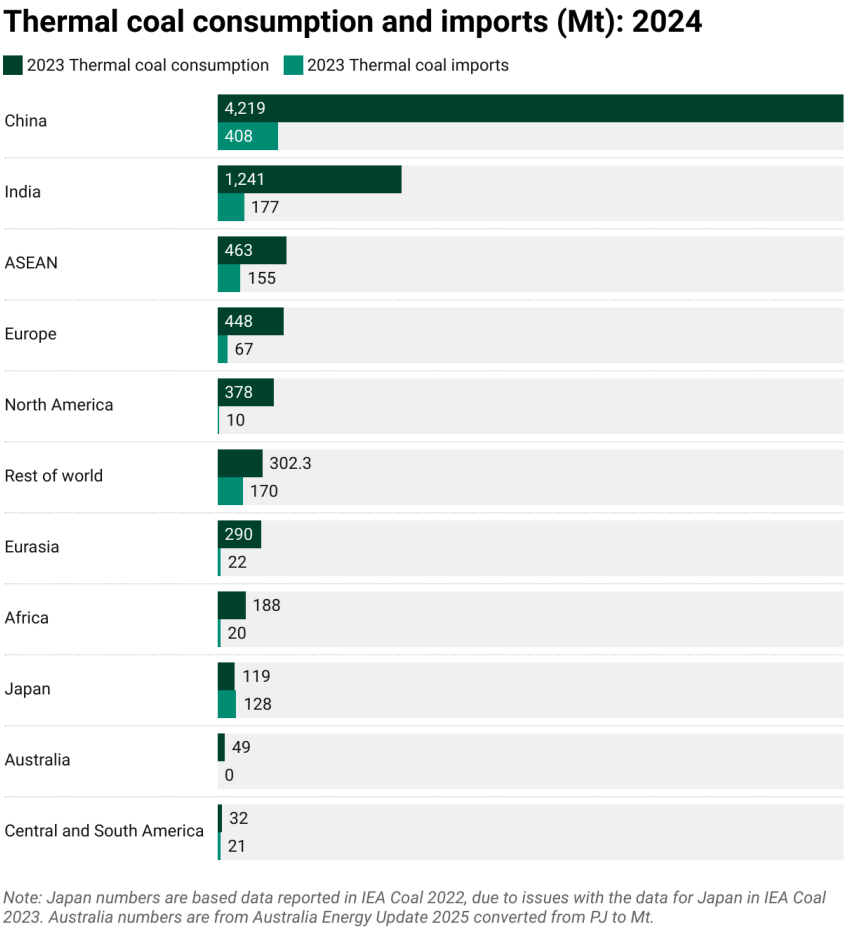

***Figure 3** - Thermal coal consumption and imports - key markets, 2024 (Mt).*[18]

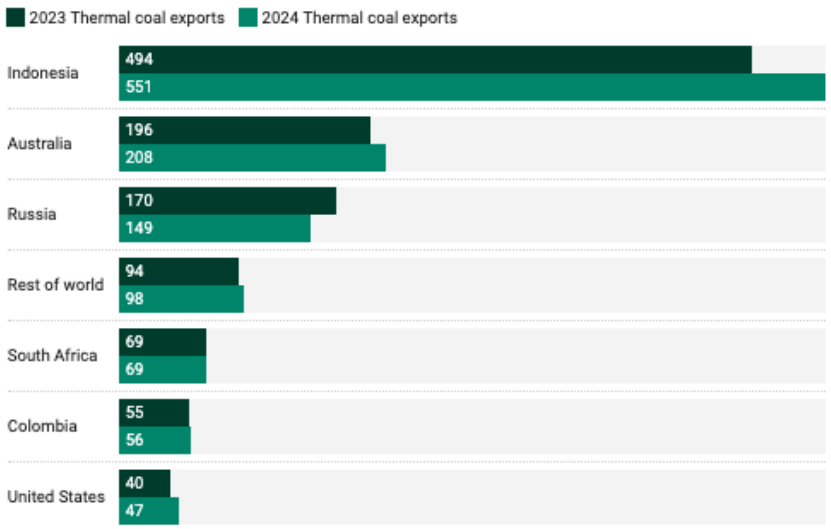

***Figure 4** - Global thermal coal exports - 2022 and 2023 (Mt).*[18]

[18] IEA Coal 2024, https://iea.blob.core.windows.net/assets/a1ee7b75-d555-49b6-b580-17d64ccc8365/Coal2024.pdf; Department of Climate Change, Energy, the Environment and Water. (2025, August 22). Australian Energy Update 2025. Commonwealth of Australia. [Australian thermal coal consumption calculated from DCCEEW(2025) applying the IEA conversion rate of 1 EJ equals 34.12 million tonne(s) of coal equivalent]

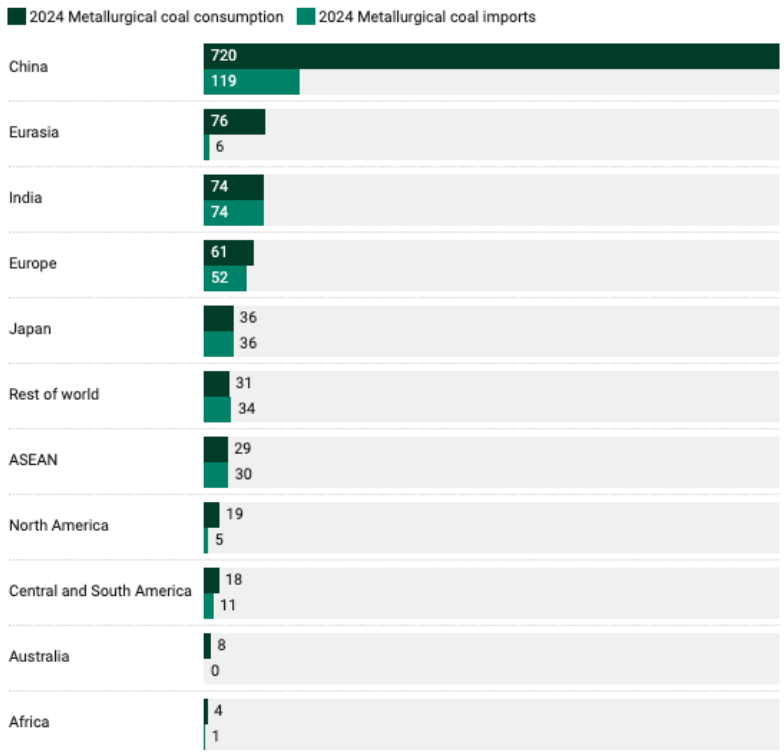

***Figure 5** - Metallurgical coal consumption and imports in key markets, 2024 (Mt).*[19]

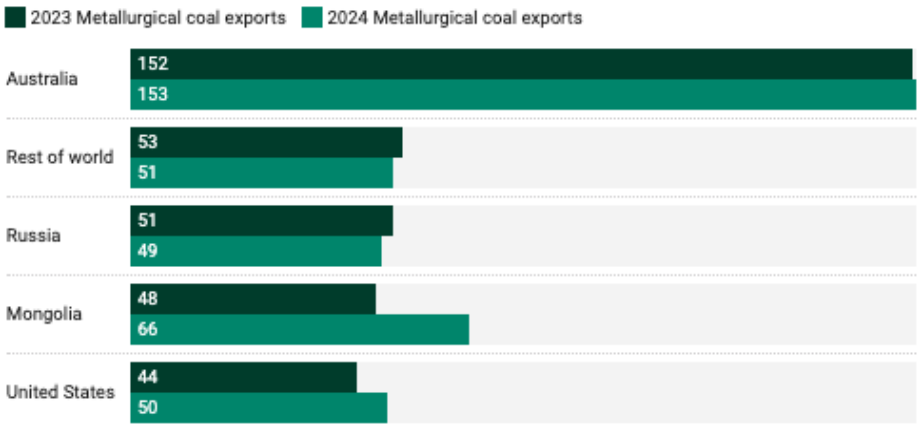

***Figure 6** - Global metallurgical coal exports - 2023 and 2024 (Mt).*[18]

4.2 Australian coal export markets

Australia's total exports of metallurgical coal declined by 18% in the 10 years from 2015 to 2024. Thermal coal exports have varied more over this period, falling by 11% in 2022, and then rebounding in the last two years. The changes in total exports over this period are shown in Figure 7.

[19] IEA Coal 2024; DISR, Resources and energy quarterly: September 2025 https://www.industry.gov.au/publications/resources-and-energy-quarterly-september-2025; DCCEEW. (2025). *Australian Energy Update 2025*. Commonwealth of Australia.

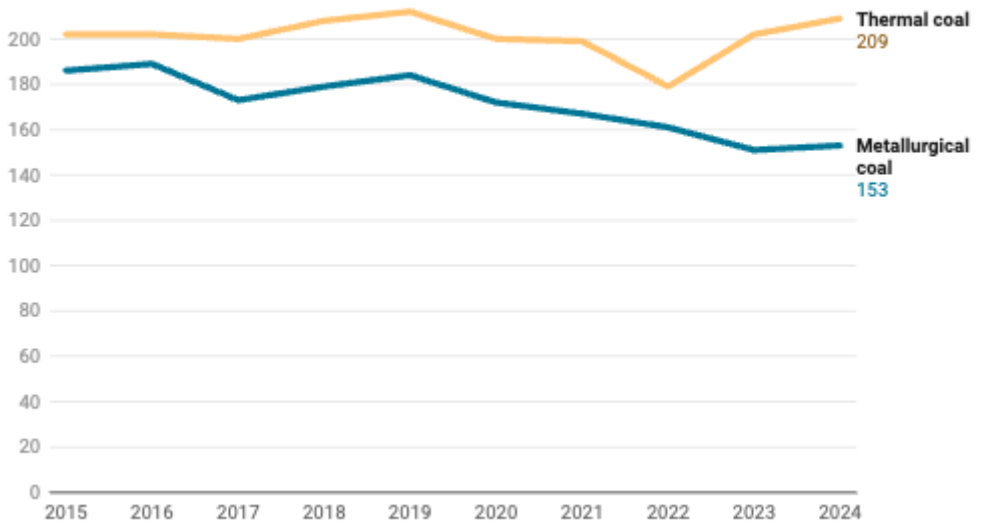

Figure 7 *- Australia's thermal and metallurgical coal exports 2015-2024 (Mt).*[20]

Australia's thermal and metallurgical coal exports to principal markets since 2015 are in Figures 8 and 9. China, India, Japan, South Korea, and Taiwan are all major markets, with differences in the shares of Australia's exports taken by each country for thermal and metallurgical coal.

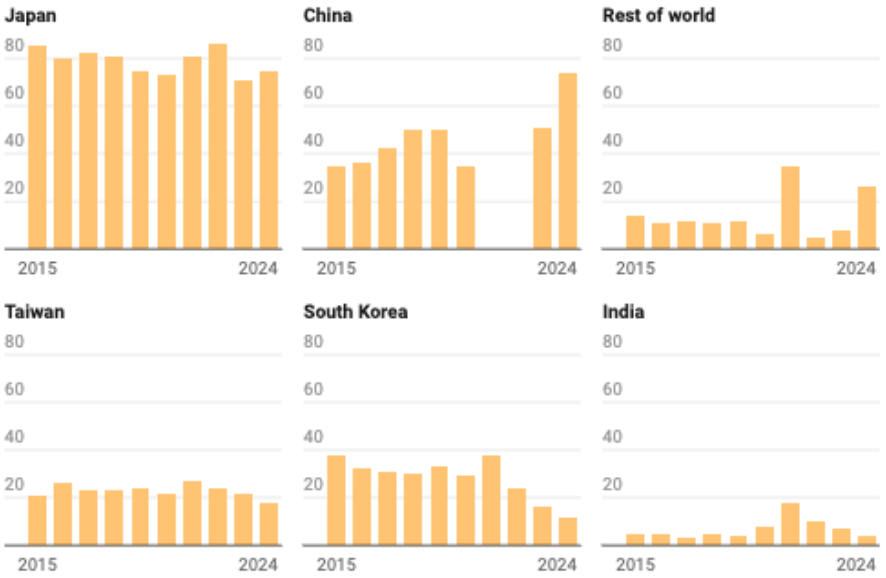

Figure 8 *- Australia's thermal coal exports: principal markets (Mt).* [21]

[20] DISR, Resources and energy quarterly: September 2025
https://www.industry.gov.au/publications/resources-and-energy-quarterly-september-2025
[21] DISR, Resources and Energy Quarterly, September 2025,
https://www.industry.gov.au/publications/resources-and-energy-quarterly-september-2025 , Table 41.

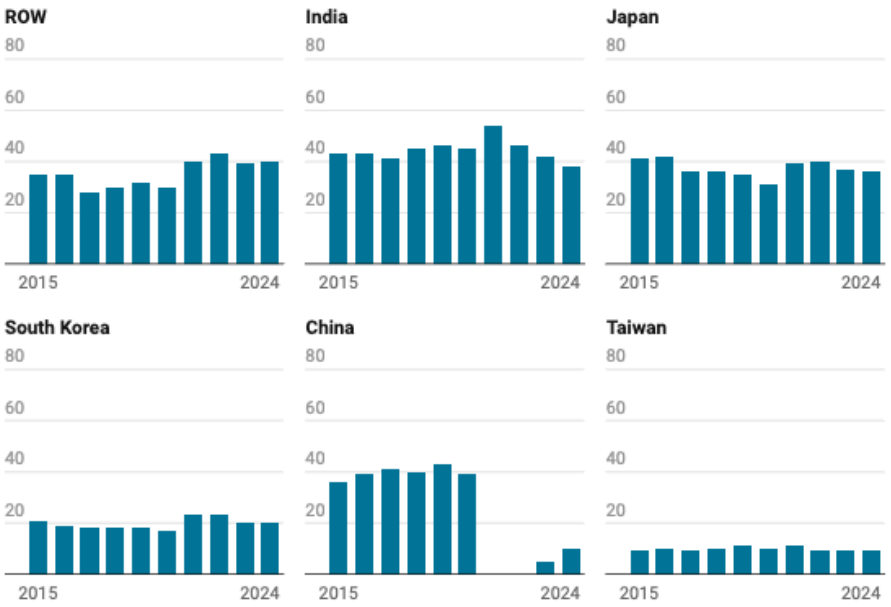

***Figure 9** - Australia's metallurgical coal exports: principal markets (Mt).*[20]

Japan accounted for approximately 36% of Australia's thermal coal exports in 2024, and 23% of its metallurgical coal. India is a significant market for Australian metallurgical coal, consuming around 25% of its exports in 2024. In contrast it accounts for a small share of Australia's thermal coal exports — around 2% in 2024.

China emerged as a major market from around 2010. In 2020, China banned Australian coal imports. Following the removal of the ban in January 2023, 36% of Australia's thermal coal exports went to China in 2024, a higher share than the 20% of exports averaged between 2015 and 2020. In contrast, only 7% of Australia's metallurgical coal went to China in 2024, compared to an average of 22% between 2015 and 2020 prior to the ban being imposed.

4.3 DISR projections

DISR (March 2025) forecasts that thermal coal exports will decline slightly so that 2030 volumes are around 4% lower than the peak in 2024. It forecasts that metallurgical coal exports will increase, peaking in FY 2028, but remaining 10% higher than current levels until 2030 (the end of its projections period).

Globally, DISR (March 2025) projects thermal coal trade will decline by around 14% by 2030 (relative to 2024), with metallurgical coal trade remaining flat.

DISR forecasts have historically overestimated Australia's coal exports, particularly for metallurgical coal, as highlighted in analysis by IEEFA, shown in Figure 10.[22] This is likely a result of a range of factors including optimistic assumptions about project development; high price assumptions; and underestimation of structural demand trends in key importers.

[22] IEEFA, 14 April 2025, https://ieefa.org/resources/australian-coal-exports-face-numerous-downside-risks-new-projections-show

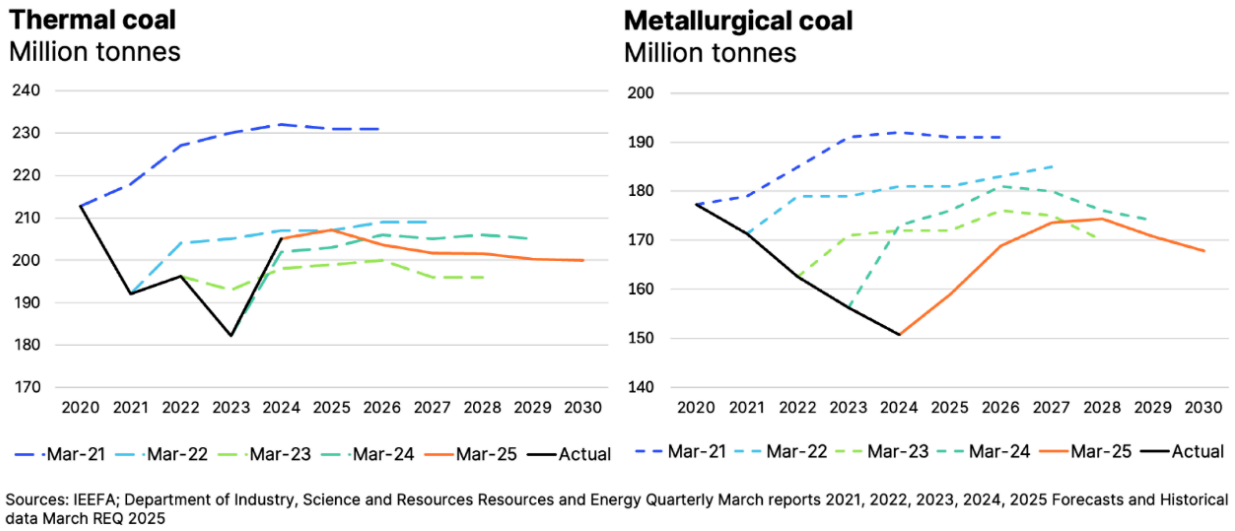

***Figure 10** - DISR thermal and metallurgical coal exports.*[23]

[23] Knight, A.-L. (2025, April 14). *Australian coal exports face numerous downside risks, new projections show*. Institute for Energy Economics & Financial Analysis (IEEFA) https://ieefa.org/resources/australian-coal-exports-face-numerous-downside-risks-new-projections-show

5 EXPORTS: PROJECTED CHANGES IN COAL CONSUMPTION IN AUSTRALIA'S MAIN MARKETS IN NGFS5 SCENARIOS

IAMs represent changes in the global economy under various social, physical and technology scenarios and the associated emissions and implied temperature rise. They are a key tool used by the global science and policy communities for evaluating changes consistent with achieving the Paris Agreement temperature goal. The NGFS5 scenarios are also widely used by regulators and investors. The underlying models are optimisation models that find the global least-cost pathways under a given set of input assumptions and constraints. They report the associated global, regional, or country emissions pathways and quantities of key physical variables (e.g., demand for coal). The reported outputs are not predictions but scenarios that explore alternative pathways under the specified constraints.

In this briefing, we use scenarios from NGFS5, which were published in November 2024 and contain sufficient regional and sectoral resolution.[24]

We assess the projected change in:

- Metallurgical coal consumption, using the variable reported as *Final Energy|Industry|Steel|Solids.*
- Thermal coal consumption, calculated as (*Primary Energy|Coal* less *Final Energy|Industry|Steel|Solids). Primary Energy|Coal* reflects all coal consumption, including coal used in electricity generation, heat, and industrial processes, including for example, chemicals and cement. Subtracting *Final Energy|Industry|Steel|Solids* removes metallurgical coal from this total.

Discussions with IAM groups and a review of model documentation for key models suggest this is a reasonable approach.

We derive the distribution of rates of change in the NGFS5 scenarios for thermal and metallurgical coal consumption between 2020 and 2040 at a global level, and at a regional or country level, with a focus on Australia's key export markets (China, EU, India, Japan, South Korea, Taiwan). The number of scenarios that report results varies across Australia's key export markets: fewer results are reported for Taiwan and South Korea.

We evaluate projections under peak warming of 1.6°C and 1.8°C. Scenarios with peak temperatures of 1.6°C and 1.7°C are often referred to as 1.5°C with low and high overshoot, respectively.[25] Scenarios with peak warming of 1.8°C are often referred to as 'well-below 2°C scenarios'. Depending on the extent of net negative emissions in the second half of the century, temperatures could theoretically be brought back towards 1.5°C after a peak at 1.8°C.

Instead of relying on a single NGFS5 scenario, we apply a rolling-quantile regression to capture the non-linear relationship between peak warming and key scenario variables. This approach maximises

[24] NGFS Climate Scenarios for central banks and supervisors- Phase 5 (November 2024), available at: https://www.ngfs.net/en/publications-and-statistics/publications/ngfs-climate-scenarios-central-banks-and-supervisors-phase-v, accessed May 2025.

[25] IPCC AR6 Working Group 1 category 1 (C1) scenarios which are described as limiting warming to 1.5°C (with >50% probability) with no or limited overshoot. No or limited overshoot is defined as temporarily exceeding 1.5°C by up to about 0.1° C. AR6 category 2 (C2) scenarios have peak temperatures of up to 1.7°C returning to warming of 1.5°C (with >50% probability) after high overshoot.

use of available data and allows inference of coal consumption under 1.6°C and 1.8°C warming, accounting for surrounding scenarios and temperature gradients. We generate 13th, 33rd, 50th, 66th, and 87th percentiles for each variable and country in five-year steps from 2020 to 2040, with annual values interpolated. Fewer scenarios inform the 1.6°C projections, reflecting the narrowing window to achieve this target.

5.1 Findings - summary

The decline in consumption of thermal and metallurgical coal in Australia's main export markets under peak warming of 1.8°C using NGFS5 scenarios is illustrated in Figure 11 (median projections). The decline in consumption in scenarios that limit peak warming to 1.6°C is shown in Figure 12. The 13th and 87th percentile projections in each market are shown in Annex 1.

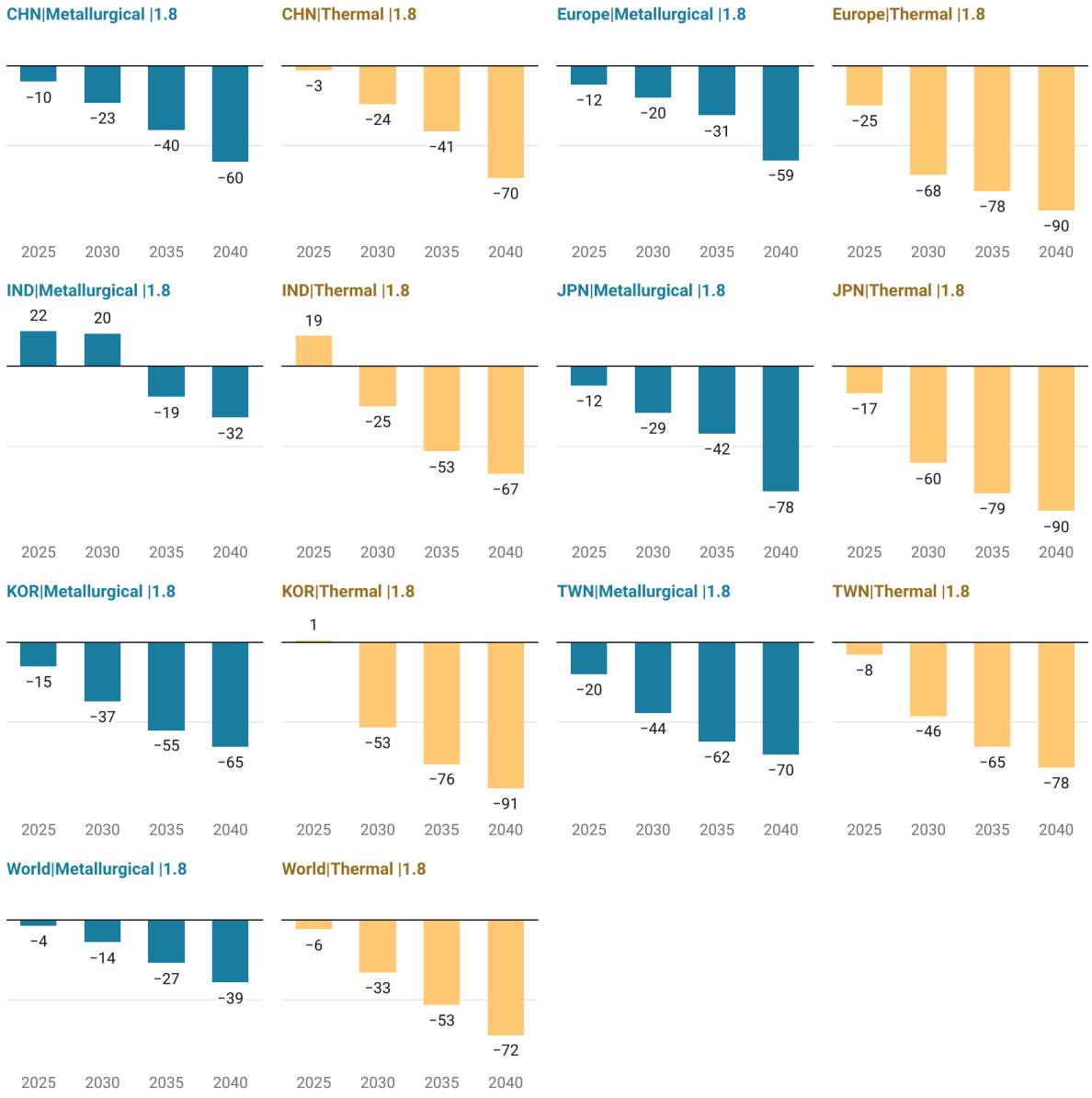

***Figure 11** - Best-estimate percentage change in coal consumption (relative to 2020) in Australia's key export markets under 1.8°C peak warming (Climate Resource analysis of NGFS5 scenarios).*

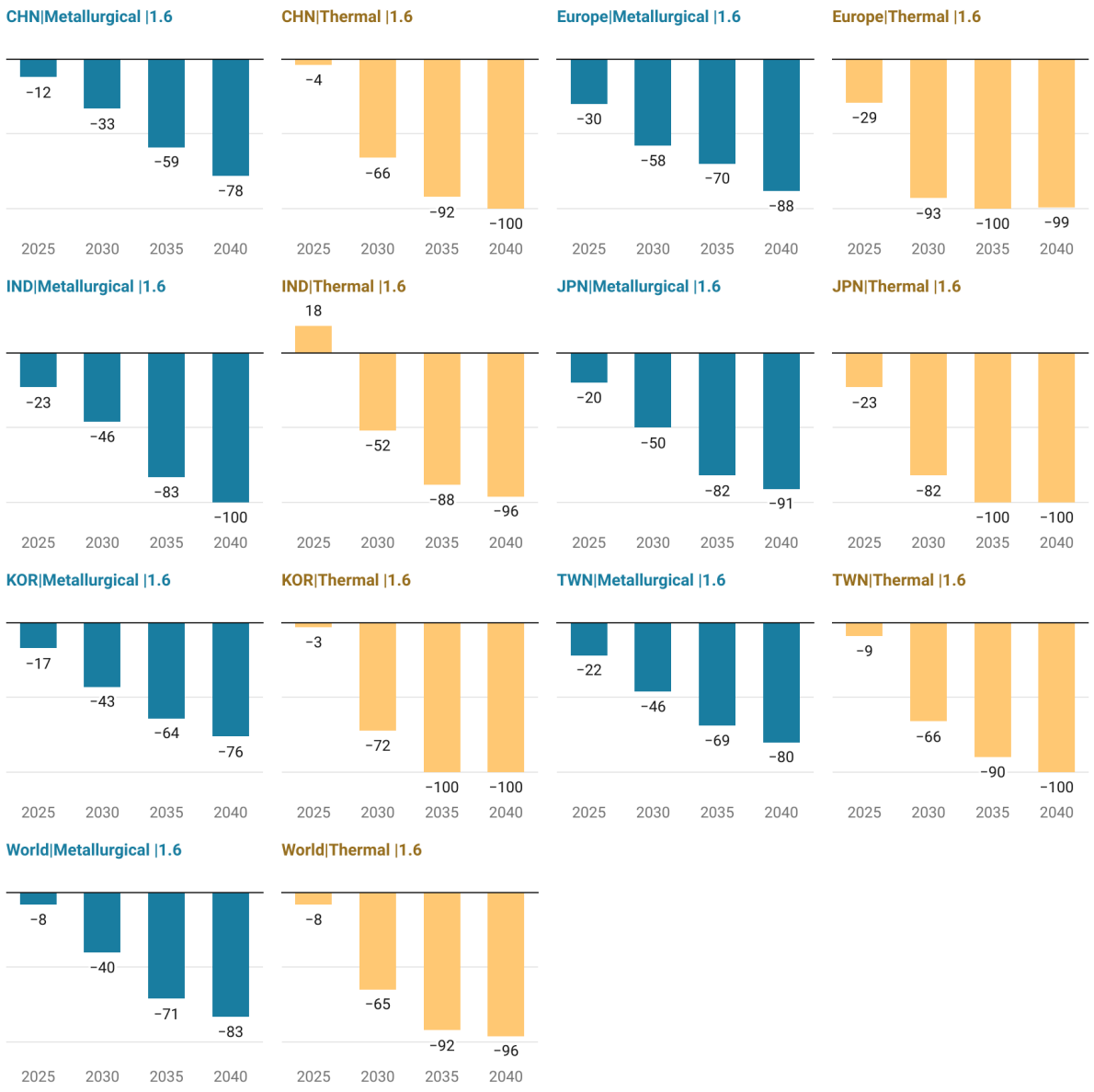

Figure 12 *- Best-estimate percentage change in coal consumption (relative to 2020) in Australia's key export markets under 1.6°C peak warming (Climate Resource analysis of NGFS5 scenarios).*

5.2 Thermal coal

Globally, and in all of Australia's major export markets, thermal coal consumption is projected to decline rapidly in the coming decades in the NGFS5 scenarios evaluated. Global consumption falls by around 65% and 33% by 2030 relative to 2020 levels in the scenarios evaluated under peak warming of 1.6° and 1.8°C respectively (median projection). By 2035, consumption is around 92% below 2020 levels under scenarios that limit peak warming to 1.6°C, and 53% below 2020 levels under scenarios that limit warming to 1.8°C.

The rate of change varies across markets. In the 50th percentile projections from these NGFS5 scenarios, relative to 2020 levels:

- In Japan, Australia's largest market (represented 36% of exports in 2024), thermal coal consumption falls by around 82% and 60% by 2030, under 1.6°C and 1.8°C respectively

- In China, which also accounted for 36% of Australia's exports in 2024, consumption falls by around 66% and 24% by 2030 under 1.6°C and 1.8°C respectively
- In South Korea, consumption falls by around 72% and 53% by 2030 under 1.6°C and 1.8°C respectively and in Taiwan, consumption falls slightly slower at around 66% and 46% by 2030 under 1.6°C and 1.8°C.

The projected change in India follows a different path to Australia's other major markets, with projected consumption rising to 2025, and before falling to 2030. In 2030, consumption is 52% and 25% lower than in 2020 in these NGFS5 scenarios evaluated at 1.6°C and 1.8°C respectively (50th percentile projections). India accounts for only around 2% of Australia's thermal coal exports in 2024, and as discussed below, is pursuing efforts to prioritise domestic coal sources and limit imports.

The range in the rate of decline across the 13th, 33rd, 66th and 87th percentile also varies across markets. In general, the range is wider for the rates of decline under scenarios evaluated at 1.8°C, which may reflect the ever narrowing window for limiting peak warming to 1.6°C.

5.3 Metallurgical coal

Consumption of metallurgical coal is also projected to decline sharply to 2040, globally and in Australia's major export markets in the NGFS5 scenarios evaluated under peak warming of 1.6°C and 1.8°C. Metallurgical coal consumption declines more slowly than thermal coal consumption at a global level and in most markets in these projections, particularly in projections related to peak warming of 1.8°C.

Global consumption falls by around 40% and 14% by 2030 relative to 2020 levels in the scenarios evaluated under peak warming of 1.6° and 1.8°C respectively (50th percentile projections). By 2035, consumption is around 71% below 2020 levels under peak warming of 1.6°C and 27% below under 1.8°C. The 13th to 87th percentile projections for global metallurgical coal consumption generally show a greater range than for thermal coal projections.

Again, the rate of change varies significantly across markets. In the 50th percentile projections from these NGFS5 scenarios, relative to 2020 levels:

- In India, one of Australia's largest markets (around 25% of 2024 exports), metallurgical coal consumption falls by around 46% by 2030 under 1.6°C. Conversely, metallurgical coal consumption increases by 20% by 2030 under scenarios evaluated with peak warming of 1.8°C before declining by 19% relative to 2020 levels by 2035.
- In Japan, also one of Australia's largest markets (around 23% of 2024 exports), metallurgical coal consumption falls by around 50% and 29% by 2030, under 1.6°C and 1.8°C respectively.
- In South Korea, Australia's third-largest market in 2024, consumption falls by around 43% and 37% by 2030 under peak warming of 1.6°C and 1.8°C.

6 AUSTRALIAN COAL EXPORTS - ITS FUTURE SHARE OF A CHANGING MARKET

The impact of declining demand for coal globally and in Australia's key export markets on Australian production depends on both the absolute decline and the share of those markets that Australia secures.

Historical patterns of trade provide only a rough guide to future export markets. Australia's share of the international coal trade will depend on a range of factors, in addition to relative cost, delivered price, and available reserves.

Australia's share of the changing global market is assessed for a low and high-demand case:

1. In the low-demand case, we assume major export markets with domestic coal reserves transition away from imported coal and towards domestic sources as their demand declines. The low demand case would predominantly affect Australian exports to China for metallurgical and thermal coal, and to India for thermal coal. This is a credible scenario given the available domestic reserves and policy intent expressed as discussed below.

2. In the high-demand case, we assume Australia retains a constant share of the declining demand for coal in its key export markets (based on the average market share from 2018–2024, excluding 2021–2022 for China when Australian coal was subject to import restrictions). It would result in Australian exports declining at the same rate in each market as is projected in the IAM scenarios.

In both cases, we apply assumptions about Australia's market share to market size projections derived from NGFS5 scenarios.

We do not explore a case in which global demand for Australia's relatively higher quality coal may fall more slowly than for lower quality coal, although DISR (March 2024) notes that this is one possible outcome.[26] We are not aware of evidence that supports this. It contrasts with the recent views of some analysts. S&P Global (April 2025) notes for example: *Japanese thermal coal importers have been turning away from key traditional supplier Australia toward low-sulfur Indonesian coal in recent years, as well as exploring alternative markets such as South Africa and Colombia, as they seek to diversify supply sources amid a lack of liquidity in high calorific value grades, stricter environmental norms and price pressure.*[27] On balance we consider an appropriate high-demand case is one in which Australia maintains its share of declining consumption in its major export markets.

[26] This assumption may inform some projections such as DISR Resources and Energy Quarterly March 2025

[27] Jain, T., & Saha, S. (2025, April 4). Japan's thermal coal importers look to alternative markets amid environmental pressure, sanctions. S&P Global Commodity Insights. https://www.spglobal.com/commodity-insights/en/news-research/latest-news/coal/040425-japans-thermal-coal-importers-look-to-alternative-markets-amid-environmental-pressure-sanctions

6.1 Low demand case - rationale and assumptions

Thermal coal

India produced around 85% of its thermal coal consumption in 2024.[28] An intention to eliminate thermal coal imports by FY 2026 was announced in January 2024.[29] It is unclear if this timetable continues to be the target. However, the government's focus on rapidly ending thermal coal imports and prioritising domestic coal production has been clearly communicated for several years.

In February 2025, the government announced that reducing coal imports and increasing domestic production is the focus of the Ministry of Coal.[30] In December 2024, it was reported that the government intends to remove the mandate to blend imported coal with domestic coal in thermal power plants and allow 100% of domestic coal.[31] Thermal coal imports had declined by over 22% month-on-month and 21% year-on-year in July 2025, despite thermal coal-fired power generation staying flat over that period.[32]

For the low demand case, we assume that the Australian share of Indian coal consumption declines in a straight line from 2024 levels to zero by 2030.

China produced around 90% of its thermal coal consumption in 2024.[33] We are not aware of recent clear statements from the Chinese government regarding an intention to substitute domestic coal for imports, but it will likely have the capacity to do so as demand declines. In the low case, we also assume that Australia's market share in China declines in a straight line from 2024 levels to 2030.

Metallurgical coal

India produced only around 5% of its current metallurgical coal consumption in 2024.[34] The Indian government imposed restrictions on imports of metallurgical coke in December 2024.[35] Australia accounted for around 50% of India's imports of metallurgical coal in 2024, down from 75% in 2018. In the low-demand case we assume that Australia's share of India's metallurgical coal consumption continues to decline at the same rate as has occurred since 2018.

China produced around 85% of its metallurgical coal consumption in 2024.[36] As with thermal coal we are not aware of clear statements regarding an intention to substitute domestic coal for imports.

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[28] IEA Coal 2024

[29] ET Bureau. (2024, January 26). *Government aiming for zero thermal coal import by FY26, says Coal Minister Joshi*. *The Economic Times*. https://economictimes.indiatimes.com/industry/energy/power/goverment-aiming-for-zero-thermal-coal-import-by-fy26-says-coal-minister-joshi/articleshow/107155074.cms

[30] Ministry of Coal, Government of India. (2025, February). *Press Information Bureau release ID 2100763*. https://coal.nic.in/sites/default/files/2025-02/PIB2100763.pdf

[31] CNBC-TV18. *India removal mandatory blending mandate imported coal*. CNBC-TV18. https://www.cnbctv18.com/energy/india-removal-mandatory-blending-mandate-imported-coal-19528761.htm

[32] India Non-Coking Coal Imports Fall 4% YoY in Jan-Jun 2025: BigMint Report Highlights Market Shift. July 2025. https://www.bigmint.co/events/bigmint-india-ferrous-week/blog/india-non-coking-coal-imports-fall-4-yoy-in-jan-jun-2025-bigmint-report-highlights-market-shift

[33] IEA Coal 2024

[34] IEA Coal 2024

[35] Wood McKenzie January 2025, India's Quantitative Restriction on met coke: impact on seaborne trade and coking coal prices, https://www.woodmac.com/reports/coal-indias-quantitative-restriction-on-met-coke-impact-on-seaborne-trade-and-coking-coal-prices-150347500/

[36] IEA Coal 2024

China's steel production faces an uncertain outlook including risks of overcapacity, and a transition to increased production from electric arc furnace production in the coming years.[37] In the low-demand case we assume that China produces sufficient metallurgical coal to meet all its demand by 2030.

6.2 Findings: Australia's projected exports

Australia's projected exports in the low-demand and high-demand cases under scenarios evaluated at peak warming of 1.6°C and 1.8°C are summarised in Table 1.

In all cases evaluated, Australia sees rapid declines in demand for thermal coal exports by 2030, ranging from a reduction of 44% (high demand case 1.8°C) to 81% (low demand case 1.6°C).

***Table 1** - Change in Australia's thermal and metallurgical coal exports (median projection) relative to 2024, derived from NGFS5 scenarios evaluated at peak warming of 1.6°C and 1.8°C*

Case	Product	2030	2035	2040	2045	2050
Low Demand Case - 1.6°C						
	Thermal	-81%	-98%	-99%	-100%	-100%
	Metallurgical	-56%	-80%	-90%	-93%	-96%
Low Demand Case - 1.8°C						
	Thermal	-63%	-78%	-89%	-95%	-96%
	Metallurgical	-33%	-54%	-72%	-82%	-87%
High Demand Case - 1.6°C						
	Thermal	-72%	-96%	-99%	-100%	-100%
	Metallurgical	-38%	-69%	-86%	-90%	-93%
High Demand Case - 1.8°C						
	Thermal	-44%	-64%	-81%	-90%	-94%
	Metallurgical	-5%	-28%	-49%	-61%	-71%

The projected changes are illustrated in Figure 13 which show the median and the 13th and 87th percentile range of projections for the low and high-demand cases.

The projected change in demand in each of Australia's major export markets (mean, 13th and 87th percentile projections) evaluated based on the NGFS5 scenarios, and the low and high case for the Australian share of those declining markets, are shown in Annex 1.

[37] Wood MacKenzie March 2025, China Steel in its Post Peak Era https://go.woodmac.com/l/131501/2025-04-02/343s1h/131501/1743577754bANMrk1j/China_Steel_in_its_Post_Peak_Era.pdf

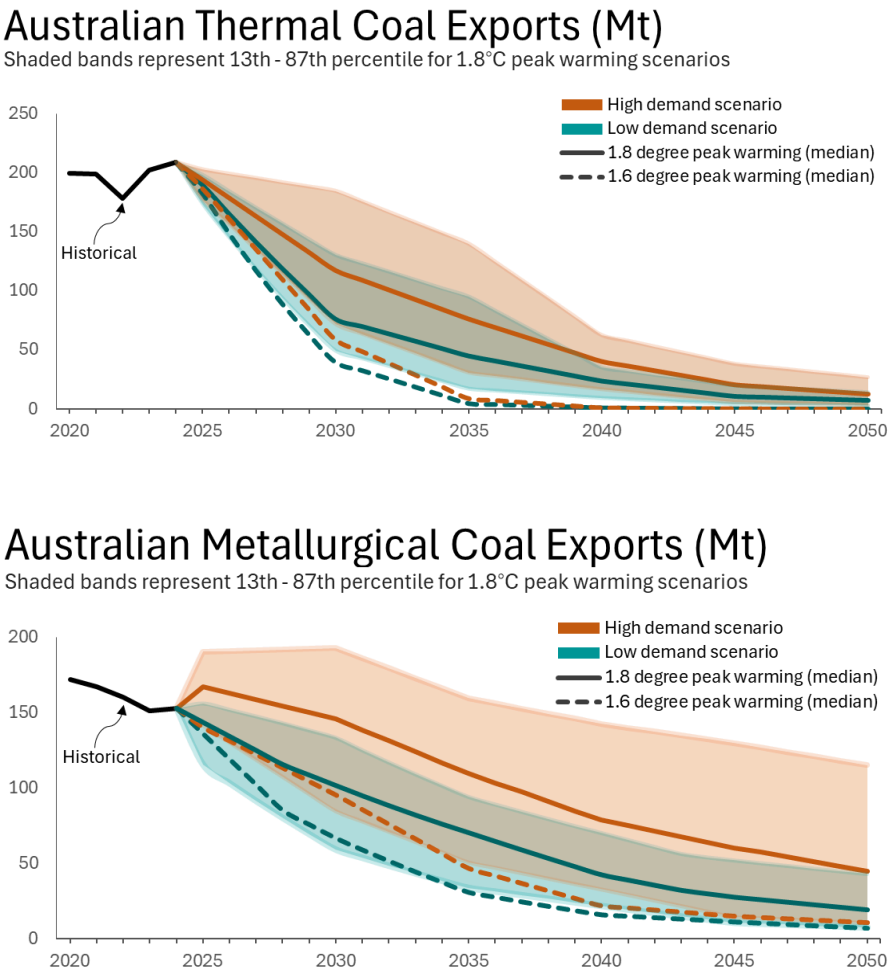


Figure 13 - *Australia's projected exports - 1.6°C and 1.8°C scenarios*

7 DOMESTIC: PROJECTED CHANGES IN COAL CONSUMPTION IN AUSTRALIA

Although most of Australia's coal is exported, domestic use remains significant, accounting for around 1,510 PJ in 2023-24 (approximately 13% of total coal production).[38]

We explore the projected changes in domestic coal consumption using national and regional analysis, in addition to the NGFS5 dataset, specifically:

- AEMO's 2024 Integrated System Plan (ISP)[39]
- Western Australia's Whole of System Plan (WOSP)[40]
- CSIRO's 2024 Modelling Pathways to Net Zero report[41]
- Energy Transitions Initiative's 2023 Pathways to Industrial Decarbonisation report[42]

These national and regional analyses incorporate more granular constraints than global IAMs —such as regional transmission limits, local technology deployment timelines, specific coal plant closure timelines, and state-level policy settings – providing a more nuanced, region-specific view. Combining IAM results with these local insights provides a more complete picture of Australia's future coal use.

The combined insights from IAMs, AEMO's ISP, Western Australia's WOSP, CSIRO and ETI modelling demonstrate a sharp projected decline in Australia's domestic coal use, under both 1.6°C and 1.8°C scenarios. This trend aligns with ongoing coal-fired capacity retirements, high deployment of renewables, and the broader global push towards net zero. The methodology and projections are described below.

7.1 Current domestic coal consumption

In 2023-24, around 1,510 PJ of coal was consumed domestically, equal to roughly 13% of Australia's total coal production. This was made up of (Figure 14):

- 1,442 PJ thermal coal (95%), of which 1,347 PJ was used for electricity supply.
- 68 PJ (5%) metallurgical coal.

[38] DCCEEW, 2025 Australian Energy Update
https://www.energy.gov.au/sites/default/files/2025-08/australian_energy_update_2025.pdf
[39] AEMO, 2024 Integrated System Plan
https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp
[40] Government of Western Australia, 2020 Whole of System Plan
https://www.wa.gov.au/government/document-collections/whole-of-system-plan
[41] CSIRO, 2024 Modelling Sectoral Pathways to Net Zero Emissions
https://www.csiro.au/en/research/environmental-impacts/decarbonisation/sectoral-pathways-modelling
[42] ETI, 2023 Pathways to Industrial Decarbonisation
https://www.climateworkscentre.org/resource/pathways-to-industrial-decarbonisation-positioning-australian-industry-to-prosper-in-a-net-zero-global-economy/

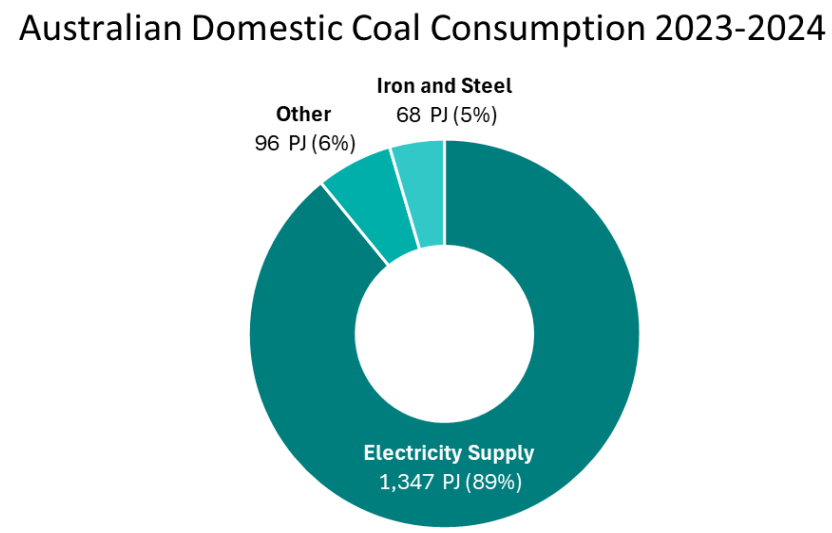


***Figure 14** - Australia's domestic coal consumption (2023-2024)*[43]

7.2 Domestic coal projection methodology

7.2.1 Thermal coal

Electricity sector assumptions

Future coal consumption for electricity is estimated by scaling the 2024 baseline according to scenario-based projections for coal-fired generation from AEMO's ISP and Western Australia's WOSP.

1. **National Electricity Market (NEM)**
    - **Peak warming of 1.5-1.6°C** is based on AEMO's ISP Green Energy Exports scenario. This scenario reflects decarbonisation efforts that limit global temperature increase to ~1.5°C by 2100, aligned with Representative Concentration Pathway (RCP) 1.9.[44]
    - **Peak warming of 1.8°C** is based on the AEMO's ISP Step Change scenario. This scenario reflects global efforts to limit temperature rise to ~1.8°C by 2100, aligned with RCP 2.6.
2. **South West Interconnected System (SWIS)**
    - **Peak warming of 1.6°C** is based on the WOSP Cast Away scenario. This scenario features rapid and deeper reductions in fossil-fuel use compared to other WOSP scenarios, and is considered to be a reasonable approximation for peak warming of 1.6°C.
    - **Peak warming of 1.8°C** is based on the WOSP Groundhog Day scenario. Compared to Cast Away, Groundhog Day has a more moderate coal phase-down, and is close to the average of the four WOSP scenarios.

[43] DCCEEW. (2025, August). *Australian Energy Update 2025*. https://www.energy.gov.au/publications/australian-energy-update-2025

[44] AEMO, 2023 Inputs, Assumptions and Scenarios Report https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp/current-inputs-assumptions-and-scenarios

Although WOSP scenarios do not map to peak global temperatures directly, these approximations are considered sufficient given the SWIS's relatively small share of Australia's total coal generation capacity (less than one-tenth of the NEM's).

Industry sector assumptions

For domestic thermal coal used in Industry, CSIRO's 2024 Modelling Pathways to Net Zero projections are used, subtracting the metallurgical coal portion to isolate thermal coal use. Relative reductions in industrial thermal coal use are applied to the 2024 baseline from DCCEEW's 2025 Australian Energy Statistics.[45]

Total thermal coal assumptions

Total domestic thermal coal is projected by summing:

- Coal use in electricity generation (NEM + SWIS)
- Thermal coal for industry (excluding iron and steel)

These estimates are then compared to the results of the NGFS Phase 5 rolling quantile regression analysis.

7.2.2 Metallurgical coal

Australia's domestic metallurgical coal projection is based on:

- **Warming of 1.5°C:** Average of CSIRO's 2024 Modelling Pathways to Net Zero projection, and the Energy Transition Initiative's 2023 Pathways to Industrial Decarbonisation projection.
- **Warming of 2°C:** CSIRO's 2024 Modelling Pathways to Net Zero projection.

These estimates are then compared to the results of the NGFS5 rolling quantile regression analysis.

These don't align exactly with scenarios that result in peak warming of 1.6°C and 1.8°C that anchor the analysis in the rest of the report due to the availability of projections. Nonetheless, they are a reasonable approximation given the intended use.

7.3 Thermal coal projections

The domestic projections based on national and regional modelling are fairly consistent with IAM pathways, and indicate that (Figure 15 and Table 2):

- Under the 1.5-1.6°C peak warming scenario, domestic thermal coal consumption declines by 76% by 2030, and 93% by 2035 compared to 2024.
- Under the 1.8°C peak warming scenario, domestic thermal coal consumption declines by 59% by 2030 and 86% by 2035 compared to 2024.

[45] Department of Climate Change, Energy, the Environment and Water. (2025, August). *Australian Energy Update 2025*. https://www.energy.gov.au/publications/australian-energy-update-2025

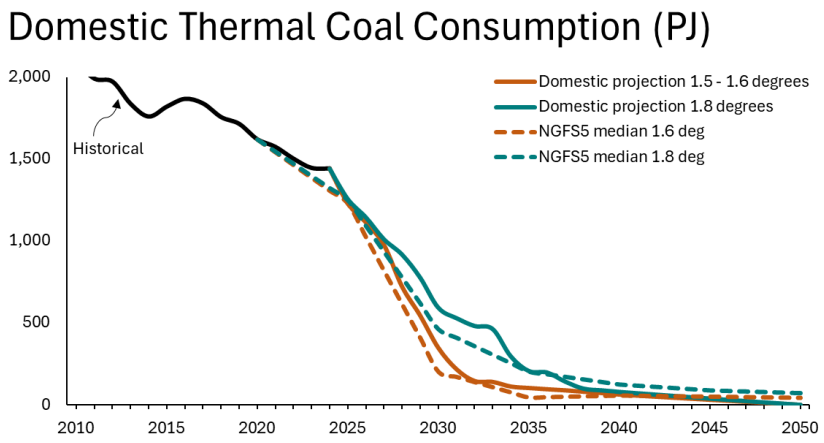


***Figure 15** - Australian domestic thermal coal consumption historical and to 2050*

Recent downward trends in coal-fired electricity generation support this projection. According to AEMO's 2024 ISP, the 1.8°C Step Change scenario may even be conservative, as coal retirements could occur sooner than forecast due to high operating and maintenance costs, reduced fuel security and greater competition from renewable energy in the wholesale market.[46]

7.4 Metallurgical coal projections

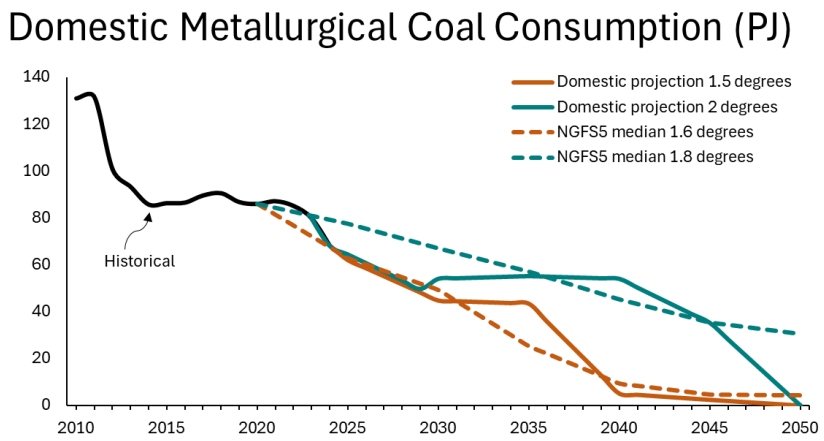


***Figure 16** - Australian domestic metallurgical coal consumption historical and to 2050*

Domestic metallurgical coal is projected (Figure 16) to fall more gradually than thermal coal. However, metallurgical coal represents just 5% of domestic coal consumption so this will have minimal impact on Australia's overall domestic coal trajectory.

[46] AEMO, 2024 Integrated System Plan
https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp

8 CONCLUSIONS

This analysis shows the rapid decline in demand for Australian coal evident in NGFS5 projections as the world takes action to limit peak warming to 1.8°C or 1.6°C peak warming. Australian analyses of the decline in domestic demand show the likelihood of similar or, in the case of thermal coal, even more rapid falls under comparable warming scenarios.

The pathways we derive from the NGFS scenarios that result in peak warming of 1.8°C are still achievable if countries fully implement their climate pledges, which limits end-of-century warming to 1.8°C - 1.9°C (best estimate) and retains options for strengthening ambition to close the gap. These NGFS pathways are also broadly consistent with Australian analyses of changes in domestic demand, particularly for thermal coal.

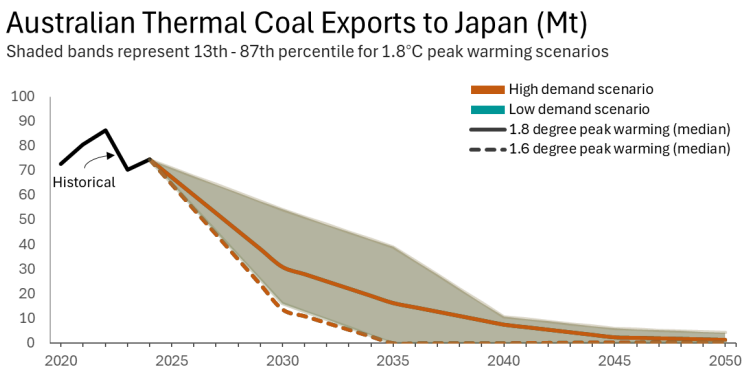
A clear implication is that Australia is prudent to use scenarios that incorporate this rapid phase-out of coal production in the near term as part of planning the decarbonisation of its economy, and its response to the global transition to net zero. The short timelines highlight the need for policies to support a just transition away from coal, and realise the opportunities as the world transitions to alternative energy sources.

Australian thermal coal declines fast in a 1.8°C scenario and is at least 64% or more below 2024 levels by 2035 (median projection). In low-demand cases, or scenarios consistent with stronger global action that limits peak warming to 1.6°C, thermal coal demand is at least 78% below 2024 levels by 2035 (median projection). Metallurgical coal demand declines slower, but still faces rapid and sustained declines. The different trajectories suggest the implications for New South Wales thermal coal-producing regions will need to be considered on a different and faster time scale than for regions in Queensland that produce metallurgical coal.

ANNEX 1: PROJECTED CHANGES - AUSTRALIA'S EXPORTS BY COUNTRY

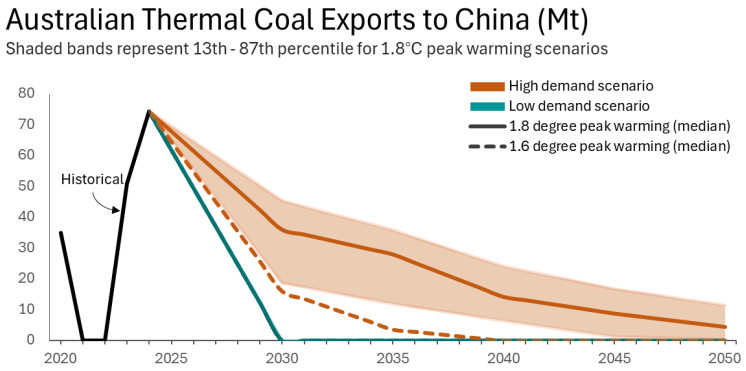
Thermal coal exports

Japan

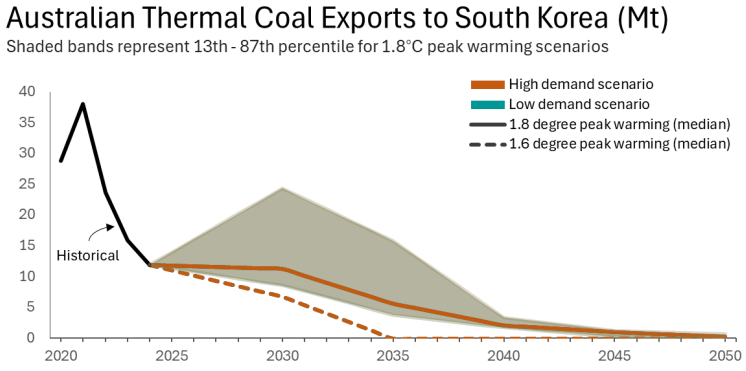


China

Note: China's ban on Australian coal in 2021 is a disruption of historical trends. Also, Australia supplies less than 2% of China's thermal coal consumption, so demand for Australian thermal coal is expected to fall quickly as China prioritises domestic production. In scenarios consistent with limiting warming to 1.8°C, China is projected to meet all of its thermal coal demand from domestic sources in the near future.

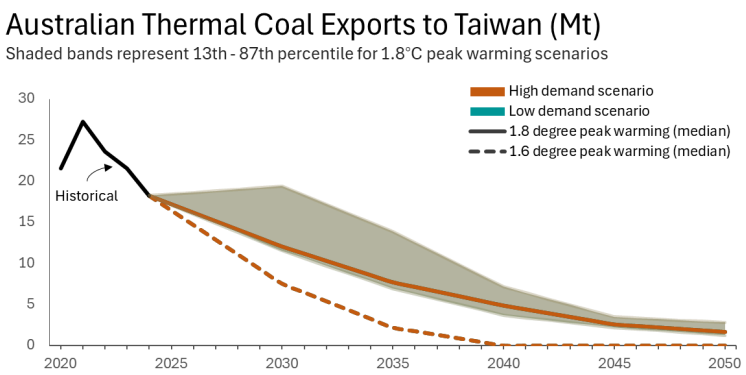


South Korea

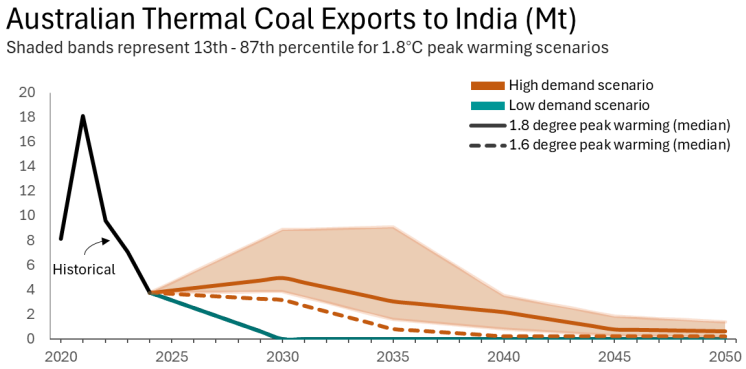


Climate Resource

Taiwan

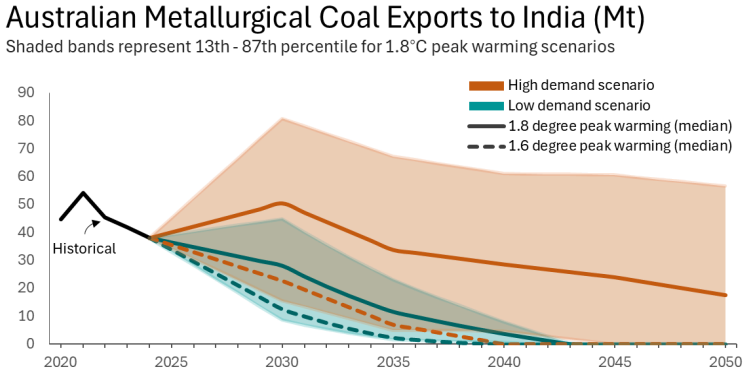


India

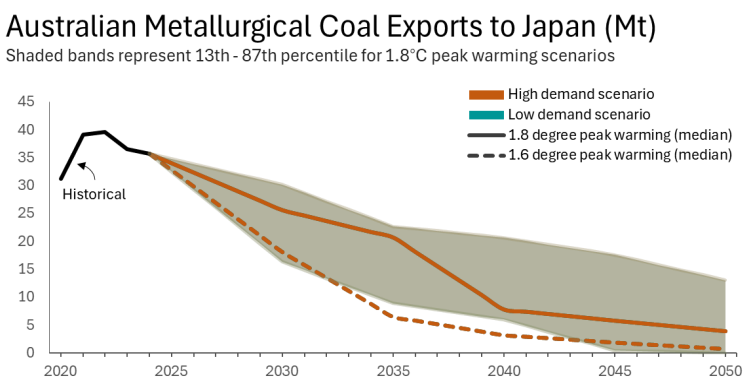


Metallurgical coal exports

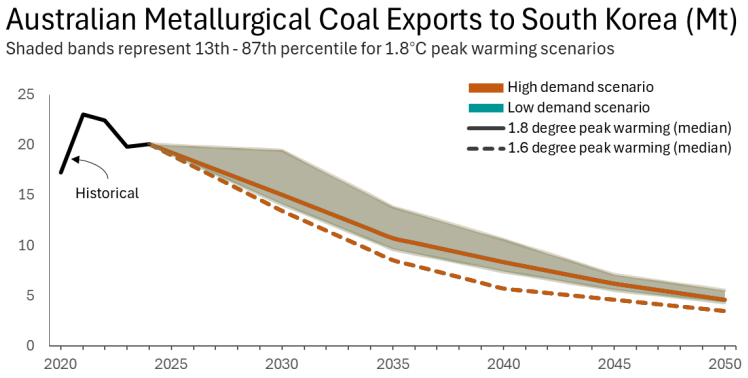
India



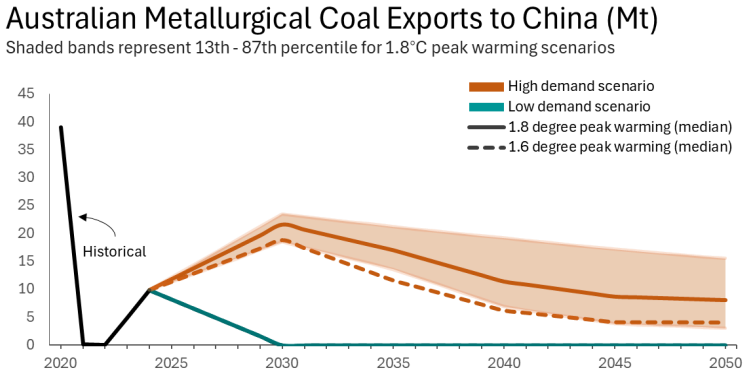
Japan



South Korea

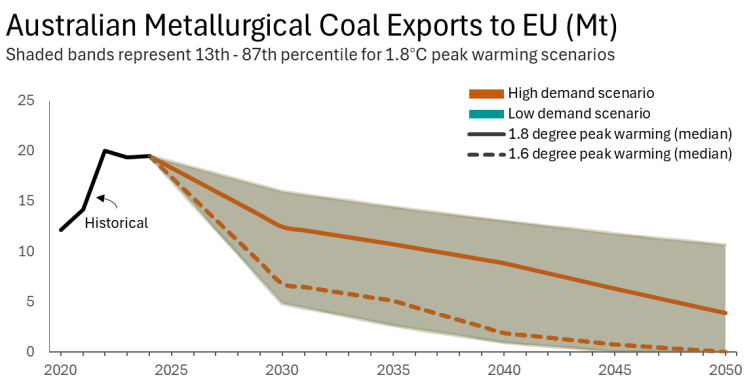


China

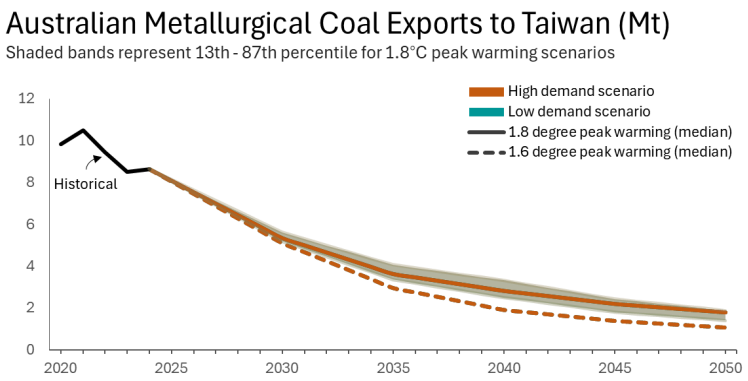


Climate Resource

EU


Australian Metallurgical Coal Exports to EU (Mt)
Shaded bands represent 13th - 87th percentile for 1.8°C peak warming scenarios
High demand scenario
Low demand scenario
1.8 degree peak warming (median)
1.6 degree peak warming (median)
Historical
25
20
15
10
5
0
2020
2025
2030
2035
2040
2045
2050

Taiwan


Australian Metallurgical Coal Exports to Taiwan (Mt)
Shaded bands represent 13th - 87th percentile for 1.8°C peak warming scenarios
High demand scenario
Low demand scenario
1.8 degree peak warming (median)
1.6 degree peak warming (median)
Historical
12
10
8
6
4
2
0
2020
2025
2030
2035
2040
2045
2050

ANNEX 2: NGFS5 SCENARIOS

The NGFS5 scenarios analysed and the results presented in the preceding sections provide useful insights on future demand for Australian coal exports. In reaching this conclusion, we have considered three issues that should be taken into account in using this work to inform policy.

- The purpose of the underlying IAM scenarios and the insights they are designed to provide.
- The country-level resolution reported by each model that contributes to the NGFS5 database and number of scenarios and models on which the projections are based for different peak warming levels.

Purpose of the underlying IAM scenarios

The NGFS scenarios were designed as a tool to assist policymakers in exploring potential future risks and opportunities at a global level, with some regional and country-specific resolution. They are published annually and widely used by the science, policy, regulatory and investment communities globally. The technical documentation describes the policy frameworks, socio-economic characteristics, and assumptions underlying these scenarios.[47]

The underlying models are optimisation models that find the least-cost solution under a given set of input assumptions and constraints. They report the associated global, regional, or country emissions pathways and quantities of key physical variables (e.g., demand for coal). The reported outputs are not predictions but scenarios that explore alternative pathways under the specified constraints.

This context helps in using and interpreting the results. For example, the finding that coal demand falls rapidly in the scenarios presented in this report, infers that this is part of the set of least-cost opportunities in scenarios that limit warming to 1.6°C or 1.8°C. If these are not pursued, the implication is that the total cost of limiting warming to these levels will be higher.

Each model that contributes to the NGFS5 scenarios reports seven scenarios. This includes a current policy scenario, that explores least-cost pathways if current policies are preserved but not strengthened, and six other scenarios that reflect different pathways for the transition to a lower emissions global economy under stronger or weaker climate mitigation action, and underlying assumptions. Given the global focus of the models, the policy representation differs across models and sectors. These models do not include a detailed, bottom-up representation of Australia, such as might be provided by country or sector-specific modelling developed with the purpose of exploring Australian-specific pathways or forecasts. It is for this reason that we also evaluate Australian-specific studies to inform the assessment of domestic demand for coal.

There are a sufficient number of models and scenarios in the database to provide a useful perspective on the rate of reduction in demand for Australian coal in future decades. However, the limited number of scenarios consistent with limiting peak warming to 1.6°C means that we have more limited data points on which to draw. It makes the regression methodology and distribution it produces less robust than when a large number of data points is available, and in the case of the NGFS5 dataset, creates a greater risk of those findings being overly influenced by one model. If the window for limiting warming to 1.5°C with low overshoot continues to narrow in the coming years, including similar analysis for peak warming of 1.6°C will likely become increasingly problematic. It is appropriate to take this into account considering the NGFS5 scenarios consistent with peak warming of 1.6°C. However we also note that the results obtained remain useful and represent a consistent progression compared to the 1.8°C scenarios.

[47] NGFS Climate Scenarios for central banks and supervisors - Phase V, available at https://www.ngfs.net/en/publications-and-statistics/publications/ngfs-climate-scenarios-central-banks-and-supervisors-phase-v, accessed May 2025.

The NGFS5 dataset contains 28 scenarios. These are produced by three well-established models from leading institutions that are widely used by the international climate science and policy communities. The three models are:

- GCAM, which is developed and maintained by the Joint Global Change Research Institute (JGCRI), a partnership between Pacific Northwest National Laboratory (PNNL) and the University of Maryland.
- MESSAGE-GLOBIOM, which is developed and maintained by the IIASA (the International Institute for Applied Systems Analysis in Austria).
- REMIND-MAgPIE, which is developed and maintained by the Potsdam Institute for Climate Impact Research (PIK). This model reports scenario results for two setups, one of which integrates physical damages. As a result, there are more data points from REMIND.

Country-level resolution and number of scenarios included in the analysis

Not all models report country-level resolution for the countries of interest to this analysis. Some report these results as part of regional groupings. Some models also provide fewer scenarios consistent with all warming levels that we might want to explore. Given the smaller number of models and scenarios in NGFS, we have examined whether some models contribute a significant proportion of data points for some of the warming levels explored, and the risk of bias due to the regional groupings (rather than country-specific data) reported by some models.

We omit scenarios that report the relevant country as part of a large regional grouping, in which the results risk not being a reasonable representation of the likely pace of change in demand. We include scenarios in which a country is reported as part of a regional grouping in which the country of interest contributes a large share of demand. The country and regions reported by each model are outlined in Table A2.1, together with the maximum number of scenarios from each that we have included in the analysis. This is the maximum number of scenarios in each case because not all models will report scenarios relevant to all warming levels. For example there will almost certainly be fewer than the maximum scenarios relevant to the regression results related to limiting peak warming to 1.6°C.

Table A2.1: Country and regional resolution, and number of scenarios

Country	# Scenarios	GCAM6.0 NGFS	REMIND-MAgPIE 3.3-4.8	MESSAGE-GLOBIOM 1.1-r12
Australia	21	Australia/NZ (7)	Australia, Canada, NZ (14)	Pacific OECD (Australia, Japan, NZ) (0)
China	28	China (which includes HKG) (7)	China (which includes CHN, HGK, MAC, TWN) (14)	China (which includes HGK, MAC) (7)
India	21	India (7)	India (14)	South Asia (0)[48]
Japan	21	Japan (7)	Japan (14)	Pacific OECD (Australia, Japan, NZ) (7)

[48] MESSAGEix-GLOBIOM 1.1-r12 'South Asia' region includes: BTN, LKA, MDV, NPL, PAK.

Country	# Scenarios	GCAM6.0 NGFS	REMIND-MAgPIE 3.3-4.8	MESSAGE-GLOBIOM 1.1-r12
South Korea	7	South Korea (7)	Other Asia (0) [49]	Other Pacific Asia (0) [50]
Taiwan	7	Taiwan (7)	China (0)	Other Pacific Asia (0)
Europe	28	EU12 + EU15 + Europe Non EU (7)	EU28 + Non-EU28 Europe (14)	Western Europe + Eastern Europe (7)
World	28			

Source: NGFS5 Climate Scenarios Technical Documentation, 2024, Table 26

[49] REMIND-MAgPIE 3.3-4.8 'Other Asia' region includes AFG, ASN, ATF, BGD, BRN, BTN, CCK, COK, CXR,FJI, FSMGUM,IDN, IOT, KHM, KOR, LAOLKA, MDV, MHL, MMR, MNG, MNP, MYSNCL, NFK, NIU, NPL, NRU, PAK, PCN, PHL, PLW, PNG, PRK, PYF, SGP, SLB, THA, TKL, TLS, TON, TUV, UMI, VNM, VUT, WSM.

[50] MESSAGEix-GLOBIOM 1.1-r12 includes ASM, BRN, CCK, COK, FJI, FSM, IDN, KIR, KOR, TLS, TWN TON, TIV VUT, WSM.