

Surging Metallurgical Coal Price is driver for New Projects

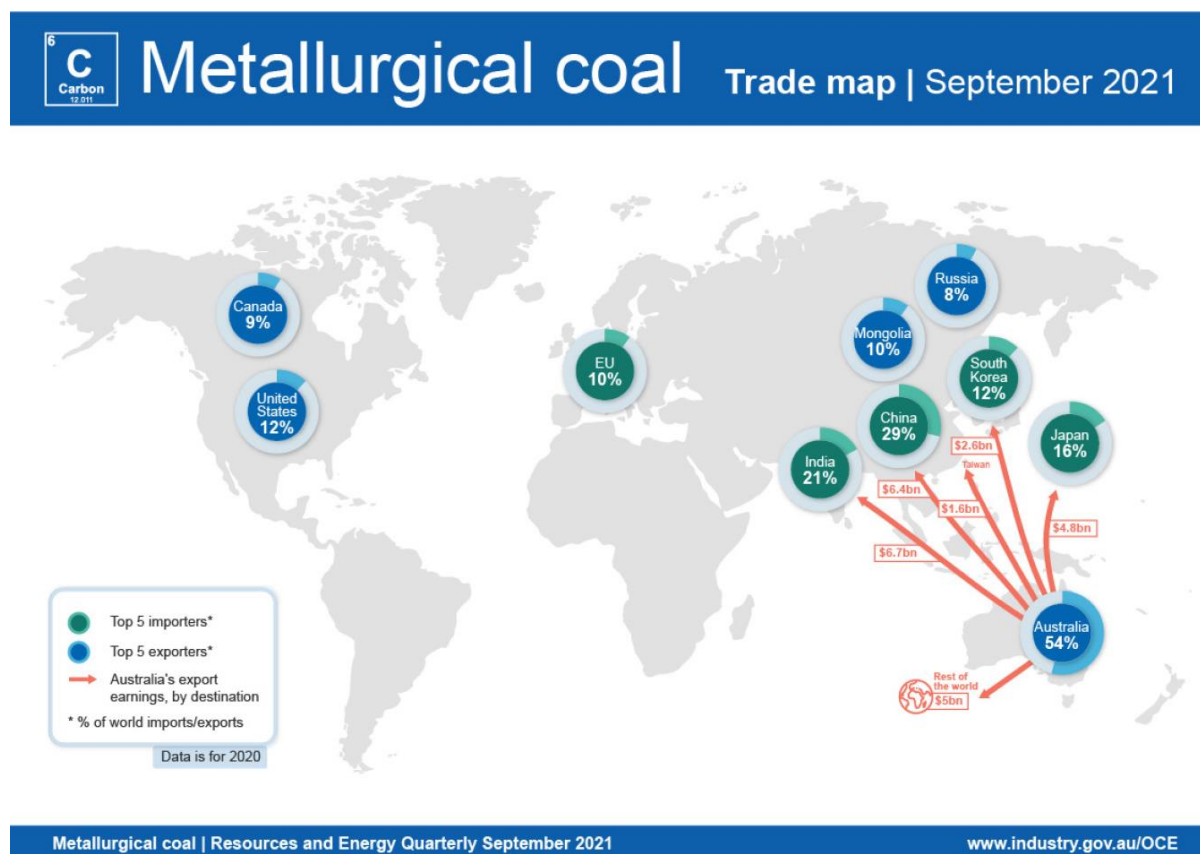
Australia is the world's largest exporter of metallurgical coal primarily used for steelmaking which is the world's second largest industry.

Australia exports about 170 m tonnes per annum of metallurgical coal comprising

- HCC - Hard Coking Coal for making coke
- Semi Soft Coking Coal for making coke
- PCI - Low volatile Pulverised Coal for injection into blast furnace

A wind turbine requires 142,000 kg of metallurgical coal and an average car 650 kg

There are over 20 metallurgical coal projects in QLD & NSW progressing through
Exploration > Feasibility Studies > Development Approval > Funding > Commencement



This report references the Australian Government Office of The Chief Economist
Resources and Energy Quarterly September 2021 | Metallurgical Coal
<https://www.industry.gov.au/data-and-publications/resources-and-energy-quarterly-september-2021>

Contents

- 1 Metallurgical Coal | Resources and Energy Quarterly September 2021
Australian Government Office of The Chief Economist
- 2 A Snapshot of Advanced Metallurgical Coal Projects in QLD & NSW
- 3 Upcoming event - Connecting Coal Conference QLD online 11 November 2021
- 4 Digital Technologies and Automation
- 5 About the Author

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1 Metallurgical Coal | Resources and Energy Quarterly September 2021 Australian Government Office of The Chief Economist

Metallurgical coal prices have continued to surge (off the graph Figure 5.5), driven up by tight supply and rising demand with Australian Premium Quality Hard Coking Coal hitting a new peak of US\$400 FOB per tonne in September as rebounding global steel production is impacted by coal supply shortages.

Figure 5.5: Metallurgical coal prices, monthly



Notes: HCC stands for hard coking coal. PCI stands for pulverized coal for injection.
Source: Platts (2021)

US\$400/tonne September 2021



Metallurgical coal export earnings are on a strong trend

Supply chains disrupted by China's informal import restrictions have largely reorganised. Australian exports have now integrated into new supply chains, with no impact on volumes evident in the wake of the informal import restrictions imposed by China.

Australia's exports are forecast to rise from 171 million tonnes in 2020–21 to 186 million tonnes by 2022–23. Metallurgical coal supply is expected to be supported shortly by output from Wollongong Coal's Russell Vale Colliery extension, which received final environmental approval in early September 2021.

Australian coal demand has risen significantly in South Korea and Japan. European importers have also sought greater access to Australian supply, seeking to capitalise on its lower price relative to US supply. Higher demand from India is expected to add further to pressure on Australian exports with buyers in Japan, South Korea and Taiwan also expressing interest in greater supply in the December quarter.

Much of the recent surge in metallurgical coal demand is 'pent-up': caused by the closure of significant steel and automotive making capacity over much of 2020 due to COVID. Australian government Chief Economist forecast expect prices for Queensland premium quality metallurgical coal to soften to an average of \$159 per tonne FOB in 2022 and to an average \$152 per tonne in 2023

Decarbonisation of the steel industry and green steel

With the global energy transition gathering momentum, the steel industry is exploring opportunities to play its part in the decarbonisation plan. In the first half of 2021, a number of new initiatives have been announced or implemented by major steel producers. This includes the introduction of Carbon Capture, Utilisation and Storage (CCUS) in existing steelmaking processes, as well as the use of renewable energy and new technologies to drive the steelmaking process including:

- ArcelorMittal - Direct Reduced Iron – Electric Arc Furnace (DRI-EAF), and
- SAAB – Hydrogen Breakthrough Ironmaking Technology (HYBRIT)

Commercialisation of these technologies will reduce growth of metallurgical coking coal exports over time. **However, this will be the driver for critical mineral projects where Australia has a rich resource base and emerging project pipeline which is an area of current interest.**

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2 A Snapshot of Advanced Metallurgical Coal Projects in QLD & NSW

There are over 20 metallurgical coal projects in QLD & NSW progressing through Exploration > Feasibility Studies > Development Approval > Funding > Commencement

Some Advanced Projects include:

Vitrinite QLD

Privately owned Vitrinite plans to ramp up production to a run-rate of around 1.2 mt/t run of mine (ROM) of metallurgical coal from the new Vulcan open-cut coal operation in central Queensland.

Vitrinite plans to produce up to 6 mt over the four-year life of the mine and says it has received good feedback from Asian customers for coal that has similar coal quality to BHP's Peak Downs and Saraji mines

Whitehaven Coal NSW & QLD

Whitehaven Coal's Vickery coal mine expansion in the Gunnedah Basin of NSW was approved by Australia federal government on 16 September. Vickery is an open-pit metallurgical and thermal coal operation, which services the export market. The site currently has approval for 4.5 million mt/year. The Vickery planned ramp up from FY21 is to take the mine to 10 million mt/year run of-mine production for around 20 years.

In early 2018, Whitehaven Coal acquired Rio Tinto's Winchester South metallurgical coal project located in the Bowen Basin. The A\$1bn project, 30 km south east of the town of Moranbah, is targeting production of 15 mt/y of ROM coal, predominantly high quality metallurgical coal for export to Asian markets.

Winchester South JORC Resource was upgraded in December 2020 to 1,100Mt from 530Mt and includes 665Mt of Measured and Indicated Resources. The project continues to progress through the Queensland Government's Coordinated Project approval process with the draft Environmental Impact Statement (EIS) having been submitted to Queensland's Office of Coordinator General for adequacy review ahead of Public Notification

Pembroke Resources

Pembroke Resources has secured a loan facility of up to \$175 million with a tenor of 10 years by the Board of the Northern Australia Infrastructure Facility (NAIF) to finance the development of the Olive Downs Steelmaking Coal Complex in the Bowen Basin in Central Queensland, one of the world's leading steelmaking coal regions.

Olive Downs has a JORC Reserve of 514M tonnes of high-quality steelmaking coal and will initially operate at 4.5Mtpa, expanding to 15Mtpa capacity, with low-cost production and a long life mine estimated at 80 years.

Olive Downs has been approved to a high level of environmental accountability and standards and has received its Environmental Authority and Mining Lease from the Queensland Government along with the Environmental Protection and Biodiversity Conservation approval from the Commonwealth Government. . Olive Downs is also the first mine to be approved under the State Government's 'Strong and Sustainable Communities Act'. Source Pembroke Resources 1 July 2021

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3 Upcoming event - Connecting Coal Conference QLD online 11 November 2021

The online Connecting Coal Conference Queensland is designed to assist the resource, construction, engineering, manufacturing, and services sectors on the latest project and procurement opportunities. <https://www.connectingindustry.com.au/events/>

M Resources - Mavis and Millennium Downs Metallurgical Coal Mine Restart

In April 21 M Resources acquired the Mavis and Millennium Downs Mines from Peabody Energy Australia in a joint venture (MetRes) with Stanmore Coal. The restart of the Mavis and Millennium Downs Mines will allow underground expansion, along with continuation and completion of rehabilitation. M Mining will be the JV Manager and Operator and will extract full value from the mines by streamlining operations through auger and open cut mining methods followed by underground extension from the existing highwalls to achieve low-cost mining and stable production of low ash high quality metallurgical coal which remains an essential component of the steel making process.

Bowen Coking Coal: Broadmeadow East

Broadmeadow East is Bowen Coking Coal's most advanced project, which includes a granted Mining Lease and access to infrastructure. The Company is currently accelerating its development with a view to getting the project "shovel ready" as soon as practically possible. The Broadmeadow East Coking Coal Project is located about 25km northeast of the township of Moranbah, within the Central Bowen Basin.

Bowen Coking Coal: Isaac River Coking Coal Project

Given the relatively small resource [Measured and Indicated resources of 8.35Mt], the assessment of reasonable prospects for economic extraction has been based on a likely scenario of minimal on-site development and infrastructure with coal washing and other services to be negotiated with nearby operations.

Mastermyne Group: Crinum Underground Mine Restart

Mastermyne have been awarded a 7 year Mining Services Contract to operate the Gregory Crinum Underground mine owned by Sojitz Blue Pty Ltd. Crinum underground mine operations ceased in January 2016 with re-entry in 2020 and production is planned for mid 2021.

Mastermyne Group: Cook Colliery Mine Restart

Mastermyne has been selected by Constellation Mining Pty Ltd, a subsidiary of QCoal, to operate its Cook Colliery Mine in Central Queensland producing high quality metallurgical coal. The project will be restarted over two distinct phases with the first phase commencing immediately.

The Stage 1 works will see the Company re-commence the underground operations including bringing the operation out of care and maintenance and transitioning back into production. Stage 1 works will include re-commissioning of underground infrastructure, overhauling of mining equipment, establishment of production panels and all other associated administrative and procurement works. Stage 1 work is to be completed by late 2021.

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4 Digital Technologies and Automation

The rapidly growing application of digital technologies and automation along the entire mining value chain from exploration through to shipping is illustrated by two examples.

Glencore Oaky Creek Automation of Underground Longwall Operations

Glencore's Oaky Creek metallurgical coal operation in Queensland's Bowen basin became the first coal mine in Australia to fully automate its underground longwall operation using a laser imaging system developed by CSIRO's Centre for Advanced Technologies.

The 'ExScan' laser technology provides three dimensional scans of the Oaky Creek underground mining area. The 3D laser scans are transmitted by ExScan sensors in the longwall to the above-ground Oaky Creek control centre that remotely operates the longwall.

The CSIRO ExScan technology was developed for use in explosion risk zones in underground coal mining. The 3D images it produces are accurate in real-time and can be used for locating, steering, and navigating mining equipment in 3 Dimensions.

CommChain

www.commchain.com

CommChain Pty Ltd is an Australian company that sees its mission to become the global independent digital platform to facilitate bulk commodity trade documentation and financial settlement. The aim of digitising trade is consistent with the G7 statement from its recent meeting in UK, calling for digitisation of trade to improve supply chains and reduce fraud.

The current bulk commodity trade settlement processes involve traditional paper-intensive systems and require a large and expensive operational footprint that are the source of many inefficiencies and frictions. A typical coal trade settlement transaction by emails, phones and spreadsheets from vessel nomination to financial settlement has been measured at 282 independent interactions between all parties. CommChain's digital platform offers savings in time and expense whilst providing greater accuracy and security.

In more recent times, the COVID-19 pandemic has served to highlight these inefficiencies in international bulk commodity seaborne trade and the wider global economy. Disruptions in global supply chains caused by the pandemic have thus accelerated the trend toward the need to improve and streamline trade transactions.

At the same time, the advent of distributed ledgers (DLT) using blockchain technology have been an important technology development that can be used as a tool to vastly improve the traditional trade settlement processes that hinder global trade.

The CommChain Platform allows each party to the commodity trade to be connected in real time, and greatly reduces the duplication of work and the risk of fraudulent transactions. CommChain uses a privately permissioned blockchain platform that is programmed with "smart contracts".

The features and benefits of digital platform have now been proven in both a technology sense and by trials with real buyers and sellers. Trial shipments with all parties collaborating are scheduled for October 2021.

Surging Metallurgical Coal Price is driver for New Projects

5 Bede Boyle – Executive Advisor Industrial Profit and Growth

Business Drivers Ltd – Director Executive Advisory Board and Head Industrial Services
Business Drivers helps companies become strategically and operationally fit, to thrive in the new economy. We also provide an integrated suite of services to companies seeking to grow and develop their mining and industrial operations through either organic growth or targeted merger and acquisition programs. We operate in ANZ, ASIA, UK and USA. www.bizdrivers.biz

TEXO Australasia – Technical Advisor to CEO

TEXO Australasia is an innovative Australian owned company that develops and manufactures speciality construction products for the mining, industrial, building and construction industries. www.texo.com.au

HiValue Strategies – Founding Principal

Formed in 1994, to provide corporate and business strategies for resource companies, rail and port operations and their service providers in collaboration with specialist consultants.

Strategic Growth Assignments

AGL	BHP Steel
BlueScope Steel	Genesee Wyoming Inc.
Coffee Projects	Laing O'Rourke
Elliot Advisors USA & HK	Exxaro Australia
Fluor Australia [iron ore]	GVK Hancock Coal
Leighton Contractors	Diversified Construction Corporation
NSW Coal Compensation Board	NSW Industry and Investment
NSW Freight Corp (now PN)	OPG Power – India
Newcastle Port Corporation	NSW Powercoal (now Centennial Coal)
Port Waratah Coal Services	Xstrata Coal (now Glencore)
South Blackwater Collieries	Vale Coal

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SMEC - Business Manager Mining
Perenia Carbon Solutions – BD Advisor
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– BD Carbon Capture and Storage
Axon Solutions – BD Advisor
McLean Management Consultants - Defence

Business Development Director

Futureware Corporation - Director
Bywater McLean JV - Chairman
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