2022 Benchmark Reserve Capacity Price

Cost Escalation Factors

September 2021

pwc

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The analysis also assumes that a new Open Cycle Gas Turbine (OCGT) entrant is able to access labour, currency markets, steel and copper at typical market rates. Should the OCGT entrant be able to access rates that are different from the market, the appropriate escalation factors for the entrant may be different to those provided in this report. This report is not intended to provide guidance on the total cost of building a 160 MW OCGT, which is dependent on technical specifications and technological changes that are outside the scope of this engagement.

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Executive summary

The Economic Regulation Authority engaged PricewaterhouseCoopers Consulting (Australia) Pty Limited (PwC) to determine appropriate cost escalation factors related to the proposed construction of a 160 MW open cycle gas turbine generation facility. The cost escalation factors cover five consecutive financial years, with the first year being the year ending June 2022 and will be used by ERA in the development of a Benchmark Reserve Capacity Price (BRCP) for the 2024-25 capacity year. These cost escalation factors include:

- labour cost escalation factors specific to labour costs for building and maintaining a power plant in the South West Interconnected System
- the exchange rate between the Australian dollar (AUD) and the US dollar (USD), and
- steel and copper prices.

The proposed cost escalation factors reflect the dynamics of the relevant labour, financial and resources markets, and are affected by both macroeconomic factors and global events such as the COVID-19 pandemic.

For labour costs, we analysed the level and trajectory of construction costs separately from operation and maintenance costs, giving consideration to Western Australian and industry-specific trends.

For the AUD/USD exchange rate and the change in the prices of steel and copper, we drew on historical price data and a range of forecasts from various investment banks and forecasting institutions, supplemented by a high-level analysis of commodity market trends, policy events and economic indicators.

In the table below we summarise the cost escalation factors developed by PwC for the 2022 BRCP compared with the 2021 BRCP cost escalation factors.

2021 BRCP Cost Escalation Factors and 2022 BRCP Cost Escalation Factors

	Financial year	2021	2022	2023	2024	2025	2026
Operations and Maintenance Labour Costs (%Δ)	2021 CEF	1.71	1.96	2.50	2.50	2.50	-
	2022 CEF	**-**	**2.45**	**2.45**	**2.70**	**2.70**	**2.42**
Construction Labour Costs (%Δ)	2021 CEF	0.77	1.02	1.56	1.56	1.56	-
	2022 CEF	**-**	**2.01**	**2.01**	**2.26**	**2.26**	**1.98**
AUD/USD ($)	2021 CEF	0.7375	0.7757	0.7900	0.7900	0.7900	-
	2022 CEF	**-**	**0.7700**	**0.7863**	**0.7663**	**0.7663**	**0.7663**
Steel price (%Δ)	2021 CEF	-14.93	-0.06	-0.96	0.64	0.13	-
	2022 CEF	**-**	**20.70**	**-27.97**	**-10.21**	**-6.98**	**-2.79**
Copper price (%Δ)	2021 CEF	-1.12	-2.17	-0.65	3.57	2.98	-
	2022 CEF	**-**	**4.40**	**-8.61**	**-1.61**	**-3.84**	**2.34**

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1. Project overview

1.1 Background

The Economic Regulation Authority (ERA) engaged PricewaterhouseCoopers Consulting (Australia) Pty Limited (PwC) to determine appropriate cost escalation factors related to the proposed construction of a 160 MW open cycle gas turbine (OCGT) generation facility. The escalation factors cover five consecutive financial years, with the first year being the year ending June 2021.

The cost escalation factors comprise:

- labour cost escalation factors specific to labour cost for building and maintaining a power plant in the South West Interconnected System (SWIS)
- the exchange rate between the Australian dollar (AUD) and the US dollar (USD), and
- steel and copper prices.

The cost escalation factors will be used in the development of a Benchmark Reserve Capacity Price (BRCP) for the 2024-25 capacity year.

1.2 Approach

For labour costs, we analysed the level and trajectory of construction costs separately from operation and maintenance costs reflecting the different skill sets and nuanced labour market conditions of the two sectors.

For the AUD/USD exchange rate and the prices of steel and copper (converted from USD to AUD), we drew on historical price data and a range of forecasts from various investment banks and forecasting institutions. This analysis was supplemented with a high-level analysis of commodity market trends, policy events and economic indicators, both national and global.

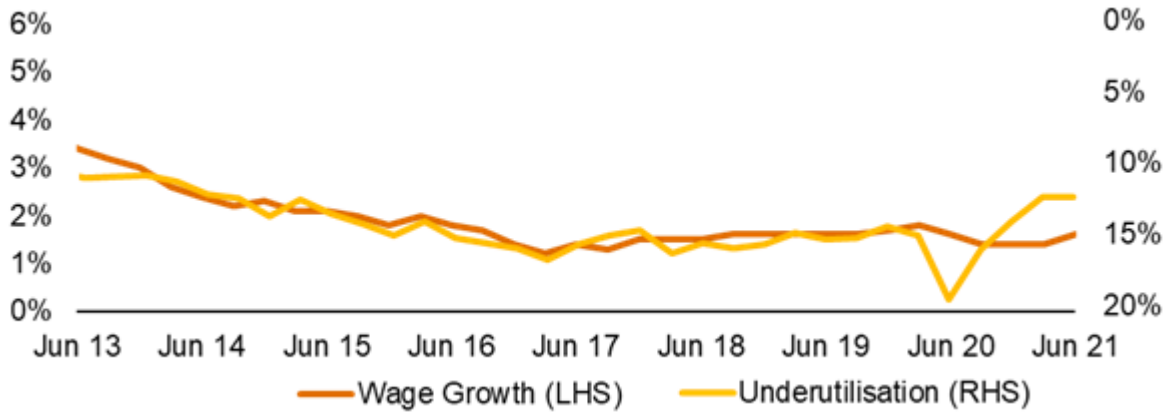
While our forecasts reflect the dynamics of the relevant labour, resources and financial markets, which are affected by both macroeconomic factors and global events (e.g. the COVID-19 pandemic), our analysis does not extend to providing quantified estimates of the precise impact of COVID-19 on specific estimates, nor a ‘with/without’ pandemic scenario. We do not believe it is feasible to seek to distil the specific impact of COVID-19 from other market and macroeconomic factors.

2. Labour

2.1 Market trends

Owing to Western Australia's ability to minimise the impacts of the COVID-19 pandemic relative to other jurisdictions (recording the fewest locally acquired cases of any state),[1] the labour market in Western Australia has largely recovered from the initial shock of the pandemic. The unemployment rate, which peaked at 8.7 per cent in June 2020 (its highest level since February 1994), was 4.6 per cent in August 2021. Similarly, the labour underutilisation rate,[2] which has largely tracked wage growth in Western Australia, decreased from 19.5 per cent (the highest level recorded since the series began in 1978) to 12.4 per cent over the same period.

Figure 2.1: Western Australia annual wage growth and labour force underutilisation



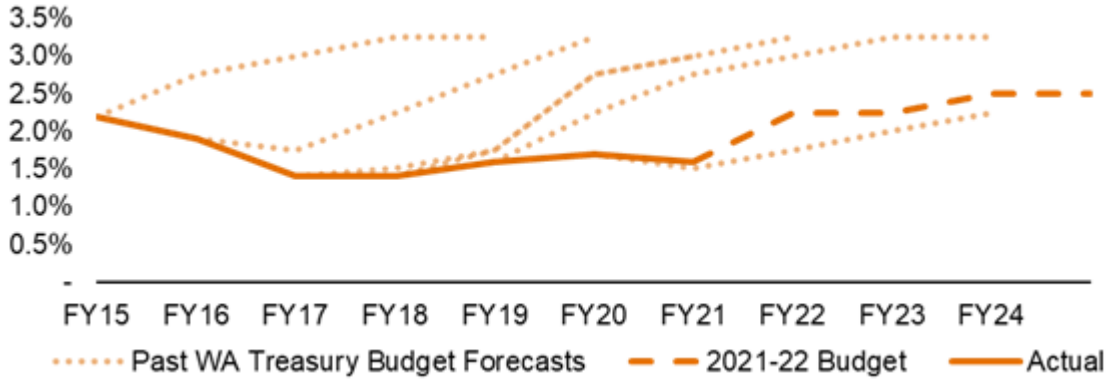
Source: Australian Bureau of Statistics (ABS)[3]

Notwithstanding the COVID-19 pandemic, wage growth in Western Australia has remained relatively subdued since 2015, remaining between 1.2 and 2.1 per cent annually. This can be partly attributed to the wage cap for public sector employees, first introduced in 2017.[4] Public sector wages in Western Australia have lagged behind wages in other states and territories (ranking no higher than seventh out of the eight Australian jurisdictions for wage increases each quarter since September 2017).

Wage forecasts released in the 2021-22 budget suggest annual wage growth will continue to stay within a narrow band, increasing to 2.25 per cent in FY22 and reaching 2.50 per cent in the final year of the forecast - FY25.[5] We note the budget forecasts appear more measured than in previous years when wages were consistently expected to top 3 per cent before the end of the relevant budget forecast period.

[1] https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/coronavirus-covid-19-case-numbers-and-statistics
[2] As defined by the ABS, the underutilisation rate represents the sum of the number of people unemployed and the number of people in underemployment (counted as workers who want, and are available for, more hours of work than they currently have); ABS (2021), *Labour Force - Australia methodology*, available at: https://www.abs.gov.au/methodologies/labour-force-australia-methodology/aug-2021
[3] ABS (2021), *Wage Price Index, Australia - Table 2b. Total hourly rates of pay excluding bonuses: all sectors by state, original (quarterly index numbers)*, available at: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/wage-price-index-australia/jun-2021
[4] Western Australia Government (2017), *New wages policy another critical budget repair measure*, available at: https://www.mediastatements.wa.gov.au/Pages/McGowan/2017/05/New-wages-policy-another-critical-budget-repair-measure.aspx
[5] Western Australia Government (2021), State Budget 2021-22 - Budget Paper No 3 - Economic and Fiscal Outlook, available at: https://www.ourstatebudget.wa.gov.au/2021-22/budget-papers/bp3/2021-22-wa-state-budget-bp3.pdf

Figure 2.2: Western Australia budget wage growth forecasts



Source: WA Treasury[6]

Previously, our recommended labour cost estimates specific to the operation and maintenance of the power plant were based, in part, on the national energy, gas, water and waste services (EGWWS) sector Wage Price Index (WPI) series. Labour cost estimates for the construction of the power plant were based, in part, on the national construction sector WPI series. Table 2.1 sets out the labour cost escalation factors recommended for the 2021 BRCP.

Table 2.1: 2021 BRCP recommended labour cost escalation factors

Financial year	2021	2022	2023	2024	2025
WPI: EGWWS (%Δ)	1.71	1.96	2.50	2.50	2.50
WPI:Construction (%Δ)	0.77	1.02	1.56	1.56	1.56

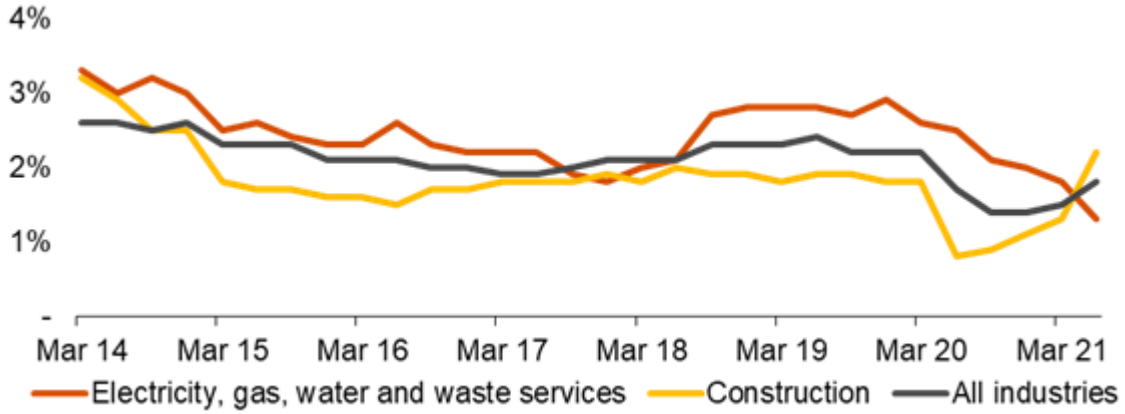
Source: PwC analysis

Across these two sectors nationally there have been diverging outcomes with respect to wages over the past 12 months (see Figure 2.3). EGWWS sector workers saw the lowest pay increase of any industry in the year to June 2021 (1.3 per cent) while workers in the construction sector saw the greatest year-on-year wage increase since 2014 (2.2 per cent).

Note the values in Figure 2.3 are reflective of nationwide figures whereas the figures in Table 2.1 are Western Australia specific, meaning they are not directly comparable. The ABS does not publish West Australian EGWWS or construction wage series.

[6] Western Australia Government (2021), *State Budget 2021-22 - Budget Paper No 3 - Economic and Fiscal Outlook*; Western Australia Government (2020), *State Budget 2020-21 - Budget Paper No 3 - Economic and Fiscal Outlook*, available at: https://www.ourstatebudget.wa.gov.au/2020-21/budget-papers/bp3/2020-21-wa-state-budget-bp3.pdf; Western Australia Government (2019), *State Budget 2019-20 - Budget Paper No 3 - Economic and Fiscal Outlook*, available at: https://www.ourstatebudget.wa.gov.au/2019-20/budget-papers/bp3/2019-20-wa-state-budget-bp3.pdf; Western Australia Government (2018) *State Budget 2018-19 - Budget Paper No 3 - Economic and Fiscal Outlook*, available at: https://www.ourstatebudget.wa.gov.au/2018-19/budget-papers/bp3/2018-19-wa-state-budget-bp3.pdf; Western Australia Government (2017) *State Budget 2017-18 - Budget Paper No 3 - Economic and Fiscal Outlook*, available at: https://www.ourstatebudget.wa.gov.au/2017-18/budget-papers/bp3/2017-18-wa-state-budget-bp3.pdf; Western Australia Government (2016) *State Budget 2016-17 - Budget Paper No 3 - Economic and Fiscal Outlook*, available at: https://www.ourstatebudget.wa.gov.au/2016-17/budget-papers/bp3/2016-17-wa-state-budget-bp3.pdf; Western Australia Government (2015) *State Budget 2015-16 - Budget Paper No 3 - Economic and Fiscal Outlook*, available at: https://www.ourstatebudget.wa.gov.au/2015-16/budget-papers/bp3/2015-16-wa-state-budget_bp3.pdf

Figure 2.3: Annual wage growth by industry (public and private sectors, national)

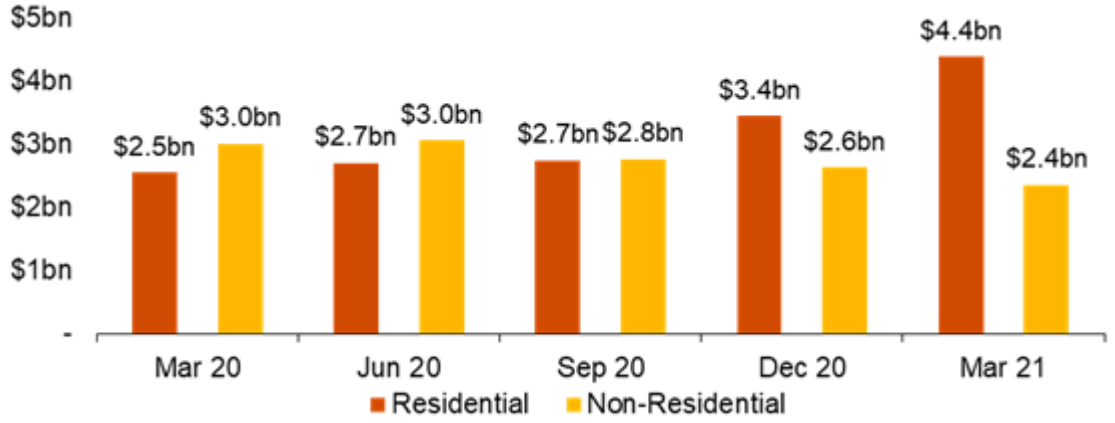


Source: ABS[7], PwC analysis

Construction activity has been bolstered by stimulus programs and industry support packages adopted in response to the COVID-19 pandemic, including the Australian Government's 'homebuilder' program[8] and the Western Australian Government's 'building bonus grant'.[9] Owing to Western Australia's relative success in suppressing local COVID-19 infections, the construction industry has faced fewer disruptions than other states.

As outlined in Figure 2.4, the construction pipeline value increased significantly on the back of strong demand for new housing. Between March 2020 and March 2021, the number of houses under construction in Western Australia more than doubled from approximately 6,300 to 12,800.[10] Business groups have reported labour shortages in the construction sector owing to increased demand and an inability to hire workers as a result of closed state and international borders.[11]

Figure 2.4: Western Australia construction pipeline value (nominal $)



Source: ABS[12]

[7] ABS (2021), *Wage Price Index, Australia - Table 5b. Total hourly rates of pay excluding bonuses: sector by industry, original (quarterly index numbers)*, available at: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/wage-price-index-australia/jun-2021
[8] Commonwealth Treasury (2020), *Economic Response to the Coronavirus - Homebuilder*, available at: https://treasury.gov.au/coronavirus/homebuilder
[9] Western Australia Government (2020), *Building Bonus Grants*, available at: https://www.wa.gov.au/government/announcements/building-bonus-grants
[10] ABS (2021), *Building Activity, Australia - Table 77. Number of Dwelling Units Under Construction, by Sector, States and Territories: Original*, available at: https://www.abs.gov.au/statistics/industry/building-and-construction/building-activity-australia/mar-2021
[11] Chamber of Commerce and Industry of Western Australia (2021), *Outlook August 2021 - World Title Beckons*; Chamber of Commerce and Industry of Western Australia (2021), *CCIWA Business Confidence Survey: June Quarter 2021 - Confidence booms as skills pressures grow*, available at: https://cciwa.com/wp-content/uploads/2021/06/0621-Business-Confidence.pdf
[12] ABS (2021), *Building Activity, Australia - Table 79. Value of Work in the Pipeline, States and Territories, Current Prices, Original*, available at: https://www.abs.gov.au/statistics/industry/building-and-construction/building-activity-australia/mar-2021

In contrast to the construction sector, year-on-year wage growth in the national EGWWS sector declined. It is just the fourth year in the 20-year period since June 2001 that EGWWS sector wage growth was outstripped by the national average. Over the 20-year period EGWWS sector wages have increased above all-sector wages by an average of 0.4 per cent annually.

ABS estimates show a majority of workers in the EGWWS sector - approximately 63 per cent - are covered by enterprise bargaining agreements as opposed to an award or an individual agreement. This is significantly above the 40 per cent coverage for all non-managerial employees nationally (and the construction industry, 26 per cent). With the strong bargaining power of the sector, and the relative transferability in skills between the EGWWS, construction and mining sectors (with the latter two industries experiencing booms), it is likely wages in the EGWWS sector will increase as firms look to retain workers.

2.2 Labour cost projections

Consistent with the cost escalation factors for the BRCP in previous years, our forecasts for labour costs are informed by analysis of wage price based indices.[13] Our analysis of regulatory determinations indicates that regulators have generally expressed a preference for labour cost escalation factors to be based on long-run historical growth or forecasts of WPI, as opposed to average weekly earnings based estimates. Recent determinations by the ERA[14] and the Australian Energy Regulator[15] have adopted WPI based series to estimate appropriate labour cost escalation factors.

We have again developed separate series for construction and operations/maintenance work as the two series measure separate components of the labour force which rely on different skill sets, experience different labour market dynamics, and are subject to different enterprise agreements.

Our forecasts are based on the Western Australian Treasury forecasts included in the 2021-22 budget with an industry specific delta applied. These industry specific deltas are outlined in Table 2.2 and are based on the average wage growth over the past five years across the EGWWS sector and the construction sector, respectively, relative to the wage growth nationally.

Table 2.2. Historical wage increases by financial year (%)

WPI measure	2017	2018	2019	2020	2021	Average
WPI: All industries, National	1.40	1.50	1.60	1.60	1.60	1.98
WPI: EGWWS, National	2.20	2.10	2.80	2.50	1.30	2.18
					Δ	**+0.20**
WPI: Construction	1.80	2.00	1.90	0.80	2.20	1.74
					Δ	**-0.24**

[13] PwC (2018), *Estimating the Escalation Factors for the 2019 Benchmark Reserve Capacity Price Final report*, available at: https://www.aemo.com.au/-/media/Files/Electricity/WEM/Reserve_Capacity_Mechanism/BRCP/2019/Supporting-documents/PwC-Report-Estimating-the-Escalation-Factors-for-the-2019-Benchmark-Reserve-Capacity-Price.pdf; PwC (2019), *Estimating the Escalation Factors for the 2020 Benchmark Reserve Capacity Price Final report*, available at: https://aemo.com.au/-/media/files/electricity/wem/reserve_capacity_mechanism/brcp/2020/estimating-the-escalation-factors-for-the-2020-benchmark-reserve-capacity-price-august-2019.pdf; PwC (2020), *2021 Benchmark Reserve Capacity Price Cost Escalation Factors,* available at: https://aemo.com.au/-/media/files/electricity/wem/reserve_capacity_mechanism/brcp/2021/20200908---aemo---cost-escalation-factors-final.pdf?la=en

[14] ERA (2021), *Final decision on proposed revisions to the Dampier to Bunbury Natural Gas Pipeline access arrangement 2021 to 2025*, available at: https://www.erawa.com.au/cproot/21855/2/PUBLIC---DBNGP---DBP---AA5-Final-Decision.PDF

[15] Australian Energy Regulator (2021), *Final Decision - Australian Gas Networks (SA) Access Arrangement 2021 to 2026 - Attachment 6 - Operating expenditure*, available at: https://www.aer.gov.au/system/files/AER%20-%20Final%20decision%20-%20AGN%28SA%29%20access%20arrangement%202021-26%20-%20Attachment%206%20-%20Operating%20Expenditure%20-%2030%20April%202021.pdf

Many government and industry publications containing wage forecasts were delayed last year as a result of the COVID-19 pandemic, including the 2020-21 Western Australia budget. As one of the few credible forecasts released subsequent to the beginning of the pandemic, our projections last year used the RBA forecasts for the first two years of the forecast period with an industry specific delta applied (as calculated above). The final three years of the forecast period were based on the average wage growth across the two industries over the preceding five year period.

We note the Western Australia Treasury forecasts capture Western Australia-specific labour market factors that may not be factored into the national WPI series and cover a four year period (as opposed to the two year period covered by the RBA forecasts). Further, a historical average which is likely to be materially influenced by COVID-19 is not an appropriate basis for the "out years" of the BRCP forecast period.

Hence, for the 2022 BRCP we recommend adopting the **Operations and Maintenance** series below for labour costs specific to the operation and maintenance of the power plant, and the **Construction** series below for the construction of the power plant.

Table 2.3 Labour cost projections by financial year (%)

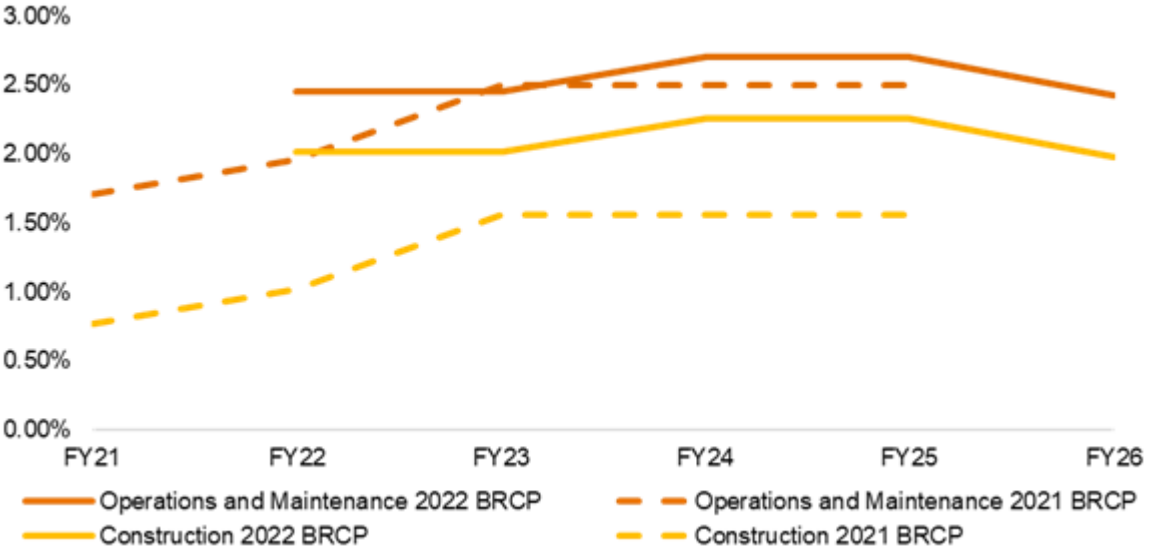
	2021	2022	2023	2024	2025	2026
WPI measure	*Actual*	*Forecast*	*Forecast*	*Forecast*	*Forecast*	*Average FY21 to FY25*
WPI - All industries, Western Australia	1.60	2.25	2.25	2.50	2.50	2.22
Δ				**+0.20**		
Operations and Maintenance	-	**2.45**	**2.45**	**2.70**	**2.70**	**2.42**
Δ				**-0.24**		
Construction	-	**2.01**	**2.01**	**2.26**	**2.26**	**1.98**

These projections represent an increase in forecast labour costs for the construction industry across each year of the forecast period relative to the 2021 BRCP cost escalation factors. This reflects the increase in value of the construction pipeline (noting that much of this sits within the residential section, though) and potential ongoing skill shortages. Migration, both interstate and international, is relevant to both the supply side and demand side of the construction labour market. While border restrictions are likely to ease as vaccination targets are met[16], any easing of the skills shortage may be met by additional demand for housing.

The operation and maintenance forecasts also sit higher than the 2021 BRCP factors, though the increase is more measured than the construction series. This is a result of the broader Western Australia labour market recovery, the strong negotiating position of the sector, and competition for workers in sectors with comparable skills such as the mining and construction sectors.

[16] Note the 2021-22 Western Australia budget assumes a 'gradual reopening' of international budgets in the September 2022 quarter, in-line with the assumptions in the 2021-22 Commonwealth budget.

Figure 2.5: 2021 and 2022 BRCP labour cost escalation factors



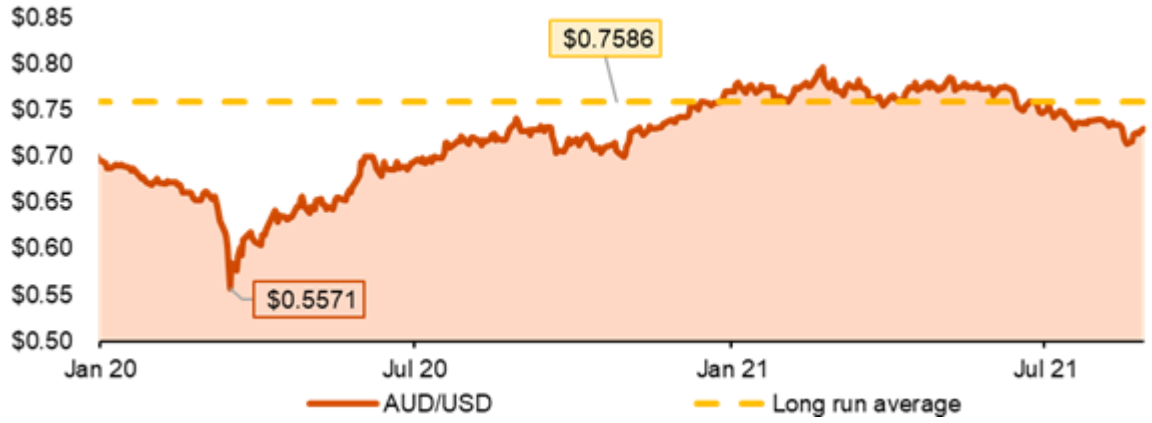
Source: PwC analysis

3. AUD/USD exchange rate

3.1 Market trends

The value of the AUD relative to the USD has remained relatively stable since our September 2020 report when it sat at $0.73. As at the time of publication the AUD/USD exchange rate was once again $0.73.[17] After hitting an 18 year low of $0.55 in March 2020, the AUD recovered on the back of Australia's relative success in handling the COVID-19 pandemic and the resilience of Australian commodity exports - in particular iron ore.

Figure 3.1: AUD/USD exchange rate (January 2020 - August 2021)



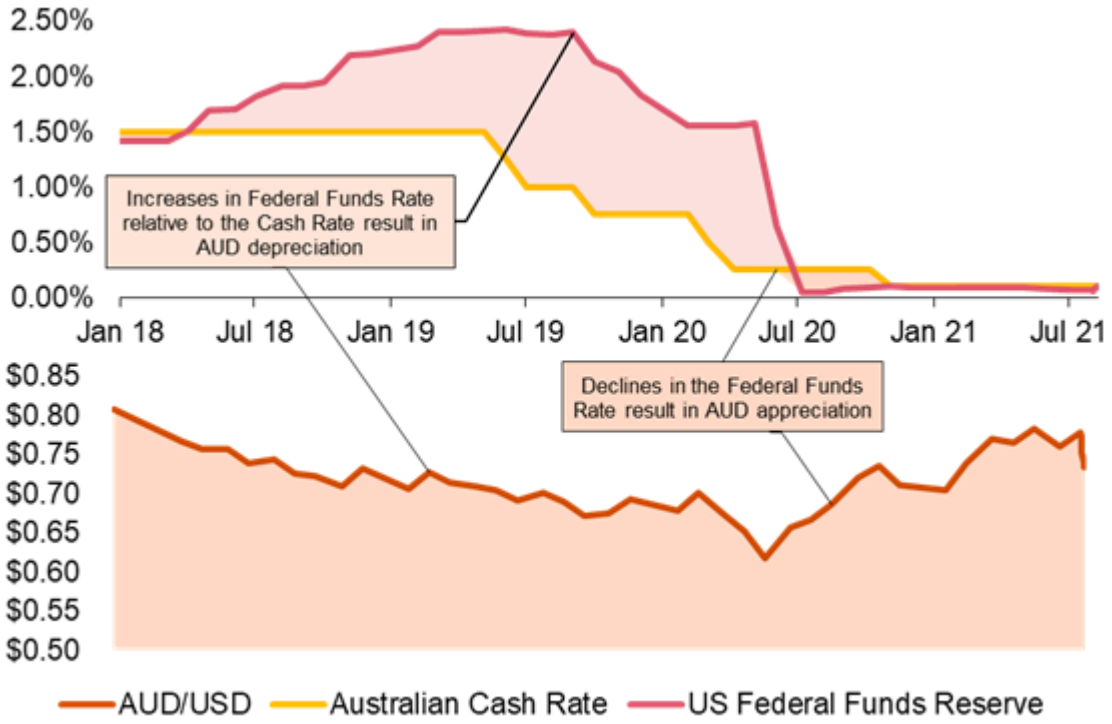
Source: RBA[18], PwC analysis. Note the AUD/USD values represent daily values.

The AUD has depreciated recently with Australian commodity export prices recently sliding from near decade highs.[19] Identified as a key downside risk to our forecasts last year, Australian trade tensions with China have escalated, with China imposing import bans on many Australian goods including coal. The import ban was not expanded to iron ore though, a critical component in steel production. There are signs that China may cut back on Australian iron ore imports as authorities look to meet pollution targets[20] and Brazilian iron ore supply chains recover.[21] As a result, iron ore prices (as measured by the benchmark Chinese spot price) have fallen from $227USD/tonne in May to $128USD/tonne as at the time of publication.[22]

Fluctuations in the value of the AUD have also been driven in part by the relativity of the Australian Cash Rate and the US Federal Funds Rate. Interest rates are indicative of financial returns available and are an important influence on capital flows, and hence, the demand for the currency to which they are tied. Figure 3.2 shows that as the US Federal Funds rate increases (decreases) relative to the Australian Cash Rate, the AUD becomes less (or more) attractive relative to the USD, leading to depreciation (or appreciation).

[17] Reserve Bank of Australia (2020), *Statement of Monetary Policy - May 2020*, available at: https://www.rba.gov.au/publications/smp/2020/may/pdf/statement-on-monetary-policy-2020-05.pdf
[18] RBA (2021), *Exchange Rates – Daily - 2018 to Current – F11.1, Statistical Tables*, retrieved September 2021, available at: https://www.rba.gov.au/statistics/tables/
[19] Reserve Bank of Australia (2021), *Statement of Monetary Policy - May 2021*, available at: https://www.rba.gov.au/publications/smp/2021/may/pdf/statement-on-monetary-policy-2021-05.pdf
[20] Reuters (2021), *Analysis: Green-push dilemma: China's steel curbs could cripple price control efforts*, available at: https://www.reuters.com/world/china/green-push-dilemma-chinas-steel-curbs-could-cripple-price-control-efforts-2021-08-17/
[21] Reuters (2021), *COLUMN-Iron ore slump justified by improving supply, China steel control: Russell*, available at: https://www.reuters.com/article/column-russell-iron-china-idUSL1N2PU011
[22] Capital IQ (2021), *Iron Ore 62% FE (^IY) (NYMEX) Summary*, accessed September 2021

Figure 3.2: Comparison of movements in the Australian Cash Rate, US Federal Funds Rate and AUD/USD



Source: Federal Reserve[23], RBA[24] & PwC analysis. Note the AUD/USD values represent start of month values.

Over the short-to medium-term both the US Federal Funds Rate and the Australian Cash Rate are both expected to remain low. Public statements released by the RBA suggest the board remains committed to maintaining accommodative monetary conditions to support the Australian economy in its recovery from the economic impacts of the COVID-19 pandemic. The RBA has stated the cash rate will not increase until inflation is sustainably within the 2 to 3 per cent target range and has indicated that this may not be before 2024.[25]

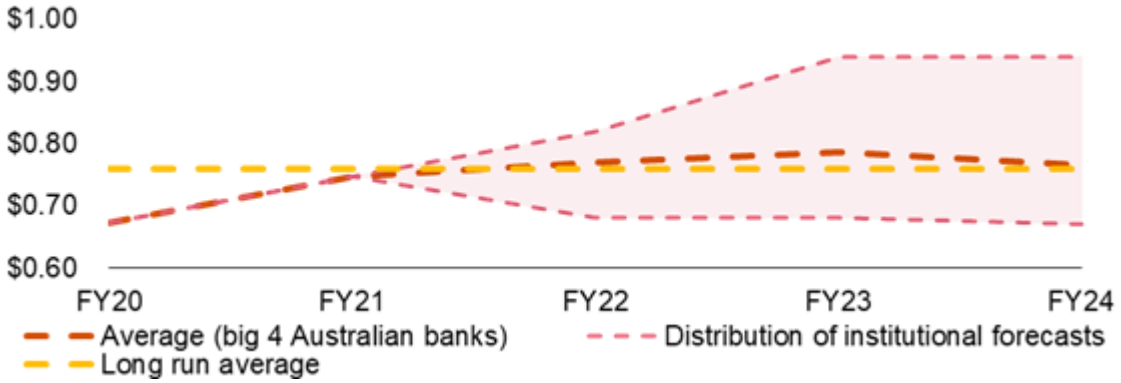
At the US Federal Open Market Committee meeting in June 2021, all 18 members determined that the midpoint of the projected appropriate target range for the Federal Funds Rate in 2021 should remain at 0.1 per cent. By 2023, projections of the appropriate midpoint for the Federal Funds Rate ranged from 0.1 per cent to 1.6 per cent, with 0.6 per cent the median projection.[26] As the US Federal Funds Rate rises, it may lead to a depreciation in the value of the Australian Dollar.

[23] Federal Reserve (2020), *Policy Tools - Open Market Operations*, available at: https://www.federalreserve.gov/monetarypolicy/openmarket.htm
[24] RBA (2021), *Monetary policy Changes – A2, Statistical Tables*, available at: https://www.rba.gov.au/statistics/tables/
[25] Reserve Bank of Australia (2021), *Monetary Policy Decision - August 2021*, available at: https://www.rba.gov.au/media-releases/2021/mr-21-14.html
[26] Federal Reserve (2021), *Summary of Economic Projections - June 2021*, available at: https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20210616.pdf

AUD/USD exchange rate forecasts suggest the value of the Australian Dollar will remain relatively unchanged between FY22 and FY24. The average of the institutional forecasts compiled on the Bloomberg Terminal indicate the Australian Dollar will remain at $0.75 in FY22, appreciate to $0.78 in FY23, before falling to $0.77 in FY24.

The average forecasts published by the big 4 Australian banks[27] are slightly higher in FY22 and FY23, at $0.77 and $0.79 respectively. The outlook of the big 4 banks is largely in-line with the long-run average of the AUD since it was floated in 1983, $0.7586.

Figure 3.3: AUD/USD analyst forecasts FY22 - FY24



Source: Bloomberg Terminal[28], RBA[29] & PwC analysis. Note the AUD/USD values represent annual averages.

3.2 AUD/USD exchange rate projections

Consistent with our approach last year, we recommend applying the average of the most recent forecasts published by the big 4 Australian Banks for FY22 to FY24, and holding the exchange rate constant for the remainder of the forecast period.

Recent forecasts published by analysts suggest the value of the AUD will remain consistent throughout the forecast period. This is predicated on a continuation of the low interest rate environment in both Australia and the US as well as continued demand for Australian commodities. As with our forecasts last year, a further escalation of the trade dispute with China - in particular any potential pullback on iron ore imports - and setbacks in containing COVID-19 present downside risks.

The following exchange rates are proposed for the five year period:

Table 3.1: AUD/USD exchange rate projections

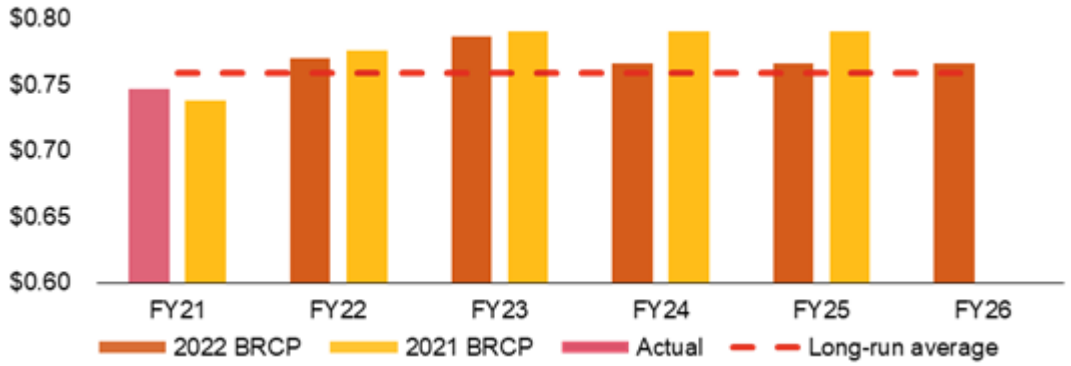
Financial year	2022	2023	2024	2025	2026
AUD/USD	0.7700	0.7863	0.7663	0.7663	0.7663

Source: PwC analysis

[27] Being the Commonwealth Bank of Australia, National Australia Bank Limited, Australia and New Zealand Banking Group Limited and Westpac Banking Corporation.
[28] Bloomberg (2021), *Australian Dollar/US Dollar Exchange Rate data*, accessed on the Bloomberg Terminal August 2021
[29] RBA (2021), *Exchange Rates – Historical – Daily and Monthly – F11, Statistical Tables*, available at: https://www.rba.gov.au/statistics/tables/

Our 2022 BRCP estimates are broadly in-line with the 2021 BRCP, with some slight downside risk in the latter years reflecting market expectations that interest rates will remain low for the foreseeable future and the potential for a slowdown in commodity exports.

Figure 3.4: 2021 and 2022 BRCP AUD/USD exchange rate estimates



Source: PwC analysis

4. Steel and copper

4.1 Market trends

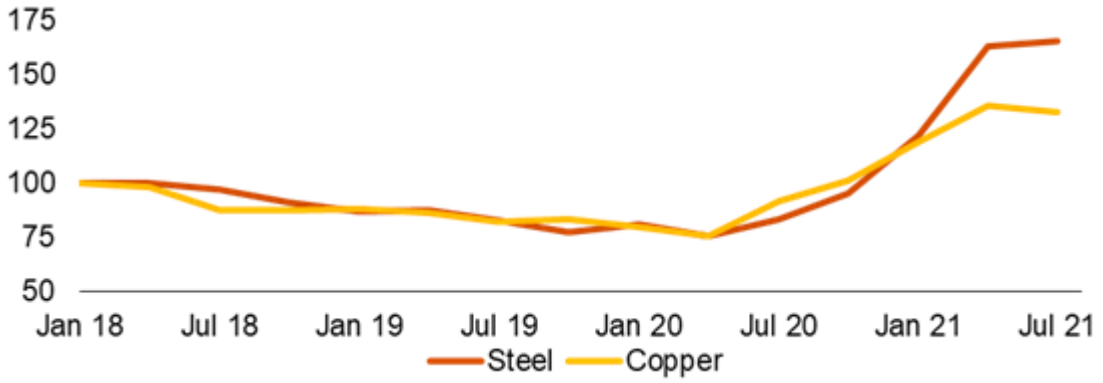
Steel is a key input for most industrial and construction industries. As a result, demand for steel tends to rise and fall in line with general global economic activity, and in particular, industrial activity.[30] Demand for copper is also strongly linked to the construction sector as copper is used extensively in new buildings, with secondary demand coming from machinery and electronics manufacturing.[31]

Steel has been subject to significant price swings in recent years. In 2015, steel prices took a significant downturn as worldwide production outpaced global demand, a phenomenon known as global overcapacity. Global demand for steel sharply increased at the beginning of 2017, leading to a rally in global steel prices. Notably, the heightened price of steel persisted despite the United States' imposition of 25% tariffs on steel imported from China, in response to accusations of 'dumping'. Renewed demand for steel from Europe and much of the developing world helped offset negative price pressure until 2018.

Steel prices fell considerably between late-2018 and early-2020 due to slowing pre pandemic global growth (particularly in the US as a result of the high prices caused by protectionist policies). Price declines continued into 2020 as the COVID-19 outbreak in China weighed on the country's industrial activity, disrupting demand and ultimately global supply chains as it spread.

More recently, steel prices have recovered from their 2020 lows on the back of supply shortages linked to production issues. While demand continues to strengthen, steel producers have remained wary of ramping up production due to uncertainty regarding the pandemic. Steel prices have also been driven upwards by governments globally pursuing construction and infrastructure-led fiscal stimulus.[32]

Figure 4.1: Steel and copper prices, Jan 2018=100

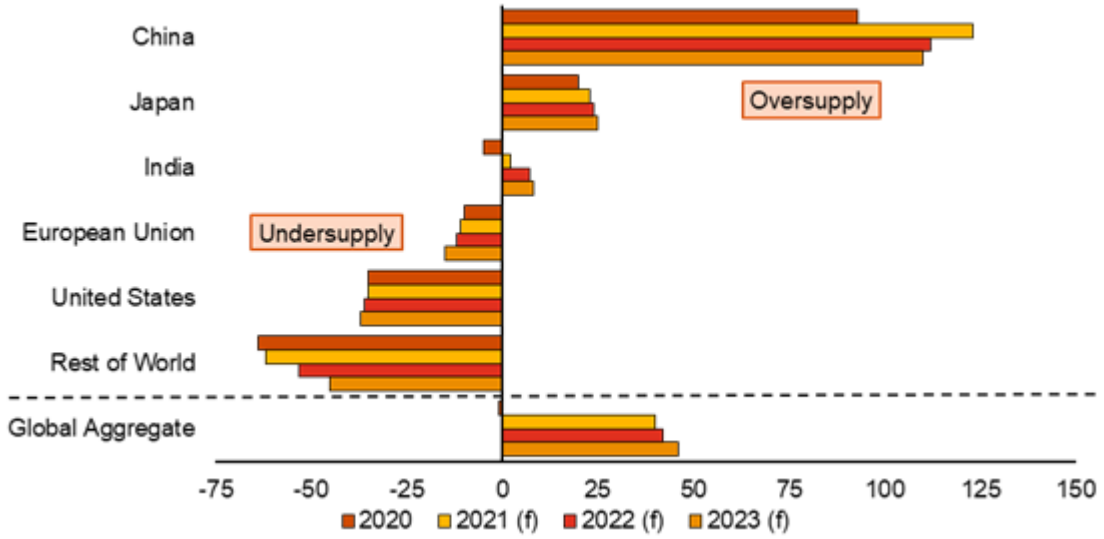


Source: IHS Markit & PwC analysis. Note the steel price reflects the average of Chinese, European and US hot rolled coil steel.

[30] IBISWorld (2021), *World Price of Steel - Business Environment Report A5230*, accessed September 2021
[31] IBISWorld (2021), *World Price of Copper - Business Environment Report A5223*, accessed September 2021
[32] Office of Chief Economist, Department of Industry, Science, Energy and Resources (2021), *Resources and Energy Quarterly - June 2021*, available at: ttps://publications.industry.gov.au/publications/resourcesandenergyquarterlyjune2021/documents/Resources-and-Energy-Quarterly-June-2021.pdf

Forecasts suggest a global oversupply of steel in the coming years will put downward pressure on prices from FY23. Despite expectations that consumption will exceed production in key markets such as Europe and the US, Figure 4.2 shows that excess steel production in China is likely to continue to be the key driver of global oversupply. A global undersupply of 1 million tonnes was recorded in 2020. However, in 2021 this is expected to increase to an oversupply of 40 million tonnes, 42 million tonnes by 2022 and 46 million tonnes by 2023.

Figure 4.2: Annual domestic production of steel, relative to consumption (million tonnes, by calendar year)

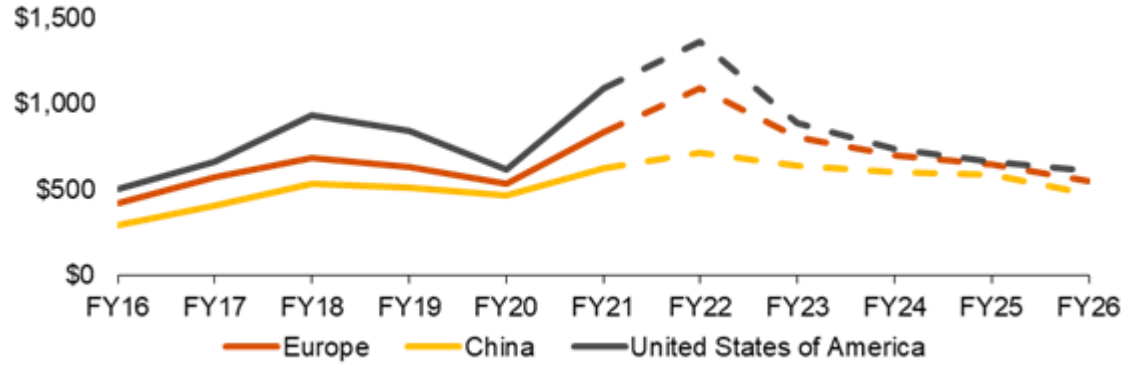


Source: Department of Industry, Science, Energy and Resources[33], PwC analysis. As noted in Section 3.1, there have been reports that China may cut back on steel production in order to meet pollution targets. We note this has contributed to significant price movements in recent months which may not have been considered in the Department of Industry, Science, Energy and Resources forecasts.

Demand for steel is expected to normalise during the outlook period from its high level in 2021, and prices will follow. As government stimulus programs are wound back and demand recedes while supply ramps up, the price of steel is expected to begin recorrecting as early as 2022.[34] The price decline over the forecast period is expected to be more severe in the US (a decline of 44 per cent over the period FY21 to FY26) and EU (decline of 33 per cent) than in China (decline of 23 per cent).

[33] Office of Chief Economist, Department of Industry, Science, Energy and Resources (2021), *Resources and Energy Quarterly - June 2021*
[34] IBISWorld (2021), World Price of Steel - Business Environment Report A5230, accessed September 2021

Figure 4.3: Hot rolled coil steel spot price projections (nominal USD per metric tonne)[35]

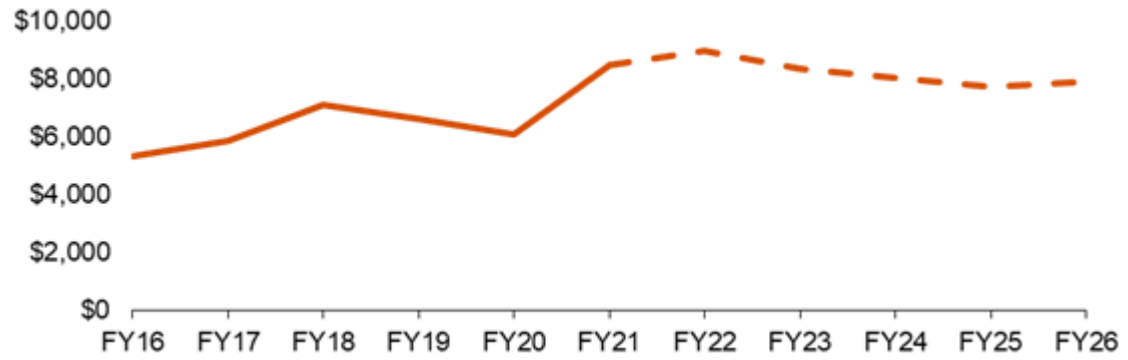


Source: Consensus Economics, IHS Markit.

Over the longer term, emission reduction targets over the next few decades are expected to directly impact the demand for steel. The US recently announced a new target of a 50-52 per cent reduction in greenhouse gas emissions on 2005 levels by 2030. This follows similar targets set by other major steel producers such as the EU (55 per cent reduction on 1990 levels by 2030) and China (carbon neutral by 2060).[36]

The price of copper is also expected to decline over the forecast period, but at a lower rate than the price of steel. The price of copper has also been supported by supply shortages and recovering consumer spending. Strong industrial growth globally (particularly in China) coupled with limited global supply is expected to continue supporting the price of copper in FY22.[37] Prices are expected to normalise from FY23 as supply ramps up. Owing to an increasing uptake in low-emissions technologies that use copper as an input, namely electric vehicles, the price of copper is expected to remain strong over the medium- to long-term.[38]

Figure 4.4: Copper spot price projections (nominal USD per metric tonne)



Source: Consensus Economics, IHS Markit.

[35] As US steel prices are reported in short tonnes, we have applied a multiplier of 0.9072 to calculate a metric tonne equivalent.
[36] Office of Chief Economist, Department of Industry, Science, Energy and Resources (2021), *Resources and Energy Quarterly - June 2021*
[37] IBISWorld (2021), *World Price of Copper - Business Environment Report A5223*, accessed September 2021
[38] Office of Chief Economist, Department of Industry, Science, Energy and Resources (2021), *Resources and Energy Quarterly - June 2021*

4.2 Steel and copper price projections

Consistent with prior cost escalation factor estimates, we have used hot rolled coil (HRC) steel as the basis of our steel price escalation. We consider HRC steel a robust indicator for the price of the different types of steel used in power plant construction. We have again used the London Metal Exchange copper spot price as the basis of our copper price analysis.

The approach used in our steel and copper price projections are consistent with the estimates in prior years - being the average of compiled institutional spot price forecasts. For steel we recommend adopting the average of the forecast Chinese, European, and US HRC steel spot prices. Using this average minimises the impact of country-specific supply and demand events on steel prices. We consider this granular view of steel forecasts by source market (Chinese, European and the US) as important as a new OCGT entrant may source its steel from any one or combination of these markets.

The following steel and copper prices, converted from USD to AUD using the exchange rate projections in Table 3.1, are projected for the five year period:

Table 4.1: Steel price (per metric tonne) projections

Financial year	2022	2023	2024	2025	2026
Steel price (USD)	1,055	776	680	632	615
Steel price (%Δ)	24.42	-26.45	-12.41	-6.98	-2.79
AUD/USD[39]	*0.7700*	*0.7863*	*0.7663*	*0.7663*	*0.7663*
Steel price (AUD)	1370	987	887	825	802
Steel price (%Δ)	20.70	-27.97	-10.21	-6.98	-2.79

Source: PwC analysis based on Consensus Economics data

[39] See Table 3.1.

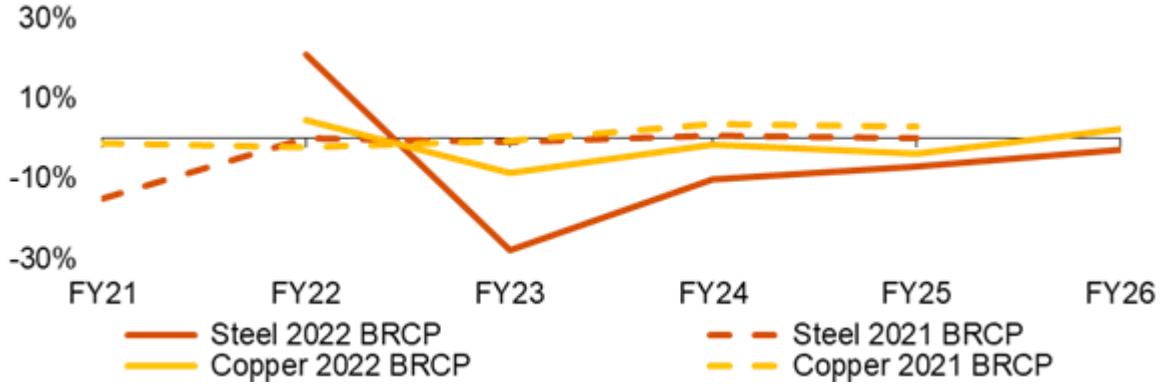
Table 4.2: Copper price (per metric tonne) projections

Financial year	2022	2023	2024	2025	2026
Copper price (USD)	8,966	8,367	8,024	7,715	7,896
Copper price (%Δ)	7.61	-6.68	-4.11	-3.84	2.34
AUD/USD[40]	*0.7700*	*0.7863*	*0.7663*	*0.7663*	*0.7663*
Copper price (AUD)	11,644	10,642	10,471	10,069	10,305
Copper price (%Δ)	4.40	-8.61	-1.61	-3.84	2.34

Source: PwC analysis based on Consensus Economics data

In last year's report, we projected the price of steel would fall by approximately 15 per cent in FY21 and hold relatively stable over the remainder of the forecast period (FY22 to FY25) noting that an excess in supply would limit any significant price increases over the forecast period. As outlined in this report, the price of steel increased in FY21 and is expected to again increase in FY22 due to unexpected supply shortages caused by COVID-19 and stronger than anticipated demand. However, beyond these unique conditions, we project a decline in steel price between FY23 and FY26. Similarly, the price of copper is projected to dip in FY23, as the market 'normalises' following a significant price increase in prior periods.

Figure 4.5: 2021 and 2022 BRCP steel and copper price estimates



Source: PwC analysis

[40] See Table 3.1.

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