



OXFORD
ECONOMICS

ELECTRICITY-RELATED MATERIALS & LAND INPUT ESCALATION FORECASTS TO 2028/29

**PREPARED BY BIS OXFORD ECONOMICS
FOR NT POWER & WATER**

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BIS Oxford Economics

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1. EXECUTIVE SUMMARY

In response to the Terms of Reference (TOR): 'Provision of Real Cost Escalation Calculations and Advice', BIS Oxford Economics (BISOE) has prepared a discrete set of materials and land price indices relevant to electricity transmission networks in the Northern Territory. We understand these forecasts will be used by NT Power & Water to develop their operating and capital expenditure forecasts. The materials and land forecasts will be used to inform NT Power & Water's regulatory proposal to the Australian Energy Regulator (AER), with the next reset period covering the five-year period from 2024/25 to 2028/29 inclusive.

1.1 COMMODITY PRICE FORECASTS AND MATERIAL COST ESCALATORS

Commodity Price Forecasts

Commodity price forecasts are global price forecasts, sourced from the latest Consensus Economics 'Energy & Metals Consensus Forecasts' (E&MCF) publication. This publication provides commodity price forecasts measured in US\$ terms from a range of forecasters. The latest available publication is August 2022, where around 30 separate forecasters supplied price forecasts out to 2031 – the average of all the forecasters is used here. The AER has shown a preference for accepting a range of forecasts from different forecasters, and then taking an average.

The three commodities presented here – **aluminium, copper and oil** – have all experienced significant recoveries from the Covid-induced lows of 2020 and are currently trading at near 10-year highs (see table 1.1). Although they are expected to retreat from these highs over the period to 2028/29, the average prices in the five years to 2028/29 (the upcoming revenue period) will be moderately higher than the current revenue period (2019/20 to 2023/24) as costs rose considerably over the last two years and are expected to stay elevated throughout the remainder of the decade, indicating the onset of cost pressures on operators of electricity distribution networks in the coming period. Aluminium, Copper and Brent Oil are all expected to experience slight declines over the revenue determination period. However, this is primarily the product of the spike in all three commodities over 2021/22 (as well as strong growth in Aluminium and Copper prices over 2020/21).

Aluminium prices are generally tied to global economic growth and electricity prices. Prices rose 21% in 2020/21 (all prices expressed in nominal terms, unless specified otherwise) and jumped a further 43% in 2021/22 to US\$2,903/tonne (in A\$ terms A\$3,999/t, a 47% increase) as production was hampered by power shortages in China, with many energy-intensive smelters shutting down. Given the aggressive expansion in Chinese coal production acting to remove constraints on power production, an increase in smelter activity is expected to see aluminium supply increase and prices start to recede. Following a correction of -10% in 2022/23, prices are forecast to remain relatively unchanged in 2023/24, before an average growth of 0.1% per annum is forecast over the next revenue determination period (2024/25 to 2028/29). In real terms, A\$ prices are forecast to decline by -2.6% over the next revenue period.

Overall, Aluminium prices are expected to average US\$2,633/t over the five years from 2024/25 to 2028/29 (the next revenue determination period) – 11.2% higher than the previous five-year average of US\$2,367/t in 2019/20-23/24 (the current revenue determination period). This will be somewhat mitigated by a slightly higher Australian dollar over the next revenue period – with A\$ prices averaging A\$3,593/t over 2024/25-28/29, 8.7% higher than the \$3,305/t of the 2019/20-23/24 period.

Table 1.1 Materials and Commodity Price Forecasts

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Average (o)
	Actuals					Forecasts		Next Revenue Determination Period					
Commodity Prices (\$/tonne) (a)													
Copper (A\$/tonne)	8702	8598	8446	10664	13316	11386	11226	11449	11339	11412	11481	11481	11432
Copper (US\$/tonne)	6747	6151	5669	7969	9665	8007	8153	8391	8311	8364	8415	8415	8379
Aluminium (A\$/tonne)	2751	2683	2496	2715	3999	3717	3598	3694	3571	3552	3573	3573	3593
Aluminium (US\$/tonne)	2133	1920	1675	2029	2903	2614	2613	2708	2618	2603	2619	2619	2633
Oil (A\$/barrel)	82.2	96.1	76.9	72.5	126.3	141.8	120.1	106.3	102.0	103.3	104.3	104.3	104
Oil (US\$/barrel)	63.7	68.7	51.6	54.2	91.7	99.7	87.2	77.9	74.8	75.7	76.5	76.5	76
Exchange rate (US\$/A\$) (b)	0.78	0.72	0.67	0.75	0.73	0.70	0.73	0.73	0.73	0.73	0.73	0.73	0.73
% ch													
Copper (A\$/tonne)	21.8	-1.2	-1.8	26.3	24.9	-14.5	-1.4	2.0	-1.0	0.6	0.6	0.0	0.5
Aluminium (A\$/tonne)	17.1	-2.5	-7.0	8.8	47.3	-7.1	-3.2	2.7	-3.3	-0.5	0.6	0.0	-0.1
Oil (A\$/barrel)	23.9	16.9	-19.9	-5.8	74.2	12.3	-15.3	-11.5	-4.1	1.3	1.0	0.0	-2.7
Nominal Material Producer Price Indices (PPI)													
Steel Beams and Sections PPI (Australia) (c)	107.0	112.4	112.6	118.4	154.9	160.9	143.2	145.7	149.0	151.1	156.3	163.2	153.1
Reinforcing Steel PPI (Australia) (d)	94.4	101.5	98.6	102.7	144.6	150.9	130.7	129.2	127.6	125.4	127.5	132.0	128.3
State Steel Products (SA) (e)	108.8	111.5	110.7	113.7	137.1	144.2	133.3	136.2	139.0	140.9	145.8	151.7	142.7
Concrete, Cement & Sand PPI (SA) (f)	104.2	105.9	104.9	104.3	105.3	109.6	114.2	117.7	119.8	121.8	124.6	128.3	122.4
Poles - Concrete (Cement Products PPI) (SA) (g)	111.9	118.5	120.9	123.0	132.9	144.1	148.5	153.7	158.0	162.2	167.4	173.9	163.0
Poles - Wood (h)	103.3	110.8	115.7	110.9	119.4	126.0	133.1	139.3	143.6	144.1	147.2	154.6	145.8
Cable (Electrical Cable Manufacturing PPI) (i)	101.3	101.5	99.2	103.7	127.2	130.3	127.7	132.3	135.3	137.1	142.6	150.6	139.6
Communications Equipment Manufacturing PPI (j)	123.9	120.7	123.7	126.4	136.8	142.1	144.8	147.9	150.7	153.6	156.9	161.0	154.0
Switchgear (Other Electrical Equipment Manufacturing PPI) (k)	103.2	107.2	105.7	109.0	114.9	122.3	124.4	128.0	131.1	133.4	137.1	141.2	134.2
Non-hydro Electricity Engineering Construction IPD (l)	110.8	115.2	118.2	120.5	127.7	132.6	134.4	139.1	143.1	146.5	151.4	158.0	147.6
% ch													
Steel Beams and Sections PPI (Australia) (c)	2.2	5.0	0.2	5.1	30.8	3.9	-11.0	1.8	2.3	1.4	3.4	4.4	2.7
Reinforcing Steel PPI (Australia) (d)	8.6	7.4	-2.8	4.1	40.7	4.4	-13.4	-1.2	-1.2	-1.7	1.7	3.5	0.2
State Steel Products (SA) (e)	3.7	2.4	-0.7	2.7	20.6	5.2	-7.6	2.2	2.1	1.4	3.4	4.1	2.6
Concrete, Cement & Sand PPI (SA) (f)	2.4	1.7	-1.0	-0.5	1.0	4.1	4.2	3.1	1.8	1.6	2.3	3.0	2.4
Poles - Concrete (Cement Products PPI) (SA) (g)	-1.5	5.9	2.0	1.7	8.1	8.4	3.1	3.5	2.8	2.7	3.2	3.9	3.2
Poles - Wood (h)	3.4	7.2	4.4	-4.1	7.7	5.5	5.7	4.6	3.1	0.3	2.2	5.0	3.1
Cable (Electrical Cable Manufacturing PPI) (i)	11.0	0.1	-2.2	4.5	22.6	2.5	-2.0	3.6	2.3	1.4	4.0	5.6	3.4
Communications Equipment Manufacturing PPI (j)	-3.5	-2.5	2.5	2.2	8.2	3.9	1.9	2.2	1.9	1.9	2.2	2.6	2.1
Switchgear (Other Electrical Equipment Manufacturing PPI) (k)	4.0	3.9	-1.4	3.1	5.5	6.5	1.7	2.9	2.4	1.8	2.8	3.0	2.6
Non-hydro Electricity Engineering Construction IPD (l)	2.0	4.0	2.6	1.9	6.0	3.8	1.4	3.5	2.9	2.4	3.4	4.3	3.3
Consumer Price Index - headline (m)	1.9	1.6	1.3	1.6	4.4	7.0	4.2	2.6	2.6	2.6	2.6	2.6	2.6
Real Commodity Price Changes (n)													
Copper (A\$/tonne)	19.9	-2.8	-3.1	24.6	20.4	-21.5	-5.6	-0.6	-3.5	-1.9	-2.0	-2.6	-2.1
Aluminium (A\$/tonne)	15.2	-4.1	-8.3	7.2	42.9	-14.1	-7.4	0.1	-5.9	-3.1	-2.0	-2.6	-2.7
Oil (A\$/barrel)	22.0	15.3	-21.3	-7.4	69.8	5.2	-19.5	-14.0	-6.6	-1.3	-1.6	-2.6	-5.2
Real Material Producer Price Indices (PPI) (n)													
Steel Beams and Sections PPI (Australia) (c)	0.2	3.4	-1.2	3.5	26.4	-3.1	-15.2	-0.8	-0.3	-1.1	0.8	1.8	0.1
Reinforcing Steel PPI (Australia) (d)	6.7	5.8	-4.1	2.5	36.3	-2.7	-17.6	-3.7	-3.8	-4.3	-0.9	1.0	-2.3
State Steel Products (SA) (e)	1.8	0.8	-2.0	1.0	16.1	-1.8	-11.8	-0.4	-0.5	-1.2	0.9	1.5	0.1
Concrete, Cement & Sand PPI (SA) (f)	0.5	0.0	-2.3	-2.1	-3.5	-3.0	0.0	0.5	-0.8	-0.9	-0.2	0.4	-0.2
Poles - Concrete (Cement Products PPI) (SA) (g)	-3.4	4.3	0.7	0.1	3.6	1.4	-1.1	0.9	0.2	0.1	0.6	1.3	0.6
Poles - Wood (h)	1.5	5.6	3.1	-5.8	3.2	-1.5	1.5	2.0	0.5	-2.2	-0.4	2.5	0.5
Cable (Electrical Cable Manufacturing PPI) (i)	9.1	-1.5	-3.6	2.9	18.2	-4.5	-6.2	1.0	-0.3	-1.2	1.4	3.0	0.8
Communications Equipment Manufacturing PPI (j)	-5.5	-4.2	1.1	0.6	3.7	-3.1	-2.3	-0.4	-0.7	-0.7	-0.4	0.0	-0.4
Switchgear (Other Electrical Equipment Manufacturing PPI) (k)	2.1	2.3	-2.7	1.4	1.0	-0.6	-2.5	0.3	-0.1	-0.8	0.2	0.5	0.0
Non-hydro Electricity Engineering Construction IPD (l)	0.0	2.3	1.3	0.3	1.6	-3.2	-2.8	0.9	0.3	-0.2	0.8	1.8	0.7

Source: ABS, BIS Oxford Economics, Consensus Economics

(a) Forecasts from June quarter 2022 to FY29 come from June 2022 Consensus Economics publication, "Energy & Metals Consensus Forecasts".

(b) Forecasts from June 2022 to FY29 come from June 2022 Consensus Economics publication, "Asia Pacific Consensus Forecasts".

(c) Historical figures come from Table 18 of ABS release 6427.

(d) Historical figures come from Table 18 of ABS release 6427.

(e) South Australian historical figures and forecasts are used as a proxy for the Northern Territory. Historical figures come from Table 18 of ABS release 6427.

(f) South Australian historical figures and forecasts are used as a proxy for the Northern Territory. Historical figures come from Table 18 of ABS release 6427.

(g) South Australian historical figures and forecasts are used as a proxy for the Northern Territory. The Cement Products PPI is the proxy for Concrete Poles.

Historical figures come from Table 18 of ABS release 6427.

(h) Historical figures come from Australian Bureau of Agriculture Resources Economics and Sciences. The index of Plantation and Native Hardwood prices are used.

(i) The Electrical Cable Manufacturing PPI is the proxy for cables. Historical figures come from Table 12 of ABS release 6427.

(j) Historical figures come from Table 18 of ABS release 6427.

(k) The Other Electrical Equipment Manufacturing PPI is the proxy for Switchgears. Historical figures come from Table 12 of ABS release 6427.

(l) Historical figures come from the ABS Engineering Construction Service series, provided as an unpublished 'Special Run series'.

(m) Inflation forecasts are RBA forecasts to June 2024 from latest 'Statement of Monetary Policy'. Beyond that, inflation forecasts are based on a glide-path to the mid-point of RBA inflation target (2.5%) by year 5. The overall forecasts are then calculated as a geometric mean of the 'official' RBA inflation forecasts over the next 5 years or to the end of the regulatory period, with years 3,4 and 5 CPI equal to the calculated 5-year geometric mean. This methodology is the position adopted by the Australian Energy Regulator.

(n) Real price changes are calculated by deducting the inflation rate from nominal price changes.

(o) Average for the next revenue determination period i.e. from 2024/25 to 2028/29 inclusive.

Long term **Copper** prices are driven by global industrial activity and economic growth. Prices surged 41% (in US\$ terms) in 2020/21 on the back of COVID-19 related issues impacting production levels in Latin America. The efforts of large copper producers to increase production materialised in increased stock levels as forward prices fell. Nevertheless, Copper prices still grew 21.3% in 2021/22, to US\$9,665/t (A\$13,316/t, a 25% increase). While copper demand will get a boost from greater use in electric vehicles and green electricity production, these sectors are currently too small to offset the strong mine supply growth currently in the pipeline. As a result, prices are projected to fall 17.2% in 2022/23, before averaging an annual increase of 0.5% (in A\$ terms) over the next revenue determination period (2024/25 to 2028/29). In real terms, A\$ prices are forecasts to decline by -2.1% over the next revenue period. Overall, Copper prices are expected to average US\$8,379/t over 2024/25-28/29 (the next revenue determination period), which will be 6.2% higher than the previous five-year average of US\$7,893/t in 2019/20-23/24; with A\$ prices to average A\$11,432/t, almost 4% higher than the 2019/20-23/24 period.

Oil prices recovered from an average of US\$52/barrel in 2019/20 to average US\$92/brl (A\$126/brl) in 2021/22. Key drivers of the 69% upswing in US\$ prices in 2021/22 included falling Covid infections (helping to boost the global economy), improving transport and travel, continued supply controls implemented by the OPEC+ group as well as the Russian invasion of Ukraine, the latter driving increased growth in prices through the implementation of trade restrictions and supply disruptions. Consensus forecasts project a further increase of 8.7% in 2022/23 and a drop of 12.5% in 2023/24, followed by an average annual decline of 2.7% over the next revenue determination period (2024/25 to 2028/29) in A\$ prices. In real terms, A\$ prices are forecasts to decline by -5.2% over the next revenue period. Brent Oil prices are expected to average US\$76/brl (A\$104/brl) over 2024/25-28/29.

Material Price Forecasts

In terms of mostly locally determined materials prices, Steel Beams and Sections PPI (Australia), Reinforced Steel (Australia), State Steel Products, Concrete, Cement & Sand (state price), Concrete poles (proxied by Concrete Products, Lime, Cement & Plaster Manufacturing PPI – in each state), Wooden Poles (proxied by the Plantation and Native Hardwood prices index - Australia), Cables (proxied by the Electrical Cable Manufacturing PPI - Australia), Communications Equipment Manufacturing PPI (Australia), Switchgears (proxied by Other Electrical Equipment Manufacturing PPI - Australia) and the Non-hydro Electricity Engineering Construction IPD (Australia) are all expected to grow modestly over the forecast period, with higher-than-average growth over 2021/22-22/23 for most prices. We note that SA State Steel Products prices, SA Concrete Cement & Sand Prices and SA Cement Products prices have been adopted as suitable proxies for the corresponding NT producer price indices.

The **Steel Beams & Sections, Reinforced Steel and State Steel Products PPIs** are heavily driven by the price of the primary inputs including the price for iron ore and coking coal. As COVID-19 worked to hamper Brazilian iron ore production, the resulting spike in prices drove modest growth steel PPIs in 2020/21. Supply chain constraints, recovering demand and the impacts of the Ukraine conflict have seen coking coal prices soar over 2021/22, leading to jumps of 31% and 41% in steel beams and reinforcing steel prices in 2021/22, and further growth of around 4% in 2022/23, with prices also boosted by strengthening construction activity. Easing coal and iron ore prices are then projected to drive declines of 11% to 13% in 2023/24 before stabilising somewhat as the input commodity prices stabilise and show modest growth in the latter part of the decade. Annual growth rates are expected to average 2.7% in the steel beams PPI in the five years to 2028/29, while the reinforcing steel price PPI is expected to average a 0.2% annual average growth over 2024/25-28/29. The SA State Steel Products PPI (used as a proxy for NT State Steel Products prices) will follow a similar trend, averaging a growth of 2.6% per annum over 2024/25-28/29. In real terms, growth will be a mere 0.1% on average in steel beams and sections over the 2024/25-28/29 revenue period, while

reinforcing steel will suffer an average real decline of -2.3% over the reset period. However, prices will be considerably higher on average over the 2024/25-28/29 period than the current 2019/20-23/24 reset period.

Concrete, cement, and quarry material prices are predominantly driven by construction activity in the economy. The SA **Concrete, Cement and Sand PPI** (used as a proxy for NT Concrete, Cement and Sand prices) is expected to mostly see above average increases over 2022/23 to 2024/25, as total construction activity reaches record levels, putting demand pressures on construction materials prices. Price increases are then expected to subsequently moderate as construction activity eases back, and are forecast to grow at an average of 2.4% per annum over the next revenue determination period (2024/25 to 2028/29), or -0.2% in real terms in SA. Likewise, **Concrete Poles (SA Cement Products Manufacturing PPI)** – used as a proxy for NT Cement Products Manufacturing PPI) will see above average growth over 2022/23-24 followed by an average of 3.2% per annum (+0.6% p.a. real) over the next revenue determination period (2024/25 to 2028/29).

Wooden Poles are proxied by the price index of 'Plantation and Native Hardwood', sourced from the Australian Bureau of Agricultural and Resources Economics and Sciences (ABARES). To forecast wooden poles prices, we modelled prices on residential house construction, GDP per capita and the exchange rate, with adjustments for supply problems due to the 2019/20 fires and the current global supply shortages (also due to strong global demand). Wooden poles are estimated to have experienced sizeable price increases in 2021/22, with above-average price increases to persist over 2022/23 and 2023/24, before moderating over the five years to 2028/29 - growing at an annual average rate of 3.1% (+0.5% p.a. real) - as housing construction eases back and supply problems are gradually addressed.

Prices for **Electrical Cable, Communications Equipment and Other Electrical Equipment** (the latter being the proxy for switchgear – note that 'Other' is electrical equipment other than lighting equipment, and includes switchgear, transformers, power generating equipment, etc) all increased sharply in 2021/22, off the back of record high copper prices, which is a key input to these items. Other key drivers of prices are energy costs, manufacturing wages, the exchange rate and the level of construction activity in the electricity and telecommunications sectors. As copper prices ease off over 2022/23 and 2023/24 (but remain at a higher than pre-covid levels), prices will ease back, with electrical cable prices declining in 2023/24 (-2.1%). Price growth will return to cables in 2024/25 with fairly stable price growth averaging 3.4% p.a. (real +0.8% p.a.) from 2024/25-28/29, while price growth in the Other Electrical and Communications equipment PPIs will average 2.6% (0 real) and 2.1% (-0.4% real) respectively over the reset period.

The **Non-hydro Electricity Engineering Construction IPD** is an aggregate measure of the change in cost of construction within the electricity construction sector (including the change in margins). The transition to renewable energies will be taking a step up in coming years, with the announcement and commencement of major solar and wind projects picking up pace, which, combined with the significant expansion and enhancement of transmission, will see the demand for electricity engineering inputs intensify. Boosted by higher copper prices, the IPD increased 6% in 2021/22, although price growth will ease back over 2022/23 and 2023/24 as copper prices ease. However, we are forecasting price growth to remain elevated over 2024/25 to 2028/29, with sustained growth averaging 3.3% in the 5 years to 2028/29, as the renewable transition accelerates and increasing electrification puts upward pressure on input prices and the costs of construction, while construction wage increase will rise strongly.

1.2 LAND PRICE FORECASTS

The Northern Territory has a small and sparsely distributed populace, accounting for just below 1% of Australia's population in 2020/21. Mining, construction and defence dominate the economy, with

volatility in population growth introduced by the outsized influence of major projects. The territory's net interstate migration (NIM) outflow is falling, with a reduced 1,800-person loss expected in 2021/22. Beyond this, elevated defence investment should extend the NIM recovery, with the state anticipated to reach interstate migration parity in 2023/24. Net overseas migration (NOM) inflows are expected to trend upwards over the three years to 2023/24 as the border reopens and the economy improves. From an extremely low base, the Northern Territory is projected to see population growth improve, reaching an estimated 0.8% in 2021/22. In line with overseas migration returning, growth is expected to lift, averaging 1.4% over the four years to 2028/29. This compares with a forecast national average population growth of approximately 1.3% during this period. Within the Northern Territory, population growth over the forecast period will be heavily skewed towards Darwin.

The Darwin **industrial** property market comprises a number of precincts, mainly stretching to the east of the city centre along the Stuart Highway towards Yarrowonga, as well as East Arm. A shortage of market evidence means that trends are difficult to quantify, and forecasting is highly problematic. Discussions with agents active in this market indicate that demand for larger industrial property has typically been low in Darwin, particularly buildings greater than 1,000 sq m. The outlook for the industrial market in Darwin is linked to the prospects for the Northern Territory economy, which looks reasonable overall. The outlook is influenced by major resource projects proceeding, however some of these are uncertain. Nevertheless, some large-scale projects are underway and have further to run, including Santos' \$5 billion Barossa gas project, other major minerals projects and several large projects currently being undertaken by the federal and territory government. Over the medium term, positive economic conditions and project specific requirements linked to these large-scale projects should flow through to moderate demand for industrial properties, with a lag, allowing the substantial overhang of vacancies to be slowly absorbed.

The Darwin CBD contains around 215,000 square metres of **office** stock with the largest user by far being public administration & safety ahead of the next largest sector, health. The ownership of CBD office stock is dominated by local private investors, without the same competition for office assets from the major A-REITs as in the larger office markets. Overall, we expect moderately positive office employment growth to slowly absorb the market oversupply in Darwin.

Table 1.2 Land Price Forecasts – Darwin

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Average (b)
	Actuals						Forecasts		Next Revenue Determination Period					
Nominal Land Price Changes (Median Prices)														
Darwin Residential Land Price (\$'000)	221	203	197	201	256	275	263	285	300	315	332	339	355	328
%ch														
Darwin Residential Land Price (\$'000)	-7.1	-8.1	-3.0	2.0	27.4	7.4	-4.4	8.4	5.3	5.0	5.4	2.1	4.7	4.5
Consumer Price Index (headline) (a)	1.7	1.9	1.6	1.3	1.6	4.4	7.0	4.2	2.6	2.6	2.6	2.6	2.6	2.6
Real Land Price Changes (Median Prices) (c)														
Darwin Residential Land Price (\$'000)	-8.9	-10.1	-4.6	0.7	25.7	3.0	-11.4	4.2	2.7	2.4	2.8	-0.5	2.2	1.9

Source: ABS, PriceFinder, BIS Oxford Economics

(a) Inflation forecasts are RBA forecasts for the next 2 years from latest 'Statement of Monetary Policy'. Beyond that, inflation forecasts are based on a glide-path to the mid-point of RBA inflation target (2.5%) by year 5. The overall forecasts are then calculated as a geometric mean of the 'official' RBA inflation forecasts over the next 5 years or to the end of the regulatory period, with years 3,4 and 5 CPI equal to the calculated 5-year geometric mean. This methodology is the position adopted by the AER in its Final position paper "Regulatory treatment of inflation" of December 2020.

(b) Average Annual Growth Rate for 2024/25 to 2028/29 inclusive, ie for next regulatory period.

(c) Real price changes are calculated by deducting the inflation rate from nominal price changes.

The performance of **residential** land values broadly reflects the underlying performance of the local housing market. Following successive years of price declines, Darwin's median house price grew 30% y/y in 2020/21, followed by slower growth in 2021/22 (+6%), leaving Darwin the most affordable capital city at \$627,000. The outlook for the Darwin market has several factors playing in its favour

against a backdrop of rising interest rates. A recovery in population flows will be encouraged by major investments in resources and defence. Works on the Barossa LNG project should prop up demand during construction while non-residential developments related to the Darwin City Deal create greater job opportunities. Simultaneously, an improving demand/supply dwelling balance will help to place a floor under prices over the near term. Though we forecast house prices to flatten in 2022/23, the city has only just recovered the losses incurred during the resources boom hangover, and therefore the room for prices to fall further is limited. We forecast the median house price and the median land price to grow over the period to June 2029. In real terms, Darwin's residential land price is forecast to rise by an annual average of 1.9% between 2024/25 and 2028/29.

2. INTRODUCTION

In response to the Terms of Reference (TOR): 'Provision of Real Cost Escalation Calculations and Advice', BIS Oxford Economics (BISOE) has prepared a discrete set of labour, materials, commodity and land price indices relevant to electricity transmission and distribution networks in Australia and the NT. We understand these forecasts will be used by NT Power & Water to develop their operating and capital expenditure forecasts. The materials and land forecasts will be used to inform NT Power & Water's regulatory proposal to the Australian Energy Regulator (AER), with the next reset period covering the five-year period from 2024/25 to 2028/29 inclusive. Over the next regulatory period forecasts of both nominal and real price growth of the relevant inputs are provided. The forecasts in this report were finalised in early September 2022.

The Australian Bureau of Statistics is the primary data source for the consumer price index, employment, real gross value added and investment (including engineering construction) data, and for a range of other economic variables. The data used in the projections is the latest available as at early September and includes the June quarter Consumer Price Index and Producer Price Indices data releases. Other inflation and interest rate data were sourced from the Reserve Bank of Australia. Historical commodity price data came from the Commonwealth Department of Industry, Science, Energy and Resources (DISER).

Forecasts of the economic variables in this report were mostly sourced from BIS Oxford Economics reports, including *Australian Macro Service, Long Term Forecasts: 2021 – 2036*, *Engineering Construction in Australia 2021-2036* and *Building in Australia 2021-2036*, along with other unpublished forecasts and from BIS Oxford Economics internal research and modelling. Forecasts of commodity prices were sourced from the latest Consensus Economics publication *Energy & Metal Consensus Forecasts* (August 2022).

The previous Summary section presents an overview of the outlook for commodity, material and land costs, including numerical forecasts which are presented in the summary table (and separately provided in an excel spreadsheet).

Section 3 provides a macroeconomic outlook for Australia and the Northern Territory. This section also has forecasts of key economic variables plus a discussion of the drivers and logic underpinning the projections, to provide context for the materials and land prices outlooks. There is also a section on the Consumer Price Index forecasts, based on the latest Reserve Bank of Australia (RBA) projections.

Section 4 covers the key drivers of materials prices, and includes the construction outlook for Australia and the Northern Territory, providing commentary on the residential and non-residential building sectors as well as engineering construction activity.

Sections 5 provides forecasts of commodity prices and the materials indices.

Section 6 provides forecasts of residential land prices for Darwin, which are a proxy for Northern Territory land price changes.

3. MACROECONOMIC OUTLOOK

3.1 AUSTRALIA MACROECONOMIC FORECASTS

Australian economy has rebounded from COVID-19, but now slowing as constraints emerge

In 2019/20, real Gross Domestic Product (GDP) was virtually flat – due to COVID-related impacts in the first half of calendar 2020. Australian domestic demand then increased by 2.6% in 2020/21, with the huge bounce-back in both farm and non-farm stocks pushing the growth in Gross National Expenditure (GNE) to 3.3%. However, with net exports detracting -1.6% from growth, GDP rose 1.6% in 2020/21. In 2021/22, a further strengthening in domestic demand to 5.1% - despite disruptions from further lockdowns and then severe flooding in the eastern states – lifted GDP growth to 3.9%, with net exports again detracting -1.6% from growth.

GDP growth in the recent June quarter (Q2) was in line with our expectations at 0.9% q/q. Growth in the quarter was driven by household consumption growth, while net exports also contributed strongly. Investment outcomes were underwhelming in Q2. Public and machinery and equipment investment increased, while private, construction-related investment fell, due both to rain, flooding and capacity constraints. There is a strong pipeline of work to be done in both dwellings and non-residential construction. But capacity constraints due to labour and materials shortages are delaying the realisation of this investment by extending construction times.

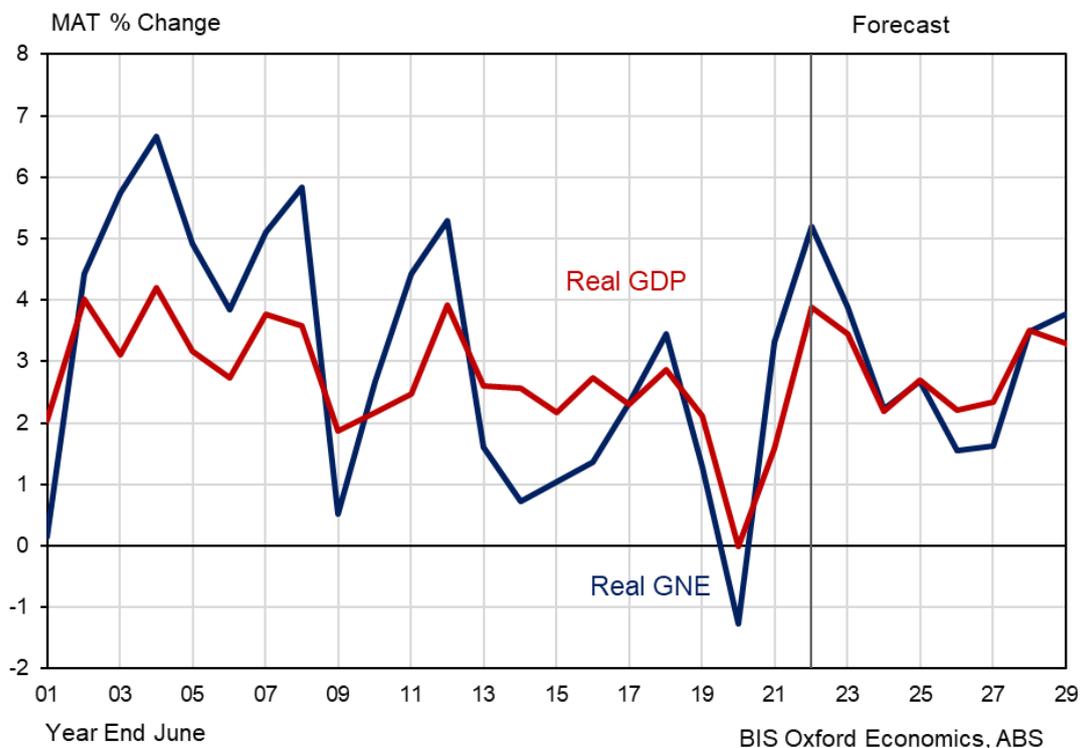
Further, the higher-cost environment is threatening the viability of future projects. Mining investment picked over 2020/21 and 2021/22. With prices for a number of commodities expected to remain at healthy levels over the medium term and strong demand for renewable energy-related minerals (such as Lithium), we expect further investments to get underway and mining investment to continue to rise and remain strong well into the middle of the decade. Overall, new business investment increased 5% in 2021/22 and is expected to grow by around 7% and 9% in 2022/23 and 2023/24 respectively, before growth eases. The recovery in business investment will not only drive near-term demand but will increase the economy's productive capacity in the long run.

Consumption growth was strong once again in June quarter 2022 (Q2) at 2.2% q/q. Jobs growth and rising wages have supported income growth, while a sharp fall in the savings rate indicates that households are fuelling spending out of accumulated savings. Q2 was free from Covid restrictions, and spending on travel and hospitality benefitted accordingly. We expect there will be a further pivot in consumption from goods to services, although catch-up growth in services components will slow from here. Further, household budgets will face greater pressure from brisk inflation in essential spending components (food and energy), while higher interest rates will restrain spending by households with mortgages. Nevertheless, the fundamentals for growth remain encouraging. Strong employment growth and a tight labour market will support income growth, while there is still scope for the savings rate to fall further. The strength in the labour market and stronger migration flows will put a floor under conditions over the second half of 2022. However, cost-of-living pressures are squeezing real incomes, and inflation concerns are prompting higher interest rates.

Strong employment growth over the first half of 2022 has seen the unemployment rate fall to a 40-year low of 3.4% in July, while underemployment has plummeted. There is still a large cohort of workers forced to take sick leave or isolate due to Covid each month, which is constraining growth in hours worked. With the labour market likely beyond capacity and the participation rate at a historically high level, jobs growth is expected to slow. With demand indicators firm, notwithstanding job ads plateauing over the past few months, we expect a recovery in wage growth over 2022 and 2023. The large 5.2% increase in the minimum wage on July 1 will underpin a lift in wage growth over 2022/23.

Fiscal policy is now moving from supportive to tightening. Nevertheless, public infrastructure spending is set to remain strong over the short-to-medium term as there is a large pipeline of transport and other projects to complete, which were brought forward as part of the COVID response. In addition, dwelling building also remains elevated due to direct grants for individuals to put towards dwelling construction or major alterations and additions (the HomeBuilder program) which have spurred activity. The 2022/23 budget delivered a considerable upgrade to the fiscal outlook; Treasury projections for the budget deficit in 2021/22 and 2022/23 have been upgraded to 3.5% and 3.4% of GDP, respectively. The strong performance of the labour market has boosted government revenue and lowered welfare payments, while the recent spike in commodity prices has also contributed to the upgrade in forecast revenue. The budget announced a temporary cut to the fuel excise, which will lower CPI inflation in Q2, before a reversion in Q4 of 2022/23. Low- and middle-income earners, along with welfare recipients, have received one-off 'cost-of-living' payments. To the extent these transfers add to demand (and are not saved), they may add to inflationary pressures over the second half of 2022, which are already mounting.

Figure 3.1 Australia – Basic Economic Indicators



Monetary policy settings are in the process of moving from 'extremely accommodative' to a more 'normal' setting. The RBA started its rate hiking phase in May 2022, with the cash rate now at 2.6% (October 2022) in response to the stronger outlook for energy prices and higher domestic inflationary pressures. More increases are possible in the near term, although the Bank may pause as it awaits the reaction to the rises over 2022. It is important to note that with many mortgages on fixed rates (which were fixed when rates were low), some impacts will stretch well into late 2023. As noted by the RBA, inflation pressures at present are primarily being caused by global and domestic supply disruptions, which are expected to abate over 2023. Higher interest rates will do little to cool inflation caused by negative supply shocks, but the recent and upcoming rate rises are about trying to control inflation expectations and signal the RBA's tolerance for an inflation overshoot is limited. The Bank sees the labour market recovery as sufficiently well entrenched that it can withstand higher interest

rates. The RBA also wants to move away from "emergency" low rates as quickly as possible before taking pause to assess the data.

Global Economic Outlook

The near-term outlook for global growth continues to deteriorate. The recent escalation of both formal and informal sanctions against Russia, further supply chain problems, and more upside inflation surprises continue to weigh on global economic growth. Our baseline forecast for global GDP growth is 3.1% this year and 1.8% in 2023, before picking up to over 3% in 2024 and 2025. Global CPI inflation is now expected to average over 7% this year. Much of the increase reflects higher energy and food inflation triggered mainly by the war in Ukraine. But the prospect of further long-lasting supply chain disruptions and more upside surprises have prompted upward revisions to core inflation in some major economies, including the US and eurozone.

Despite the upward revisions to our near-term CPI forecasts, we still expect inflation to ease markedly over the next year. While energy and food prices may remain high over the coming quarters, the annual inflation rate should fall back sharply as we move into 2023, helping to lower the headline rate of inflation. In addition, the squeeze on households' real incomes from high inflation and tighter monetary and fiscal policies should exacerbate any downward forces on core inflation from an eventual easing of supply chain pressures. Nonetheless, the prospect of even higher inflation over the next few quarters means that we expect many central banks will continue to push ahead with more rate hikes in the near term, including the US Federal Reserve. US GDP growth is expected to slow to 1.7% in 2022 and decline by -0.5% in 2023, before recovering to 1.6% in 2024 and 2.2% in 2025. Coupled with higher energy prices and disruptions to energy supplies in Europe, Europe GDP slows to 3.1% in 2022 and 0% in 2023, before picking up to 2.3% in 2024.

Meanwhile, greater disruption in the near term – especially in China where a zero-tolerance approach to COVID-19 continues to be pursued – points to slower normalisation of supply-chain pressures and potentially a slower transition of consumer spending from goods back to services. China has stuck to its zero-tolerance approach to Covid, with widespread lockdowns weighing on consumption and, with headwinds from the real estate sector persisting, we forecast GDP growth will slow to 3.1% in 2022 (from 8.1% in 2021), before rebounding to over 4% in 2023 and 2024, and then 5.3% in 2025.

High and rising US interest rates and increased uncertainty has seen a broad-based appreciation of the US dollar. After averaging around US\$0.72 in the March and June quarters, the Australian dollar has fallen sharply to around US\$0.65. Our outlook is for the AUD to remain weak over 2022 and 2023, before appreciating gradually alongside further monetary tightening in Australia in the medium term, to near US\$0.80 by mid-decade, before easing back to the long-term average of US\$0.75.

Beyond the near-term disruptions, we expect global growth will return to its trend pace of around 3.3% by mid-decade, and gradually slow over the long term as resident population growth eases. Australia's trading partner growth (weighted by exports) is forecast to grow at a faster pace over the next 5-20 years (between 0.5% to 1% higher), due to the high weights of China, East Asia and India (all of which are expected to outpace the average pace of global growth) in Australia's export mix.

GDP to remain buoyant in 2022/23, with growth moderating over 2023/24 and 2024/25

Although the pace of growth will ease through 2022/23, growth is coming off a high base and is not expected to slow sharply. Australian domestic demand is forecast to slow from 5.1% in 2021/22 to 4.1% in 2022/23, with a much slower accumulation of inventories and falls in farm stocks pushing growth in GNE to 3.9%. Growth in dwelling, business and public investment is expected to pick up as bottlenecks ease. Meanwhile, private consumption expenditure holds up as households spend heavily on services, funded by the increased savings accumulated over the past year or so and the strong labour market. Net exports are expected to provide less of a drag as tourism and education boost

exports, partially offset by faster growth in imports. GDP growth is forecast to be 3.9% in 2022/23, although there is more downside risk to this outlook from a number of factors.

Housing and business investment are expected to ease over 2023/24 and 2024/25 as the government incentives finish or are reduced. However, we expect further moderate growth in business investment in 2023/24 and 2024/25 as deferred investment is undertaken, although some sectors, such as hotel construction and other tourism-related investment, will take longer to recover. Meanwhile, public investment is expected to peak in 2023/24, but remain at elevated levels in 2024/25, as a large pipeline of transport infrastructure and social and institutional building projects come through. Meanwhile, government recurrent expenditure is expected to weaken sharply as the boost from the NDIS and vaccine roll-outs finish and governments attempt budget repair. With employment growth expected to slow as investment eases and because of labour constraints, household consumption expenditure growth will also ease over 2023/24 and 2024/25, with higher inflation and higher interest rates also weighing on spending. Tax cuts slated for July 2024 will boost spending in 2024/25, although there is considerable uncertainty around these tax cuts.

The war in Ukraine has raised export and import prices substantially and has delivered a brief, but sharp, spike up in the terms of trade. Trade volumes will be a mixed bag. Mining exports have been capped by capacity, and largely haven't been able to respond quickly to higher prices, but we expect mining export volumes to pick up over the next 2-3 years as new capacity comes onstream. Rural exports bounced back over calendar 2021 and will remain strong over 2021/22 and 2022/23 with bumper seasons in the eastern states boosting grain, other crops and dairy exports. With manufacturing exports now recovering, overall merchandise export volumes will continue to strengthen over 2022/23, before moderating. Import demand will be stronger over 2022 and into 2023, in line with the improvement in domestic demand. But higher prices may still dull some of this demand, while supply disruptions will make growth in merchandise volumes sporadic and patchy.

Large increase in both service credits and debits are expected over 2022/23 and 2023/24, before moderating in 2024/25. This will have different implications for the all-important tourism and education services trade and related industry sectors. Education exports were worth \$37.6 billion in FY19, or almost 39% of overall services exports (compared to only \$461m for outbound education import 'debits'). Although still impacted, education exports should recover quicker than 'tourism' flows – partly because of online teaching and partly because there is a large backlog of visas already for overseas students. We also expect inbound tourism 'exports' to recover well in the near term. Tourism exports (including 'business travel') were worth \$25.3 bn in FY19 (26% of overall services exports), compared to \$50.6 billion for outbound services 'imports' – which accounted for almost 50% of overall services imports. We expect a slower ramp-up in outbound tourism (compared to inbound tourism), even after travel restrictions are lifted, with tourism flows unlikely to recover back to their previous levels for a couple of years. The forecasts assume that the tourism and education credits (inbound) will recover back to pre-COVID levels by mid-2024, while outbound tourism debits will not get back to 2018 peaks until late 2024.

With the initial rebound from the pandemic likely to be over by late 2022, the pace of growth will naturally slow, with the interest rate rises of 2022 expected to bite over the next year or so. Overall, we are forecasting both GDP and GNE to ease to 2.2% in 2023/24 and 2.7% in 2024/25, with net exports neutral.

Mild slowdown in the mid-2020s, before the economy moves to trend growth

Annual headline inflation jumped to 6.1% (y/y) in the June quarter 2022, while underlying inflation lifted from 2.6% (December quarter 2021) to 4.6%. Transitory components continue to drive headline inflation, including high fuel prices. However, with upward price pressure emerging from supply chain disruption, it is now apparent that inflationary pressures are broadening, with CPI to peak at over 7%

during the second half of 2022, before subsequently easing. The rise in inflationary pressures has seen the RBA lift the cash rate by 2.5% since May to 2.6% in October. The RBA may raise rates again in the near-term, but we expect a pause in rises in 2023 and into 2024.

However, large tax cuts expected in July 2024 is expected to see a further lift in rates to 3.4% (potentially higher) over 2024/25, as the RBA attempts to curtail the extra demand pressures from the tax cuts, particularly while inflationary pressures are still present with the unemployment rate below 4%. Meanwhile, the 3+% rise in the cash rate in Australia means the benchmark housing variable rate will rise toward 7.7% by early 2025, which will be enough to slow consumer spending and impact housing and business investment over 2025/26 and 2026/27. With government capital spending falling at that time and recurrent spending still constrained, the end result will see annual GDP growth easing to around 2.2% over those two years.

Table 3.1 Australia – Key Economic Indicators, Financial Years

Year Ended June							Forecasts						
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Total New Private Investment (+)	-2.0	3.7	-2.7	-3.3	2.5	5.4	3.9	5.0	1.6	-1.7	0.1	6.6	6.9
New Public Investment (+)	8.6	11.2	4.8	0.5	5.7	7.1	7.2	4.0	-0.6	-2.8	-2.4	1.1	3.7
Gross National Expenditure (GNE)	2.3	3.5	1.3	-1.3	3.3	5.2	3.9	2.2	2.7	1.5	1.6	3.5	3.8
GDP	2.3	2.9	2.1	0.0	1.6	3.9	3.4	2.2	2.7	2.2	2.3	3.5	3.3
Inflation and Wages													
CPI (Yr Avg) - RBA forecasts (*)	1.7	1.9	1.6	1.3	1.6	4.4	7.0	4.2	2.6	2.6	2.6	2.6	2.6
Wage Price Index (Yr Avg)**	2.0	2.1	2.3	2.1	1.5	2.4	2.9	3.4	3.4	3.3	3.2	2.9	3.1
Average Weekly Earnings (Yr Avg) ^(A)	2.0	2.4	2.7	3.9	2.7	1.9	3.2	3.9	3.9	3.7	3.7	3.2	3.5
Employment													
– Employment Growth (Yr Avg)	1.5	3.0	2.4	0.5	0.6	3.2	3.1	2.0	1.8	1.6	0.8	1.6	2.2
– Employment Growth (May/May)	2.1	2.6	2.8	-5.6	8.3	3.0	2.0	1.9	1.8	1.3	0.9	2.0	2.1
– Unemployment Rate (May) (%)	5.5	5.4	5.2	7.0	5.1	3.9	3.6	3.7	4.0	4.1	4.3	4.0	3.8
Labour Productivity Growth													
– Total	0.8	-0.2	-0.2	-0.5	1.0	0.7	0.4	0.2	0.8	0.6	1.5	1.8	1.1
– Non-farm	0.6	0.0	0.0	-0.3	0.5	0.2	0.4	0.4	0.9	0.6	1.5	1.9	1.1

Source: BIS Oxford Economics, ABS and RBA

+Expenditure on new assets (or construction work done). Excludes sales (or purchases) of second hand assets.

*Headline CPI forecasts based on Reserve Bank of Australia's forecasts to June 2023 quarter. Beyond this, we've used the arithmetic mean the next 2 years and the the mid-point of the Reserve Bank's 2 to 3 per cent inflation target range after 2024.

** Based on Ordinary Time Hourly Rates of Pay Excluding Bonuses. Includes impact of Superannuation Guarantee increases.

^A Average Weekly Ordinary Time Earnings for Full-Time Adult Persons. Includes impact of Superannuation Guarantee increases.

The tightening of monetary policy will precipitate an overall slowing of economic growth in the mid-2020s. But as consumers and businesses re-adjust to the 'normalcy' of higher interest rates – although at much lower levels than the 2000s and 2010s – investment and consumer spending will return to long term trend (or potential) rates of growth over the second half of the 2020s with an initial rebound in GDP growth to 3.5% in 2027/28, before subsequently easing back.

Over the longer term, potential growth will slow primarily due to a smaller contribution from labour force growth compared to recent history. Net overseas migration will fall back to a more normal level, and the contribution from natural increase (births minus deaths) will also moderate. The relatively large cohort of Australians aged 65+ moving into retirement will also place downward pressure on the labour force participation rate, although this will continue to be somewhat alleviated by relatively high net immigration.

3.2 OUTLOOK FOR THE NORTHERN TERRITORY ECONOMY

The Northern Territory economy is highly cyclical, with wild swings in the growth rates of State Final Demand (SFD) driven by large variations in work done on large investment projects, particularly those associated with mining projects. The construction of colossal \$37 billion Ichthys LNG project over 2012/13 to its completion in 2017/18 was a major driver of activity. It's completion then saw sharp declines in SFD over FY18 to 2019/20, with SFD recovering over 2020/21 and 2021/22, rising 5.9% and 8.2% respectively. However, overall output – in terms of Gross State Product (GSP) – has been impacted by Covid, particularly international tourism and interstate tourism. GSP declined -0.6% in 2020/21 and is estimated to have increased only 2% in 2021/22, with a 55% increase in international goods imports resulting in a large negative external contribution. This increase in imports is currently being driven by the equipment and facilities for a new round of oil and gas and mining projects in the Territory.

The recovery in SFD over the past two years has been driven by strong growth in overall investment, with contributions from business investment (mostly mining related), public and dwelling investment. Further strong growth in investment is forecast to drive a cumulative 22% increase in SFD over 2022/23 to 2024/25. Key to the investment surge are large offshore oil and gas projects, supported by onshore gas and minerals (particularly lithium) projects, plus elevated public and dwelling investment. The main risk is constraints in the capacity to deliver the investment surge – and this may push out the timing of investment and therefore the SFD growth profile. There are also other uncertainties. Shifts in policy and concerns about climate change are clouding the outlook for the oil and natural gas sector and this headwind is not expected to go away for some time. Some projects have been put on pause.

Table 3.2 Northern Territory – Key Economic Indicators, Financial Years

Year Ended June							Forecast						
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Northern Territory													
Total Construction Activity(*)	-11.2	-4.2	-61.0	-33.7	21.1	23.5	32.3	50.2	17.0	-23.1	-13.4	-9.1	9.1
State Final Demand	8.9	-4.4	-17.0	-5.3	5.9	8.2	5.6	8.9	6.2	-3.3	-0.5	1.7	4.6
Gross State Product (GSP)**	1.5	1.9	-1.1	6.0	-0.6	2.0	4.0	5.8	5.6	1.6	2.3	2.9	3.2
Employment Growth (Year Avg)	3.1	-1.1	-3.4	-0.5	-1.7	1.5	4.1	3.5	2.8	-0.6	0.4	1.2	2.0
Australia													
Total Construction Activity(*)	-3.3	12.2	-9.1	-3.7	-0.7	1.5	6.4	7.2	-1.1	-4.6	0.0	5.7	6.8
Australian Domestic Demand	2.3	3.4	1.5	-0.9	2.6	5.1	4.1	2.2	2.6	1.6	1.7	3.4	3.7
Gross Domestic Product (GDP)	2.3	2.9	2.1	0.0	1.6	3.9	3.4	2.2	2.7	2.2	2.3	3.5	3.3
Employment Growth (Year Avg)	1.5	3.0	2.4	0.5	0.6	3.2	3.1	2.0	1.8	1.6	0.8	1.6	2.2

Source: BIS Oxford Economics and ABS

* Total construction work done in constant prices as per the ABS Building Activity and Engineering Construction Activity
Total construction is the sum of new dwelling building (includes alterations and additions activity greater than \$10,000), new non-building activity and new engineering construction.

** GSP is an estimate for FY2022

Meanwhile, public investment is set to rise further, with the Federal government currently undertaking several projects to expand the number of military installations in the region, while social and institutional non-residential building will show large increases in the near-term. Dwelling investment and some areas of infrastructure spending are expected to be strong, driven by undersupply and the return of healthy growth in the Territory's population. After an extended period of weakness from FY18 to 2020/21, population growth picked up in 2021/22 and is expected to average 1.6% over the next four years, before easing to 1.3% by 2028/29. This will also underpin solid growth in household spending and employment, with employment also boosted by strong investment over the next few years. The strength of employment growth is expected to see the unemployment rate in the Territory

remain around 3.4% over the next 3 years – below the national average – and the NT’s tight labour market will add to local wage pressures.

The full return of international and interstate tourism will also help underpin the strength of GSP and employment over the next few years, and help offset some of the volatility in investment projects. The completion of a number of major projects around mid-decade is expected to see SFD weaken sharply over 2025/26 and 2026/27, before growth returns in 2027/28 and picks up in 2028/29 as the next round of projects get underway.

3.3 RBA CPI FORECASTS ARE USED TO CALCULATE REAL PRICES

To calculate real wage and other cost increases, we deflate nominal price growth by deducting expected inflation. For the inflation forecast, we use the methodology preferred by the Australian Energy Regulator (AER). This methodology uses the official near-term CPI forecasts from the Reserve Bank of Australia (RBA) and a glide path to the longer-term average, which is based on the 2.5% mid-point of the RBA’s inflation target band (i.e., 2 to 3%). The RBA’s August 2022 ‘Statement on Monetary Policy’ forecast the headline CPI rate to be 7 $\frac{3}{4}$ % in the December 2022 quarter, easing to 6 $\frac{1}{4}$ % in the June quarter 2023 (giving a year average of 7% for 2022/23). An easing to 4 $\frac{1}{4}$ % is forecast for the December quarter 2023 and then to 3 $\frac{1}{2}$ % in the June quarter 2024 – giving a year average CPI rate of 4.2% for 2023/24. The RBA’s CPI forecast for December 2024 is 3%, after which we have the annual rate easing to its long-run rate of 2.5% by June 2024 - giving a year average CPI rate of 2.8% for 2023/24. Beyond the RBA’s forecast from the SoMP, we assume the CPI averages 2.5% over the medium-to-long term.

The AER has adopted a changed methodology for calculating CPI inflation, according to the AER Final position paper “Regulatory Treatment of Inflation”, released in December 2020. The main changes for the expected inflation projection are to reduce the length of the geometric average from 10 to 5 years and have a ‘glide-path’ from the end-point of the latest RBA forecast to the 2.5% mid-point by year 5 of the forecast period – with this 2.5% projection maintained until 2028/29. The average used for the five years from 2024/25 to 2028/29 is 2.6%.

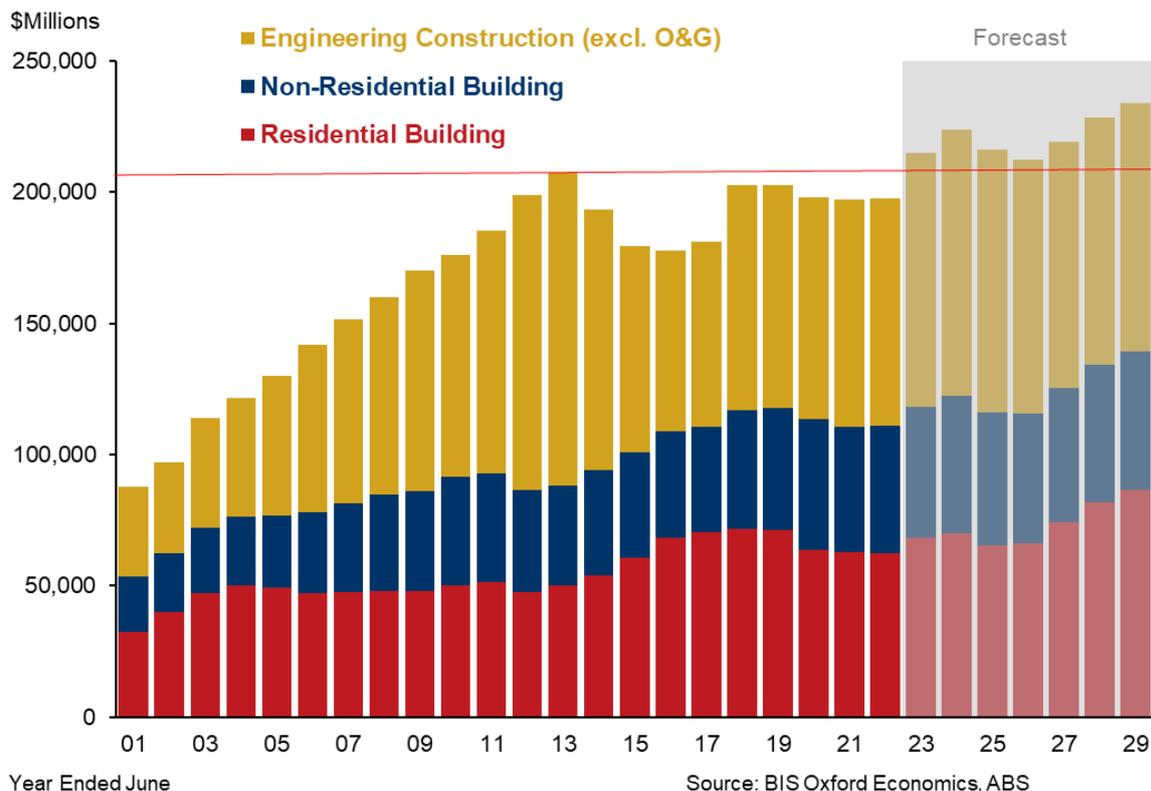
4. KEY DRIVERS OF MATERIALS PRICES

4.1 AUSTRALIA CONSTRUCTION OUTLOOK

Total construction activity is dominated by cycles in the building and engineering construction sectors. Heightened building activity (both residential and non-residential building) over 2013/14 to 2018/19 propped up the overall construction sector during a significant downturn in engineering work done (particularly oil and gas) over those years. Overall construction activity then declined over 2019/20 and 2020/21 as firstly residential building and then non-residential building declined. However, construction has been relatively shielded from the negative economic impacts of the Covid-19 outbreak, as most construction activities were allowed to continue throughout the pandemic. Additionally, federal and state governments highlighted the importance of the construction sector for supporting economic activity and building future infrastructure through various stimulus measures. Total construction activity returned to growth in 2021/22 on the back of strong growth in the roads and oil and gas engineering construction sectors, while building construction activity picked up.

Looking ahead, total construction activity is set to experience elevated levels of growth over the two years to 2023/24, as the rebound in engineering construction activity coincides with an upswing in building activity, which has been supported by the federal government’s HomeBuilder stimulus. Non-oil and gas construction activity is expected to reach a record high in 2023/24, surpassing the previous peak which was reached during the mining boom in 2012/13. Renewed growth in residential building construction is then expected to drive total construction activity towards the end of the decade.

Figure 4.1 Australia Construction Work Done



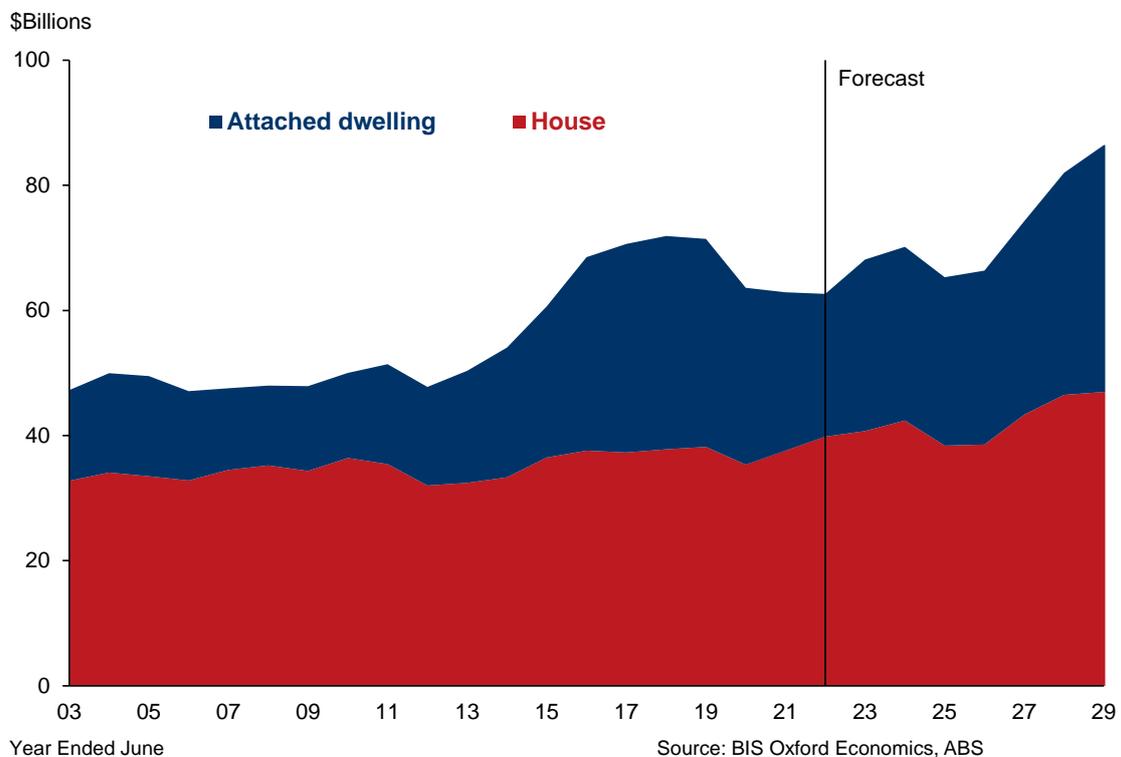
As construction activity reaches unprecedented levels, a key area of concern is that local material production capacity and labour supply (especially skilled labour) will struggle to meet this demand. As a result, higher construction material prices, which are beginning to materialise, are expected to be sustained in the near-term.

Furthermore, governments around the world have been targeting stimulus towards the construction of transportation infrastructure to help the economy recover from the coronavirus pandemic. This in turn has seen global increases in the demand for key construction materials, such as copper and steel. These factors are also expected to support the domestically driven higher price levels over the near-term.

Residential Building

The residential sector, which was enduring a downturn that commenced in 2018, began showing signs of stabilising in the first half of 2020. Lead indicators for the property market turned positive, assisted by interest rate cuts, APRA easing its lending guidance and the First Home Loan Deposit Scheme. The onset of the pandemic halted this momentum, but only temporarily. Residential construction held firm in 2020/21, with unprecedented levels of housing stimulus, sub 2% p.a. fix rate mortgages, rising house prices boosting household confidence, and pandemic driven housing preference shifts, leading to sustained levels of activity. The extension of the HomeBuilder grant until December 31st 2021 resulted in housing approvals rising for six straight months. Residential work done receded slightly to a trough in 2021/22, albeit remaining at elevated levels compared to the long term average. Added to this are high levels of residential alterations and additions activity (which is not shown in the accompanying charts), peaking at a record high \$11.2bn in 2021/22.

Figure 4.2 Residential Building Work Done: By Sector



Moving forward, activity is positioned to step up again in 2022/23 and peak in 2023/24, with the value of work done rising a cumulative 12% over those two years to a peak of \$70.1bn in 2023/24. Supply issues are expected to remain acute into 2022/23, with rising interest rates and higher construction costs set to stall the cycle. By 2024/25, activity is expected to normalise, falling by around -6.7% before stabilising in 2025/26 as rising borrowing and construction costs weigh on demand.

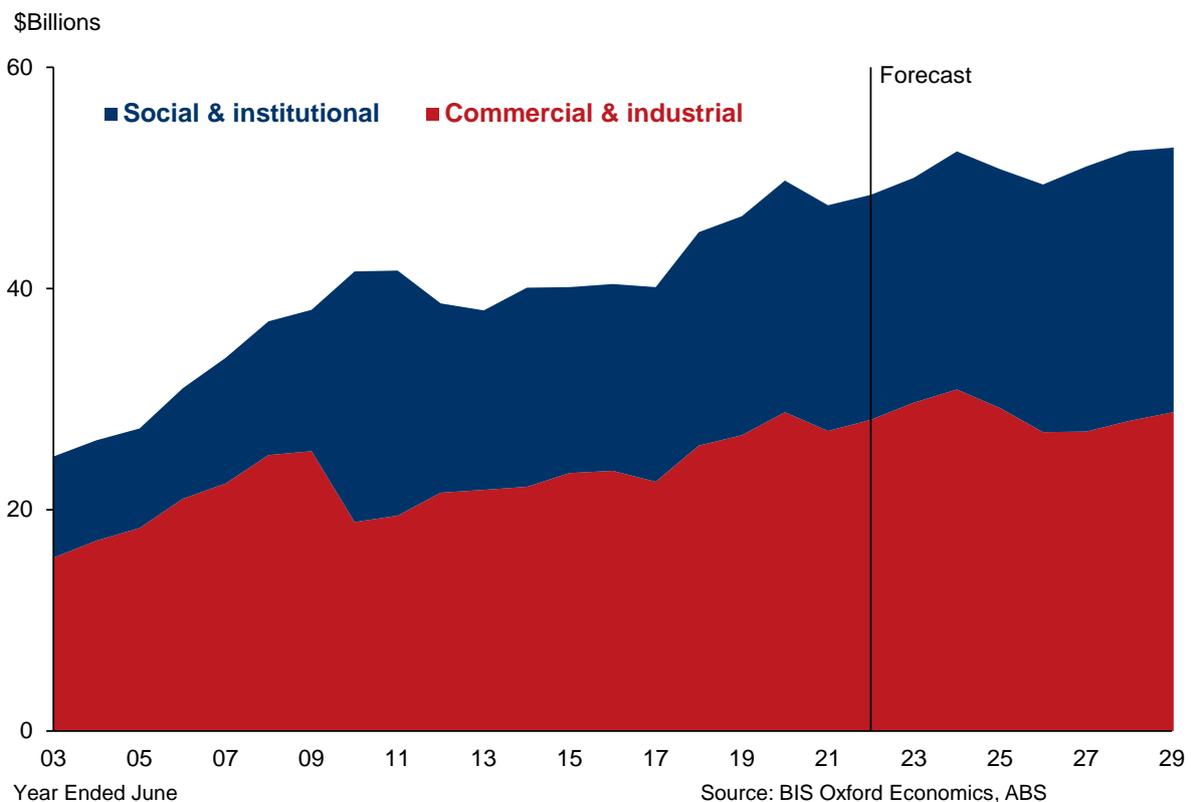
Non-Residential Building (NRB)

After non-residential building (NRB) work done held relatively stable near an average of \$40bn over the decade to FY17, NRB work done shot up over 12% in FY18, and continued to grow in subsequent years to a peak of \$49.8bn in in 2019/20. The vast bulk of this lift was concentrated in office building, with stronger growth in 2019/20 (despite COVID-19) was supported by health and warehouse building. After a modest decline in 2020/21, NRB construction rose slightly in 2021/22 to \$48.5bn.

COVID effects continue to weigh on work, with raised levels of absenteeism arising in H1 2022 as the Omicron outbreak led to surging case numbers. Combined with severe flooding in eastern Australia and heightened supply issues, project delivery is likely to be pushed back even further.

Firms appear to be looking through these disruptions. Private investment is anticipated to continue growing in 2022/23, whilst the backlog of delayed work from 2020/21 and 2021/22 will begin to unwind. Total work done activity is forecast to lift modestly over 2022/23 and 2023/24, after which the effects of rising borrowing costs will weigh on private investment. 2024/25 will see construction activity cool off over the following two years. However, elevated levels of public investment will place a floor under total losses during this period.

Figure 4.3 Non-Residential Building Work Done: By Sector



Engineering Construction

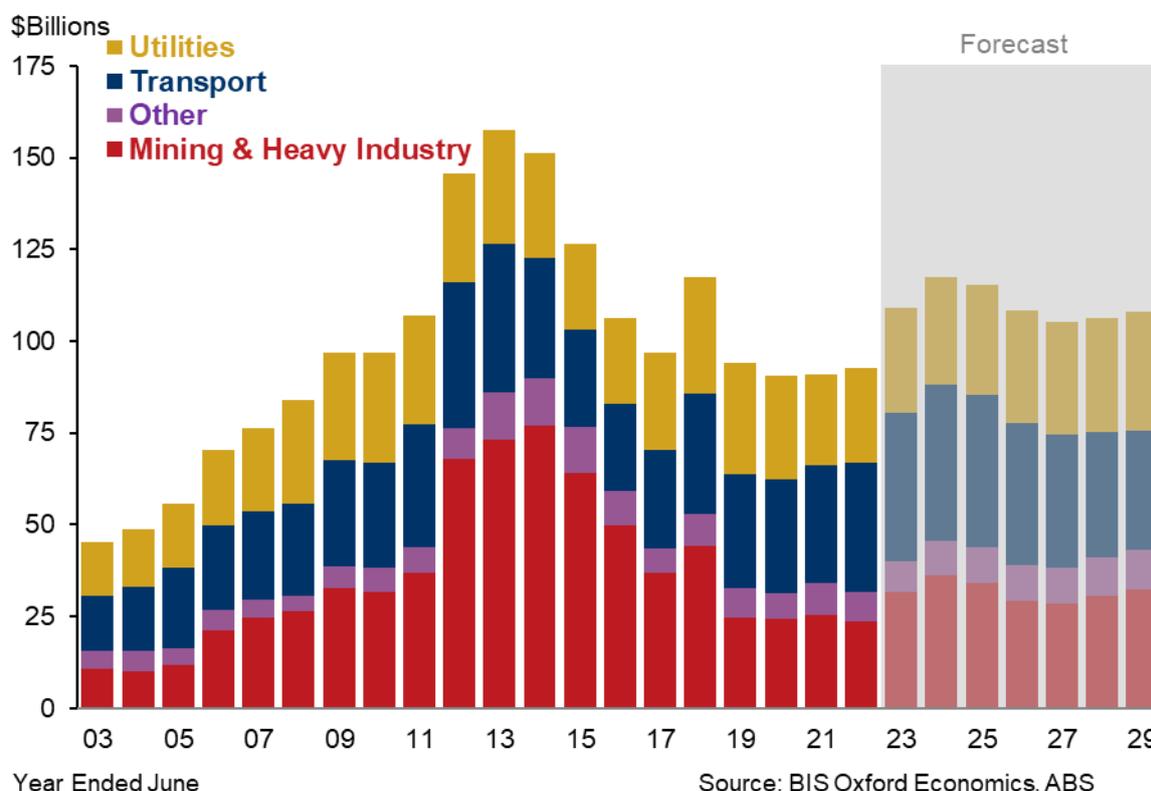
Engineering construction activity, excluding oil and gas, has experienced a cyclical upswing since FY16. The focus of the COVID-related stimulus was on the engineering sector, with the ‘infrastructure-led’ recovery a key component of the 2020/21 Federal Budget. During the early stages of the outbreak, a lack of restrictions targeted towards construction workers had allowed ongoing projects to progress steadily, and civil projects located outside of dense population centres were geographically shielded from any direct impacts.

Activity is forecast to grow strongly over the next two years to a peak of \$117.4bn in 2023/24, driven in part by the transport infrastructure investment boom forecast to ramp up over the next few years, supported by a large pipeline of major publicly funded projects in Sydney, Melbourne and Brisbane.

Our forecasts assume delays on a number of major projects. There is a risk that these delays do not eventuate, as governments may push ahead with a large volume of work despite growing input cost inflation. There is also a risk of further delays beyond what we anticipate, and also project cancellations, as the industry grapples with capacity constraints.

Total engineering construction activity continues to be heavily influenced by oil and gas construction. The sector peaked at over \$52bn in FY14, before falling back to \$4bn in 2020/21. We believe that this marks the trough in activity and forecast the next upswing to peak at \$16bn in 2023/24. It is noted, however, that Oil and Gas activity typically does not strain local supply for materials and labour as other sectors do. This is because a large proportion of Oil and Gas expenditure is dedicated to prefabricated infrastructure, much of which is imported. Oil and Gas represented 6.6% of total engineering construction expenditure in 2021/22, with its share to increase to 13.7% by 2023/24.

Figure 4.4 Engineering Construction Work Done: By Sector

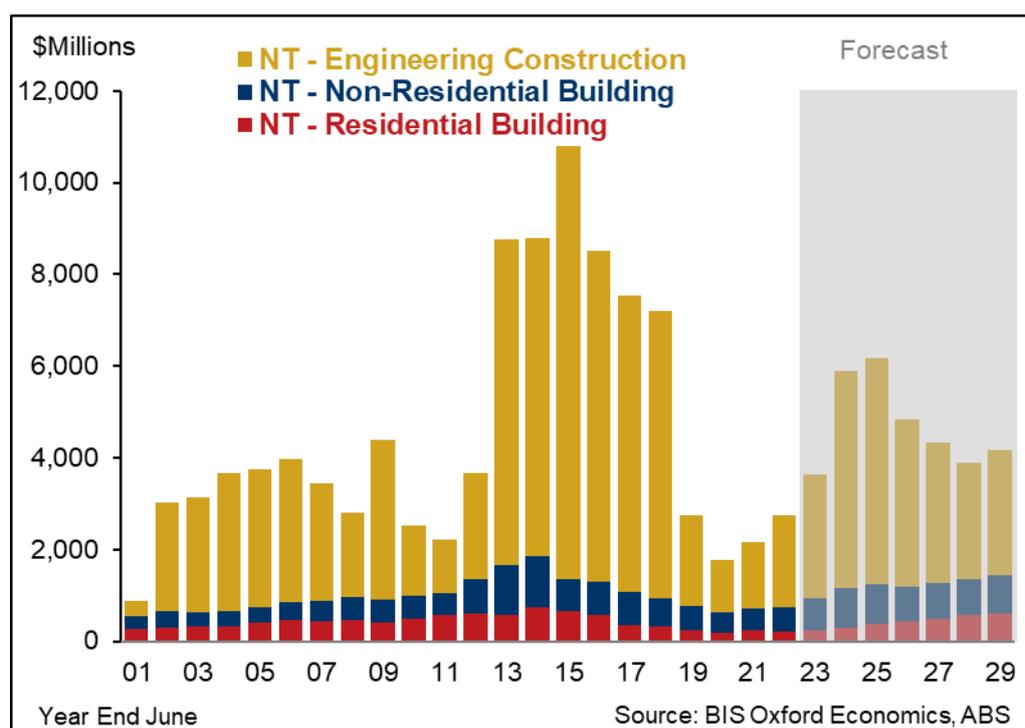


4.2 NORTHERN TERRITORY CONSTRUCTION OUTLOOK

Due to the Northern Territory’s small population, the building construction segment is miniscule relative to other Australian states. Additionally, due to the territory’s reliance on the mining sector, engineering construction activity has historically had a significant influence on trends in total construction activity. A surge in total mining and heavy industry, harbours and pipelines construction led to record levels of construction activity between 2012/13 and 2017/18. A cumulative collapse of around 75% in engineering construction activity over the two years to 2019/20 then saw total construction activity hit a 20 year low. A recovering engineering construction sector, driven by growth in roads, water and recreation as well as mining and heavy industry construction in 2021/22 drove strong growth in total construction over 2020/21-2021/22.

Looking ahead, strong growth in residential and non-residential building construction activity as well as a spike in engineering construction activity (particularly in pipelines, mining and heavy industry) are expected to drive significant growth rates in total construction activity through to a peak in 2024/25. This is likely to increase the risk of material and labour supply capacity constraints and therefore place upward pressure on material prices. Despite projections of sustained growth in residential construction over the remainder of the decade, declining engineering construction activity is expected drag on total activity until total construction activity falls to a trough in 2027/28.

Figure 4.5 NT Construction Work Done

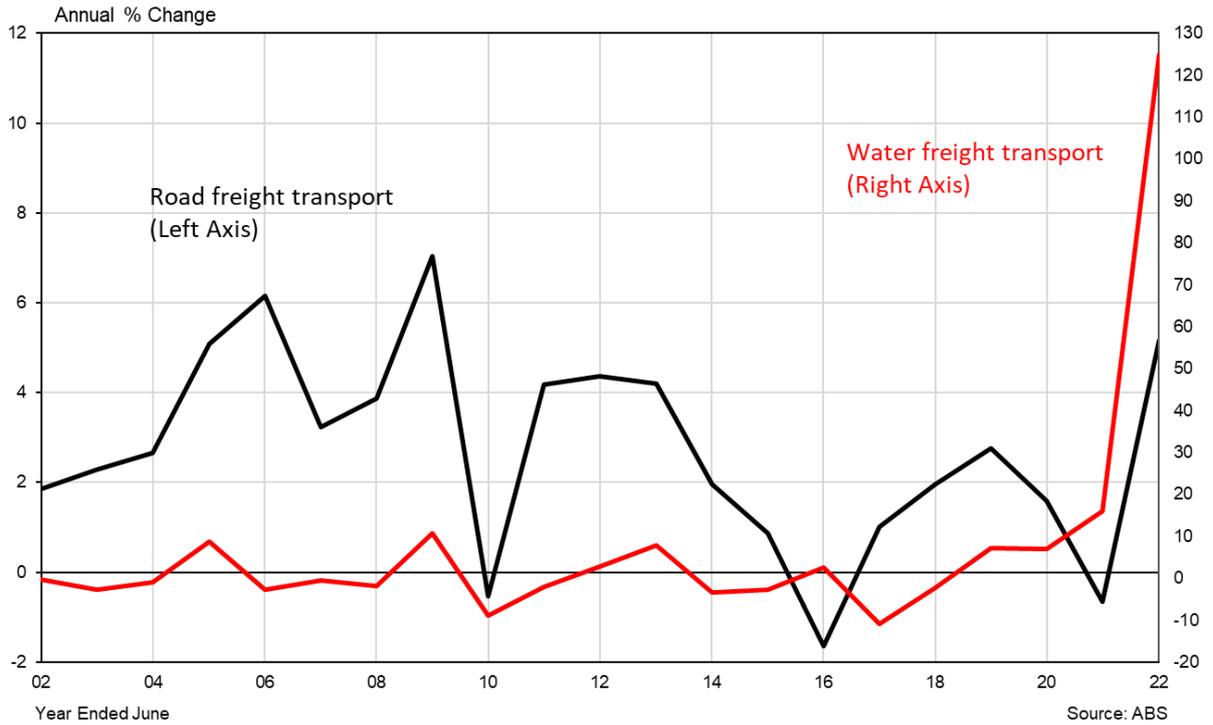


4.3 TRANSPORT COSTS AND OTHER INFLUENCES

Transport costs represent a further price driver for materials and inputs which are manufactured overseas as well as those which need to be transported considerable distances within Australia. Growth in the Water Freight Transport PPI, which includes international sea freight transport services surged in 2021/22 to almost eight times the previous record, corresponding to significant growth rates in the Baltic Dry Index. This growth reflects the Covid-19 related supply chain constraints in the shipping sector, which have contributed to increases in the prices of imports. The Road Freight

Transport PPI has meanwhile recorded its fastest growth since FY09 in 2021/22, albeit at a much more modest rate. Additionally, oil prices, a major input into the transportation sector, spiked 69.4% in 2021/22, driving a component of this growth in transport costs (see section 5.1). Construction wages are yet another driver of materials costs. Construction wages are expected to grow at above average rates in coming years as inflation growth accelerates and skilled labour shortages materialise.

Figure 4.6 Transport Cost Indices



5. COMMODITY PRICE AND MATERIAL COST ESCALATOR FORECASTS

5.1 COMMODITY PRICE FORECASTS

Commodity price forecasts are global price forecasts, sourced from the latest Consensus Economics 'Energy & Metals Consensus Forecasts' (E&MCF) publication. This publication provides commodity price forecasts measured in US\$ terms from a range of forecasters. The latest available publication is August 2022, where around 30 separate forecasters supplied price forecasts out to 2031 – the average of all the forecasters is used here. The AER has shown a preference for accepting a range of forecasts from different forecasters, and then taking an average. The Consensus Economics E&MCF provides that for a range of global energy and metals commodities. Quarterly forecasts are provided for two financial years, followed by calendar year forecasts for the next three years. Long term forecasts are provided by a five-year average.

These US\$ forecasts were converted into A\$ terms using consensus forecasts of exchange rates. Exchange rate forecasts are only available for the next two years from the Consensus Economics *Asia Pacific Consensus Forecasts* (APCF) publication. The US\$/A\$ exchange rate is then held constant at the last APCF forecast point over the longer term. Overall, the exchange rate is predicted by the large range of forecasters supplying forecasts to the Consensus Economics survey. The Australian dollar is heavily influenced by movements in Australia's basket of commodity prices and interest rate relativities between Australian and overseas interest rates (particularly US interest rates). The A\$ averaged US\$0.75 in 2020/21, having recovered from US\$0.67 in 2019/20 (see table below). The A\$ averaged US\$0.73 in 2021/22 and is forecast to fall to US\$0.70 in 2022/23. The Consensus Economics AOCF forecasts then project an appreciation in the A\$ back to US\$0.73 in 2023/24.

Overall, the three commodities presented here – aluminium, copper and oil – have all experienced significant recoveries from the Covid-induced lows of 2020 and are currently trading at near 10-year highs (see table 5.1). Although they are expected to retreat from these highs over the period to 2028/29, the average prices in the five years to 2028/29 (the upcoming revenue period) will be higher than the current revenue period (2019/20 to 2023/24), indicating higher cost pressures on operators of electricity distribution networks in the coming period.

Aluminium prices fell to an average of US\$1675/tonne in 2019/20 due to Covid-related demand concerns, but subsequently rebounded and experienced robust growth of 21% in 2020/21 to US\$2029/t (+8.8% in A\$ terms, to A\$2715/t). Aluminium production was hampered over 2021 and into 2022 by power shortages in China, with many energy-intensive smelters shutting down. With production constrained and demand recovering, stock levels on the LME fell, leading on-warrant inventories to reach 14-year lows and aluminium surpassing the US\$3,500/t mark in March 2022, the highest level since June 2008. Prices then fell sharply in the June quarter, but averaged US\$2903/t (A\$3,999/t) in 2021/22. Base metals have since hit one-year lows in July, before recovering over August. Prices of the most energy-intensive metals such as aluminium and copper will be supported by high energy costs in the near-term as the 'energy crisis' approaches this winter in the northern hemisphere.

Table 5.1 Materials and Commodity Price Forecasts

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Average (o)
	Actuals					Forecasts		Next Revenue Determination Period					
Commodity Prices (\$/tonne) (a)													
Copper (A\$/tonne)	8702	8598	8446	10664	13316	11386	11226	11449	11339	11412	11481	11481	11432
Copper (US\$/tonne)	6747	6151	5669	7969	9665	8007	8153	8391	8311	8364	8415	8415	8379
Aluminium (A\$/tonne)	2751	2683	2496	2715	3999	3717	3598	3694	3571	3552	3573	3573	3593
Aluminium (US\$/tonne)	2133	1920	1675	2029	2903	2614	2613	2708	2618	2603	2619	2619	2633
Oil (A\$/barrel)	82.2	96.1	76.9	72.5	126.3	141.8	120.1	106.3	102.0	103.3	104.3	104.3	104
Oil (US\$/barrel)	63.7	68.7	51.6	54.2	91.7	99.7	87.2	77.9	74.8	75.7	76.5	76.5	76
Exchange rate (US\$/A\$) (b)	0.78	0.72	0.67	0.75	0.73	0.70	0.73	0.73	0.73	0.73	0.73	0.73	0.73
% ch													
Copper (A\$/tonne)	21.8	-1.2	-1.8	26.3	24.9	-14.5	-1.4	2.0	-1.0	0.6	0.6	0.0	0.5
Aluminium (A\$/tonne)	17.1	-2.5	-7.0	8.8	47.3	-7.1	-3.2	2.7	-3.3	-0.5	0.6	0.0	-0.1
Oil (A\$/barrel)	23.9	16.9	-19.9	-5.8	74.2	12.3	-15.3	-11.5	-4.1	1.3	1.0	0.0	-2.7
Nominal Material Producer Price Indices (PPI)													
Steel Beams and Sections PPI (Australia) (c)	107.0	112.4	112.6	118.4	154.9	160.9	143.2	145.7	149.0	151.1	156.3	163.2	153.1
Reinforcing Steel PPI (Australia) (d)	94.4	101.5	98.6	102.7	144.6	150.9	130.7	129.2	127.6	125.4	127.5	132.0	128.3
State Steel Products (SA) (e)	108.8	111.5	110.7	113.7	137.1	144.2	133.3	136.2	139.0	140.9	145.8	151.7	142.7
Concrete, Cement & Sand PPI (SA) (f)	104.2	105.9	104.9	104.3	105.3	109.6	114.2	117.7	119.8	121.8	124.6	128.3	122.4
Poles - Concrete (Cement Products PPI) (SA) (g)	111.9	118.5	120.9	123.0	132.9	144.1	148.5	153.7	158.0	162.2	167.4	173.9	163.0
Poles - Wood (h)	103.3	110.8	115.7	110.9	119.4	126.0	133.1	139.3	143.6	144.1	147.2	154.6	145.8
Cable (Electrical Cable Manufacturing PPI) (i)	101.3	101.5	99.2	103.7	127.2	130.3	127.7	132.3	135.3	137.1	142.6	150.6	139.6
Communications Equipment Manufacturing PPI (j)	123.9	120.7	123.7	126.4	136.8	142.1	144.8	147.9	150.7	153.6	156.9	161.0	154.0
Switchgear (Other Electrical Equipment Manufacturing PPI) (k)	103.2	107.2	105.7	109.0	114.9	122.3	124.4	128.0	131.1	133.4	137.1	141.2	134.2
Non-hydro Electricity Engineering Construction IPD (l)	110.8	115.2	118.2	120.5	127.7	132.6	134.4	139.1	143.1	146.5	151.4	158.0	147.6
% ch													
Steel Beams and Sections PPI (Australia) (c)	2.2	5.0	0.2	5.1	30.8	3.9	-11.0	1.8	2.3	1.4	3.4	4.4	2.7
Reinforcing Steel PPI (Australia) (d)	8.6	7.4	-2.8	4.1	40.7	4.4	-13.4	-1.2	-1.2	-1.7	1.7	3.5	0.2
State Steel Products (SA) (e)	3.7	2.4	-0.7	2.7	20.6	5.2	-7.6	2.2	2.1	1.4	3.4	4.1	2.6
Concrete, Cement & Sand PPI (SA) (f)	2.4	1.7	-1.0	-0.5	1.0	4.1	4.2	3.1	1.8	1.6	2.3	3.0	2.4
Poles - Concrete (Cement Products PPI) (SA) (g)	-1.5	5.9	2.0	1.7	8.1	8.4	3.1	3.5	2.8	2.7	3.2	3.9	3.2
Poles - Wood (h)	3.4	7.2	4.4	-4.1	7.7	5.5	5.7	4.6	3.1	0.3	2.2	5.0	3.1
Cable (Electrical Cable Manufacturing PPI) (i)	11.0	0.1	-2.2	4.5	22.6	2.5	-2.0	3.6	2.3	1.4	4.0	5.6	3.4
Communications Equipment Manufacturing PPI (j)	-3.5	-2.5	2.5	2.2	8.2	3.9	1.9	2.2	1.9	1.9	2.2	2.6	2.1
Switchgear (Other Electrical Equipment Manufacturing PPI) (k)	4.0	3.9	-1.4	3.1	5.5	6.5	1.7	2.9	2.4	1.8	2.8	3.0	2.6
Non-hydro Electricity Engineering Construction IPD (l)	2.0	4.0	2.6	1.9	6.0	3.8	1.4	3.5	2.9	2.4	3.4	4.3	3.3
Consumer Price Index - headline (m)	1.9	1.6	1.3	1.6	4.4	7.0	4.2	2.6	2.6	2.6	2.6	2.6	2.6
Real Commodity Price Changes (n)													
Copper (A\$/tonne)	19.9	-2.8	-3.1	24.6	20.4	-21.5	-5.6	-0.6	-3.5	-1.9	-2.0	-2.6	-2.1
Aluminium (A\$/tonne)	15.2	-4.1	-8.3	7.2	42.9	-14.1	-7.4	0.1	-5.9	-3.1	-2.0	-2.6	-2.7
Oil (A\$/barrel)	22.0	15.3	-21.3	-7.4	69.8	5.2	-19.5	-14.0	-6.6	-1.3	-1.6	-2.6	-5.2
Real Material Producer Price Indices (PPI) (n)													
Steel Beams and Sections PPI (Australia) (c)	0.2	3.4	-1.2	3.5	26.4	-3.1	-15.2	-0.8	-0.3	-1.1	0.8	1.8	0.1
Reinforcing Steel PPI (Australia) (d)	6.7	5.8	-4.1	2.5	36.3	-2.7	-17.6	-3.7	-3.8	-4.3	-0.9	1.0	-2.3
State Steel Products (SA) (e)	1.8	0.8	-2.0	1.0	16.1	-1.8	-11.8	-0.4	-0.5	-1.2	0.9	1.5	0.1
Concrete, Cement & Sand PPI (SA) (f)	0.5	0.0	-2.3	-2.1	-3.5	-3.0	0.0	0.5	-0.8	-0.9	-0.2	0.4	-0.2
Poles - Concrete (Cement Products PPI) (SA) (g)	-3.4	4.3	0.7	0.1	3.6	1.4	-1.1	0.9	0.2	0.1	0.6	1.3	0.6
Poles - Wood (h)	1.5	5.6	3.1	-5.8	3.2	-1.5	1.5	2.0	0.5	-2.2	-0.4	2.5	0.5
Cable (Electrical Cable Manufacturing PPI) (i)	9.1	-1.5	-3.6	2.9	18.2	-4.5	-6.2	1.0	-0.3	-1.2	1.4	3.0	0.8
Communications Equipment Manufacturing PPI (j)	-5.5	-4.2	1.1	0.6	3.7	-3.1	-2.3	-0.4	-0.7	-0.7	-0.4	0.0	-0.4
Switchgear (Other Electrical Equipment Manufacturing PPI) (k)	2.1	2.3	-2.7	1.4	1.0	-0.6	-2.5	0.3	-0.1	-0.8	0.2	0.5	0.0
Non-hydro Electricity Engineering Construction IPD (l)	0.0	2.3	1.3	0.3	1.6	-3.2	-2.8	0.9	0.3	-0.2	0.8	1.8	0.7

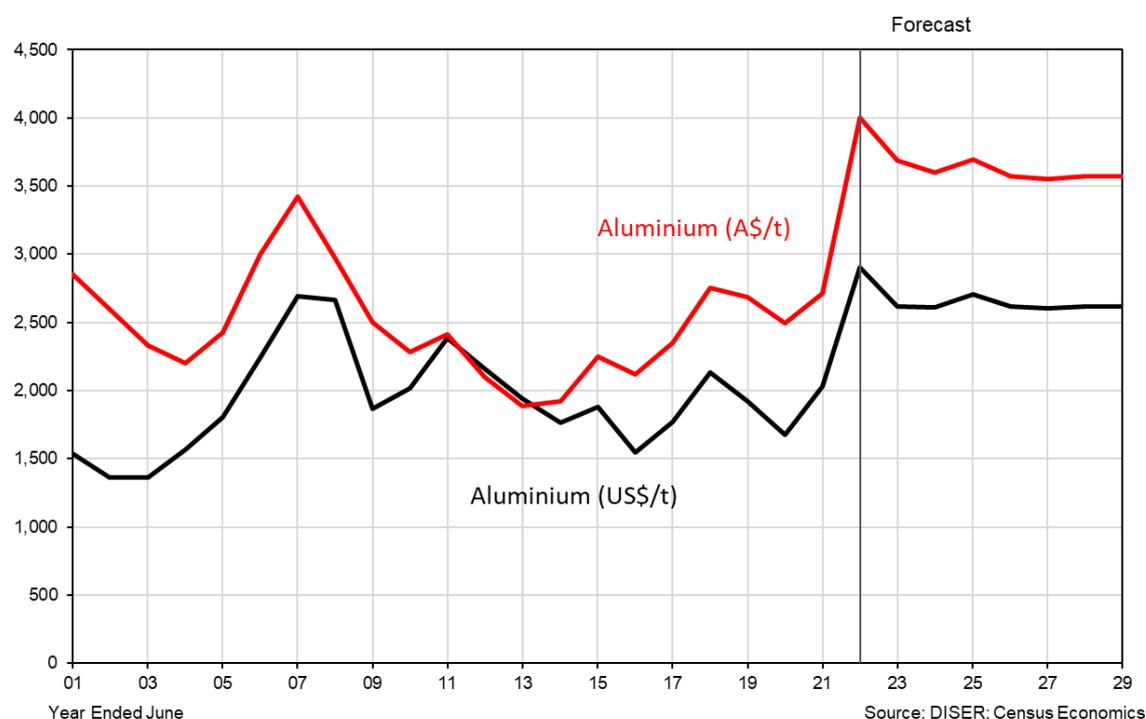
Source: ABS, BIS Oxford Economics, Consensus Economics

- (a) Forecasts from June quarter 2022 to FY29 come from June 2022 Consensus Economics publication, "Energy & Metals Consensus Forecasts".
- (b) Forecasts from June 2022 to FY29 come from June 2022 Consensus Economics publication, "Asia Pacific Consensus Forecasts".
- (c) Historical figures come from Table 18 of ABS release 6427.
- (d) Historical figures come from Table 18 of ABS release 6427.
- (e) South Australian historical figures and forecasts are used as a proxy for the Northern Territory. Historical figures come from Table 18 of ABS release 6427.
- (f) South Australian historical figures and forecasts are used as a proxy for the Northern Territory. Historical figures come from Table 18 of ABS release 6427.
- (g) South Australian historical figures and forecasts are used as a proxy for the Northern Territory. The Cement Products PPI is the proxy for Concrete Poles. Historical figures come from Table 18 of ABS release 6427.
- (h) Historical figures come from Australian Bureau of Agriculture Resources Economics and Sciences. The index of Plantation and Native Hardwood prices are used.
- (i) The Electrical Cable Manufacturing PPI is the proxy for cables. Historical figures come from Table 12 of ABS release 6427.
- (j) Historical figures come from Table 18 of ABS release 6427.
- (k) The Other Electrical Equipment Manufacturing PPI is the proxy for Switchgears. Historical figures come from Table 12 of ABS release 6427.
- (l) Historical figures come from the ABS Engineering Construction Service series, provided as an unpublished 'Special Run series'.
- (m) Inflation forecasts are RBA forecasts to June 2024 from latest 'Statement of Monetary Policy'. Beyond that, inflation forecasts are based on a glide-path to the mid-point of RBA inflation target (2.5%) by year 5. The overall forecasts are then calculated as a geometric mean of the 'official' RBA inflation forecasts over the next 5 years or to the end of the regulatory period, with years 3,4 and 5 CPI equal to the calculated 5-year geometric mean. This methodology is the position adopted by the Australian Energy Regulator.
- (n) Real price changes are calculated by deducting the inflation rate from nominal price changes.
- (o) Average for the next revenue determination period i.e. from 2024/25 to 2028/29 inclusive.

We note that aluminium forecasts from September quarter 2022 to 2028/29 come from the August 2022 Consensus Economics publication, "Energy & Metals Consensus Forecasts". A total of 26 participants were included in the August survey data. Although risks of further increases in energy prices persist, aluminium prices are expected to fall 10% to just over US\$2,600/t in 2022/23, before stabilising in 2023/24. A 3.6% rebound is forecast for 2024/25, after which prices are expected to fall back to around US\$2,600/t over the two years to 2026/27. As base metal demand is heavily tied to global economic growth, any cyclical downturn will drag commodity prices alongside it. Therefore, we expect prices to rise gradually over the long term. A key factor pushing up prices over the long term will be higher electricity prices, a significant input into aluminium (and often alumina) production.

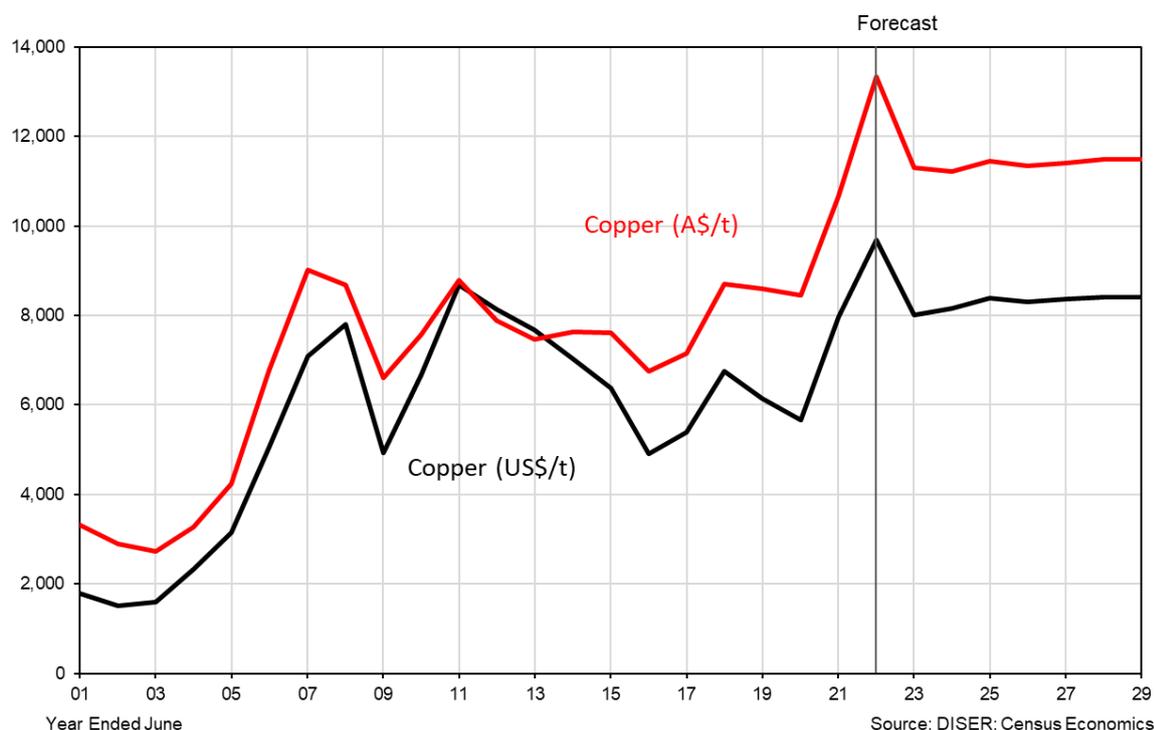
Overall, Aluminium prices are expected to average US\$2,633/t over the five years from 2024/25 to 2028/29 (the next revenue determination period) – 11.3% higher than the previous five-year average of US\$2,367/t in 2024/25-28/29 compared to 2019/20-23/24 (the current revenue determination period); although this will be somewhat mitigated by a slightly higher Australian dollar – to average 2.5% higher than the 2019/20-23/24 period.

Figure 5.1 Aluminium Price Forecast to 2028/29



Copper is an industrial metal and its usage is seen as a barometer of global industrial activity and economic growth. Copper prices fell -7.8% in 2019/20 to an annual average below US\$5,700/t. Subsequently, acute production problems due to covid disruptions and the recovery in demand saw prices surge 40.6% in 2020/21 to an annual average of just under US\$8,000/t. While the Big 4 copper producers (BHP Billiton, Codelco, Freeport McMoran and Glencore) aimed to increase copper production over 2021, reduced investment activity throughout the pandemic has thinned the pipeline of project development. Over 2021/22, signs of increased supply began to appear, despite continued production issues in Chile (due to strikes and water shortages). However, prices increased 21.3% in 2021/22, averaging US\$9665/t (a 25% increase in A\$ terms to A\$13,386/t).

Figure 5.2 Copper Price Forecast to 2028/29



While copper demand will get a boost from greater use in electric vehicles and green electricity production, these sectors are currently too small to offset the strong mine supply growth currently in the pipeline. There is also likely to be some substitution away from copper towards aluminium in end-use markets such as wire and cable and air-conditioning. Copper is particularly sensitive to global economic activity, and prices have consequently fallen by more than 20% m/m, to an 18-month low on 8 July.

We note that copper forecasts from September quarter 2022 to 2028/29 come from the August 2022 Consensus Economics publication, "Energy & Metals Consensus Forecasts". A total of 29 participants were included in the August survey data. The amount of survey participants providing forecasts gradually declines to 10 for the long term 2027-2031 forecasts. Prices are expected to fall -17.2% in 2022/23 to around US\$8,000, given the deterioration in market sentiment amidst recession fears and a darkening demand outlook. Copper prices are then expected to register a modest growth over the two years to 2024/25 (average annual growth of 2.4%). After a slight drop in 2025/26, minimal growth rates are projected over the remainder of the forecast horizon, with prices surpassing US\$8,400 in 2027/28.

Overall, Copper prices are expected to average US\$8,379/t over 2024/25-28/29 (the next revenue determination period), which will be 6.2% higher than the previous five-year average of US\$7893/t in 2019/20-23/24.

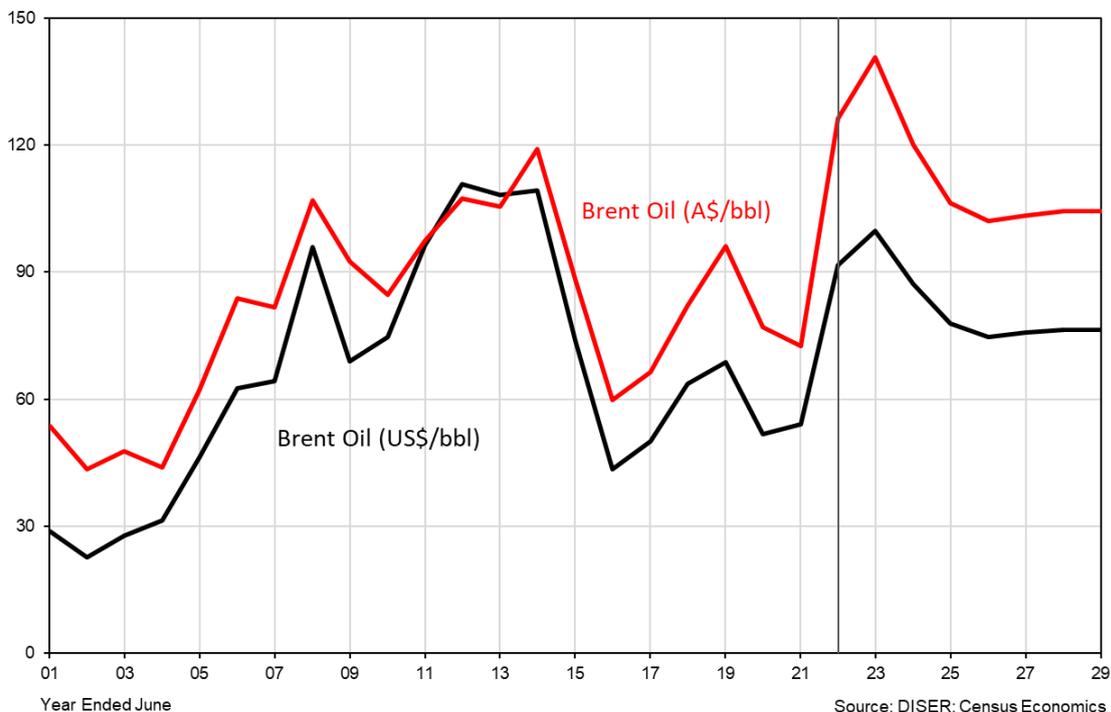
Oil markets were decimated in the first four months of 2020, with opposing demand and supply shocks sending prices into a freefall. **Brent Oil** spot prices were around US\$20pb in April 2020 (an almost 60% drop for the year to April 2020) reflecting a massive industry glut, with producers struggling to find buyers for their crude oil. On average Brent Oil prices fell 24.9% from 2018/19 to 2019/20 (annual average of US\$51.6pb in 2019/20). On the demand side, the activity restrictions in place due to the COVID-19 outbreak has led to a dramatic reduction in oil usage, with sharp drops in all transport fuels and falls in petrochemicals used in the automotive industry.

The lifting of COVID-19 lockdowns corresponded to a sharp rebound in oil demand, but with production remaining low throughout 2020/21, upward pressure was placed on prices, leading to a 4.9% increase in 2020/21. Brent oil prices continued to grow for the remainder of 2021 with the upswing in the global economy and improving transport and travel boosting demand, while supply disruptions continued to persist amid tight control by the OPEC+ group.

Prices spiked upon Russia’s invasion of Ukraine in February 2022 as supply side risks emerged. As oil prices began to subside, a partial EU ban on Russian oil placed further upward pressure on prices. By mid-2022, OPEC had largely ignored the disruption to Russian supply, with OPEC+ sticking to its production schedule of an increase of 432,000 barrels per day. But data from April suggest OPEC+ is still falling well short of that target, even leaving out Russian production. Production in the US, in contrast, is responding to higher prices, albeit more slowly than in previous price upturns. Nonetheless we are beginning to see the impact of higher prices weighing on consumption in advanced economies.

Brent Oil prices averaged US\$91.7pb over 2021/22 (a 69.2% year on year increase). Brent Oil forecasts from the September quarter 2022 to 2028/29 come from August 2022 Consensus Economics publication, "Energy & Metals Consensus Forecasts". A total of 29 participants were included in the August survey data. The amount of survey participants providing forecasts gradually declines to 11 for the long-term 2027-2031 forecasts. Prices are projected to grow a further 8.8% to US\$99.7pb in 2022/23, before returning to market fundamentals with an average annual decline of - 9.1% between 2023/24 and 2025/26, reaching a trough of US\$74.8pb. Subsequent years are forecast to see modest growth rates of 1.3% in 2026/27 and 1% in 2027/28. Brent Oil prices are expected to average US\$76.3pb over 2024/25-28/29 (the next revenue determination period), which will be 0.8% lower than the previous five-year average of US\$76.9pb over 2019/20-23/24.

Figure 5.3 Oil Price Forecast to 2028/29

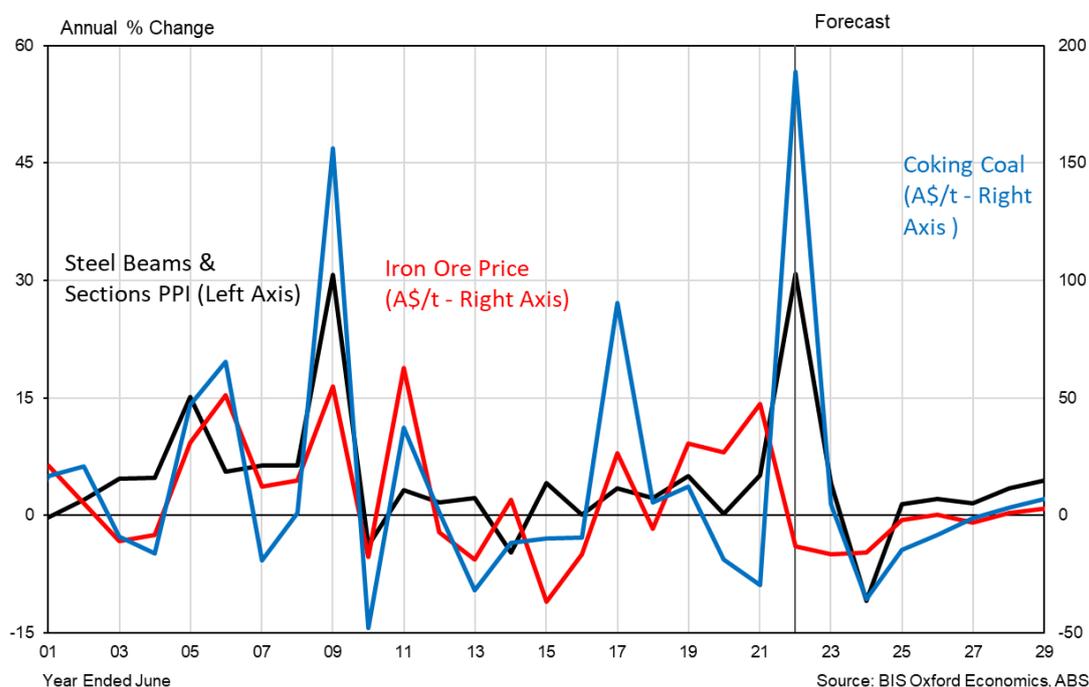


5.2 STEEL BEAMS AND SECTIONS PRICES - AUSTRALIA

The Steel Beams & Sections PPI is heavily driven by the price of the primary inputs – i.e. the price for iron ore and coking coal. This was particularly apparent in FY09, where the leap in coking coal prices was followed by significant growth in both structural steel producer price indices. Further, we find a relationship between steel and the total level of construction activity (albeit more muted relative to primary material prices) which reflects the price squeeze on construction inputs at the peak of each cycle.

The **Steel Beam & Sections PPI** grew 5.1% in 2020/21. Supply chain constraints and recovering demand saw coking coal prices soar in 2021/22, with a further boost from supply concerns due to the Russian-Ukraine conflict, which had seen thermal coal prices more than double. Thermal coal prices can influence coking coal prices, particularly in the lower priced semi-soft and PCI (pulverised coal injection) segments. Russia also supplies some coking coal to the international market (mostly Europe). In addition, the construction boom added to local steel price pressures, leading to a spike of 30.8% in the Steel Beam & Sections PPI in 2021/22 (the highest on record). Further growth in coking coal prices and elevated levels of construction activity are projected to see the Steel Beam & Sections PPI rise a modest 3.9% in 2022/23. A dip of -11% is forecast in 2023/24 on the back of easing iron ore and coking coal prices. A relatively restrained outlook for iron ore and coking coal prices over the longer term should constrain any large upwards movements in the price index. In total, average growth over the next revenue determination period (from 2024/25 to 2028/29) sits at 2.7% per annum. This is lower than the previous five-year period over 2019/20-23/24 of 5.8% growth per annum, due to the major spike seen in 2021/22. In real terms, growth is expected to be a 0.1% on average over 2024/25 to 2028/29 (see table 5.1).

Figure 5.4 Steel Beams & Sections PPI – Drivers



5.3 REINFORCING STEEL PRICES - AUSTRALIA

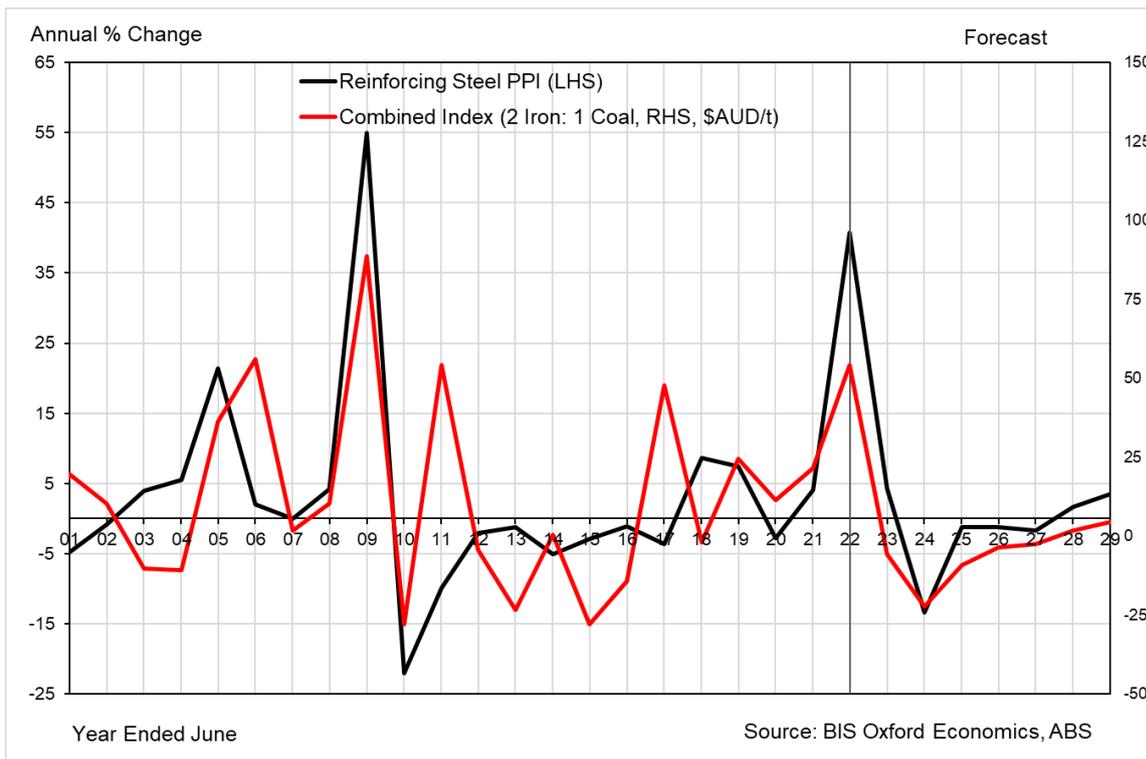
This producer price index tracks the price change in reinforcing steel, mainly used as rebar (reinforcing bar) to support load-bearing concrete products. However, local Australian construction

activity – particularly the more concrete-intensive sectors of buildings and roads & bridges – can also have an influence on prices. Note that there is usually much more volatility in the price of reinforcing steel than steel beams and sections. The price of steel and related products has consistently had a tight relationship with the primary input prices – i.e., the prices for iron ore and metallurgical coking coal. This was particularly apparent in FY09 and currently, where the leap in both coking coal and iron ore prices shifted up manufacturing costs and led to significant growth in the PPI.

2019/20 saw a -2.8% decline in the index, with a majority of the losses coming through before the outbreak. The Reinforcing Steel PPI increased 4.1% in 2020/21, due mainly to higher iron ore prices. Prices then lifted 40.7% in 2021/22 as coking coal prices almost tripled, iron prices remained high and local steel demand increased as construction increased, while Chinese steel production and exports were impacted by their zero tolerance Covid policy.

As with steel beams and sections, mentioned above, the easing in prices lagging the declines in input prices, but reinforcing steel price growth is forecast to hold up due to strong local demand from the construction sector, with growth of 4.4% in 2022/23. Beyond 2022/23, reinforced steel prices will see prices fall by -13.4% in 2023/24 due to the fall in input prices, although strong local construction demand will mute the price declines relative to input price falls. Thereafter, prices will remain flat, averaging 0.2% p.a. over 2024/25 to 2028/29.

Figure 5.5 Reinforcing Steel Price Drivers



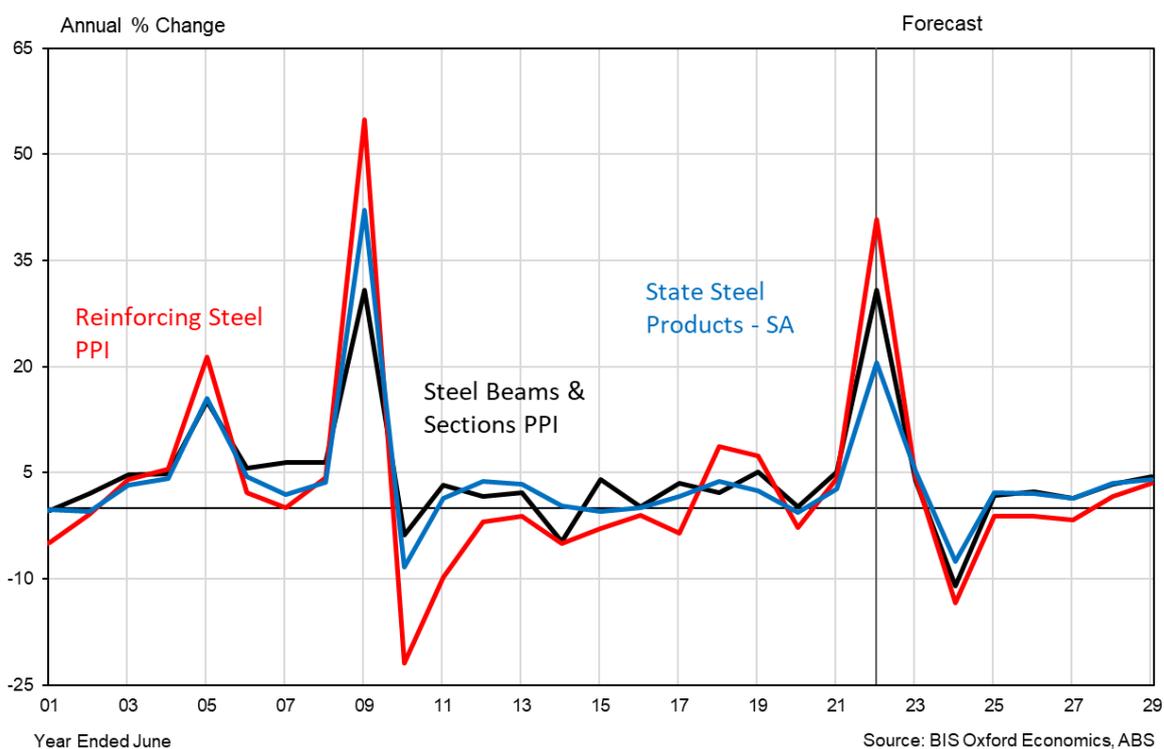
5.4 STATE STEEL PRODUCTS – SOUTH AUSTRALIA

The Adelaide Steel Products PPI (used as a proxy for SA State Steel Products prices, which has been adopted as the most suitable indicator for NT State Steel Products prices) makes up part of the ABS's Input to the House Construction Industry index. This index measures the price change for selected inputs used in the construction of detached houses. This PPI is composed of both structural steel and milled steel products (sheeting, rods, pipe and tubing and t-sections), and follows a similar trend to the previously outlined construction industry materials Steel Beams and Sections and Reinforcing Steel.

The price of Adelaide steel products has a tight relationship with primary input prices (iron ore and coking coal), and the supply/demand dynamics that influence structural steel products. As such, we employ a weighted average of Steel Beams and Sections and Reinforcing Steel to derive the price movements for state steel products.

A combination of local and international price pressures saw the Adelaide Steel Products PPI spike 20.6% in 2021/22 (the highest since 2009). State steel products are expected to record a further growth of 5.2% in 2022/23 before a 7.6% market correction in 2023/24. In total, average growth over the next revenue determination period (from 2024/25 to 2028/29) sits at 2.6% per annum. This is lower than the previous five-year period over 2019/20-23/24 of 4% growth per annum, due to the strong growth seen in 2021/22. In real terms, the Sydney Steel Products PPI is expected to grow at 0.1% on average over 2024/25 to 2028/29 (see table 5.1).

Figure 5.6 Steel Beams & Sections PPI – Drivers



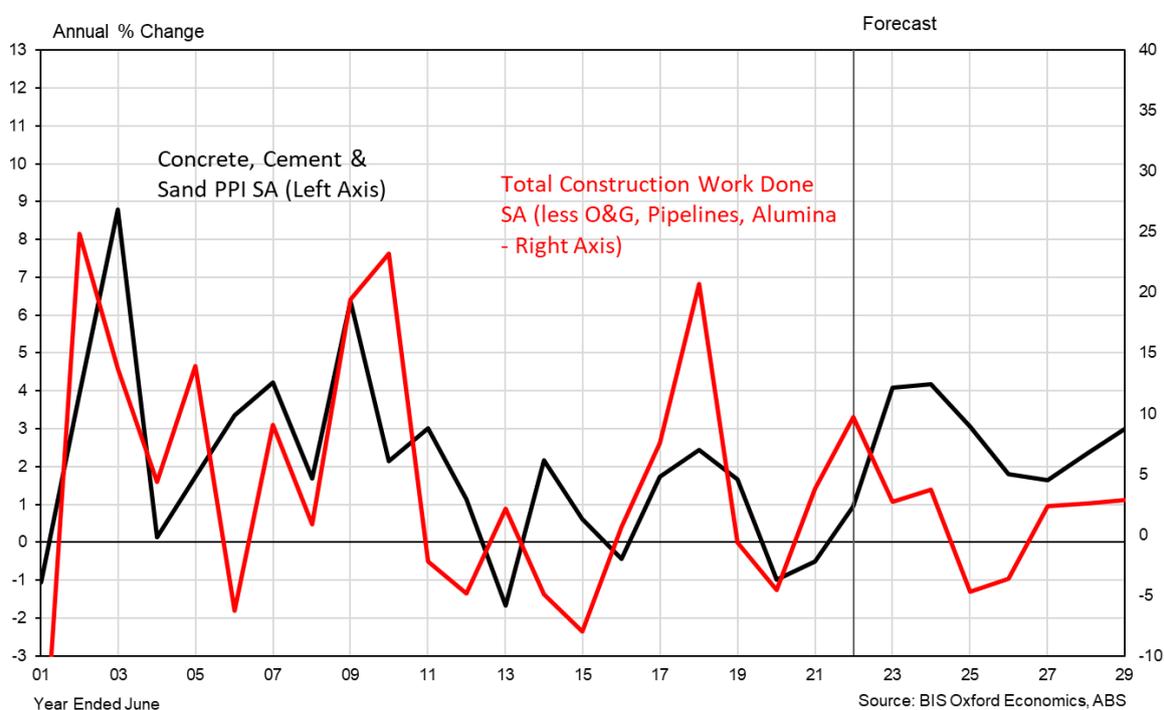
5.5 CONCRETE, CEMENT & SAND PRICES – SOUTH AUSTRALIA

Research performed by BIS Oxford Economics has found that the Concrete, Cement & Sand PPI is heavily driven by the level of construction activity in the economy – and for this index we employ statistical techniques that take account of residential, non-residential and engineering construction

activity in South Australia (with the subtraction of aluminium, pipeline and oil & gas-related work done, which have much less concrete per \$m than other engineering construction categories) to predict future price levels.

The **Adelaide Concrete, Cement and Sand PPI** (used as a proxy for SA state prices, which in turn is used as a proxy for NT state prices) declined -0.5% in 2020/21, before growing 1% in 2021/22. Above average growth rates are then expected over 2022/23 and 2023/24 on the back of moderate growth in building construction and high inflation, as total construction activity reaches its peak in 2023/24. Declining total construction activity (less oil & gas, pipelines and alumina engineering construction) over the subsequent two years is expected to ease upward cost pressures on Concrete, Cement and Sand prices. Overall, an average annual increase of 2.4% is forecast for the next revenue determination period (between 2024/25 and 2028/29), with a real decline expected to average -0.2% p.a. (see table 5.1).

Figure 5.7 Concrete, Cement & Sand PPI – Drivers



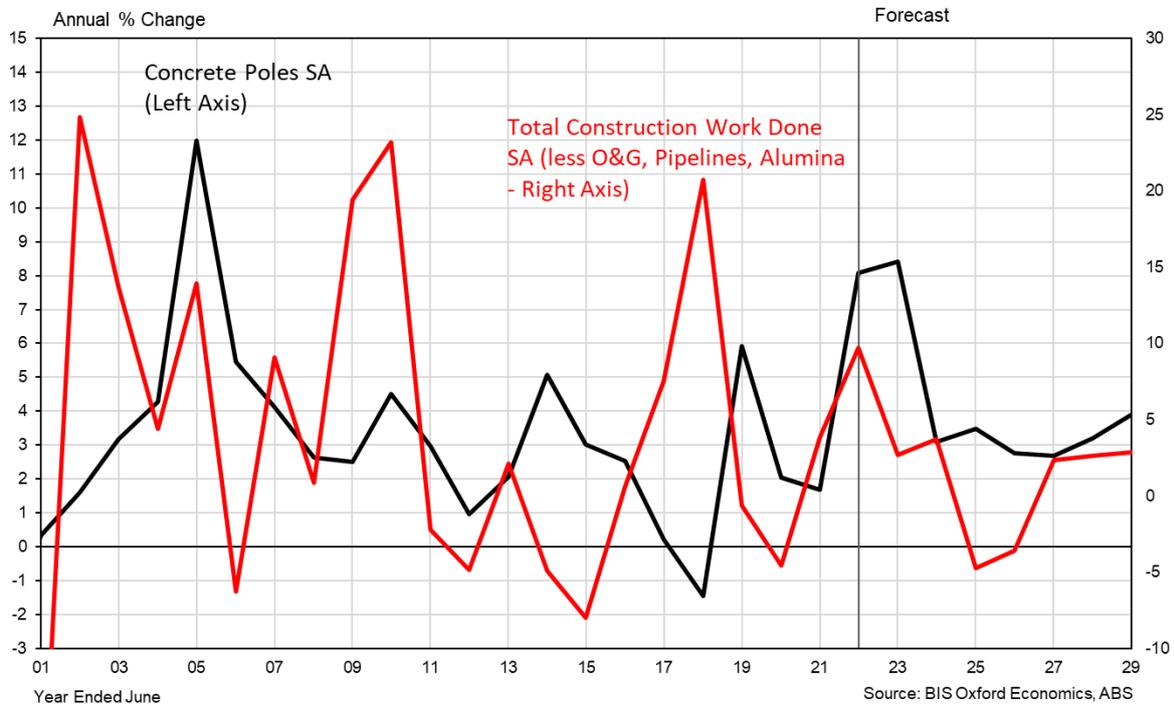
5.6 CONCRETE POLES – SOUTH AUSTRALIA

As no direct price series for concrete poles is available, the ABS’s ‘Cement Products PPI (Adelaide)’ has been selected as a suitable proxy for SA prices (used as a proxy for NT Cement Products prices). This is a capital city-based measure of the price change in manufactured cement products as inputs to the house construction industry. Movements in the Cement products PPI (Adelaide), similar to the Concrete, Cement & Sand PPI are largely driven by levels of construction activity in the economy.

Concrete Pole prices grew 8.1% in 2021/22 (the fastest rate since 2004/05). Growth is then expected to accelerate to 8.4% in 2022/23 on the back of sustained moderate growth rates in building construction activity. Above average growth is expected to continue into 2023/24 as total construction work done in peaks in SA. Overall, an average annual increase of 3.2% is forecast for the next

revenue determination period (between 2024/25 and 2028/29), with the real increase expected to average 0.6% p.a. (see table 5.1).

Figure 5.8 Concrete Poles – Drivers

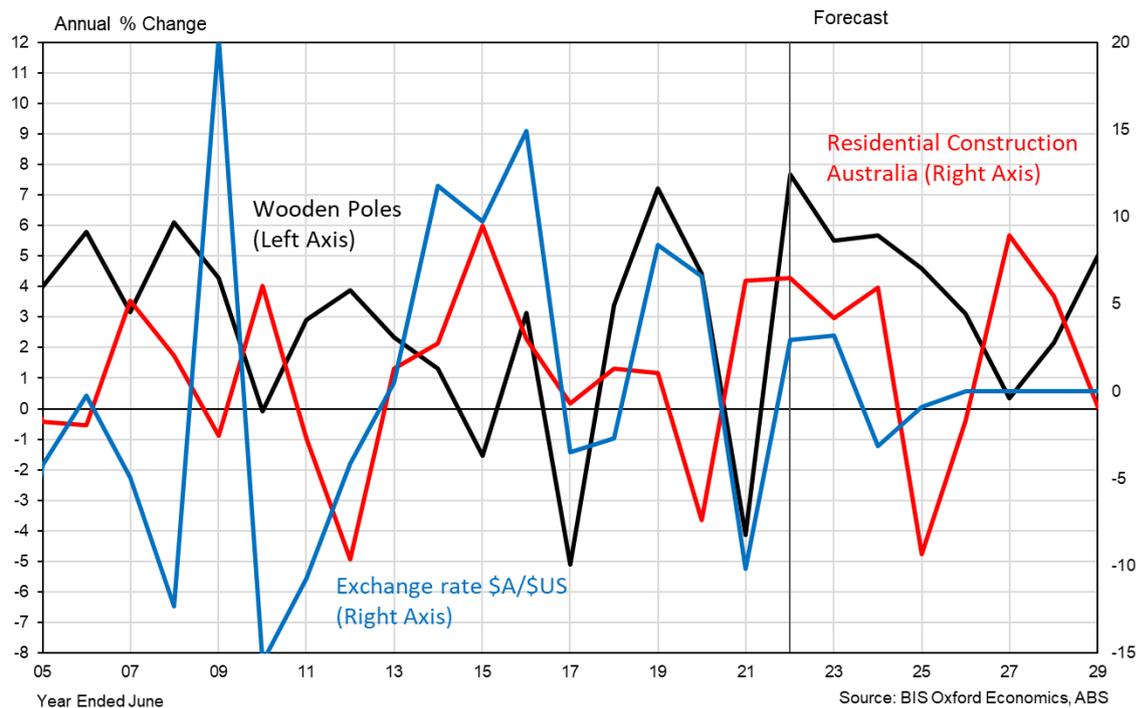


5.7 WOODEN POLES – AUSTRALIA

The price index of ‘Plantation and Native Hardwood’, sourced from the Australian Bureau of Agricultural and Resources Economics and Sciences (ABARES) is used as the proxy for **Wooden Poles**. To forecast wooden poles prices, we modelled prices on residential house construction, GDP per capita and the exchange rate, with adjustments for supply problems due to the 2019/20 fires and the current global supply shortages (also due to strong global demand).

We estimate there has been a significant increase in prices in 2021/22 resulting from local supply shortages. Above-average price increases are projected to persist over 2022/23 and 2023/24, driven by heightened levels of residential construction activity, before moderating over the five years to 2028/29 as housing construction eases back and supply problems are gradually addressed. Overall, an average annual increase of 3.1% is forecast for the next revenue determination period (between 2024/25 and 2028/29), with the real increase expected to average 0.5% p.a. (see table 5.1).

Figure 5.9 Wooden Poles – Drivers



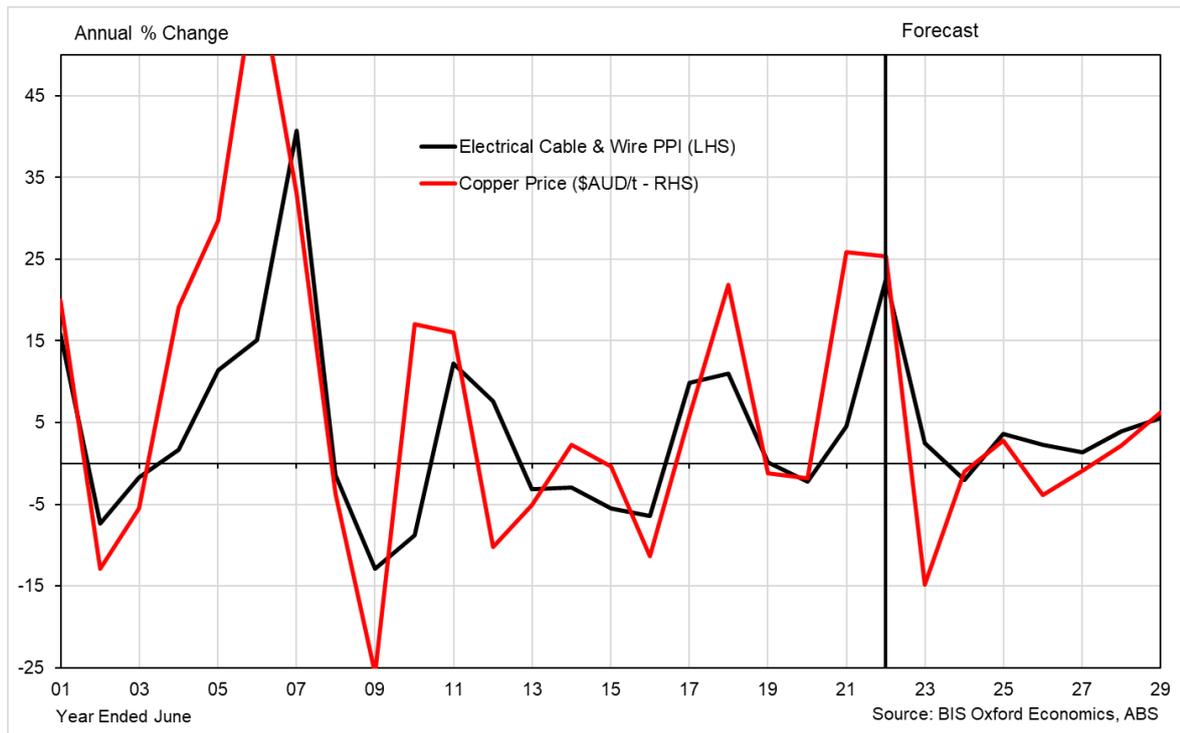
5.8 ELECTRICAL CABLE MANUFACTURING PPI – AUSTRALIA

The installation of electrical cable is ubiquitous across the construction industry, and we employ the ABS producer price index, **‘Electric Cable and Wire Manufacturing’** to measure price changes over time. This index tracks the changing price of optical fibre, telecommunications cable, fuse wire and other conductive cable & wire as an output of this sub-sector of the manufacturing industry.

There is a clear and direct link between the index and the price of copper, as it is a key input into the manufacturing process of electric cable and wire, along with wages and energy. The index exhibited solid growth over the three years to FY19, in line with the sharp rise in copper prices in FY17 and FY18, although the price increases eased in FY19 due to the falling copper price. With the onset of covid, and copper supply disruptions taking hold in Latin America, copper prices soared upwards in 2020/21. Subsequently, with around a 12-month lag, copper prices fed through into manufacturing margins, and the Electric Cable and Wire Manufacturing PPI shot up accordingly, growing 22.6% in 2021/22.

Coming in into 2022/23, and through to 2028/29, copper prices are forecast to somewhat stabilise, but at a higher average level than before the pandemic, as global supply adjusts, but demand holds strong with the anticipated electrification of vehicles and continuing transition to renewable energy generation. Subsequently, the Electric Cable and Wire Manufacturing PPI will see only a minor correction in 2023/24, with a 2% decline, with modest yearly average growth thereafter of 3.4%, from 2024/25-28/29.

Figure 5.10 Electrical Cable & Wire Price Drivers

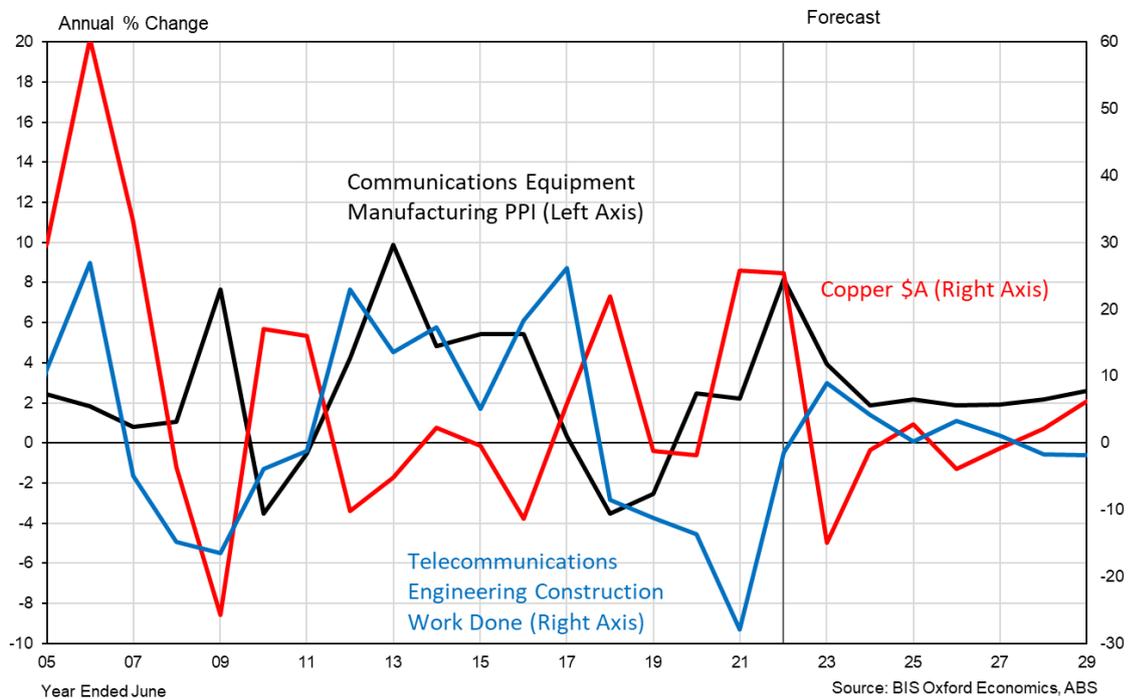


5.9 COMMUNICATIONS EQUIPMENT MANUFACTURING PPI – AUSTRALIA

The **Communications Equipment Manufacturing PPI** is an index which measures price changes in the manufacturing of electronic and studio broadcasting equipment, data transmission equipment, telecommunication data equipment, receiver and transceiver equipment. To forecast the Communications Equipment Manufacturing PPI, we modelled the index on CPI, copper prices, engineering construction work done in the telecommunications sector as well as exchange rates, with adjustments for construction of the NBN and the Covid-19 related semiconductor shortage.

The Communications Equipment Manufacturing PPI saw strong growth in 2021/22 off the back of record high copper prices and semi-conductor shortages. Despite the expected correction in copper prices in 2022/23, surging telecommunications engineering construction work done is predicted to drive a moderate level of growth. Subsequent years are expected to see lower growth rates as copper prices stabilise relative to prior years and semiconductor supply shortages ease. Overall, an average annual increase of 2.1% is forecast for the next revenue determination period (between 2024/25 and 2028/29).

Figure 5.11 Communications Equipment Manufacturing Drivers

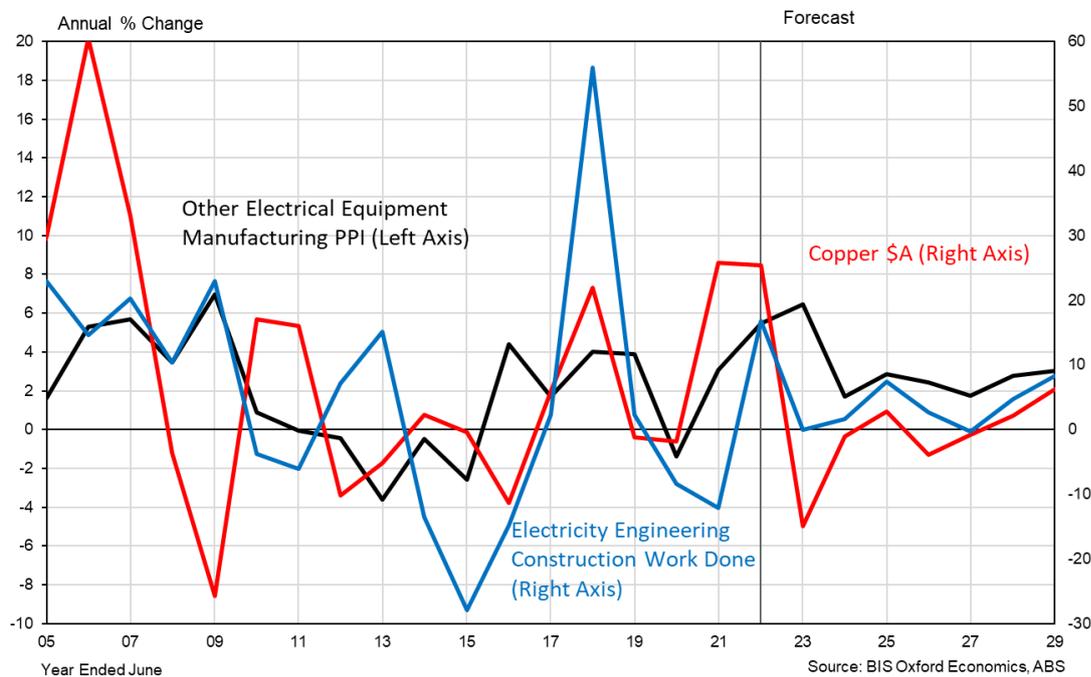


5.10 SWITCHGEARS – AUSTRALIA

The ‘Other Electrical Equipment Manufacturing PPI’ has been selected as the most suitable proxy for **Switchgear** prices in Australia. The Other Electrical Equipment Manufacturing PPI tracks the price of manufacturing electrical equipment other than lighting equipment, and includes switchgear, transformers, electric motors, electricity transmission and distribution equipment, power generating equipment, etc. Like Electrical Cable and Communications Equipment, copper is a key input into Other Electrical Equipment and therefore influences movements in the index over time.

2021/22 saw switchgear prices grow at their fastest rate since 2009 on the back of two years of significant growth in copper prices as well as a spike in electricity engineering construction work done. Wage growth, elevated levels of electricity engineering construction work done and the lagged impact of copper prices are then expected to accelerate growth marginally over 2022/23 before growth rates ease with a correction in copper prices. As copper prices remain elevated and electricity engineering construction work done continues growing towards the forecast horizon, switchgear prices are projected to grow modestly in the second half of the decade. Overall, an average annual increase of 2.6% is forecast for the next revenue determination period (between 2024/25 and 2028/29).

Figure 5.12 Switchgear Drivers

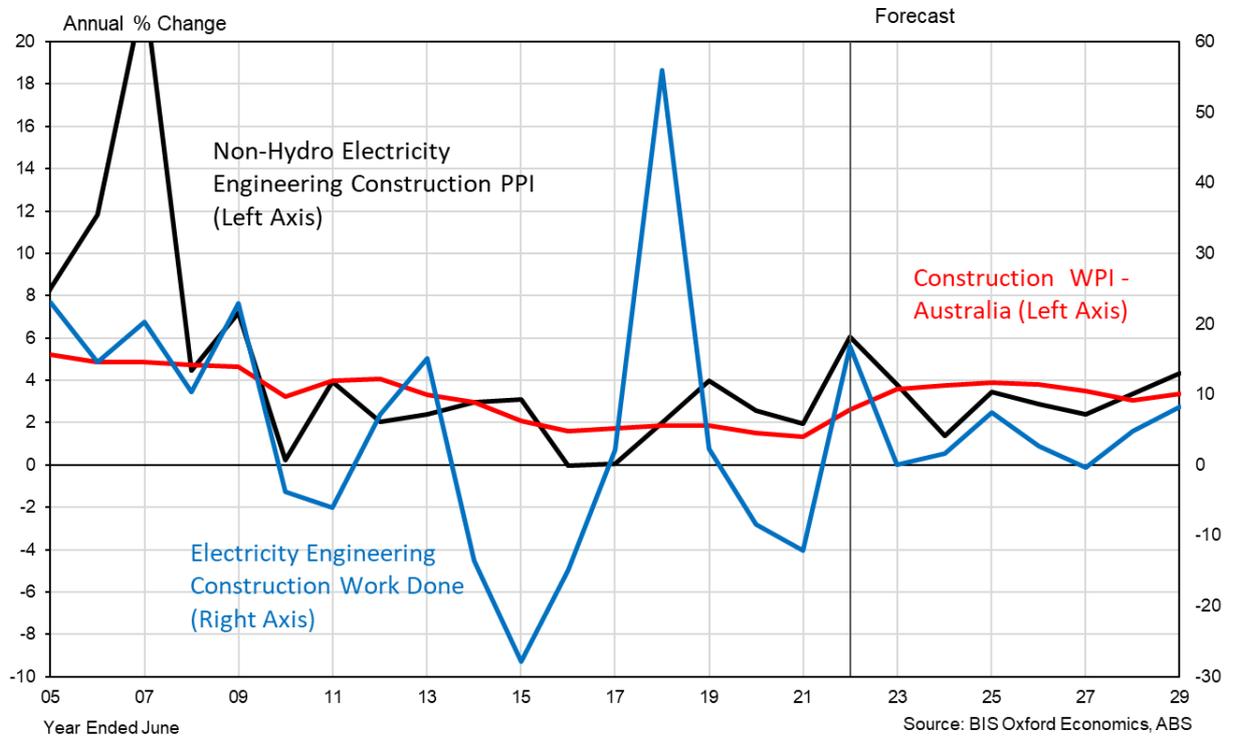


5.11 NON-HYDRO ELECTRICAL ENGINEERING CONSTRUCTION IPD – AUSTRALIA

Most aggregated cost indices are implicit price deflators (IPDs) — that is they have been calculated implicitly by dividing current price estimates of activity by a constant price series generated by the Australian Bureau of Statistics. The **Non-hydro Electricity Engineering Construction IPD** is an aggregate measure of the change in cost of construction within the electricity construction sector (including the change in margins). We build the forecast for the index from individual components – i.e. an average price growth is computed across a basket of relevant construction inputs which will then provide a general indicator for broad cost movements across the sector. Given use of similar materials and labour inputs, costs for electrical engineering construction are linked to broader cost trends in the building and construction industry – albeit, with key differences over time due to shifts in market tightness and varying importance of certain inputs specific to electrical engineering (e.g. copper and other electrical components).

The transition to renewable energy sources will be taking a step up in coming years (particularly with the passing of the Federal climate bill on 8th September 2022 which legislates a 43% reduction in greenhouse gas emissions by 2030), with the announcement and commencement of major solar and wind projects picking up pace, which, combined with the significant expansion and enhancement of transmission, will see the demand for electricity engineering inputs intensify. Aided by higher copper prices, the IPD increased 6% in 2021/22, although price growth will ease back over 2022/23 and 2023/24 as copper prices ease. However, we are forecasting price growth to remain elevated over 2024/25 to 2028/29, with sustained growth averaging 3.3% in the 5 years to 2028/29, as the renewable transition accelerates and increasing electrification puts upward pressure on input prices and the costs of construction.

Figure 5.13 Non-Hydro Electricity Engineering Construction Drivers



6. LAND PRICE FORECASTS

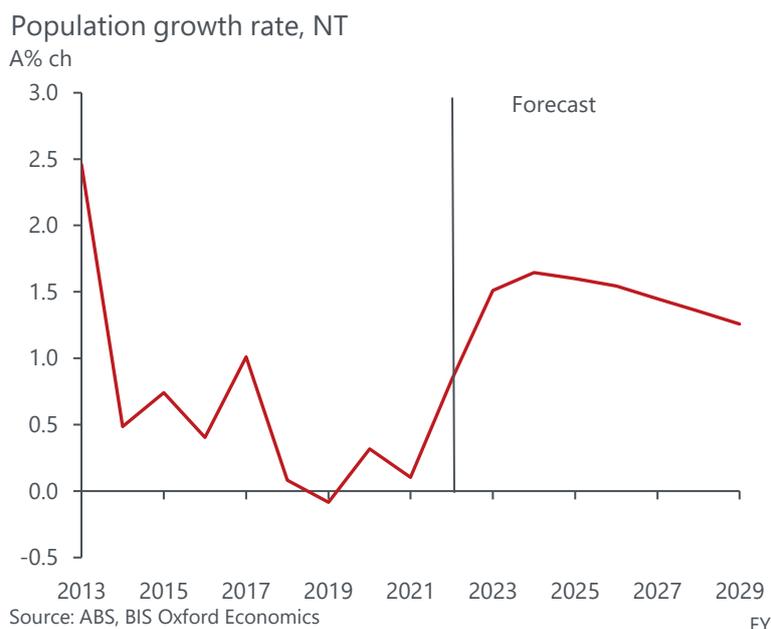
6.1 NORTHERN TERRITORY POPULATION CONTEXT

The Northern Territory has a small and sparsely distributed populace, accounting for just below 1% of Australia’s population in 2020/21. Mining, construction and defence dominate the economy, with volatility in population growth introduced by the outsized influence of major projects.

The territory’s net interstate migration (NIM) outflow is falling, with a reduced 1,800-person loss expected in 2021/22. Beyond this, elevated defence investment should extend the NIM recovery, with the state anticipated to reach interstate migration parity in 2023/24. Net overseas migration (NOM) inflows are expected to trend upwards over the three years to 2023/24 as the border reopens and the economy improves.

From an extremely low base, the Northern Territory is projected to see population growth improve, reaching an estimated 0.8% in 2021/22. In line with overseas migration returning, growth is expected to lift, averaging 1.4% over the four years to 2028/29. This compares with a forecast national average population growth of approximately 1.3% during this period. Within the Northern Territory, population growth over the forecast period will be heavily skewed towards Darwin.

Figure 6.1 Population Growth Rate Trends, Northern Territory, 2013-2029



6.2 INDUSTRIAL LAND

The **Darwin** industrial property market comprises a number of precincts, mainly stretching to the east of the city centre along the Stuart Highway towards Yarrowonga, as well as East Arm. A shortage of market evidence means that trends are difficult to quantify, and forecasting is highly problematic.

Discussions with agents active in this market indicate that demand for larger industrial property has typically been low in Darwin, particularly buildings greater than 1,000 sq m. Indeed, there are a limited number of occupants (as owner-occupiers or tenants) actively looking for industrial property space in Darwin. Amongst those who are, small scale trades businesses are the most prominent, with a focus

on servicing the local population more generally. There is no shortage of vacant properties for occupants to choose from, with options available above and below 1,000 sq m. However, the bulk of options are tilted towards secondary properties with relatively few prime buildings vacant.

The outlook for the industrial market in Darwin is linked to the prospects for the Northern Territory economy, which looks reasonable overall. The outlook is influenced by major resource projects proceeding, however some of these are uncertain. Nevertheless, some large-scale projects are underway and have further to run, including Santos' \$5 billion Barossa LNG project and Nolans \$1 billion rare earths. Some offset will be provided by government spending, with the federal government currently undertaking several projects to expand the number of military installations in the region. Further expenditure is also planned around US Force Posture initiatives, with works on this program anticipated to run until 2026. In addition, the Darwin City Deal includes a new campus for Charles Darwin University (currently under construction) and the State Square Art Gallery & Community Hub. Over the medium term, positive economic conditions and project specific requirements linked to the projects listed above should flow through to moderate demand for industrial properties, with a lag, allowing the substantial overhang of vacancies to be slowly absorbed.

6.3 COMMERCIAL VALUES

The **Darwin** CBD contains around 215,000 square metres of office stock with the largest user by far being public administration & safety ahead of the next largest sector, health. The ownership of CBD office stock is dominated by local private investors, without the same competition for office assets from the major A-REITs as in the larger office markets. Overall, we expect moderately positive office employment growth to slowly absorb the market oversupply in Darwin.

6.4 RESIDENTIAL LAND

The performance of land values broadly reflects the underlying performance of their respective local housing market.

Following successive years of price declines, **Darwin's** median house price grew 30% y/y in 2020/21. This strong rebound saw property listings increase and given recent data we expected to see slower growth in 2021/22 (+6%) leaving Darwin the most affordable capital city at \$627,000.

Whilst the recent pace of growth has slowed, Darwin retains a significant affordability advantage. The market has several factors playing in its favour against a backdrop of rising interest rates. A recovery in population flows will be encouraged by major investments in resources and defence. Works on the Barossa LNG project should prop up demand during construction while non-residential developments related to the Darwin City Deal create greater job opportunities. Simultaneously, an improving demand/supply dwelling balance will help to place a floor under prices over the near term.

Though we forecast house prices to flatten in 2022/23, the city has only just recovered the losses incurred during the resources boom hangover, and therefore the room for prices to fall further is limited. We forecast the median house price and the median land price to grow over the period to June 2029.

Table 6.1 Residential Land Price Trends, Darwin, 2002-2029

Quarter Ended June	Darwin Res. Land Price	
	\$'000	% Var. vs. Previous Year
2002	85	
2003	83	-2%
2004	98	18%
2005	126	29%
2006	131	4%
2007	164	25%
2008	172	5%
2009	216	26%
2010	238	10%
2011	216	-9%
2012	237	10%
2013	237	0%
2014	320	35%
2015	252	-21%
2016	238	-6%
2017	221	-7%
2018	203	-8%
2019	197	-3%
2020	201	2%
2021	256	27%
<i>Forecast</i>		
2022	275	7%
2023	263	-4%
2024	285	8%
2025	300	5%
2026	315	5%
2027	332	5%
2028	339	2%
2029	355	5%

Source: BIS Oxford Economics, PriceFinder, ABS



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