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REPORT:**

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**PREPARED BY BIS OXFORD ECONOMICS FOR
THE AUSTRALIAN ENERGY MARKET
OPERATOR**

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BIS Oxford Economics

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EXECUTIVE SUMMARY

This report presents the economic projections for three alternative future scenarios outlined in the Australian Energy Market Operator's (AEMO) Input Assumptions and Scenarios Report (IASR) – *Step Change*, *Progressive Change*, and *Hydrogen Export Exploring Alternatives* is another scenario considered by AEMO but is not included in the body of this report given its similarities with *Step Change* from an economic perspective.

The analysis was conducted using AEMO's core assumptions for each scenario coupled with BIS Oxford Economics' suite of quantitative models for the Australian economy. The forecasts were produced in July 2022.

Step Change

The *Step Change* scenario forms AEMO's most likely scenario pathway this year. Last year *Step Change* (previously *Sustainable Growth*) was considered an alternative scenario to the *Central Case*.

This change reflects the ever-shifting policy landscape. Australia committed to a 2050 Net Zero target late last year and with a newly elected government that has a stronger decarbonisation mandate, a more proactive and orderly transition has become a more likely pathway.

The *Step Change* scenario is based on a moderate population outlook. All announced pledges for climate mitigation are assumed to be met. To achieve this, there is increased channelling of investment towards decarbonisation, both in Australia and globally. This places the world on Representative Concentration Pathway (RCP) 2.6, with global warming limited to 1.8°C by 2100. This increased investment also brings about greater productivity improvements and efficiency gains for commodity use.

In the near-term, while COVID-19 continues to disrupt economic activity globally, many economies (Australia included) have adopted a 'living with COVID' approach. Widespread vaccinations have been a catalyst to this. Lockdowns in most economies have been unwound and travel has resumed earlier than anticipated.

There has been a strong rebound from pent-up global economic demand, following the unwinding of restrictions on activity. Meanwhile, supply has failed to catch up. Supply disruptions continue to persist, particularly as energy market disruptions worsen from the ongoing Russia-Ukraine conflict. Arising from this, high inflationary pressures are being felt world-wide, particularly through fuel and goods imports. Tightness in labour markets is also driving strong wage growth, a more persistent source of inflation. This has subsequently triggered a series of rate rises by central banks around the world (such as BoE, Bank of Canada, Federal Reserve, RBNZ). The Reserve Bank of Australia (RBA) is no exception.

Australia is also exposed to the high commodity prices globally, which is materialising through fuel and traded food prices. Additionally, severe floods experienced through the north-eastern region over the last summer has curtailed supply from the agriculture sector, which is starting to permeate domestic food prices as well.

The absence of temporary overseas arrivals over the last two years has left a gap in the domestic labour market. This is being acutely felt in sectors such as hospitality and construction. The ongoing outbreak of *Omicron* has further disrupted labour supply. Strong labour demand had initially been matched with strong domestic labour supply. The participation rate reached a record 66%, while the unemployment rate fell to 3.9%. Nevertheless, this has not been sufficient to satiate labour demand and high frequency indicators are pointing to a strong outlook for wage growth in the near-term. This is expected to further fuel inflation.

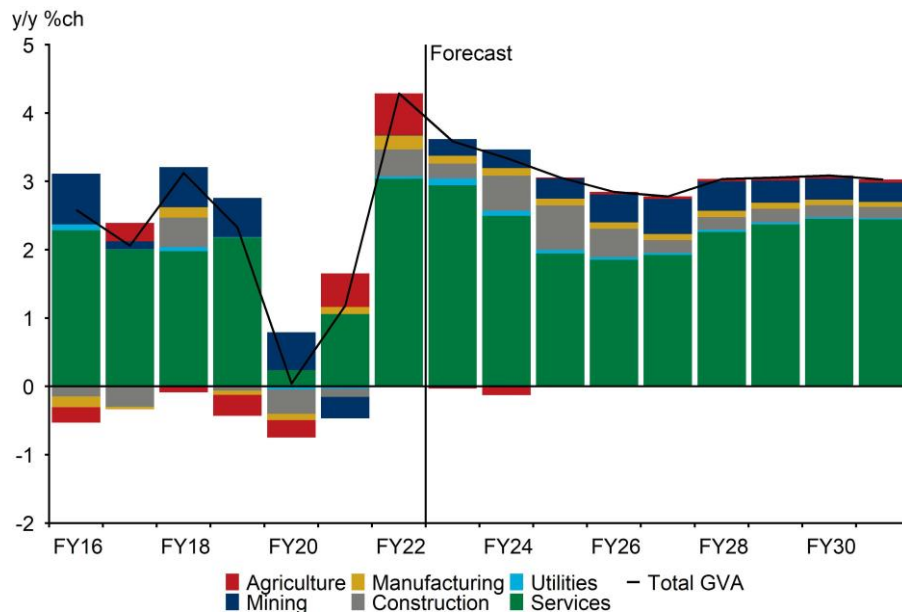
These forces are expected to drive strong inflationary pressures over the coming 12 months, taking until Q1 2024 to return to the mid-point of the RBA target range. This will erode household purchasing power, dampening the outlook for household spending through the next two years.

Businesses are also facing strong input price rises, and this is expected to weigh on private sector investment. For the construction sector in particular, another limiting factor has been capacity constraints which will also put a lid on business investment. Nevertheless, there is a strong pipeline of public and private projects, particularly in transportation and energy. This will support a fast-paced recovery in investment through the medium-term once input cost pressures ease. One sector of the economy that has fared quite well through the pandemic and especially in the current economic climate, has been the merchandise exports sector. This sector continues to benefit from the strong commodity prices in the near-term.

From an industrial output standpoint, as activity continues to normalise, we expect the services sector to drive near-term growth. However, constraints on household spending will be felt most acutely by this sector through the mid-2020s. Agriculture over the next year is expected to be a drag on growth, largely owing to the recent floods. Easing of capacity constraints will enable faster growth in the construction sector through FY23-24. Currently, ongoing investment in the mining sector (amidst a high global commodity price backdrop) is expected to translate to stronger production through the mid-to-late 2020s.

Over the long run, the economy continues to become more services orientated. As a result, the services sector will play an increasingly stronger role in driving economic output.

Figure. 1. Gross Domestic Product growth by industry sector breakdown



Source: BIS Oxford Economics/ABS

At a state level, Queensland has been a relative outperformer over the last two years. In part, this has been owing to its successful containment of COVID-19, enabling faster normalisation of domestic activity. More recently, the region’s mining sector has also benefitted from strong commodity prices. Moreover, the state has seen strong inward interstate migration. Many have been attracted by the strong labour market prospects as well as relative affordability of its housing sector. On this basis, Queensland is set to continue outperforming most other states in the near-term.

Victoria and New South Wales are also expected to grow relatively strongly through the mid-to-late 2020s. Much of this reflects catch up growth. These two states were the most severely affected through the pandemic, both from the curtailment of domestic activity during repeated lockdowns as well as the halt to migration. An unwinding of these headwinds (particularly the return of international students) plus strong public investment support will lift growth for these two states through the medium-term. However, this will be somewhat dampened by the impact of strong inflation, rising interest rates and falling property prices.

WA is expected to see solid growth through the next decade, as the mining sector undergoes a cyclical upturn following several years of slow economic activity prior to the pandemic. Strong commodity prices in the current environment have been a key tailwind to accelerating this upturn.

Over the long run, state economic performance is largely tied to demographic fundamentals. As a result, Queensland, Victoria and Western Australia continue to be the fastest growing states.

Figure. 2. GDP & GSP, Compounded Annual Growth Rate (CAGR)

	AUS	ACT	NSW	QLD	SA	TAS	VIC	WA
FY22-27	2.98%	1.86%	2.62%	3.82%	1.53%	1.39%	3.43%	2.86%
FY27-32	2.97%	2.83%	2.94%	3.03%	2.30%	2.27%	3.20%	2.92%
FY32-37	2.32%	2.50%	2.36%	2.30%	1.92%	1.82%	2.36%	2.37%
FY37-42	1.94%	2.11%	1.93%	1.96%	1.60%	1.56%	1.91%	2.07%
FY42-54	1.67%	1.90%	1.79%	1.69%	1.41%	1.41%	1.45%	1.84%

Source: BIS Oxford Economics/ABS

Commensurate with the trends in Gross State Product, Victoria and New South Wales are amongst the fastest growing states for household disposable income in the near-term as return of migrants boosts demand for services and construction and subsequently feed employment. The mining states of Queensland and Western Australia also continue to exhibit strong growth through the medium-term, driven by a cyclical upturn in the mining sector. It is worth noting though that while labour markets indicators point to a very tight market, wage growth has been slow to pick up pace. Meanwhile, inflation has been running apace. As a result, while nominal wages will continue to rise, we expect a deterioration in real wages in the near term, as rising cost of living eats into household disposable income over the next 12 months.

Figure. 3. Real Household disposable income, CAGR

	AUS	ACT	NSW	QLD	SA	TAS	VIC	WA
FY22-27	1.54%	1.38%	1.49%	1.12%	1.49%	0.56%	1.94%	1.74%
FY27-32	3.07%	3.34%	3.01%	3.07%	2.59%	2.31%	3.20%	3.28%
FY32-37	2.30%	2.51%	2.17%	2.34%	1.87%	1.66%	2.43%	2.60%
FY37-42	1.91%	2.11%	1.79%	1.98%	1.55%	1.41%	1.96%	2.27%
FY42-54	1.63%	1.85%	1.67%	1.67%	1.30%	1.25%	1.50%	1.91%

Source: BIS Oxford Economics/ABS

Alternative scenarios

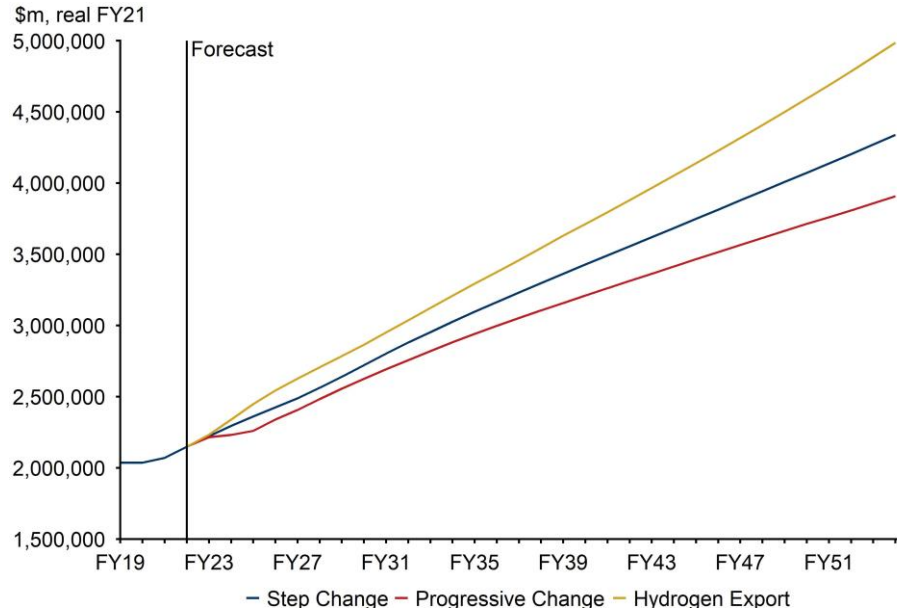
In addition to *Step Change*, this report considers two alternative scenarios – *Progressive Change*, and *Hydrogen Export*. Each of these represent alternative economic outlooks and energy transition pathways. The economic outlook relative to the current trajectories case is broadly determined by the demographic outlook, general technological progress, and the climate policy settings.

For each scenario the following settings were assumed:

- Progressive Change:** Weaker overseas migration drives lower long-term economic growth outcomes. Australia meets its net zero emissions targets by 2050, however globally only currently stated mitigation policies are achieved. This places the world on a higher warming pathway (2.6°C by 2100) relative to *Step Change*. The higher levels of warming also have a greater detrimental impact on resource productivity in this scenario.
- Hydrogen Export:** Stronger overseas migration drives higher long-term growth outcomes. This scenario also assumes a much more ambitious pathway to decarbonisation globally and in Australia. Net zero emissions globally are met, and global warming is limited (to <1.5°C by 2100). Additionally, Australia explicitly and aggressively targets the development of hydrogen production,

which results in Australia becoming a leading global producer and exporter, particularly to countries in Asia.

Figure 4. Gross Domestic Product: Step Change vs. Alternative Scenarios



Source: BIS Oxford Economics/ABS

The outlook across the states in each scenario primarily depends on their exposure to net overseas migration and the importance of the fossil fuel mining sector to overall economic activity. Of the larger states, NSW, VIC and SA are most exposed to the migration channel, and NSW in particular is a relative underperformer in *Progressive Change*. The reverse is true for *Hydrogen Export*.

For WA and QLD, the importance of the mining sector dominates the economic outcome. As a result, these states perform more strongly in *Progressive Change* as this scenario assumes a slower shift away from fossil fuels. While *Hydrogen Export* has a stronger shift away from fossil fuels, the state-based outcomes are somewhat different, as the shift into hydrogen helps to compensate for the reduction in activity in the mining sector.

Figure 5. GDP y/y growth Step Change vs. Alternative Scenarios, Australia, CAGR

	Step Change	Progressive Change	Hydrogen Export
FY22-27	2.98%	2.28%	4.09%
FY27-32	2.97%	2.76%	2.95%
FY32-37	2.32%	2.06%	2.63%
FY37-42	1.94%	1.66%	2.33%
FY42-54	1.67%	1.39%	2.11%

Source: BIS Oxford Economics/ABS

1. INTRODUCTION

BIS Oxford Economics has been engaged by the Australian Energy Market Operator (AEMO) to produce the economic and demographic scenario forecasts that feed into their 2022-23 suite of energy outlook reports.

AEMO delivers a range of planning and forecasting publications to inform decision making including the Electricity Statement of Opportunities (ESOO), the Gas Statement of Opportunities (GSOO) and the Integrated System Plan (ISP). The economic forecasts provided in this report are inputs into AEMO's modelling and forecasting processes.

The economic projections are developed for scenarios provided by AEMO in their Inputs, Assumptions and Scenarios Report (IASR)¹. The scenario narratives that underpin the economic outlook have been developed in consultation with AEMO.

BIS Oxford Economics uses our proprietary Global, Industry and Regional macroeconomic models to produce the final outputs for AEMO. This allows us to ensure consistency across global and regional settings, from channels such as global commodity prices and trade through to industrial composition mix at the state level. For more details on our macroeconomic models, please see Appendix B.

This report supplements the macroeconomic forecasts produced for AEMO. The report has been structured as follows:

Chapter 2: Outlines the key scenario narratives and their underlying assumptions.

Chapters 3 to 5: Presents the economic and demographic projections for the *Step Change* scenario.

Chapters 6 & 7: Presents the economic and demographic projections for the *Progressive change and Hydrogen Export* scenarios.

Appendix A: Presents the economic analysis and projections for the *Slow Global Decarbonisation* scenario, which is an alternative moderate growth scenario.

Appendix B: Details BIS Oxford Economics' proprietary global, industry and state models.

Appendix C: Provides a comparison of BIS Oxford Economics population forecast to the Federal Treasury's Centre for Population.

Appendix D: Provides a comparison of BIS Oxford Economics economic forecasts to public forecasts.

Appendix E: Provides additional details on the framework behind *Hydrogen Export*.

¹ <https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp/current-inputs-assumptions-and-scenarios>

2. SCENARIO ASSUMPTIONS

This chapter includes an outline of each of AEMO's scenarios including their overarching narrative and key economic and demographic assumptions.

Key Scenario Narratives

AEMO considers four energy transition scenarios, namely:

- **Step Change**
- **Progressive Change**
- **Hydrogen Export**
- **Exploring Alternatives**

This report presents the macroeconomic outcomes under the *Step Change*, *Progressive Change* and *Hydrogen Export* scenarios.

These scenarios differ in terms of their economic outlook, and they represent alternative energy transition and climate warming/mitigation pathways. The Exploring Alternatives scenario is AEMO's fourth scenario which uses the same economic input from *Step Change* but considers slower decarbonisation efforts. Therefore, the first three scenarios are the focus of this report.

Step Change represents AEMO's central pathway in this report. Last year *Step Change* (previously *Sustainable Growth*) was considered an alternative scenario to the *Central Case*.

This change reflects the ever-shifting policy landscape. Australia committed to a 2050 Net Zero target late last year and with a newly elected government that has a stronger decarbonisation mandate, a more proactive and orderly transition has become a more likely pathway.

As a result, the analysis in this report is centred around the *Step Change* scenario.

Each of the core scenario narratives are outlined as follows:

- **Step Change:** this is a moderate economic growth scenario. There is coordinated global and domestic action to mitigate emissions. All governments worldwide fulfil their announced climate action pledges. As a result, climate warming is limited to 1.8°C by 2100 (RCP 2.6).

The targets announced in ALP's *Powering Australia Plan*² are met. The energy and industrial sectors are the heavy lifters to reach this goal. In the near-to-medium-term, this sees increased investment to support large-scale renewable energy penetration, displacing fossil fuels. Stronger electrification by households, transport sector (e.g. buses and commercial fleet) as well as

² <https://keystone-alp.s3-ap-southeast-2.amazonaws.com/prod/61a9693a3f3c53001f975017-PoweringAustralia.pdf>, *Powering Australia*, ALP, 2021

industrials also reduces demand for fossil fuels. Australia's reliance on oil & gas imports reduces, as a result. Meanwhile, this is offset by increased demand for import of capital (such as machinery & equipment, solar PV panels, electric vehicles etc.) to meet the demands from electrification. On the exports side, as other countries pursue similar decarbonisation objectives, the demand for thermal coal falls away. Australia restructures to become a more services-oriented economy, including greater export of services.

- **Progressive Change:** The *Progressive Change* scenario (previously known as *Slow Growth*) is a lower growth pathway to the *Step Change* scenario. This scenario is characterised by lower population growth, which ultimately drives lower economic growth outcomes.

Australia achieves net zero emissions in this scenario. However, global action isn't sufficient, and the world is on a path to 2.6°C warming by 2100 (RCP 4.5). This is a notable departure from last year's *Slow Growth*, where the scenario assumed even further lags in policy (both domestically and globally), which placed the world on a path to 4°C warming by 2100 (RCP 7.0). This change again reflects the latest policy developments, with Australia having committed to a Net Zero emissions target.

Consequently, this leads to greater allocation of investment and higher productivity compared to the 2021 *Slow Growth* case, despite both scenarios experiencing lower population growth.

- **Hydrogen Exports:** the hydrogen export scenario is a higher growth pathway to the *Step Change* scenario. This scenario is characterised by higher population growth which drives higher economic growth outcomes.

This represents a more aggressive decarbonisation pathway. Both Australia and its global counterparts aggressively pursue net zero, limiting global warming to 1.5°C by 2100 (RCP 1.9). Moreover, Australia decarbonises faster than current set objectives, reaching Net Zero emissions by the early 2040s.

In this scenario Australia becomes a relative leader to a greener pathway, leading the production and export of hydrogen globally. As a result, Australia transitions away from coal and gas exports towards hydrogen exports.

- **Exploring Alternatives (Excluded):** This scenario uses the same economic input from *Step Change*. Furthermore, like *Step Change*, global climate policy intention is well aligned in this scenario. However, some countries take longer to fulfil their policy commitments, resulting in a 2.0°C warming by 2100 (RCP 3.5).

Alongside the four scenarios that will form AEMOs core scenarios for their suite of energy reports, another hybrid scenario – *Slow Global Decarbonisation* – was also developed. This scenario is characterised by moderate growth domestically combined with weaker decarbonisation efforts globally, resulting in 2.6°C warming by 2100 (RCP 4.5). The results of this scenario are presented in *Appendix A*.

Note that in the context of the WA suite of publications, these scenarios are consistent with the WEM rules and the tentative WEM scenario mappings are given as follows:

Figure. 6. AEMO WA Electricity Market (WEM) Scenario Mapping

Scenario names in this report	WEM Scenario mapping
<i>Step Change</i>	Expected
<i>Progressive Change</i>	Low
<i>Hydrogen Export</i>	High

2.1 NEAR TERM ASSUMPTIONS

Compared to last year, Australia’s economic recovery from the pandemic is now well entrenched and overseas migration has resumed again. Australia has also adopted a living with COVID strategy, enabled by the successful roll out of vaccines.

More recently, a combination of strong pent-up demand, ongoing supply chain disruptions and the economic fall-out from the Russia-Ukraine conflict has created the perfect storm for high inflationary pressures. This has also triggered swift central bank response around the world, moving to interest rate tightening. We expect these forces to weigh on consumer demand, but uncertainty remains around the severity. High producer input prices are also likely to hurt business investment.

Closer to home, China’s lockdowns from a resurgence in COVID also presents downside risk for Australia’s export of goods and services. It is also likely to further prolong global supply chain disruptions.

Given these sources of near-term uncertainty, we have varied the near-term outlook across scenarios as well.

- The *Step Change* scenario is characterised by moderate macroeconomic growth drivers in the near-term. In particular, inflation is expected to peak in FY23 and return to the RBA’s target swiftly as supply-side pressures ease. This is discussed in detail in Chapter 4.
- The *Progressive Change* scenario assumes a worsening of the Russia-Ukraine conflict and prolonged lockdowns in China. Initially, this gives rise to stronger and more persistent inflation than in the *Step Change* scenario. This triggers an even stronger interest rate tightening response by Central Banks, to the surprise of households and businesses. Consumer and business confidence is hampered and a cyclical downturn in real economic activity follows.
- By contrast, the *Hydrogen Export* scenario presents an upside alternative where the current inflationary pressures ease faster than *Step Change* and there is a more gradual pace of interest rate tightening. Additionally, there is stronger than expected inbound migration. Temporary workers are attracted by high wage prospects. China’s COVID cases are also assumed to be brought under control faster than in *Step Change*, enabling strong return of international students from China. This combination of forces feed aggregate demand for services across Australia, leading to stronger economic growth outcomes in the near-term, relative to the *Step Change* scenario.

Figure. 7. AEMO Scenario Settings Economic Summary Table

	Step Change	Progressive Change	Hydrogen Export
Population	Moderate Growth	Low Growth (ABS Series C adj NOM)	High Growth (> ABS Series A adj NOM)
Investment	High Growth		High Growth
Global Activity	Moderate Growth	Low Growth	High Growth
Climate Warming Settings	1.8° by 2100	2.6° by 2100	<1.5° by 2100
IEA Scenario Complete	SDS	DRS	NZE2050
Decarbonisation	Achieved by 2050	Achieved by 2050	Achieved by 2040
Resource Productivity Gains	High	Moderate	High
Near Term Narrative	Returning migrants and banked up household savings support the economy in spite of high inflation and rising interest rates; Trade benefits from strong commodity prices. Capacity constraints place a lid on investment, though strong pipeline of work to support a recovery in investment once these constraints abate.	Worsening situation in China and prolonged supply disruptions worsening inflation pressures; hampering consumer and business confidence	More international students and temporary workers attracted amidst labour shortage with NOM surpassing historical average. Inflationary pressures ease faster than Step Change.

2.2 DEMOGRAPHIC ASSUMPTIONS

Core demographic assumptions (such as fertility rate, births and deaths) that drive the Natural Increase (NI) in the population, are consistent with the Centre for Population baseline projections for the population. We see these variables as being largely unaffected by economic developments and are therefore treated as exogenous assumptions. The exception to this is the very near-term fertility rate, which is assumed to fall back as a result of the economic shock generated by the COVID-19 recession; this assumption is consistent with movements in the fertility rate through previous downturns. In contrast, analysis of the historical data highlights that migration flows are linked to economic fundamentals, and we therefore model these series endogenously.

3. *STEP CHANGE*: DEMOGRAPHIC PROJECTIONS

- The closure of international borders during the pandemic caused significant disruptions to overseas migration. With the reopening of Australia's international borders in early 2022, population growth is expected to return to its historical trend by FY23.
- The current central population profile for Australia is relatively unchanged compared to the previous population projections, as the timing of borders reopening was broadly as expected. However, there has been historical revisions back to FY17, following the recent release of the 2021 Census.
- Net Overseas Migration (NOM) has begun to recover in FY22 as the backlog of temporary migrants looking to travel to Australia unwinds. NOM is expected to gain around 110,000 in FY22 and return to trend at 250,000 per year by FY23.
- While population in Australia has been broadly unchanged, state composition has been revised. This was driven by a large shock to Net Interstate Migration (NIM) in Victoria during the lockdowns and the changing dynamics of interstate migration over the long run.
- QLD and WA are expected to experience the strongest population growth in the future underpinned by strengthening labour markets which will bring in a greater number of interstate migrants.

This chapter presents the national and state demographic outlook for the *Step Change* scenario (AEMO's 2022 central scenario). The outlook is compared to the demographic outlook in AEMO's 2021 central scenario *Current Trajectory* (2021 IASR)³. Since the 2021 report, the recent publication of 2021 census saw historic revisions back to FY17. The changes to national and state population are detailed further in section 3.1.

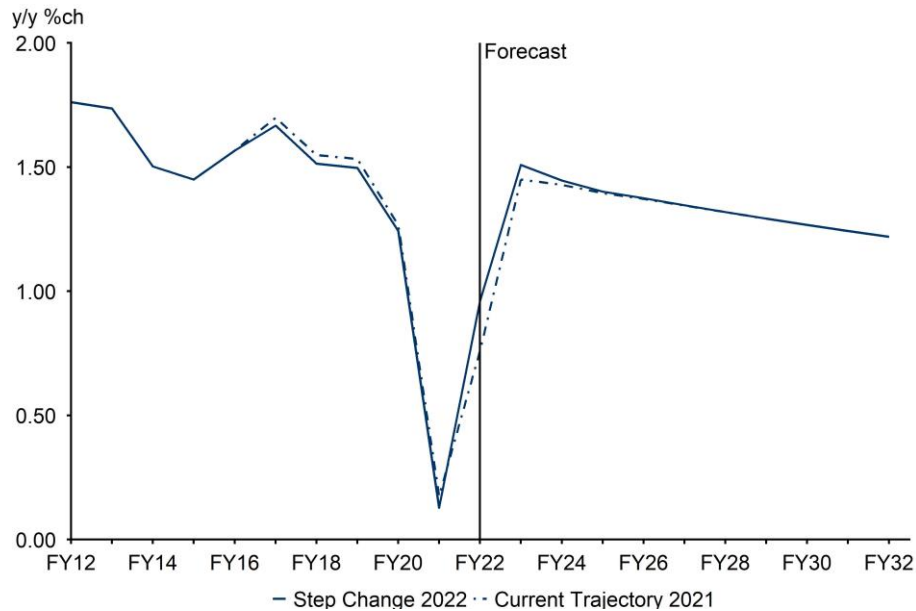
Total population is expected to reach 37.1 million persons by 2054. The forecasts for total population have not changed materially since the 2021 forecasts as the assumptions around net overseas migration (NOM) and natural increase (NI) have remained largely the same.

³ https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2021/bis-oxford-economics-macroeconomic-projections.pdf

Historically, NOM has made up a substantial portion of Australia’s population growth, averaging around 60% of the population increase over the past decade. The closure of Australia’s international borders during the pandemic generated a significant shock to NOM and consequently population growth in the near term. However, the accelerated rollout of vaccines and booster programs has enabled Australia to reopen its borders in March 2022. The timing of borders reopening was broadly in line with expectations, and it is expected that NOM will recover quickly from this point. As such, the near-term outlook has not materially changed. Net overseas migration is expected to be 110,000 persons by the end of FY22 before a return to the long-run average of 250,000 persons by FY23. This also suggests that the amount of overseas migration that was missed during the pandemic is not expected to be recovered in the future.

Turning now to the natural increase component of population growth. The fertility rate, a key determinant of natural increase, was revised down last year to 1.6 births per woman for FY21. This was driven by weak births data from the ABS, which partly reflected pandemic-induced delays to family plans. The ABS’s latest births data supported the revisions, with a recorded 1.58 births per woman in 2020. As such, the projections for birth rate remains unchanged. The birth rate is projected to stabilise at 1.65 in the long-term as stabilising economic and health conditions encourage the resumption of backlogged family plans. Overall, natural increase remains relatively unchanged since the AEMO’s 2021 central scenario *Current Trajectory*.

Figure 8. Population y/y change, Australia



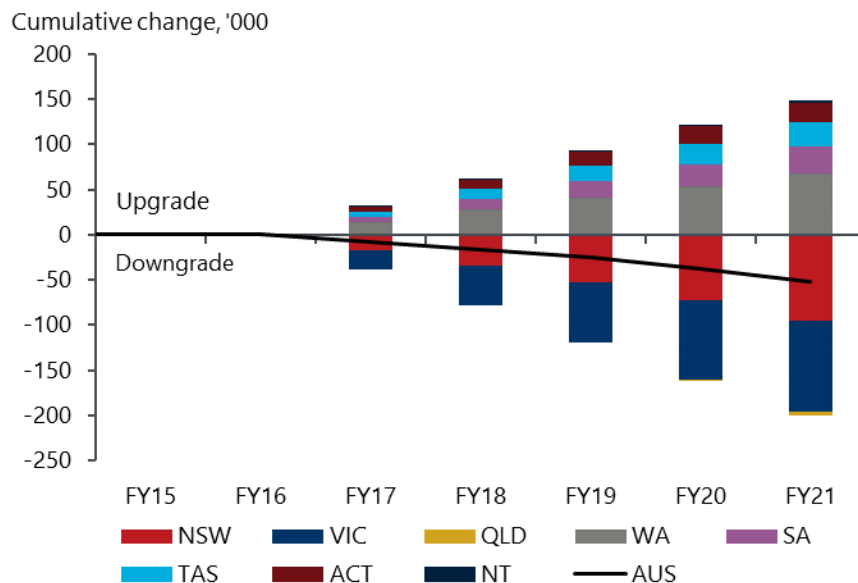
Source: BIS Oxford Economics/ABS

3.1 2021 CENSUS POPULATION REBASING

Since the 2021 report, the release of the first tranche of 2021 Census results included rebased population estimates for the five years to FY2021. This saw a cumulative reduction of around 50,000 persons applied nationally, compared to previous ABS population estimates.

NSW & VIC both saw culminative revisions of around 100,000 persons. However, in growth terms this was a rather minor change to population growth over the past five years. Conversely the upwards revisions to many of the smaller states and territories saw a significant revision in their population growth over the past five years to FY21. The largest revision was in TAS, where the rebasing TAS's population growth rate retrospectively doubled for the four years to FY21. SA and ACT also saw significant upward revisions to historical population growth estimates.

Figure. 9. 2021 Census Population Rebasing, by State



Source: BIS Oxford Economics/ABS

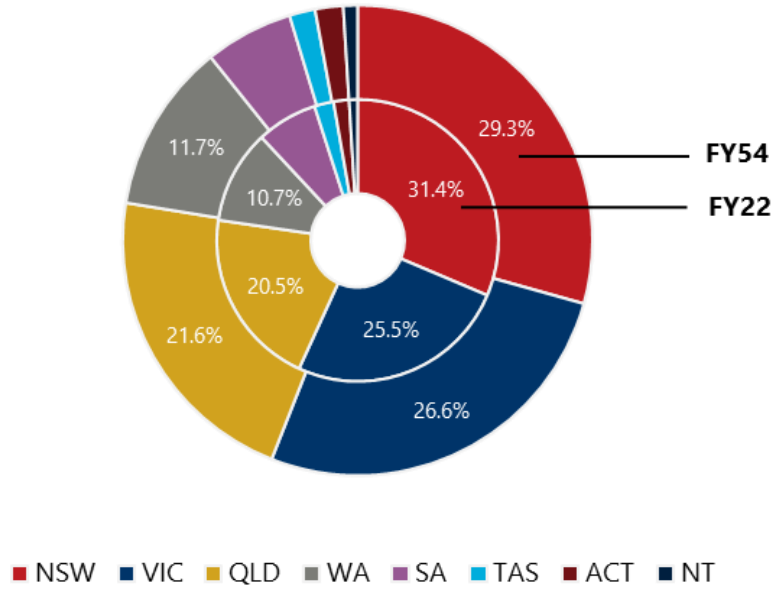
3.2 STATE LEVEL PROJECTIONS

Across the states, similar assumptions for birth and death rates mean that the main driver of shifts in population shares are trends in overseas and interstate migration. All states suffered from a loss in NOM in FY21 with the closure of international border. Since then, international borders reopened and NOM is expected to recover through FY23. In particular, the return of international students and temporary workers is anticipated to favour New South Wales and Victoria. Furthermore, the lifting of border closures across states means that interstate migration patterns is expected return to pre-pandemic trends.

Over the long run, population growth is expected to favour Victoria, Queensland, and Western Australia. This is largely driven by a modest inflow of overseas migrant as well as a net inflow of interstate migrants. The share of population continues to be the highest in New South Wales by FY54 but is lower compared to FY22. While New South Wales captures the largest share of overseas migrants, the state is expected to experience a net outflow of interstate migrants over the forecast period. Population growth in SA and

TAS are well below national average consistent with a weaker economic outlook for the two states.

Figure. 10. Share of national population



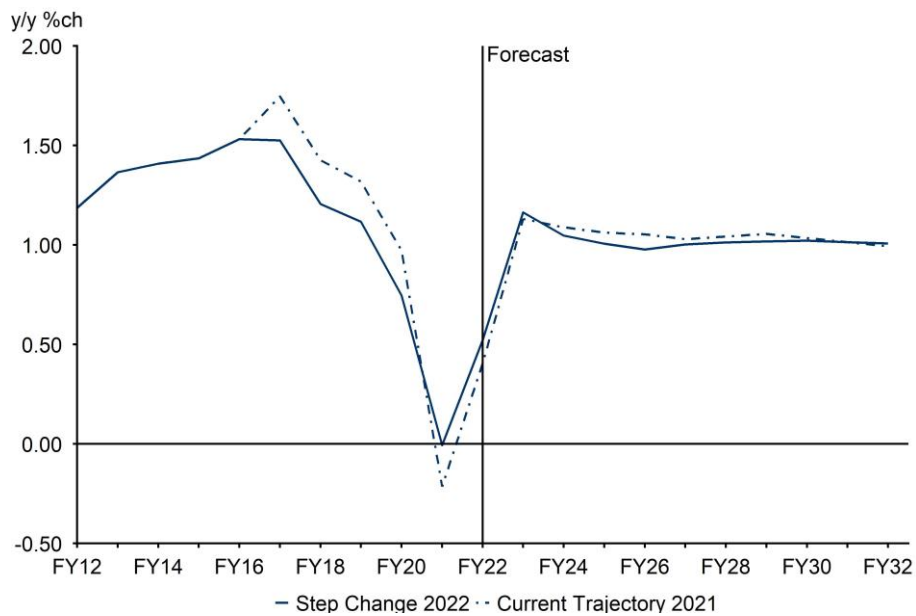
Source: BIS Oxford Economics/ABS

3.2.1 New South Wales

Population in New South Wales has been growing steadily in the past decade. The state’s population growth is mostly driven by overseas migration, particularly temporary workers and international students. During the pandemic, a loss in NOM saw population growth fall sharply. Furthermore, there was a greater outflow of interstate migration due to relatively more restrictions on mobility compared to other states (except Victoria).

Going forward, population growth is expected to pick up as migration patterns normalise over time. However, this will take some time with population growth not projected to return to trend until 2026. Long term growth is expected to be below the national average but the share of population in NSW will remain the highest across the states.

Figure. 11. Population y/y percentage change, NSW



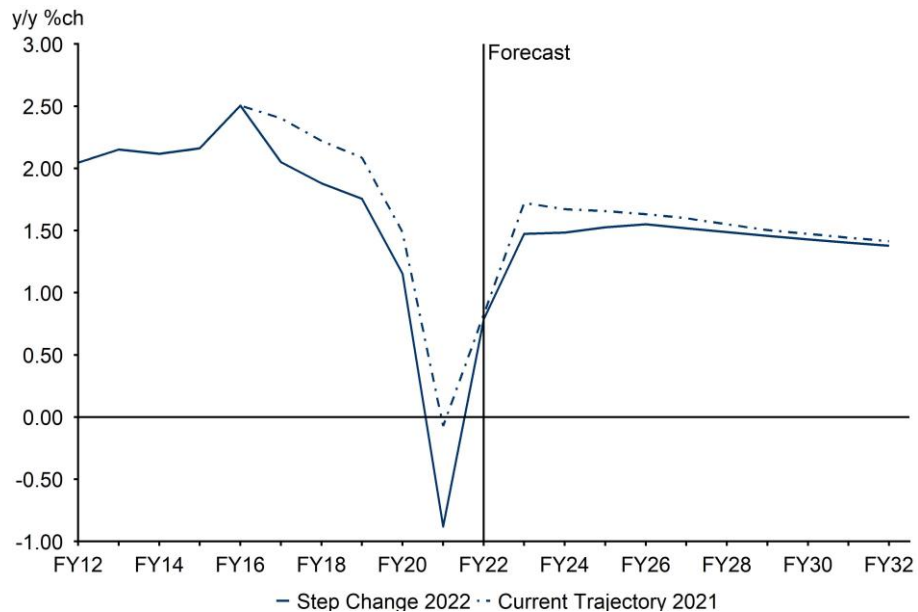
Source: BIS Oxford Economics/ ABS

3.2.2 Victoria

Prior to the pandemic, population growth in Victoria exceeded the national average, driven by growth in both NIM and NOM. However, the pandemic induced a significant shock to migration and Victoria was the only state to experience a population contraction in FY21. Victoria has been heavily dependent on overseas migration inflows in recent years, leaving the state heavily exposed to the pandemic-induced collapse in overseas migration. Net interstate migration also declined sharply in FY21. Relatively higher covid case numbers and successive lockdowns that followed has encouraged outbound migration to states with more lenient restrictions.

Now these headwinds have unwound, VIC population growth is expected to see a strong rebound through FY23. In the long-term, population growth is expected to return to levels that exceed the national average.

Figure. 12. Population y/y percentage change, VIC



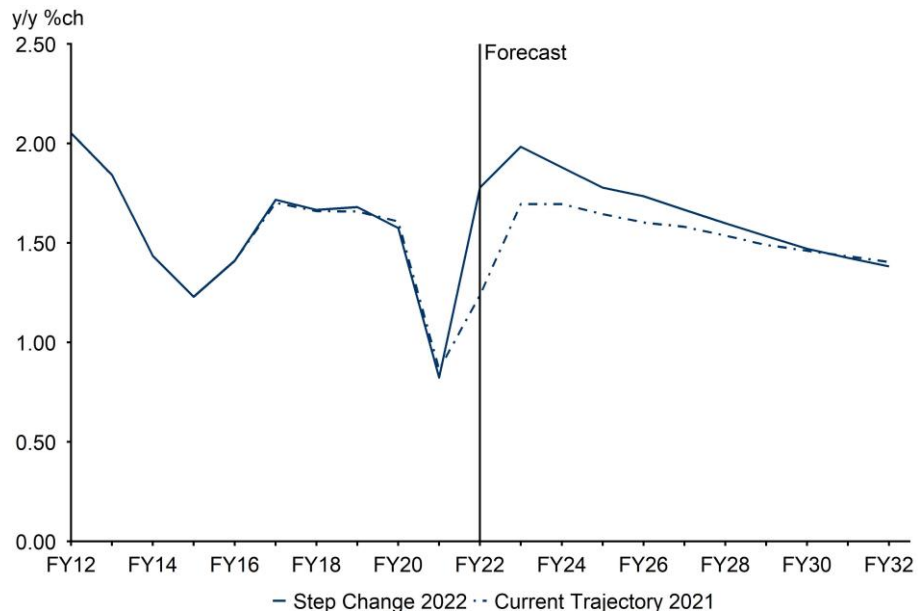
Source: BIS Oxford Economics/ ABS

3.2.3 Queensland

Queensland has seen relatively steady population growth in the 2010s. During the pandemic, a loss in NOM led to lower population growth. However, this was partly offset by an increase in NIM. Favourable conditions, including relatively affordable housing and less disruptions from the virus, have encouraged inbound migration from NSW and Victoria.

Going forward, population growth in Queensland is expected to remain strong, especially with the return of overseas migration. Furthermore, the state is expected to continue capturing a large share of interstate migration, particularly from NSW. It's also noted that population growth has been revised higher from FY22 to FY30 compared to the 2021 forecasts. This reflects favourable fundamentals such as a shift in preference towards lifestyle locations, relatively more affordable housing, and a strengthening labour market.

Figure. 13. Population y/y percentage change, QLD



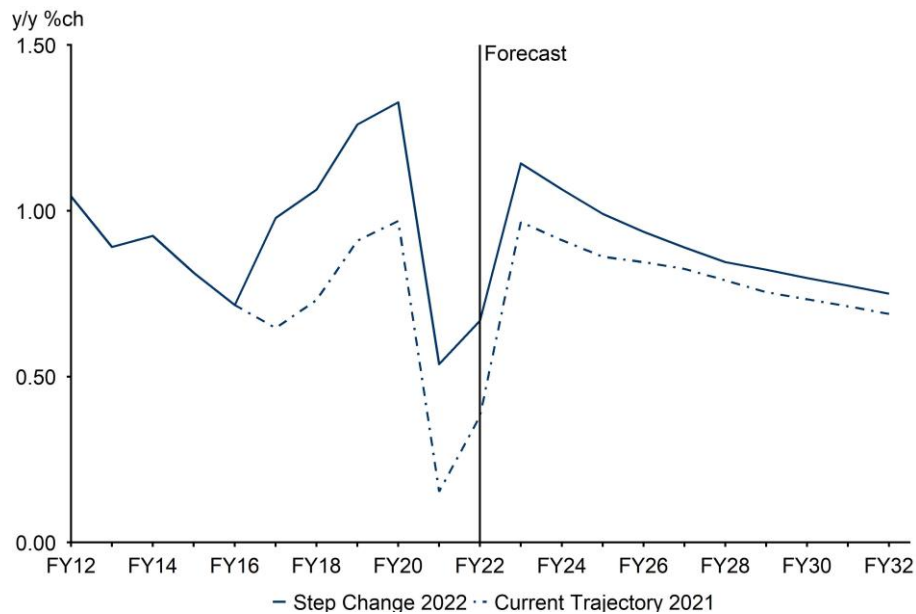
Source: BIS Oxford Economics/ ABS

3.2.4 South Australia

Over the past decade, population growth in South Australia has been relatively low compared to the major states. This has been largely driven by a net outflow of interstate migration following the decline in the local manufacturing sector. In recent years, the main source of population growth came from overseas migration. However, this trend reversed during the pandemic, with the state seeing a net inflow of interstate migration, particularly from Victoria.

As migration normalises, overseas migration is expected to again be the largest contributor to the state’s population growth. Net interstate migration is projected to return to negative in the long run, but to a lesser extent than historically. The state’s favourable affordability and a strengthening economy will likely attract some residents from NSW and VIC. Nonetheless, the long-term population growth in SA is expected to be below the national average.

Figure. 14. Population y/y percentage change, SA



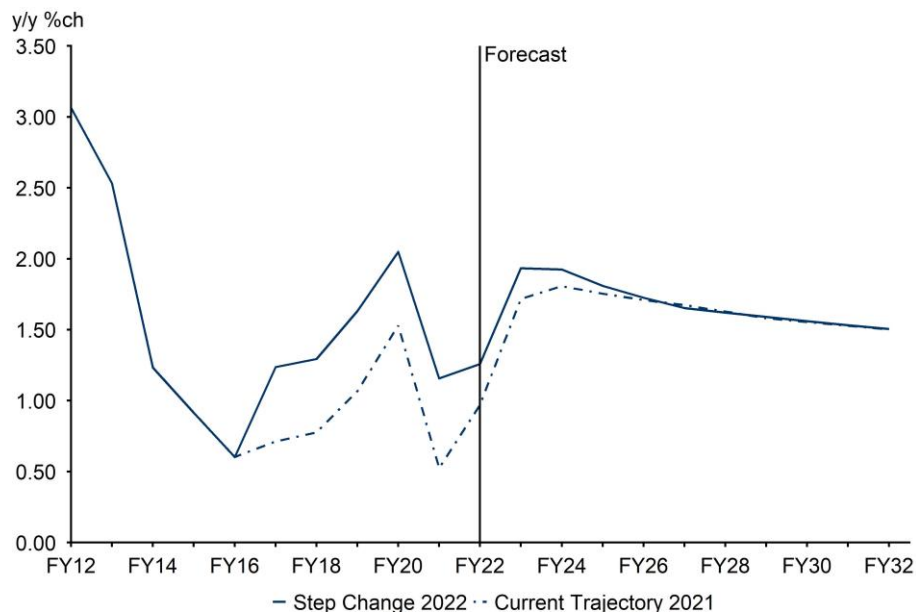
Source: BIS Oxford Economics/ ABS

3.2.5 Western Australia

Western Australia has seen population growth soften materially since the peak of the mining boom as NOM collapsed and NIM turned negative. Like SA, this reversed during the pandemic as border restrictions encouraged locals to stay put, reducing the number of interstate outflows.

Going forward, population growth is expected to be relatively strong in the near-term. Underpinning this is a lift in NIM due to a strengthening economy from an uptick in resources investment, and higher wages from a tight labour market. Additionally, WA is expected to gain an increased share of student migration as Perth has been reclassified as a regional location for migration purposes. As a result, population growth will remain above the national average over the long run.

Figure 15. Population y/y percentage change, WA



Source: BIS Oxford Economics/ ABS

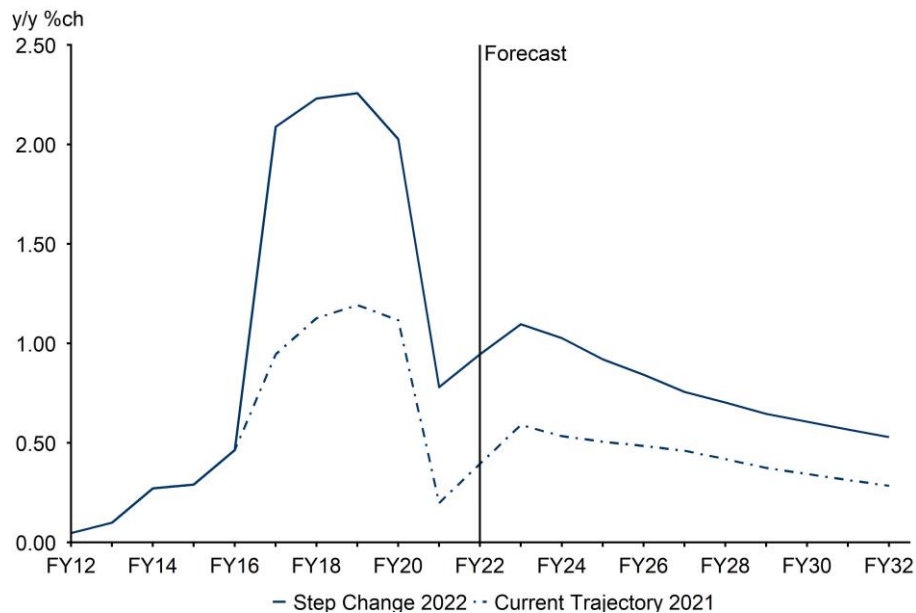
3.2.6 Tasmania

Population growth has picked up in Tasmania over recent years. This has been driven by a significant increase in overseas migration, largely from international students. Tasmania has also seen a pick-up in interstate migration inflows. With the closure of borders during the pandemic, a fall in NOM and NIM has led to a significant decline in Tasmania's population growth in FY21.

Going forward, population growth in TAS is expected to pick-up as overseas migration normalise. Beyond this, the population profile for Tasmania has been revised up compared to the 2021 forecasts due to an upward revision in the long-run outlook for NIM. The State economy's improved outlook is set to support the attraction and retainment of working migrants.

Nonetheless, the State's older population profile will cause a material drag on natural increase. This drag is expected to outsize the lift in NOM and NIM, with population growth expected to be well below the national average over the long run.

Figure. 16. Population y/y percentage change, TAS



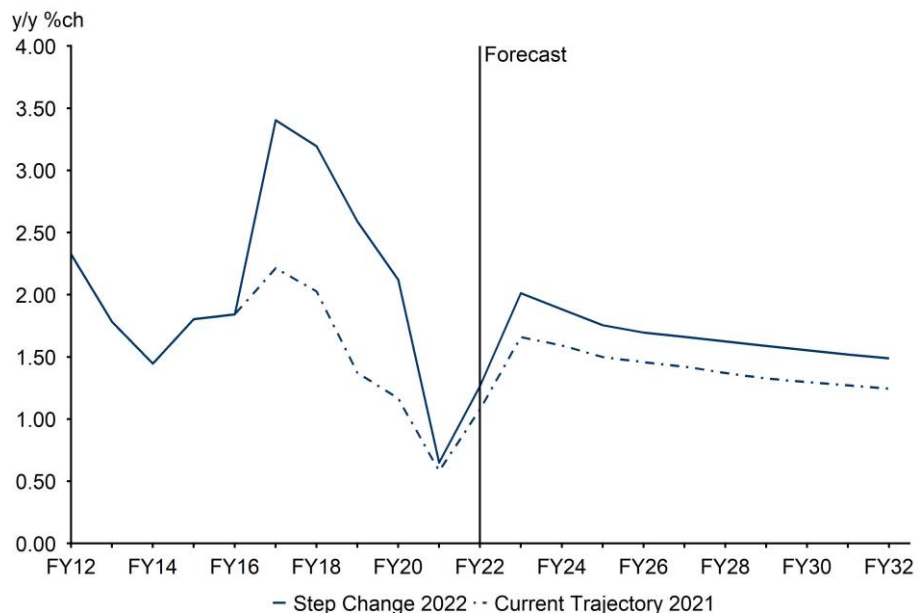
Source: BIS Oxford Economics/ ABS

3.2.7 Australian Capital Territory

The capital has seen steady growth in population over the past decade. During the pandemic, the state saw a sharp fall in population growth as NOM went negative, but this was partly offset by a pickup in NIM.

Population growth is expected to rebound in the future as overseas migrants and international students return. More broadly, the population outlook has been revised up reflecting slight upgrades to NIM and NOM over the forecast horizon. In the long run, growth is forecast to be higher than the national average.

Figure. 17. Population y/y percentage change, ACT



Source: BIS Oxford Economics/ ABS

4. *STEP CHANGE*: MACROECONOMIC OUTLOOK

- **The Australian economic rebound has been stronger than expected from the COVID-19 pandemic. Robust household consumption growth, strong labour market demand and rising wages is expected to support the domestic economy in the near-term.**
- **The emergence of new coronavirus variants, the Ukraine war, covid-related lockdowns in China and rising global inflation is weighing on the outlook and have created further uncertainty.**
- **The RBA has begun raising interest rates, earlier than anticipated, off the back of strong inflationary pressure. The RBA is expected to continue raising the cash rate to cool demand and inflation expectations.**
- **The newly elected Albanese Labour government brings with it a stronger commitment to climate action and decarbonising the domestic economy towards their commitment of net zero emissions by 2050. This is a significant policy shift since the 2021 report.**
- **Over the long run the economic outlook will continue to be dominated by population and productivity growth. Strong overseas migration will see Australia outperform most other developed economies in this scenario.**

4.1 INTERNATIONAL OUTLOOK

After a strong rebound in global activity over 2021, inflation and rising interest rates are expected to weigh on economic growth. Since the 2021 report, the emergence of the omicron coronavirus variant, covid-related lockdowns in China, the war in Ukraine and rising global inflation have further delayed the economic recovery following the COVID-19 pandemic.

The Russia-Ukraine conflict has led to higher global energy prices and added pressure to already-strained global supply chains. Oil and gas prices have climbed steeply since the start of the conflict after the European Union announced new sanctions on Russia's oil sector. Brent crude oil is forecast to average US\$113/pb this year, the highest annual average on record.

China's continued adoption of its "dynamic zero-Covid" policy adds further risk to already strained global supply chains, with the probability of lockdown measures returning remains heightened. The recent period of extended lockdowns in Shanghai was a prime example of the severe impact a period of extended lockdown has on supply chains. These disruptions have added further inflationary pressures. Annual global CPI inflation is expected to have peaked at 8.6% in the June quarter of 2022, with pressures to gradually ease over the year.

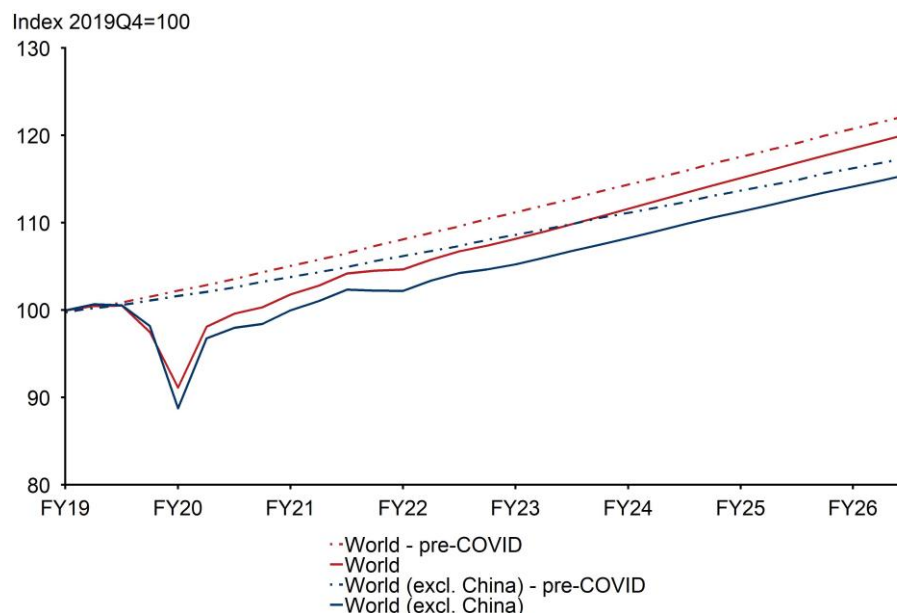
Central banks across the globe have started their monetary policy tightening cycles earlier than expected, on the back of solid growth and higher than anticipated CPI inflation data. The US Federal Reserve is expected to pursue an aggressive tightening campaign, increasing their policy rate by 250bps in total this year, after a 75bp rate hike at their June 2022 policy meeting. However, if inflation remains stubbornly high, the Fed will look to tighten even more, dampening growth. Despite many central banks pursuing aggressive rate tightening cycles, global recession risks remain low.

From 2022 onwards, world growth is expected to settle back to a pace similar to that seen prior to the pandemic. This would see the annual expansion in GDP running at 3.3% per year compared to 3.4% from 2011-2019.

Long-term growth will be fastest in India, China, and Indonesia at 4.5-5.5% per year. It is forecast to be slowest in Japan, Italy, and Russia - with the latter suffering from the impact of international isolation following the war in Ukraine, adding to existing negative influences on growth such as weak population and productivity growth.

It's expected there will be a relatively limited long-term negative impact on world GDP from the pandemic, with less financial 'scarring' than after the global financial crisis. World growth will remain held back by pre-pandemic drags including slower growth in emerging economies, unfavourable demographics, subdued investment and productivity growth, and high levels of public and private debt.

Figure. 18. Real GDP Growth



Source: BIS Oxford Economics/Haver Analytics

4.2 AUSTRALIA – NEAR TERM OUTLOOK

The Australian economy has emerged from the pandemic relatively unscathed in comparison to the experience in other countries. This was owing to timely and generous fiscal and monetary stimulus that was successful in supporting domestic consumption during the pandemic by lifting aggregate disposable incomes. The Australian economy also significantly benefited from a period of strong commodity prices for key mining exports, partially offsetting the impact of local lockdowns and the cessation of international travel.

The growth outlook for Australia is strong, despite headwinds from strong inflation. Additionally, the RBA is expected to pursue a strong rate tightening cycle as they become increasingly concerned with keeping a lid on inflation. Despite this stronger pace of rate hikes, domestic recession risks remain low. Tight labour market conditions and resilient household consumption are expected to support the domestic economy. GDP is expected to grow 4% in 2022, with growth set to return to trend levels over the next few years.

4.2.1 Household Disposable Income

The near-term outlook for household income remains resilient, despite government support falling back from its pandemic highs. The loss of overseas migration as a channel to meet labour demand has led to reports of labour and skills shortages in some sectors. The labour market is nearing or at capacity with the unemployment rate at 3.9% in May 2022. While overall wage growth remains modest, labour supply constraints are driving wage growth in select industries.

What's more, the Fair Work Commission has increased Australia's minimum wage by 5.2%. The decision was motivated by the elevated cost of living pressures, with inflation particularly fast for essential household items, as well as the strengthening of the labour market. The large minimum wage increase will further boost inflation. However, it will also shore up consumption growth, as the workers impacted have a higher marginal propensity to consume compared to other cohorts, with essential goods and services accounting for a larger portion of their spending.

It is worth noting, however, while wage growth has been modest, inflation has been running apace. Going forward, while nominal wages will continue to rise, we expect a deterioration in real wages in the near term, as rising cost of living eats into household disposable income. Beyond this, wages are forecast to pick up in line with inflation over the medium-term, leaving real wage growth steady. In the long run, wage growth is forecast to settle at a little over 3% p.a.

4.2.2 Exchange Rate

Movements in the AUD are typically influenced by a combination of commodity prices and the general health of the local and global economy.

The AUD has recently been under pressure as the Fed and the RBA start their aggressive rate tightening cycles earlier than expected, dragging on commodity and asset prices, as well as adding uncertainty to the economic outlook. These pressures led the AUD to depreciate to US\$0.69, a level not frequently seen since before the pandemic.

Australia is forecast to see strong economic growth in the near-term, despite headwinds from inflation. Australia's growing tolerance for rising COVID case numbers means the risk of stringent lockdowns is lessening, supporting a stronger outlook for real economic activity. Furthermore, LNG and iron ore prices are expected to remain resilient due to the war in Ukraine and strong steel demand to support the global infrastructure boom.

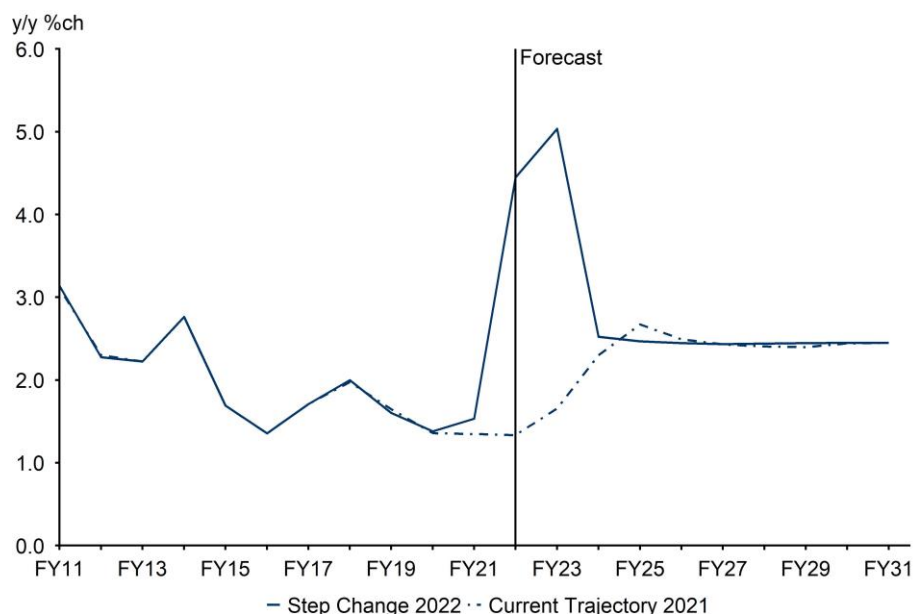
With this in mind, the AUD is expected to settle at around US\$0.80, the estimate of the equilibrium exchange rate over the medium-term.

4.2.3 Inflation Outlook

Inflation has picked up in Australia and currently sits well above the RBA’s target range, hitting 5.2% y/y growth in Q1 this year. This is a result of higher energy prices from the war in Ukraine; continuation of global supply disruptions feeding import inflation and increasing construction costs, with flow-on implications to consumer inflation. Further disruptions to global supply have been caused by China continuing to pursue an elimination strategy through stringent lockdowns. These global shocks have caused inflation to far exceed AEMO’s 2021 central scenario *Current Trajectory* projections.

The flow through of these shocks contributes to further price inflation, peaking at 6.3% in Q3 2022. These forces are anticipated to take some time to unwind. Core inflation is forecast to exceed the RBA’s target range through to early 2023.

Figure. 19. CPI y/y percentage growth, Australia



Source: BIS Oxford Economics/Haver Analytics

4.2.4 Interest Rate Outlook

Rising inflation and the strengthening labour market have led the RBA to start their rate tightening cycle much earlier than the expectations in AEMO’s 2021 central scenario *Current Trajectory*. Previously the first rate rise wasn’t expected until at least 2024.

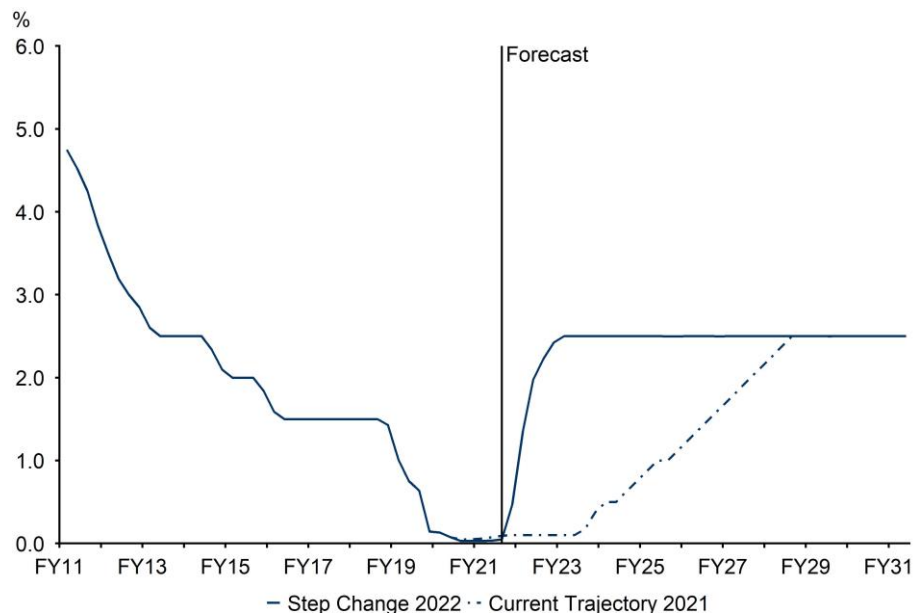
Moreover, at a Senate estimates appearance, RBA officials referred to underlying inflation having increased, and greater evidence of wage pressures from their liaison program as their reasoning for an earlier than expected rate rise⁴. The RBA is now

⁴ Commonwealth, *Economics Legislation Committee*, Senate, 6 April 2022.

expected to undergo a much more rapid tightening cycle, with the cash rate reaching 2.1% by the end of the year and reach the long-run rate much earlier, occurring now in Q3 2023.

The long-run rate remains unchanged at 2.5%.

Figure. 20. Interbank Overnight Cash Rate, Australia



Source: BIS Oxford Economics/Haver Analytics

4.3 AUSTRALIA - LONG RUN TRENDS

Moving beyond the current cycle, the long run outlook for the economy will continue to be impacted by demographics, which determine the size of the labour force, and the profile for productivity improvements.

The pandemic is expected to have caused a permanent negative impact on the size of the population, as a result of the closure of the international border and a temporary fall in the birth rate. As mentioned in Chapter 3, there isn't anticipated to be a substantial recovery of the migration flows that were missed during the pandemic. As a result, the resident labour force will be significantly smaller in the long run than was previously projected, which in turn means that the economy's productive potential will also be reduced when compared to previous projections.

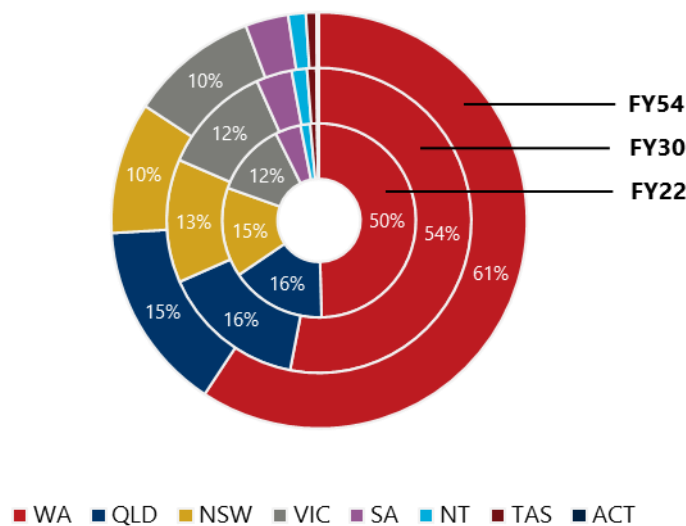
Compared to AEMO's 2021 central scenario *Current Trajectory*, the COVID-19 recession is no longer expected to have a permanent negative impact on productivity. Labour markets and the economy more generally have recovered far quicker than expected, well supported by the fiscal and monetary stimulus introduced during the pandemic.

4.3.1 Industrial Production

Industrial production is comprised of three sectors:

- Mining (55% of industrial production GVA)
- Manufacturing (31%)
- Utilities (14%)

Figure. 21. States share of industrial production (gross value added)



Source: BIS Oxford Economics/Haver Analytics

Industrial production outperformed relative to the services sector during the pandemic. All three sub-sectors of industrial production were relatively unimpacted by the restrictions on activity. Mining and manufacturing have both also benefitted from stimulatory fiscal policy and the initial rebound in activity, both domestically and overseas.

Since then, global supply disruptions and labour shortages has constrained growth in the industrial sector. The war in Ukraine and recurring lockdowns in China have created further supply bottlenecks. Despite sharp rises in coal and gas prices, mining output is constrained by production capacity. Iron ore prices have also fallen back from the record levels seen in mid-2021. Supply limitations and soaring prices have heavily impacted the production of energy intensive goods.

Moving into the long run, Australia's economy is set to undergo structural change, accelerated by the recent commitment to Net Zero emissions by 2050. The strong outlook for the mining sector, particularly in the medium run (FY25 – FY30), is supported by increased demand for natural gas, industrial commodities and new resources during the transition to a net zero emission economy. Beyond this, the growth for the emissions intensive sectors is expected to lag other sectors, particularly the services sectors.

4.3.2 Mining Sector Outlook

After a period of strong growth that followed the mining investment boom in the early 2010s, the pace of growth in mining sector output has been subdued in recent years. That said, mining investment is expected to have increased 10.3% in FY22, in response to strong commodity prices.

Production was weak through FY21, despite investment in the sector strengthening, which resulted in a decline in mining GVA. Coal production fell considerably following informal Chinese import restrictions. LNG production also fell in FY21, pulled down by disruptions at the Prelude and Gorgon facilities.

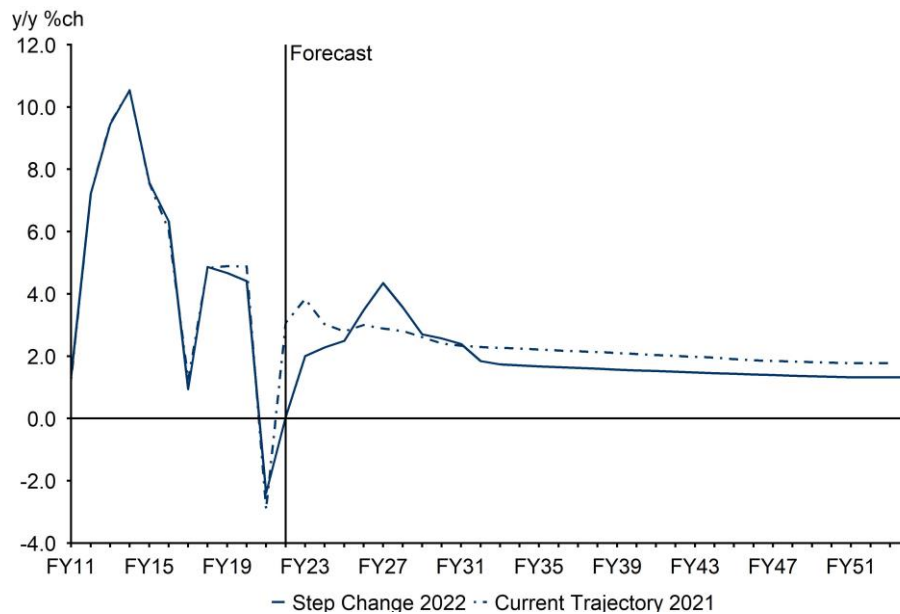
Investment in mining is forecast to record sturdy growth through to FY24, as major oil and gas projects commence. However, the forecasted rebound in oil and gas investment could be delayed if market conditions deteriorate, projects start facing funding difficulties, or labour shortages persist. Oil prices are expected to remain high - aided by the recent Russia-Ukraine conflict - which should ensure that the next wave of facilities are profitable when they come online. As around three-quarters of Australia's LNG is sold through long-term contracts, which are linked to the price of crude oil with a three-to-six month lag, producers should therefore benefit from the ramp up in oil prices due to the Russia-Ukraine conflict over the latter half of this year.

The growth outlook for mining GVA is underpinned by a ramp up of iron ore production as new mines come online. Limited production capacity is expected to be added in the LNG and coal sectors despite a near-term pickup in investment, with several projects designated as capital replacement projects (either expansions or new projects) for depleting reserves/deposits.

By commodity, natural gas and industrial metals will continue to outperform, with newer resources such as lithium becoming more important. Coal production will lag, as thermal coal is particularly impacted by climate change policy nationally and internationally. Moreover, the trade tensions between Australia and China have dampened the outlook for coal investment. While current export volumes suggest that new export destinations have somewhat offset the loss in demand from China, the outlook is still impacted. Though there isn't expected to be any further deterioration, it's also unlikely there will be a swift resolution or prompt return to previous trends.

The mining sector is expected to pick-up pace in the medium-term, supported by additional output from iron ore, coal and other metals projects coming online. Growth in the sector is expected to settle back to long run trends in the mid-2030s. Our long run growth outlook is much weaker than the long run outlook under the *Current Trajectory* scenario (AEMO's 2021 central scenario) as the government's commitment to a 2050 net zero target brings with it a stronger decarbonisation pathway. This year's *Step Change* scenario also features greater global coordination to reduce emissions, containing climate warming to 1.8°C by 2100. This faster transition to renewable energy sources sees reduced demand for fossil fuels in the long run.

Figure. 22. Mining GVA y/y percentage change, Australia



Source: BIS Oxford Economics/Haver Analytics

4.3.3 Manufacturing Sector Outlook

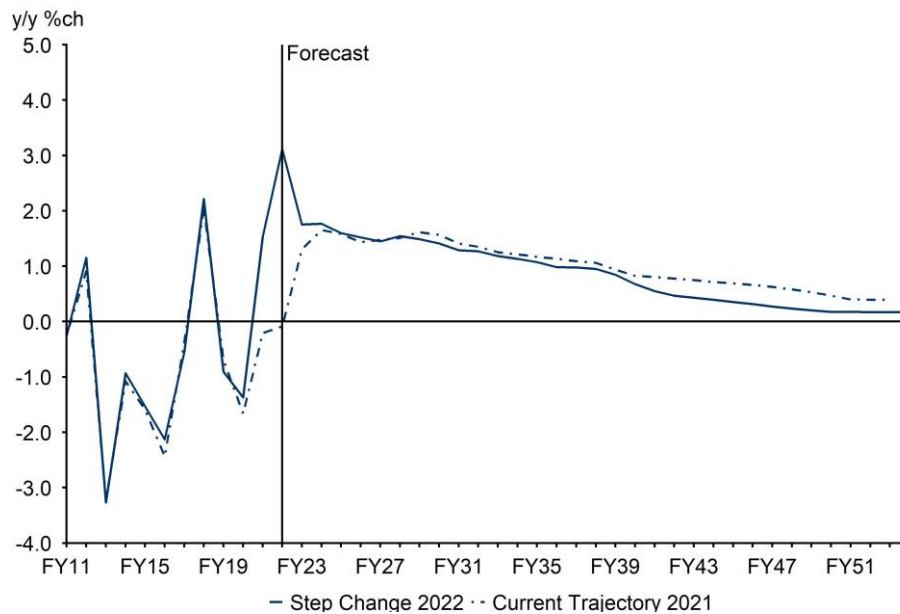
After a period of decline through most of the 2010s, the manufacturing sector had been showing tentative signs of trending up pre-COVID. This was particularly evident in the high value added sectors such as food processing and petrochemicals, where Australia has a natural comparative advantage.

After an initial drop in manufacturing GVA at the start of the pandemic, output has recovered quickly and is now at its highest level since FY14. The past two years have seen spending on services curtailed, leading consumers to switch to goods, while businesses are increasing their demand for machinery and equipment and other capital goods in response to the government's tax incentives.

Current production continues to be plagued by supply disruptions and cost inflation dampening growth. Supply limitations and soaring prices have disrupted petroleum-related goods production. Commodity prices continue to be boosted by the war in Russia-Ukraine conflict, but capacity will limit the upside for production.

Growth is expected to gradually moderate as consumption patterns continue to normalise, converging to long run trend growth beyond FY24. The strong pipeline of work in the construction sector will provide a steady demand base for materials in the medium-term. In the long run, the manufacturing sector is expected to lag behind the rest of the economy, averaging 0.6% annual growth. The long run growth outlook for the manufacturing sector has been moderated since the 2021 report. The *Step Change* scenario sees a slightly faster transition in the economy towards the service sectors along with weaker than anticipated business investment over the past year, slowing the growth in capital stock.

Figure. 23. Manufacturing GVA y/y percentage change, Australia



Source: BIS Oxford Economics/Haver Analytics

4.3.4 Utilities Outlook

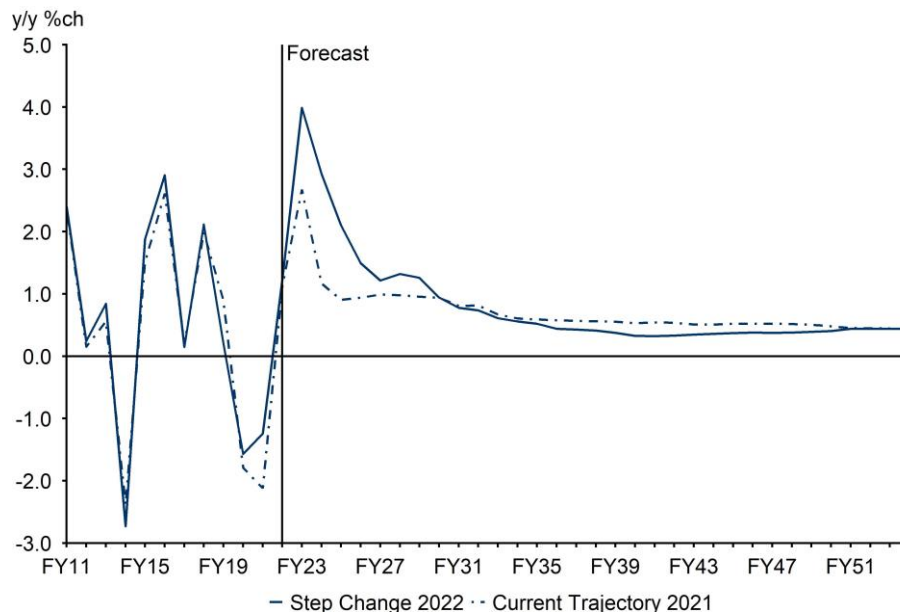
The closure of much of the economy during the pandemic resulted in a fall in utilities consumption and as a result output fell sharply in 2020. Since then, output has recovered quickly alongside a strong rebound in economic activity in FY22. However, the unusually cool weather and heavy rainfalls has reduced the demand for water supply services.

Our near-term outlook has improved significantly since the 2021 report. Despite domestic electricity and gas prices picking up strongly, largely as a result of the Russia-Ukraine war as well as unexpected generator outages, the inelasticity of utilities demand has mitigated the downwards pressure on volumes. Activity in the sector is expected to see strong growth in FY23 as prices ease and industrial activity normalises.

Australia’s commitment to a 2050 net zero target in late 2021 as well as the newly elected Albanese government bringing with it a stronger decarbonisation mandate, activity in the utilities sector is expected to remain strong in the medium-term. The government’s *Powering Australia Plan* features stronger emissions reduction targets which are expected to increase activity in the utilities and construction sectors as the domestic economy transitions towards net zero.

Over the long run, continued improvements in energy and water resource efficiency will dampen the growth in the utilities sector caused by population growth. This will result in the pace of growth of the utilities sector lagging the rest of the economy.

Figure 24. Utilities GVA y/y percentage change, Australia



Source: BIS Oxford Economics/Haver Analytics

4.3.5 Services Sector Outlook

The Services sector, which bore the brunt of the impact of domestic lockdowns, rebounded strongly through 2021. Indeed, this stellar recovery was much faster than anticipated in AEMO's 2021 central scenario *Current Trajectory* projections. This was off the back of generous and timely fiscal stimulus to drive the economic recovery as well as a strong rebound in consumption and activity. The services sector is forecast to grow strongly over FY23, increasing 4.3% over the year. This strong growth outlook is primarily driven by solid domestic demand and a nascent recovery in the tourism-related sectors.

For the private sector, those services that were highly affected by the pandemic are expected to grow sharply over the coming year as activity normalises. Hospitality output has recovered strongly, benefitting from pent up demand. The sector is expected to surpass pre-covid levels by the end of 2022. Transport services have also started to rise sharply in line with rising mobility indicators and greater demand for air travel. Further normalisation of travel flows will support activity in the sector. Activity in the arts and recreation service sector also rose sharply following the easing of restrictions, with further growth expected in the near-term as the industry returns to its pre-pandemic level of activity.

The business services and IT service sub-sectors remained resilient through the pandemic as many workers were easily able to transition to work from home arrangements. The outlook for output in these sectors is strong, supported by ongoing demand for white-collar services to support the economic rebound. Heightened construction activity will drive the need for engineering and professional services in the medium-term.

Some private sectors, such as retail and wholesale trade, boomed during the pandemic. Output rose sharply on the back of very supportive fiscal and monetary policy settings. These sectors also benefitted from the disruption to consumption patterns caused by lockdowns and activity restrictions. Now that these policy settings have been wound back

and consumption patterns normalised, growth in these sectors has fallen back from their pandemic highs. Real estate services output has already started to fall in Q1 2022, reflecting slower turnover in housing markets. The RBA has begun to tighten monetary policy at a faster rate than previously expected, which will dampen real estate activity. Further lacklustre performance is forecast in the near-term as both residential and non-residential sectors adjust to higher interest rates.

Table 1. Composition of Services GVA: FY22 vs. FY54

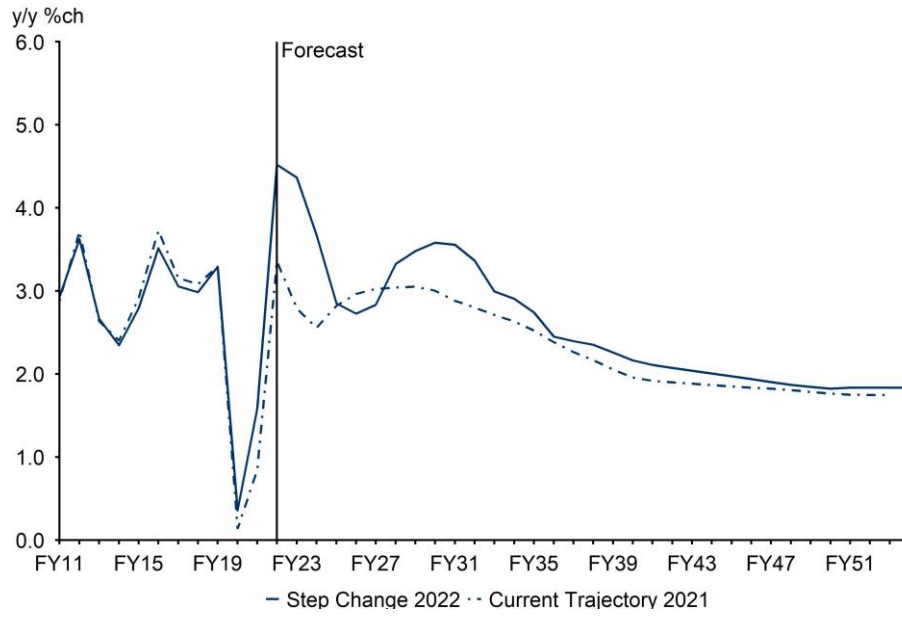
	FY22	FY54
Accommodation and Food Services	3.1%	3.3%
Administrative and Support Services	5.8%	5.6%
Arts and Recreation	1.3%	1.4%
Education and Training	8.2%	5.3%
Finance and Insurance	13.0%	12.6%
Health Care & Social Assistance	13.4%	16.6%
Information, Media and Telecom	4.1%	4.1%
Other Services	2.7%	2.3%
Prof, Scientific and Technical Services	12.6%	16.4%
Public Administration and Safety	9.2%	7.2%
Rental Hiring and Real Estate Service	5.0%	4.5%
Retail Trade	7.3%	6.6%
Transport Postal and Warehousing	7.5%	7.5%
Wholesale Trade	6.8%	6.4%

Source: BIS Oxford Economics/Haver Analytics

After two strong years of growth in healthcare services through the pandemic, growth is expected to ease back over the next two years. The sector is anticipated to be supported by the ongoing delivery of vaccinations and booster shots keeping demand for GPs elevated. Ongoing investment and expanding capacity as the population ages will support activity in the sector over the medium-term. The public administration and safety sector is expected to follow a similar profile to healthcare services. After growing strongly through to FY20, growth has eased back. Over the long run, the sector is expected to underperform the national average.

Overall, the service sector is expected to continue to grow faster than the national average in the long run, and as a result, increase its share of output over time.

Figure. 25. Services GVA y/y percentage change, Australia



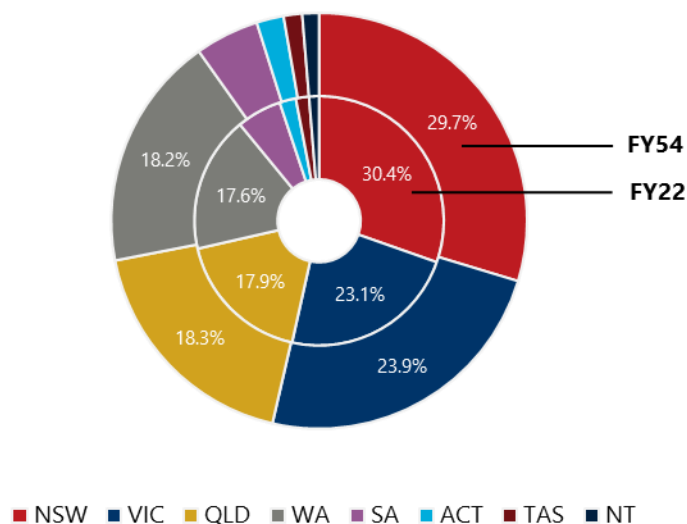
Source: BIS Oxford Economics/Haver Analytics

5. STEP CHANGE: STATES OUTLOOK

- A faster paced recovery than previously anticipated has led to a revision up for GSP across states through FY23. However, real household disposable income has been revised down for most states through FY23 as strong inflationary pressures erode consumer and business confidence.
- In the near-term, states that were most impacted by the COVID-19 pandemic will grow faster, as they catch up in economic recovery. The reopening of borders will be a further tailwind for this. As a result, NSW, VIC and QLD are expected to be outperformers.
- In the long run, GSP growth is generally in line with the states' demographic trend. A slower pace of population growth in NSW results in a decline in its share of GDP. Meanwhile VIC, QLD and WA will see an increase in their share of GDP, while SA and TAS continue their trend decline.
- The long-term outlook remains broadly unchanged from last year. This reflects similar structural fundamentals that were in place prior to the pandemic.

NSW and VIC are expected to contribute the most to incremental growth over the forecast horizon. Much of this will be concentrated in the services and construction sectors. QLD and WA are the next highest-performing states. Although services are also a strong driver for these states, mining and manufacturing play a much bigger role compared to the other states. This is particularly the case for WA, as mining and manufacturing combined will present the majority of the state's output over the forecast horizon.

Figure. 26. States shares of GDP



Source: BIS Oxford Economics/Haver Analytics

5.1 STATE MACROECONOMICS

5.1.1 New South Wales

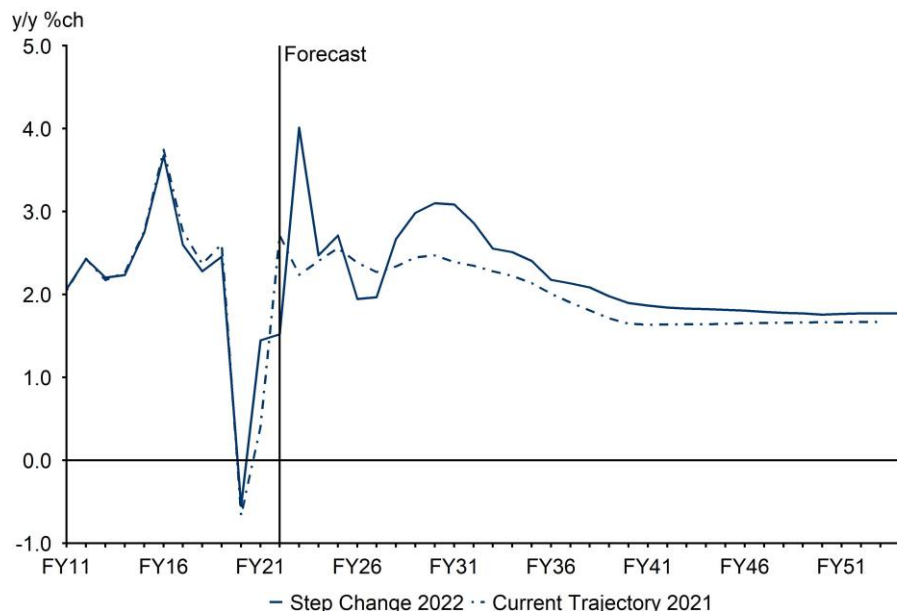
NSW's economic recovery was stronger than expected in FY21, with output growing 1.5% y/y. The strong rebound has continued through FY22, led by strong consumer spending as households' savings rate continue to normalise.

In the near-term, pent-up demand for services consumption is expected to support consumption growth through FY23. Additionally, the reopening of international borders is expected to provide a boost to the state's services export. While the outlook is relatively positive, there remain concerns over the impact of rising interest rates and high inflation in the near-term. An increase in the cost of essential goods will add pressure on household budgets, dampening discretionary spending.

The key industries driving near-term growth have not changed since the 2021 forecasts. Activity in financial and professional services remain the largest contributors to state output. These sectors are expected to continue driving activity over time. Additionally, elevated public sector activity and a strong pipeline of work in infrastructure projects and residential construction will also support the state's economic recovery. As a result, above-trend growth is expected to persist until mid-2020.

GSP growth will moderate and return to its long-run trend as investment and public spending are pulled back. The longer-term impacts of COVID-19, such as weaker migration flows and hysteresis effects in higher education and tourism-exposed industries, are expected to weigh on growth. The services sector is expected to contribute the most to economic growth, as the state continues to transition to high value-added sectors such as financial services.

Figure. 27. GSP y/y percentage change, NSW

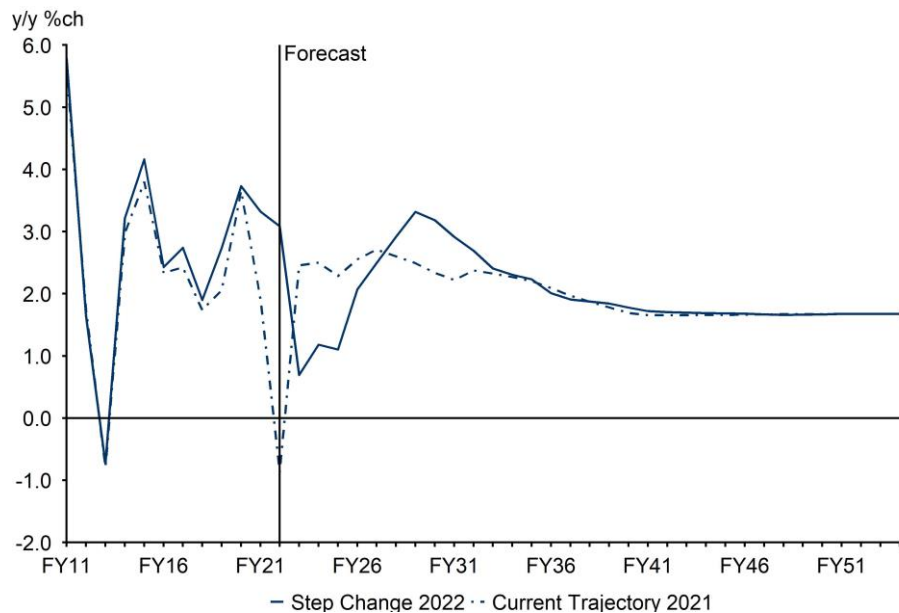


Source: BIS Oxford Economics/Haver Analytics

Household income was temporarily lifted through the pandemic as a result of government supports for the economy. With some of the support continuing through to late-2021 following the Delta and Omicron outbreaks, income levels are now expected to

remain lifted in FY22. Additionally, the strong labour market is expected to lift wages significantly in FY22, supporting household income. Going forward, income is expected to fall with the unwinding of government support. Furthermore, high levels of inflation are expected to persist through FY23 and outweigh nominal wage growth, thereby reducing household purchasing power. Income growth is expected to recover by FY25 as the economy normalises and demand for labour picks up again. In the long-run, income growth is expected to match GSP (implying labour's share of output remains constant). Income growth is expected to settle at an average of 1.7% p.a. in the long run.

Figure. 28. Household disposable income y/y percentage change, NSW



Source: BIS Oxford Economics/Haver Analytics

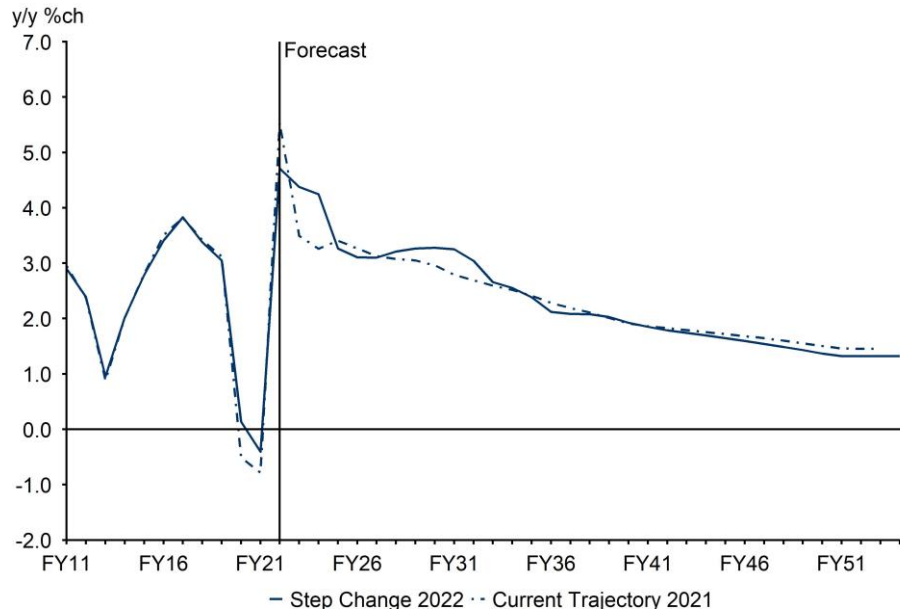
5.1.2 Victoria

Like NSW, the Victorian economy was relatively exposed to the COVID-19 pandemic. In particular, the state was heavily affected by a loss of international students. The VIC economy is expected to bounce back in FY22, with output growing 4.7% in FY22. Going forward, growth is expected to remain relatively high in the near-term.

As in other parts of the country the recovery is being driven by direct government spending and indirect support for the private sector. A pick-up in infrastructure projects, road maintenance and residential dwelling construction will support the construction sector in the near-term. This will also benefit related sectors such as finance, professional, and technical services. However, labour and material shortages are expected to delay the speed at which the work can be done. Therefore, the pick-up in activity is expected to be spread out over a prolonged timeframe.

The recent outflow of people to other states is expected to reverse over the long run. This will be driven by an improvement in economic conditions and the end of lockdowns for the state. Melbourne's favourable fundamentals and the city's focus on economic development are expected to continue to drive strong jobs growth. Together with a return of international migrants, population growth in VIC is projected to return to above-average levels. Overall, this reinforces the state's economic outperformance over time.

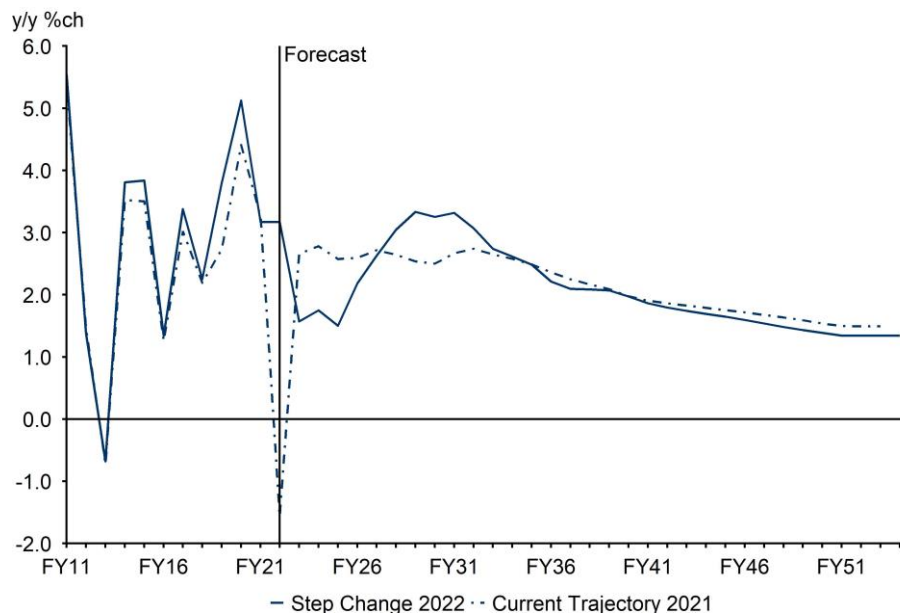
Figure. 29. GSP y/y percentage change, VIC



Source: BIS Oxford Economics/Haver Analytics

With the rebound in the Victorian economy, a steady growth in employment will support household disposable income in FY22. Employment growth, and consequently household disposable income are projected to remain modest over the near-term. This largely reflects the demographic outlook for VIC. Inward migration flows are expected to recover and turn positive, which will support employment and output growth in the long run. While a tighter labour market is supportive of wages growth, high levels of inflation is expected to dampen real incomes through FY23. The long-run growth rate for household disposable income in VIC is projected to settle at an average of 1.7% p.a.

Figure. 30. Household disposable income y/y percentage change, VIC



Source: BIS Oxford Economics/Haver Analytics

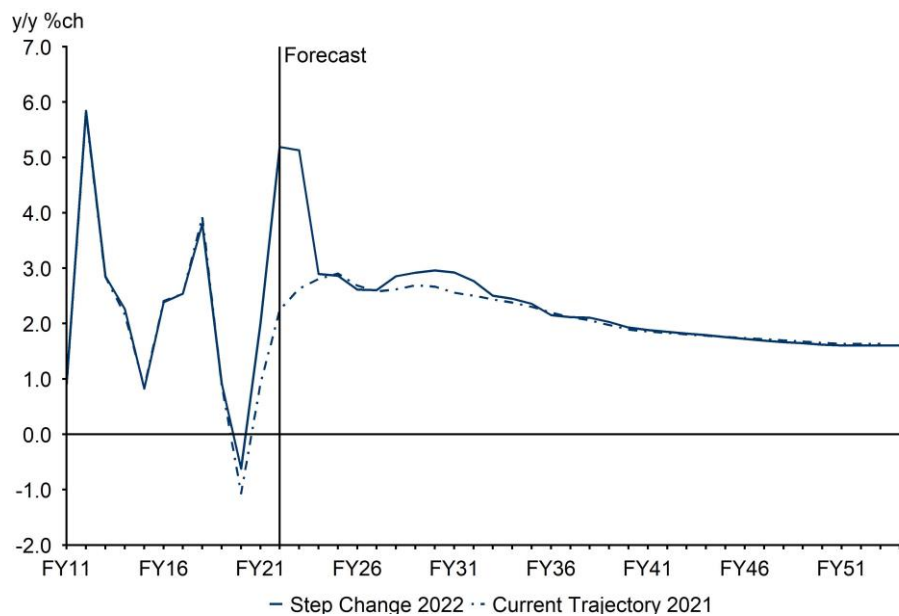
5.1.3 Queensland

The QLD economy has outperformed the other major states through the pandemic. Relatively low case numbers (and so limited restrictions on activity) coupled with an upturn in interstate migration flows have driven their strong rebound through FY22. The state’s output is expected to grow 5.2% in FY22 and 5.1% in FY23, driven by solid fundamentals coming from strong levels of employment and the return of tourism. Additionally, a pick-up in investment over the medium-term will support growth.

Mining investment is set to provide medium-term support for the economy. This will come from firms replacing worn-out capital and expanding capacity to support a surge in international trade. In addition, government support for residential construction activity, and an acceleration in government infrastructure projects are expected to support economic activity over time. The 2032 Olympics is also expected to bolster the outlook from the mid-2020s, with public investment picking up in FY26.

Over the long run, the economy is expected to broadly align with the national average. GVA growth in QLD is expected to average around 1.9% p.a. The services (particularly public services and professional services), mining and construction sectors are anticipated to drive a major share of economic growth, making up around 90% of total GVA by 2054.

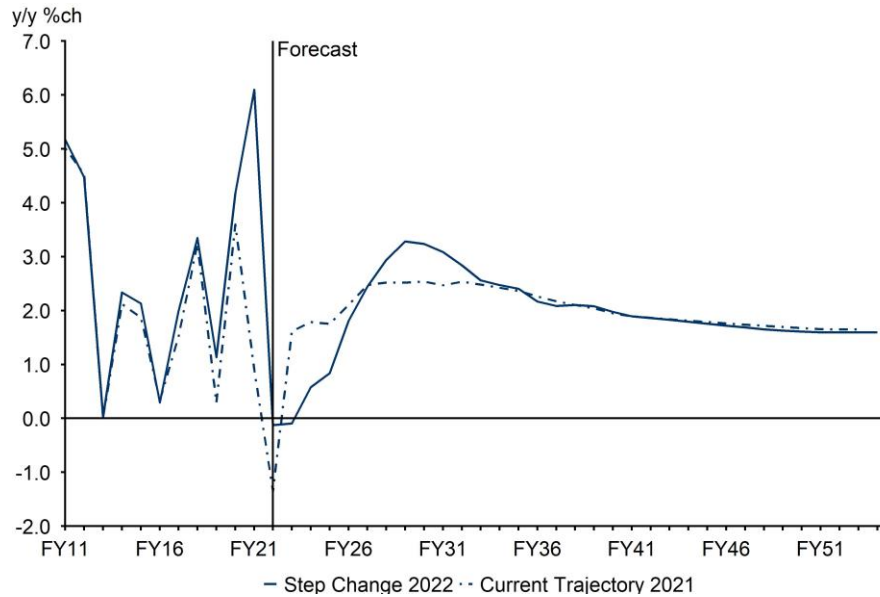
Figure. 31. GSP y/y percentage change, QLD



Source: BIS Oxford Economics/Haver Analytics

Growth in household disposable income has been relatively robust in recent years. This is underpinned by solid gains in non-employment income including interest earnings and rental income from investment properties. Most recently the pace of growth has accelerated sharply, driven by the temporary COVID-19 government support and strong growth in employment. The pace of income growth is expected to fall as these drivers are wound back. However, the strong labour market is expected to support growth to a greater extent than previously predicted. The near-term outlook on income growth has been revised up, reflecting stronger economic fundamentals. These fundamentals include solid employment growth, and subsequently wage growth. In the long-term, the pace of growth is expected to broadly align with GSP growth, at an average of 2.0% p.a.

Figure. 32. Household disposable income y/y percentage change, QLD



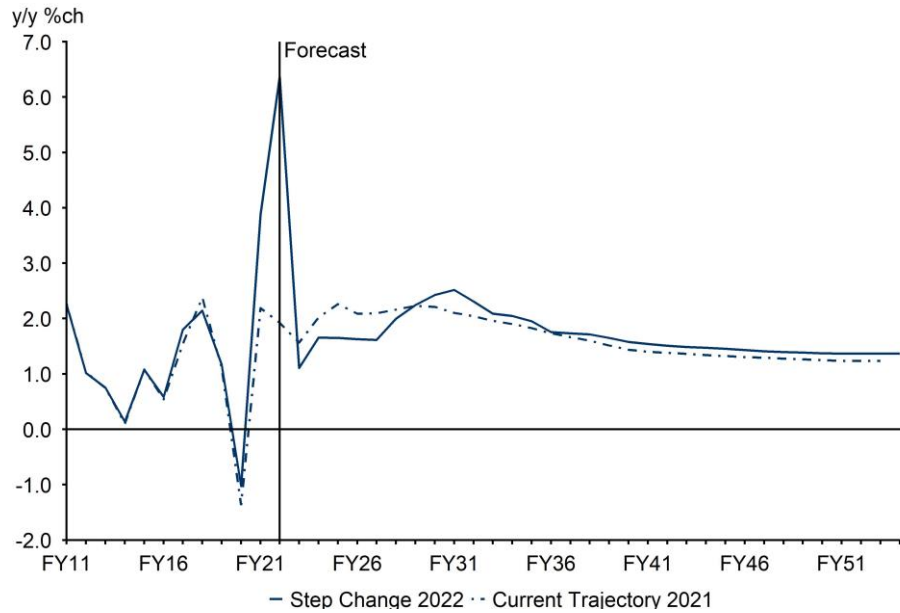
Source: BIS Oxford Economics/Haver Analytics

5.1.4 South Australia

Prior to the pandemic, the SA economy saw relatively weak growth following the financial crisis. During this period, the SA economy was hampered by the strength of the AUD and consequently accelerated the decline in the local manufacturing sector. However, the economy has enjoyed a strong recovery path following a modest contraction at the onset of the pandemic. Activity in SA has been supported by the HomeBuilder program and complementary state government grants, which have driven a strong uptick in residential construction. Favourable housing affordability and a strengthening economy are expected to attract migration from NSW and QLD, and thereby support growth in the near-term. The state is expected to also see a boost to demand with the return of international students.

Looking ahead, the pace of growth is anticipated to peak in FY22 before falling back to trend by the mid-2020s. Supporting the economy is spending on several defence programs by the Federal government including military vehicles and the Australian Space Agency in Adelaide. However, the government has recently cancelled a submarine contract with French contractor Naval Group. This has generated considerable uncertainty around defence work that was expected to take place in SA. Nonetheless, future defence work is still expected to be based in Adelaide, which will generate positive spillovers to business investment activity. While the near-term outlook has improved, the SA economy is still expected to underperform relative to the major states, reflecting SA's relatively weak demographic outlook in the long run.

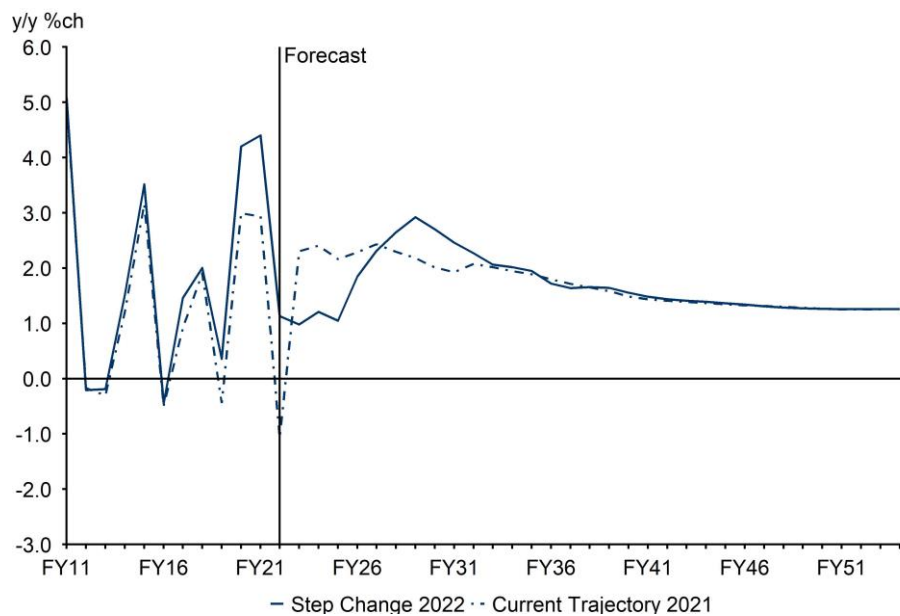
Figure 33. GSP y/y percentage change, SA



Source: BIS Oxford Economics/Haver Analytics

A stronger than expected recovery from the pandemic has supported household disposable income in SA through FY22. However, in line with its demographics, the pace of employment growth in SA generally lags behind the rest of the economy. This slower pace is reflected in both GSP and household disposable income, with both set to underperform relative to the national average. Additionally, higher inflation is expected to also weigh on real incomes in SA over the near-term.

Figure 34. Household disposable income y/y percentage change, SA



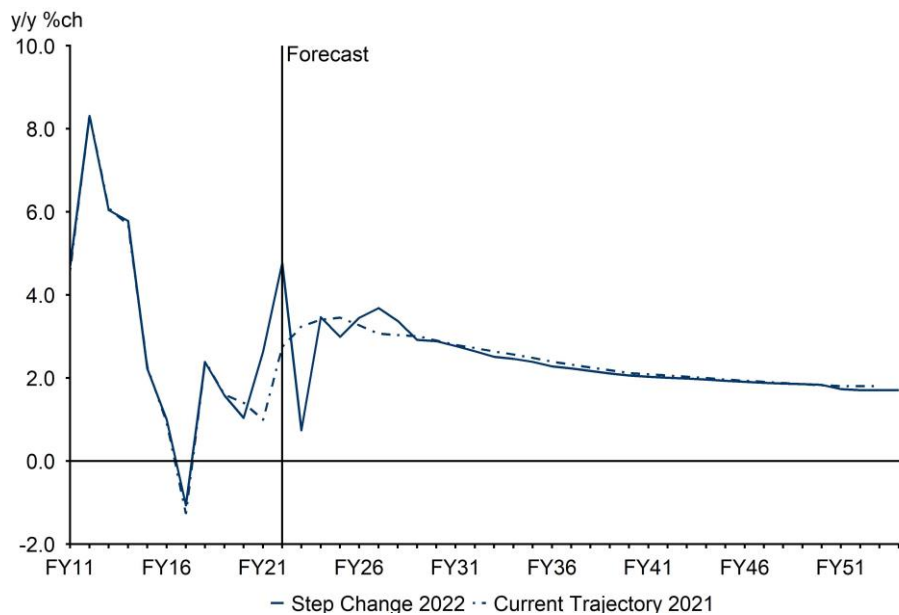
Source: BIS Oxford Economics/Haver Analytics

5.1.5 Western Australia

The WA economy has seen a strong recovery from the pandemic, with output expected to grow another 4.8% in FY22. A relatively mild experience of the pandemic and early relaxation of restrictions meant that trading conditions normalised ahead of the Eastern states. WA has also been well supported by strong demand for mining exports and consequently higher commodity prices. The surge in commodity prices is expected to help fuel resource investment and bolster the economic outlook in the short term. The strong pipeline of work generated by the HomeBuilder program will also support growth in the short term.

Going forward, the economy is expected to grow faster than the national average in the medium-term (3.1% p.a) before settling at an average of 2.1% p.a. in the long-term. This reflects investments and positive spillovers associated with the Perth City Deal, as well as a positive outlook on population growth.

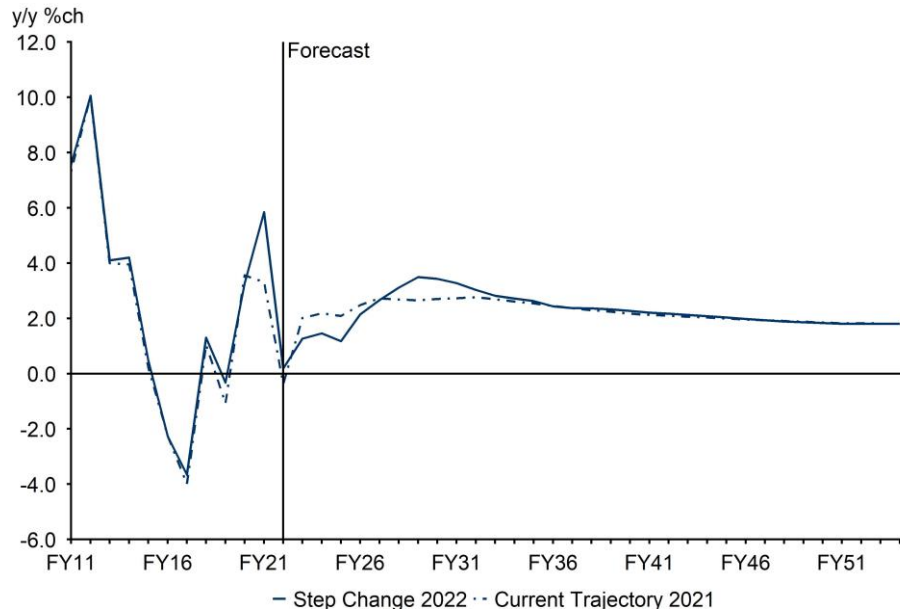
Figure. 35. GSP y/y percentage change, WA



Source: BIS Oxford Economics/Haver Analytics

The growth rate of household disposable income has broadly tracked GSP in recent years. As in other states, income growth has picked up in FY21 but will fall in FY22 as the government supports are unwound and employment growth slows. Over the long run, growth in income is expected to align with GSP growth, at around 2% p.a.

Figure. 36. Household disposable income y/y percentage change, WA



Source: BIS Oxford Economics/Haver Analytics

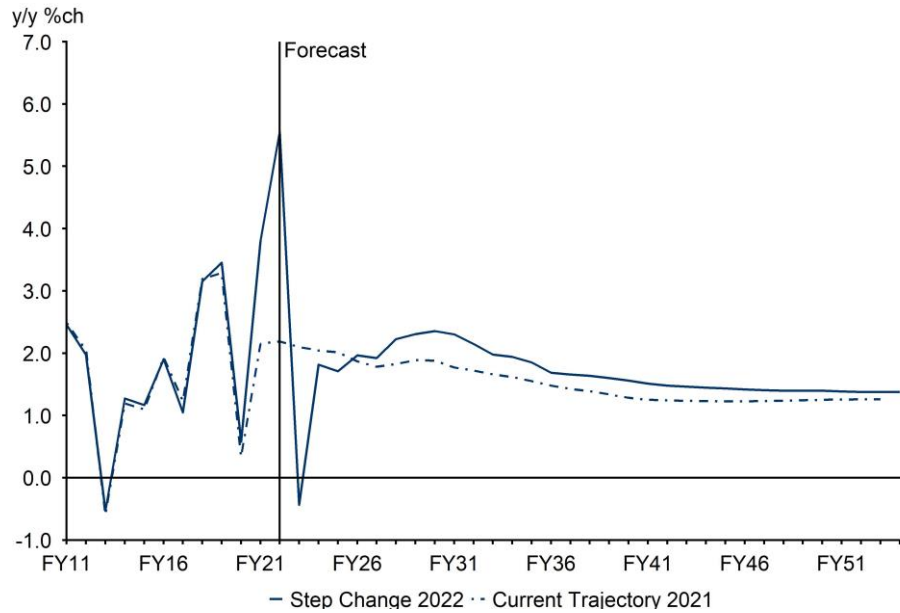
5.1.6 Tasmania

Like the other states, the Tasmanian economy has enjoyed a strong rebound from the pandemic due to greater public spending and a lift in investment. The economy is expected to grow 5.6% in FY22 before contracting in FY23 with the withdrawal of government support.

The agriculture sector makes up a relatively large share of the state's output. The worsening of competitiveness and trade tensions are expected to weigh on exports, placing pressure on the agriculture sector. However, rising commodity prices will provide the industry with some support and momentum in the short term.

Over the long run, GSP is expected to slow and revert to a trend that is moderately below the national average. Driving this will be a moderation in inward migration, with workers attracted to the other states with a stronger economic outlook.

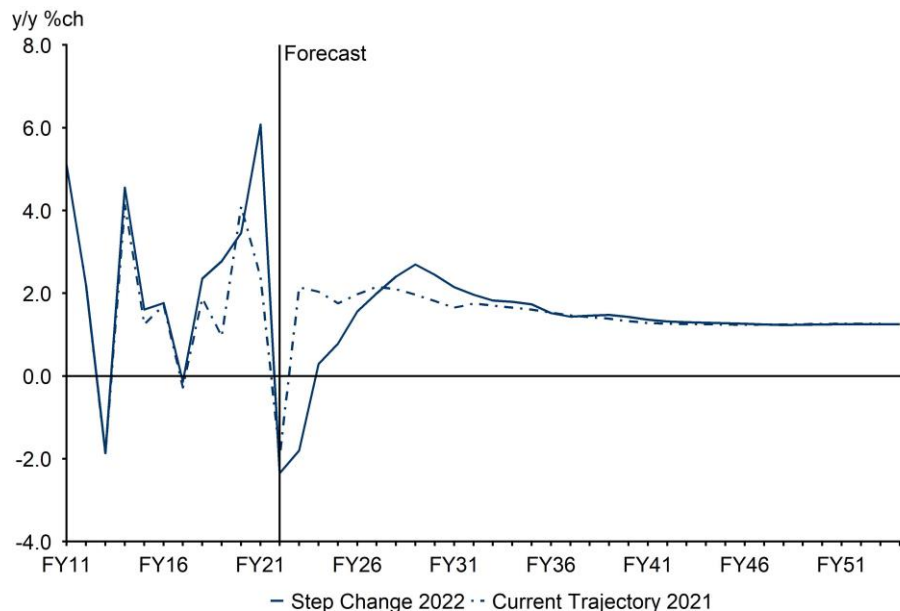
Figure. 37. GSP y/y percentage change, TAS



Source: BIS Oxford Economics/Haver Analytics

The profile for household income will mirror most other states. Disposable household income is expected to fall modestly in FY22 as government supports are removed. Over the medium and long run, the pace will broadly match GSP, at around 1.3% p.a.

Figure. 38. Household disposable income y/y percentage change, TAS



Source: BIS Oxford Economics/Haver Analytics

5.1.7 Australian Capital Territory

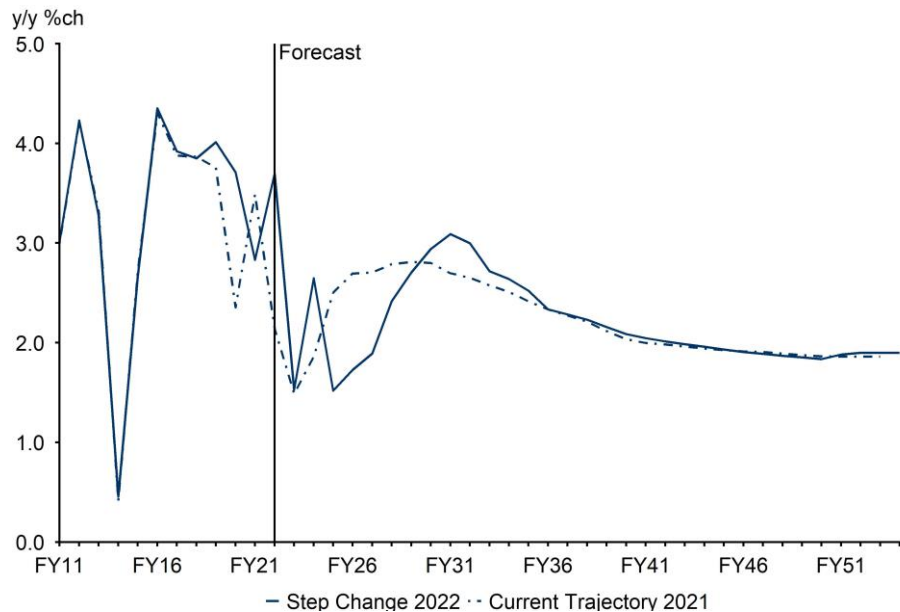
The Australian Capital Territory (ACT) is home to the Australian Public Service. Its economy is based around service delivery and public administration. After remaining relatively steady through the first wave of the pandemic, the Delta and Omicron variants have had a more pronounced (but still relatively small) impact on the economy.

Lockdowns and heavy restrictions hit household consumption, dwelling investment and non-residential construction in FY21. However, the pick-up in public demand provided a significant offset to these falls.

The ACT should experience relatively robust growth over the near-term, with a strong labour market outlook expected to underpin growth in state demand. Nonetheless, growth will dampen as government spending unwinds and the current environment of rising interest rates and high inflation begins to weigh on consumer spending.

Over the long run, the outperformance of ACT compared to the national average will resume. This will be driven by strong population growth and a high participation rate. The services sector is expected to remain the primary driver of the capital's economic growth. We expect that the services sector will account for 90% of gross state product over the forecast horizon, with much of the growth continuing to come from public services.

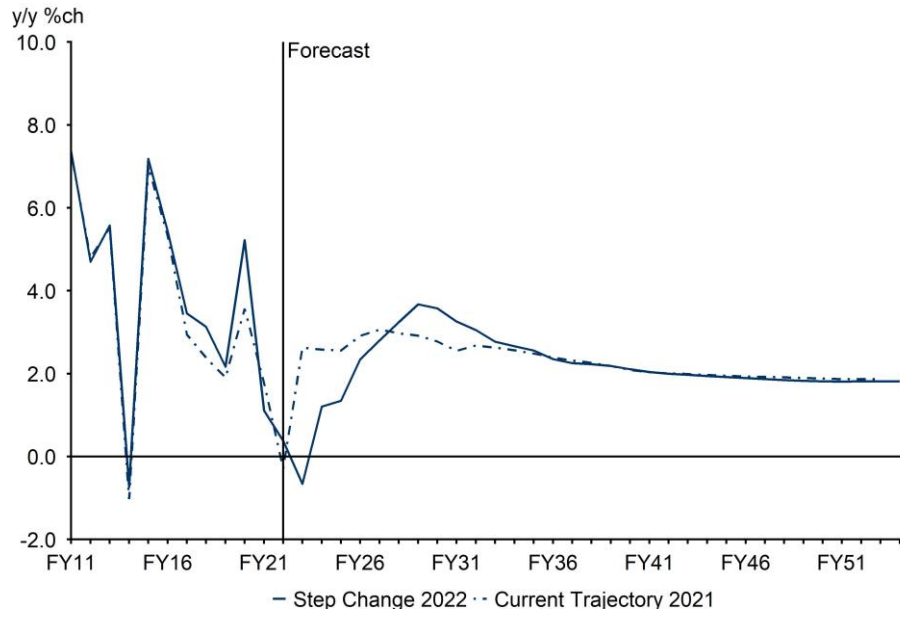
Figure. 39. GSP y/y percentage change, ACT



Source: BIS Oxford Economics/Haver Analytics

As in most other regions, the growth in household income will weaken in FY22. Incomes are then expected to fall in FY23, before picking up at a somewhat moderate pace as economic conditions improve in other parts of the country (and so attract workers), and labour market tightness subsides, dampening income growth. In the long-run, income growth trends with economic growth, and is projected to gradually slow to around 1.9% p.a.

Figure. 40. Household disposable income y/y percentage change, ACT



Source: BIS Oxford Economics/Haver Analytics

6. PROGRESSIVE CHANGE SCENARIO

- The *Progressive Change* scenario assumes slower population growth relative to the *Step Change* scenario. The near-term global disruptions weigh on the Australian economy and a generally weaker outlook on economic activity makes Australia less attractive to overseas migrants.
- Overall investment and output are expected to be lower in Australia due to a lower population base. By 2054, GDP in the *Progressive Change* scenario is expected to be 8.5% (\$364 billion) lower than in the *Step Change* scenario.
- The industrial production sector is the largest contributor to the differences in gross output in this scenario. Weaker global efforts to decarbonise lead to greater mining investment and activity in Australia compared to the *Step Change* scenario.
- Changes in the distribution of economic activity across states largely reflect slower population growth and a greater share of industrial production. Western Australia and Queensland are expected to benefit from the greater role of mining. Meanwhile, New South Wales and Victoria are expected to be more affected by the reduction in overseas migrants.

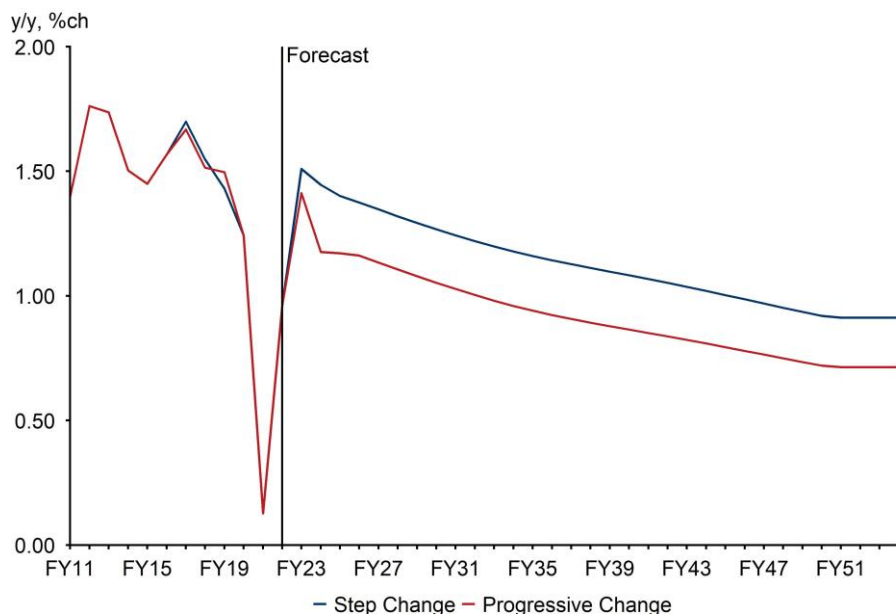
The *Progressive Change* scenario is characterised by lower population growth and a slower pace of technological progress in Australia compared to the *Step Change* scenario. This scenario also considers near-term risks to economic growth in Australia arising from a worsening of the COVID-19 situation in China and prolonged global supply disruptions. Furthermore, global efforts towards decarbonisation is weaker in this scenario. This places the world on a higher warming pathway of 2.6°C by 2100 (RCP 4.5). Domestically, there is a slower pace of investment towards decarbonisation due to a greater reliance on fossil fuels around the world. Nonetheless, Australia still achieves net-zero emissions by 2050 which will require an increase in investment towards green technology, though this is relatively delayed compared to the *Step Change* scenario.

6.1 DEMOGRAPHICS

Population growth in the *Progressive Change* scenario is expected to be lower compared to the *Step Change* scenario in both the near-term and the long-term. This is driven by lower levels of assumed net overseas migration (NOM) over the forecast period.

In the short term, a worsening of the COVID-19 containment measures in China discourages temporary migration from China, including Chinese students. However, this is expected to be a short-lived impairment to overseas migration. As these headwinds unwind, NOM is expected to return to an average of 194,000 people p.a. over the long run. This is in contrast to the *Step Change* scenario which projects net overseas migration of 250,000 people p.a.

Figure. 41. Population Growth, Step Change vs. Progressive Change, Australia



Source: BIS Oxford Economics/Haver Analytics

The weaker overseas migration profile is expected to take off approximately 0.2 ppts from national population growth each year over the forecast horizon. Population in Australia is expected to reach 34.7 million people by 2054, which is 6.4% (2.4 million people) lower than the *Step Change* scenario. While all states experience relatively lower economic growth outcomes relative to *Step Change*, the states of NSW & VIC continue to be the most exposed to these differences.

6.2 MACROECONOMIC OUTLOOK

In the near-term, global and domestic headwinds weigh on Australia’s recovery from the pandemic. The prolonged Russia-Ukraine conflict continues to raise commodity prices globally and add to global supply disruptions. Additionally, further outbreaks of the COVID-19 virus in China result in the return of their zero-COVID policy, further prolonging global supply disruptions. These factors will further add to inflationary pressures in Australia. The increase in the cost of living is expected to continue outpacing wage growth. As a result, real household disposable income will fall. Furthermore, the Reserve Bank of Australia (RBA) will likely respond with a more aggressive monetary policy stance, compared to the *Step Change* scenario, to tame inflation.

High levels of inflation and increasing interest rates will weigh on consumer and business confidence in the near-term. The catch-up growth in discretionary spending, especially for services, has been a key driver of the recovery in the domestic economy. However, households now have less income and are less likely to spend on discretionary goods and services, due to the increase in the cost of living. Meanwhile, private investment falls further as businesses are less optimistic about consumer spending and face higher borrowing costs and greater uncertainties surrounding the domestic and global recovery.

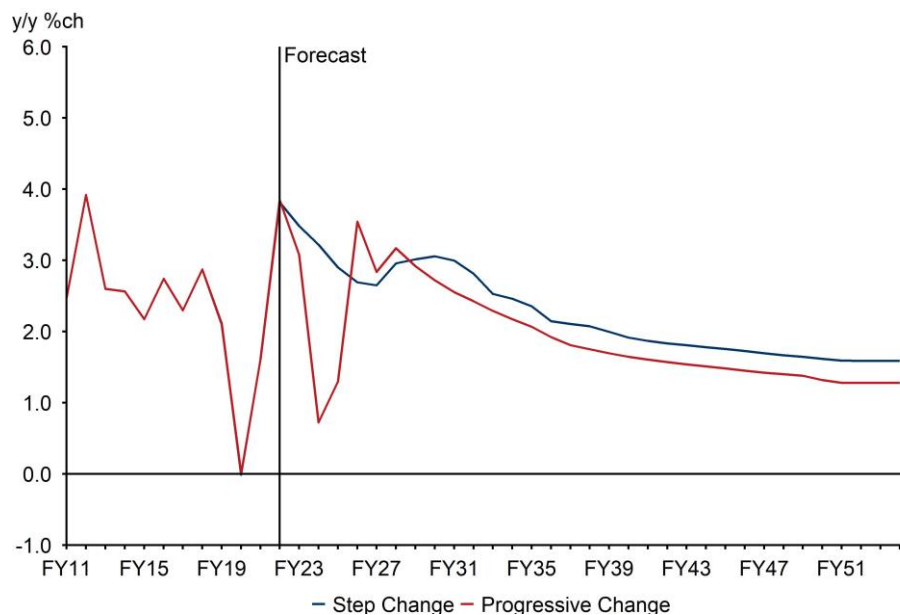
Prolonged disruptions to the global economy will also likely lead to a fall in Australia’s net exports. In particular, a worsening of China’s COVID-19 situation will weigh on the domestic mining and education sectors. A shutdown of the Chinese economy will further reduce demand for Australia’s mining exports. Meanwhile, more stringent Chinese

border rules are likely to discourage temporary migration from China to Australia, particularly Chinese students looking to study in Australia.

As global uncertainties unwind, domestic investment will pick up in order to achieve net-zero emissions in Australia by 2050. This will lift labour productivity and support economic growth through to the early 2030s.

In the long run, population growth remains the key determinant of economic growth. This is because the level of population underpins the level of underlying demand, which dictates investment, consumption, and output in the domestic economy. In the *Progressive Change* scenario, population growth is expected to be weaker compared to the *Step Change* scenario. A lower population translates into a reduction in the domestic labour supply and weaker investment. As a result, labour productivity will fall and consequently lead to weaker economic growth over time.

Figure. 42. GDP y/y Change, Step Change vs. Progressive Change, Australia

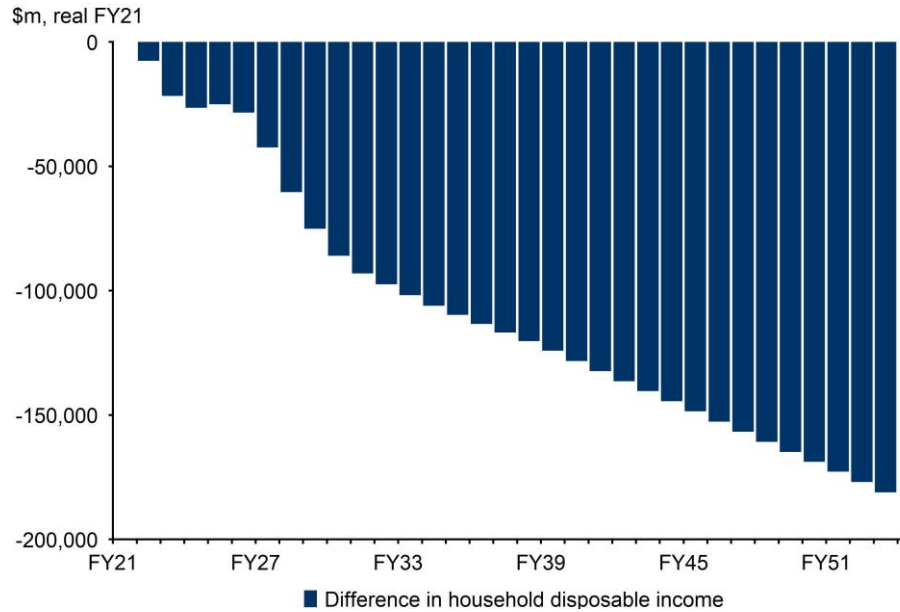


Source: BIS Oxford Economics/Haver Analytics

In line with a weaker profile for economic output, household disposable income is also weaker in the *Progressive Change* scenario. The shock to real income is more pronounced in the near-term, driven by higher and more persistent inflation than in the *Step Change* scenario. Real disposable income growth will reach a trough of 0.2% by FY23 and take until FY26 to return to trend.

Overall, the fall in disposable income is consistent with weaker economic fundamentals underpinning this scenario. Real household disposable income is expected to sit 6.8% (\$181 billion) lower by FY2054 compared to the *Step Change* scenario.

Figure. 43. Change in Household Disposable Income: Step Change vs. Progressive Change, Australia



Source: BIS Oxford Economics/Haver Analytics

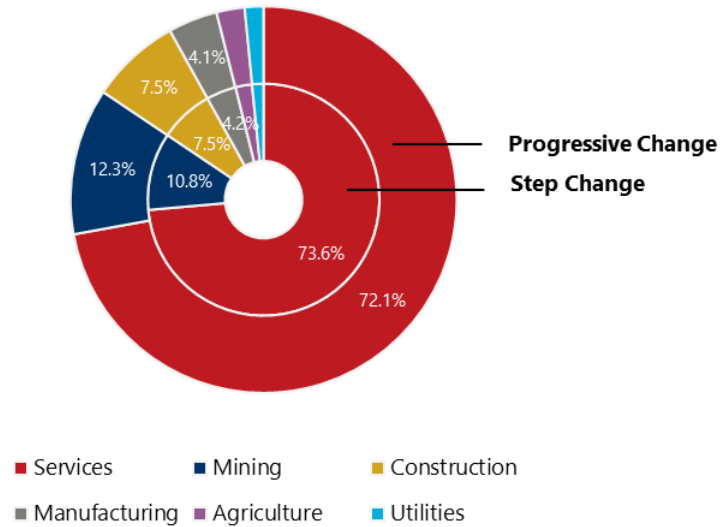
6.3 SECTOR BREAKDOWN

The industry breakdown across the Australian economy in the *Progressive Change* scenario is relatively similar to *Step Change* by FY54. This is because there is little structural change across the two scenarios. The *Progressive Change* scenario is characterised by a slower population growth and a more pronounced curtailing of economic activity in the near-term. These factors have little impact on the share of investment and employment across industries in the long run.

The mining industry is expected to see the largest difference in GVA share compared to the *Step Change* scenario. While Australia is still expected to achieve net-zero emissions in the *Progressive Change* scenario, global efforts to decarbonise are lower compared to the *Step Change* scenario. As a result, there is greater demand for fossil fuels globally and consequently stronger levels of mining activity in Australia.

The shares of GVA for the construction and services sectors are slightly lower as a result of a higher share in the mining sector. The values of these two sectors are also lower in absolute terms, consistent with a fall in overall GVA due to a lower population base. This is because lower population growth requires lower levels of infrastructure investment (residential buildings, office buildings, roads etc). Nonetheless, the services sector remains the largest contributor to GVA in Australia.

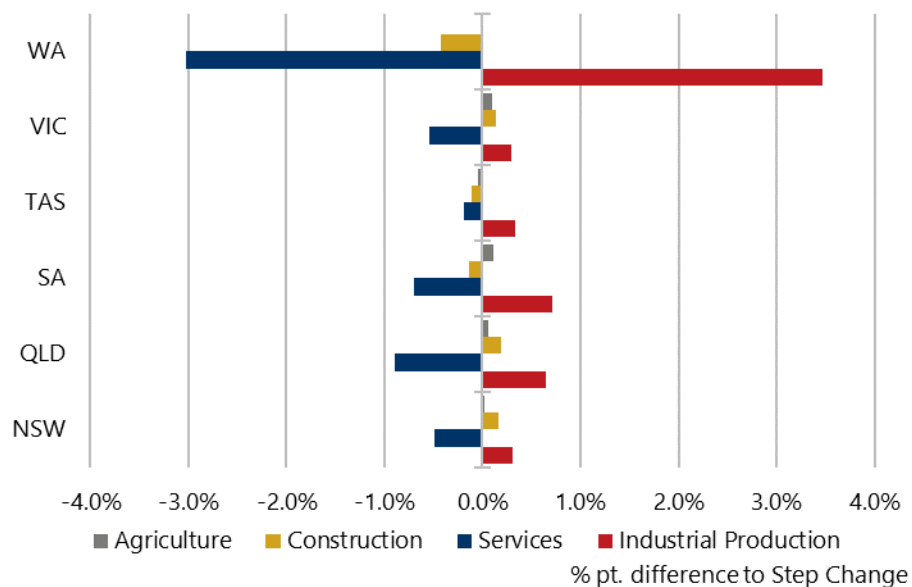
Figure. 44. Industry Share of Total GVA (FY54): *Step Change* vs. *Progressive Change*, Australia



Source: BIS Oxford Economics/Haver Analytics

The national sectoral trends are broadly mirrored at the state level. The relatively higher global demand for fossil fuel in the *Progressive Change* scenario results in a more resilient outlook for mining across all states. In particular, Western Australia is expected to experience the largest increase in its share of industrial production relative to the *Step Change* scenario. Meanwhile, states that are more services-oriented (NSW and VIC) are expected to experience relatively smaller changes in their shares of GVA.

Figure. 45. Percentage point difference in state composition between *Progressive Change* and *Step Change* (FY54), by industrial sector

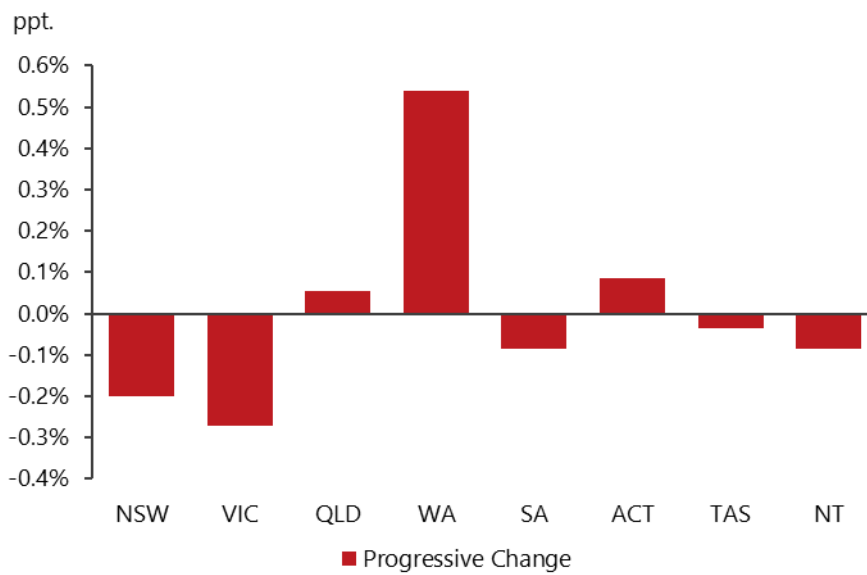


Source: BIS Oxford Economics/Haver Analytics

6.4 STATE COMPOSITON

Differences in the state composition of GDP are largely a result of the relative changes to the industry composition and asymmetric impacts of lower overseas migration. Western Australia and, to a lesser extent, Queensland are expected to be relative outperformers as a result of a stronger outlook for mining compared to the *Step Change* scenario. Meanwhile, the economic outlook for New South Wales and Victoria are noticeably weaker in the *Progressive Change* scenario. This is because the two states are expected to capture most of Australia’s inflow of overseas migrants. Therefore, a reduction in net overseas migration is expected to weigh on the outlook for NSW and VIC more than the other states.

Figure. 46. Percentage point difference in state composition of GDP from *Step Change* to *Progressive Change* (FY54)



Source: BIS Oxford Economics/Haver Analytics

7. HYDROGEN EXPORT SCENARIO

- The *Hydrogen Export* scenario sees Australia become a global leader in combating climate change. Strong policy targeting net zero by 2040 as well as Australia’s natural competitive advantages aids the development of a substantial hydrogen industry. This helps Australia outperform globally, attracting stronger population inflows.
- With increased investment globally and Australia capturing a greater share of this, faster technological progress is achieved enabling the development of the new industry, driving productivity gains and boosting real wages.
- The construction sector is a relative winner, propelled by the massive investment in infrastructure necessary to decarbonise across the board and construct a hydrogen exporting industry. The services sectors also see accelerated growth, greatly benefitting from the stronger population flows. Conversely, mining sees largest loss to share of gross output, as the national economy rapidly transitions towards clean energy. NSW and VIC increase their respective shares of national GDP, boosted by higher population flows. WA and QLD see a modest negative swing in their shares of the national economy due to the hard-hit fossil fuel mining sector making up a substantial share of their economies. However, the emergence of the hydrogen industry helps offset the impact of a declining fossil fuel mining industry.

The *Hydrogen Export* scenario is characterised by much stronger profiles of investment (public initially then private), strong exports and higher population growth for Australia relative to the global economy. This scenario features the strongest decarbonisation pathway of the four scenarios with the fastest technological progress. The *Hydrogen Export* scenario also assumes a faster reduction of inflationary pressures in the near-term, with global and domestic supply chain disruptions resolved earlier than in the *Step Change* scenario.

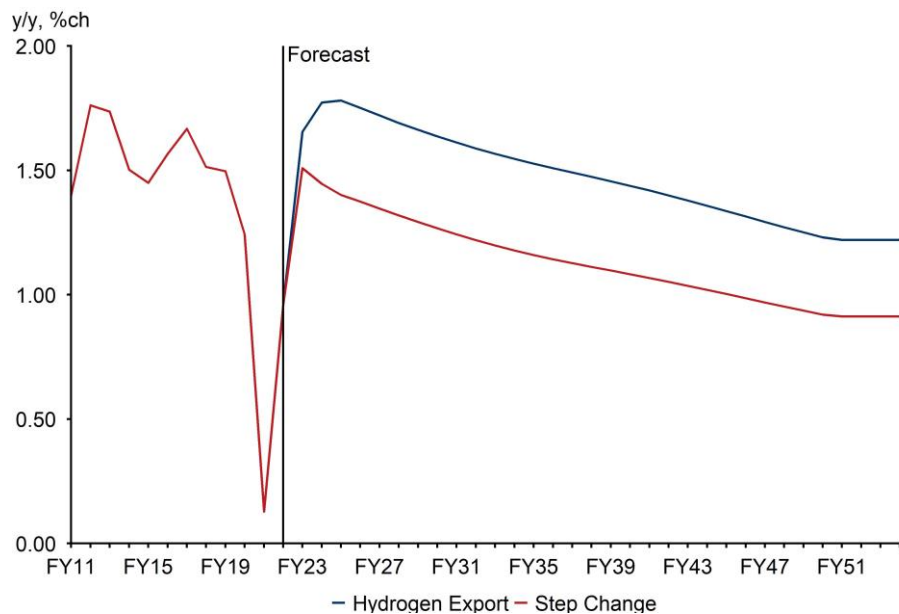
7.1 DEMOGRAPHICS

In the *Hydrogen Export* scenario, Australia becomes a global leader in climate action, targeting net zero emissions by 2040. In the near-term, the current labour shortages in many sectors are expected to attract more international students and temporary migrants to Australia. This drives a strong return of NOM, quickly surpassing historical average levels over the next few years.

Beyond this near-term boost, the introduction of strong policy aids substantial renewable energy competitive advantages and facilitates the emergence of a significant hydrogen production industry in Australia – for domestic consumption and exporting. This helps the Australian economy outperform globally, increasing the attractiveness of Australia as a destination for migration. The job opportunities associated with the nascent industry increases the demand for skilled labour. Relative to the *Step Change* scenario (AEMO’s 2022 central scenario), we expect this to sustain an elevated profile for net overseas

migration, increasing by 100,000 persons p.a. to 350,000 persons each year over the forecast.

Figure. 47. Population Growth, Step Change vs. Hydrogen Export, Australia



Source: BIS Oxford Economics/Haver Analytics

The stronger profile for NOM boosts Australia’s population growth rate in this scenario by approximately 0.3 - 0.4 percentage points p.a. over the forecast period. By FY54, this leaves Australia’s estimated resident population around 4.22 million persons greater than in the *Step Change* scenario.

7.2 MACROECONOMIC OUTLOOK

In the near-term, this scenario sees inflationary pressures ease quickly as global and domestic supply chain disruptions are resolved earlier than expected in the *Step Change* scenario. As mentioned in section 7.1, this scenario also considers a strong rebound in migration, particularly of international students and temporary workers. This higher NOM inflow contributes to stronger aggregate demand, leading to stronger near-term growth relative to the *Step Change* scenario. Additionally, this is expected to alleviate domestic labour shortages, helping to hasten the easing of cost pressures. Moderating these inflationary pressures, both global and domestic, reduces the headwinds on economic growth in the near-term, relative to the *Step Change* scenario.

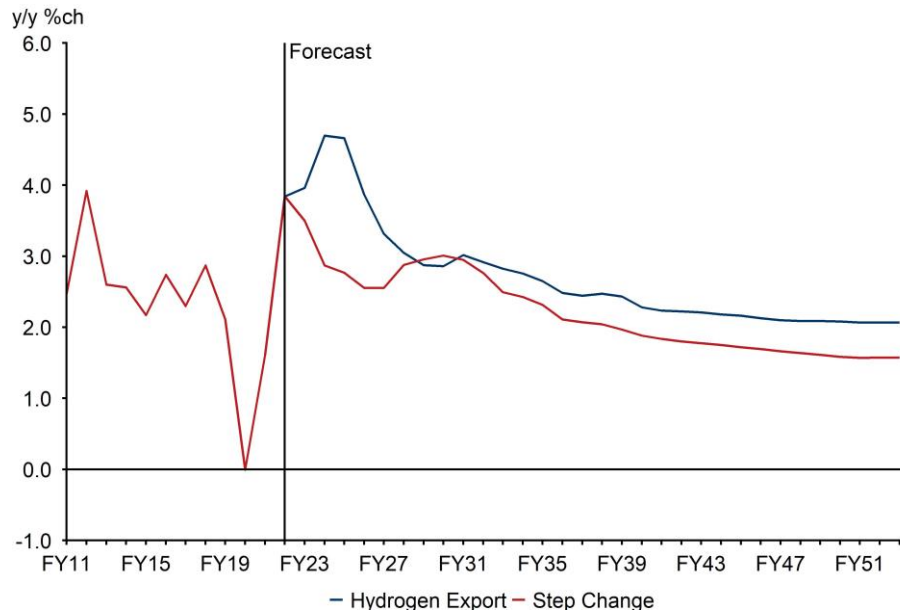
The sustained positive shock to population growth over the forecast period, driven mostly by NOM in this case, provides a boost to labour supply growth. Importantly, demand for labour increases as well, particularly for skilled migrants as the public sector increases investment to foster the early-stage development of the hydrogen industry.

As outlined in Chapter 2, the *Hydrogen Export* scenario has the strongest global decarbonisation pathway (~<1.5°C warming) of the four scenarios. As a result of a decisive shift towards hydrogen technology (that is government-led initially) and increased investment, we have assumed this scenario has the greatest pace of technological progress. This underpins greater labour and capital productivity, driving higher economic growth. An indirect impact of higher labour productivity is upwards

pressure on real wages and an incentive for firms to invest, which helps boost productivity growth further as the capital stock becomes more advanced.

The positive productivity shock from increased investment and rapid technological progress underpins stronger real wage growth over the latter half of the forecast period. Increased labour supply combined with the positive shock to productivity drives a stronger supply side path for economic growth longer term.

Figure. 48. GDP y/y Change, Step Change vs. Hydrogen Export, Australia

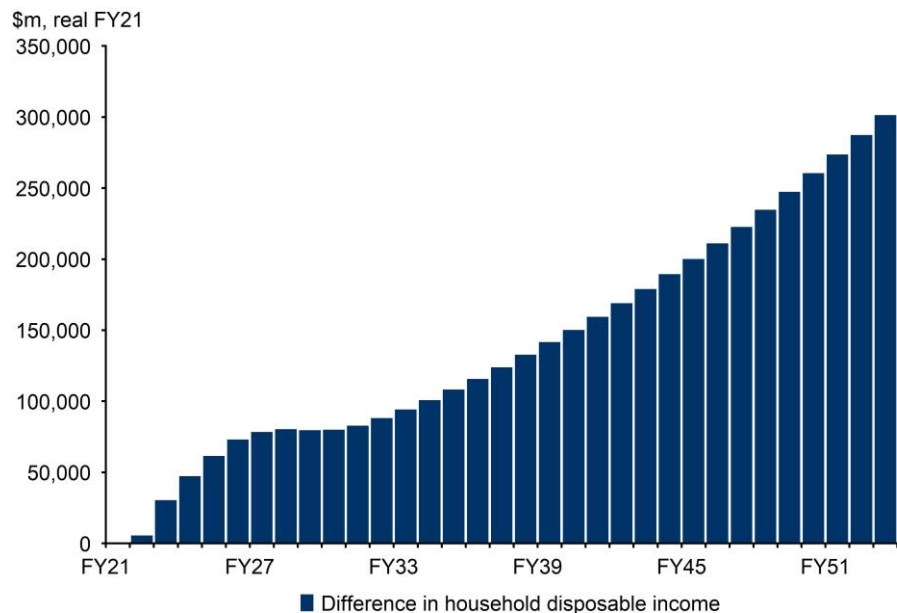


Source: BIS Oxford Economics/Haver Analytics

Significant investment is required to facilitate the successful development of a large hydrogen industry in Australia. It's expected investments in infrastructure is necessary for production at scale, such as renewable electricity generation, pipelines, electrolysers, in addition to export infrastructure, such as export hubs, storage and transportation. The potential to retrofit existing gas exporting, transmission and distribution infrastructure is anticipated to be key in scaling the industry, using the blending of hydrogen with natural gas to generate demand while the export opportunities grow. With the industry in its infancy, public investment is assumed to take the lead, while it is not currently commercially viable. Later over the forecast horizon, private investment is anticipated to drive investment activity as it becomes more cost competitive, supporting higher investment and economic growth profiles than in the *Step Change* scenario.

Household disposable income is forecast to record material gains in the *Hydrogen Export* scenario, relative to the *Step Change* scenario. This is underpinned by increased labour productivity, helping to drive greater income growth over the forecast period. By FY54, household disposable income finishes around \$300 million or 11% higher than the *Step Change* scenario in real FY21 terms.

Figure. 49. Change in Household Disposable Income: *Step Change* vs. *Hydrogen Export*, Australia



Source: BIS Oxford Economics/Haver Analytics

The AUD sits higher in the *Hydrogen Export* scenario, relative to the *Step Change* scenario. The combination of Australia’s new hydrogen exporting industry and strong global activity and consumption places upward pressure on the exchange rate. As a result, the *Hydrogen Export* scenario sees the AUD sit at USD 0.87 over the long run, compared to USD 0.80 in the *Step Change* scenario.

7.3 SECTOR BREAKDOWN

In the *Hydrogen Export* scenario, we expect material changes in the sectoral composition of economy over the forecast period.

An important consideration for incorporating the impact of the new hydrogen industry is how it will be classified. According to the Australian Bureau of Statistic’s current classification of industries⁵, the hydrogen sector is expected to come through in ANZSIC Division C – Manufacturing. Within the sector, this includes the production of hydrogen for use as an important domestic industrial feedstock, as well as the manufacturing of hydrogen for use in energy needs (both domestic and through exports). In absolute terms, the manufacturing sector ends notably higher than in the *Step Change* scenario. In relative terms, the sector’s share of gross output holds steady compared to the central scenario, reversing the downward trend that has been seen since the 1970s.

Another requirement for the development of a large-scale hydrogen industry is substantial expansions in renewable electricity generation, necessary to feed the

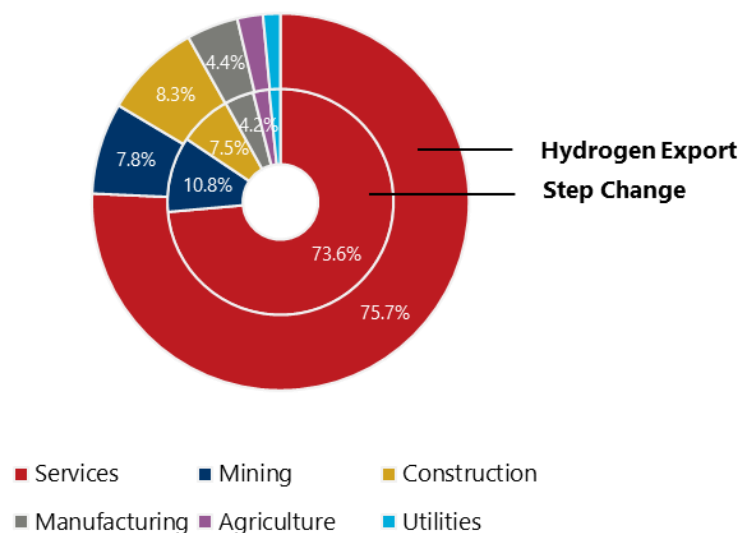
⁵ See Appendix D for more detail.

electrolysers to split hydrogen from water⁶. The rapid pace of electrification on the demand side and the positive population shock all contribute to greater demand for electricity. With the substitution away from emission-intensive electricity production towards renewables and the need to meet a stronger demand profile for electricity, utilities GVA sees its profile boosted. However, utilities' GVA share of total GVA shrinks over the forecast period, as the use of energy per unit of production continues to decline.

The construction sector is a relative winner in this scenario, with its share of GVA reaching 8.3% by FY54, compared to 7.5% in the *Step Change* scenario. Greater population growth underpins a higher incremental demand for infrastructure, while the massive investment necessary to develop the hydrogen industry lifts engineering construction activity. Productivity gains propel the sector further as fuel costs ease.

Much of the gains in construction GVA are expected to come at the expense of the mining sector. The *Hydrogen Export* scenario features the strongest decarbonisation pathway of the four scenarios, with strong global and domestic emissions reduction policies leading to the fastest earliest phasing out of fossil fuels. This is reflected in a materially lower profile for mining GVA, relative to the *Step Change* scenario. Note, that this does not lead to mining GVA falling to zero. There are still mining commodities that will continue to be strong contributors to the Australian economy, including Australia's largest export, iron ore. Similarly, the global renewable energy transition is set to create growth opportunities for the mining of commodities required to decarbonise the global economy, such as copper, nickel and lithium.

Figure. 50. Industry Share of Total GVA (FY54): *Step Change* vs. *Hydrogen Export*, Australia



⁶ In this case, it is assumed to be grid-connected renewable electricity generation that powers the electrolysers.

Source: BIS Oxford Economics/Haver Analytics

The positive population shock contributes to a stronger profile for services GVA, with its share of total GVA increasing at a faster pace than in the *Step Change* scenario. The faster pace of technological progress and stronger income growth compared to the *Step Change* scenario accelerates the long-run trend for the service sector’s share of GVA increasing over the forecast period.

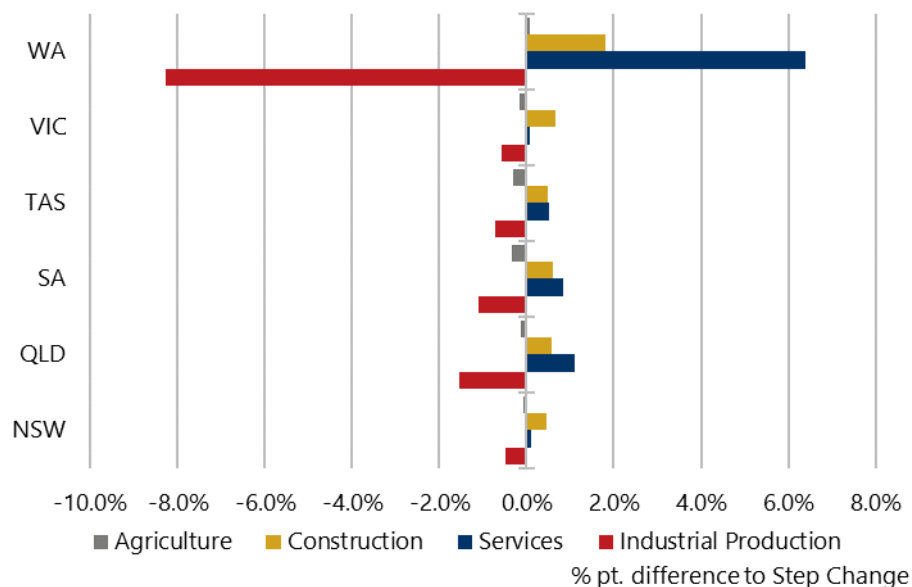
7.3.1 Industry Composition across states

The marked transition in the renewable energy generation mix in the *Hydrogen Export* scenario, in aggregate, is reflected by the shift away from mining output toward manufacturing and service sector output. This shift results in a noticeable fall in the industrial production sector’s share of WA’s economy. The other states all see a similar transition in their economic composition, although to a lesser extent than WA. At a state share level, mining output is forecast to become more concentrated towards WA under the *Hydrogen Export* scenario, largely at the expense of QLD, NSW & VIC as they transition away from fossil fuel mining.

The development of a hydrogen production sector is expected to be generally dispersed across the states in the *Hydrogen Export* scenario, with all states and territories having now announced a hydrogen roadmap or strategy.

There are minimal compositional shifts across states for the other sectors, as the sub-sectoral shifts within industrial production dominate the narrative in this scenario.

Figure 51. Percentage point difference in state composition between *Hydrogen Export* and *Step Change* (FY54), by industrial sector



Source: BIS Oxford Economics/Haver Analytics

7.4 STATE COMPOSITON

NSW and VIC are the biggest beneficiaries in the *Hydrogen Export* scenario. The boost to population growth accrues in a large part to these two states. This is consistent with history, where they have typically captured the bulk share of NOM. This trend is expected to continue, although a persistent NIM outflow provides a small drag on NSW.

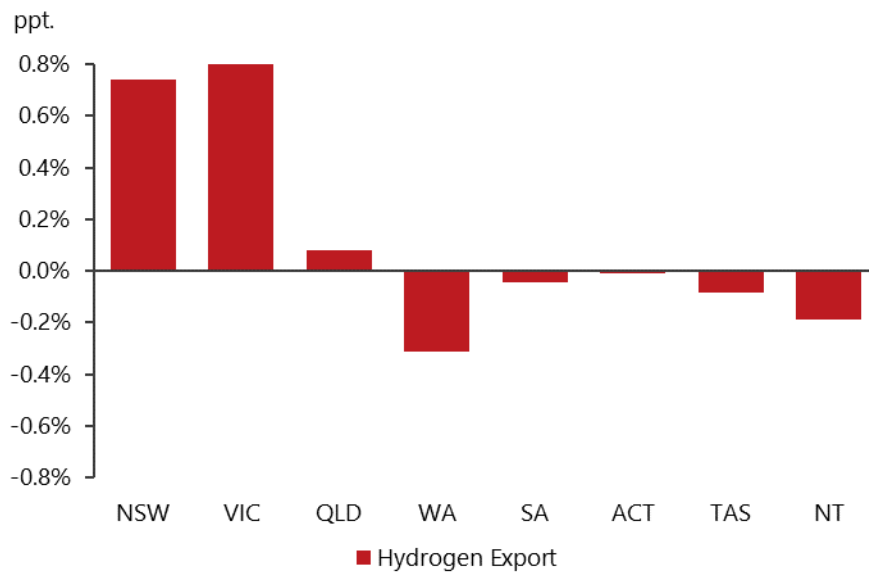
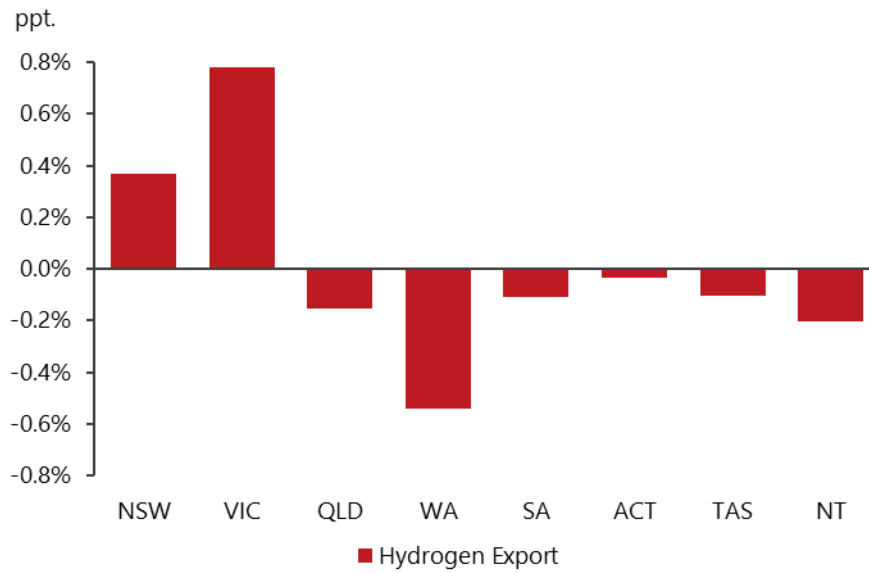
Further, both states have larger manufacturing presences than the other states. Since hydrogen production is currently classified in the ABS' Division C – Manufacturing, this means the creation of the new hydrogen industry contributes to NSW and VIC increasing their share of national GDP.

With mining GVA declining significantly in the *Hydrogen Export* scenario, this translates to WA and QLD losing a modest share of national GDP compared to the *Step Change* scenario. Conversely to NSW, the negative impact on QLD is partly offset by the strong inflow of NIM, largely from NSW.

Like NSW & VIC, both WA & QLD are expected to see substantial investment in the development of a hydrogen export industry, since they are well placed to take advantage of their abundant renewable energy resources and proximity to export markets in Asia. This is expected to ensure employment is less impacted, as the mining sector is capital-intensive, and the development of a hydrogen export sector that accrues to the manufacturing industry provides a jobs-intensive offset.

However, it's important to note that despite a reduced share of national GDP occurring in particular states, the *Hydrogen Export* scenario sees an increase in gross state product in every state over the forecast period.

Figure. 52. Percentage point difference in state composition of GDP from Step Change to Hydrogen Export (FY54)



Source: BIS Oxford Economics/Haver Analytics

Appendix A: Slow Global Decarbonisation Scenario

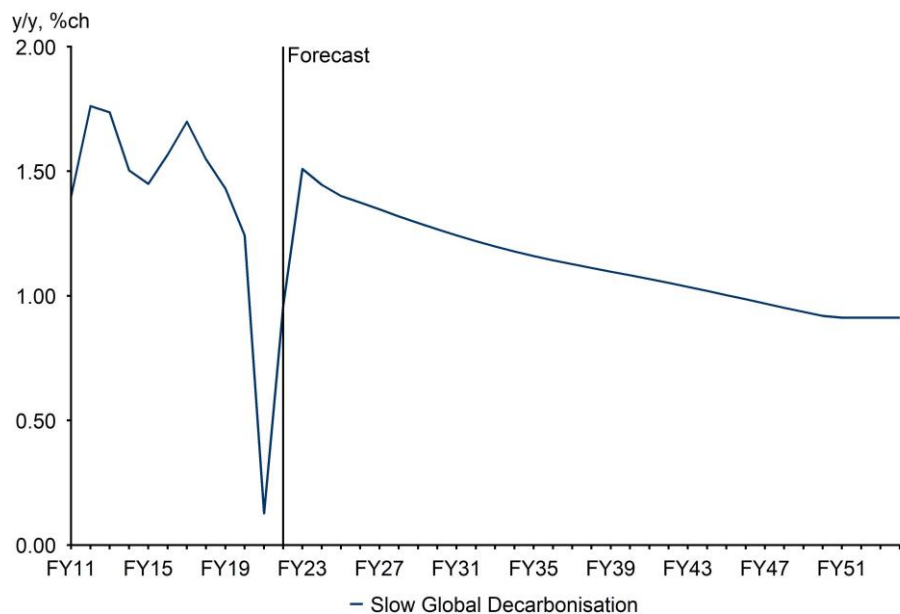
Alongside the four scenarios that will form AEMO's core scenarios for their suite of energy reports (see Chapter 2), another hybrid scenario was also developed that considers moderate growth domestically combined with weaker decarbonisation efforts globally. This appendix presents the results of that scenario, which will be referred to as *Slow Global Decarbonisation Scenario* herein.

Demographic assumptions in this scenario remain the same as the *Step Change* scenario. Australia fulfils its commitment to net zero emissions by 2050. However, like the *Progressive Change* scenario, global efforts for decarbonisation are not enough. As a result, the world is on a higher warming pathway (2.6°C by 2100) to *Step Change*. The higher levels of warming also have a greater detrimental impact on resource productivity in this scenario. As a result, the economic outcomes are slightly lower than the *Step Change* scenario.

7.5 DEMOGRAPHICS

Similar to the *Step Change* scenario, this scenario assumes moderate population growth. The overall population profile, including its components (natural increase and migration) is the same as the *Step Change* scenario (for more details on the outlook, please see Chapter 3).

Figure 53. Population Growth, Slow Global Decarbonisation, Australia



Source: BIS Oxford Economics/Haver Analytics

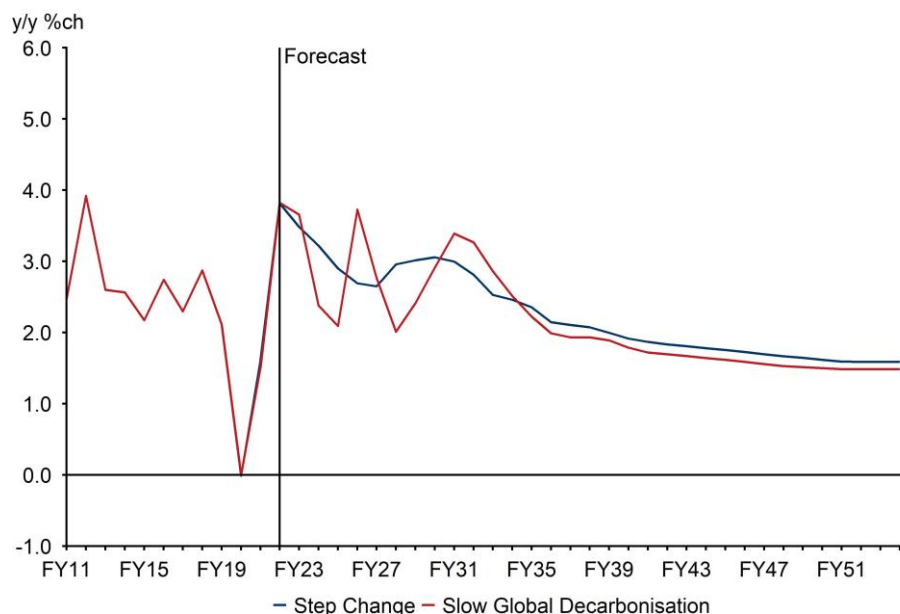
7.6 MACROECONOMIC OUTLOOK

This alternative scenario tracks a moderate economic growth scenario, similar to the *Step Change* scenario. While population growth is unchanged, the global transition away from fossil fuels is slower. Australia is still expected to achieve net-zero emissions by 2050, but there are some disruptions to the process in the near-term. As such, the main differences across the two scenarios are the structural composition of the Australian economy and the timing of investment toward decarbonising domestically.

In the near-term, the difference in economic outlook is due to a more protracted disruption to the global economy (similar to the *Progressive Change* scenario). This will dampen household and business confidence and weigh on economic activity in the near-term. This in turn delays Australia’s investment cycle towards decarbonising. As a result, economic growth is more sporadic in the short to medium-term compared to the *Step Change* scenario.

As the build-up of investment towards decarbonisation unwinds, economic growth will again be largely driven by population growth in the long run. Since population growth is unchanged, the level of output in this alternative scenario is similar to *Step Change* over the forecast horizon. However, the greater reliance on fossil fuels around the world means that mining exports (particularly LNG and coal) are expected to play a bigger in this scenario compared to the *Step Change* scenario.

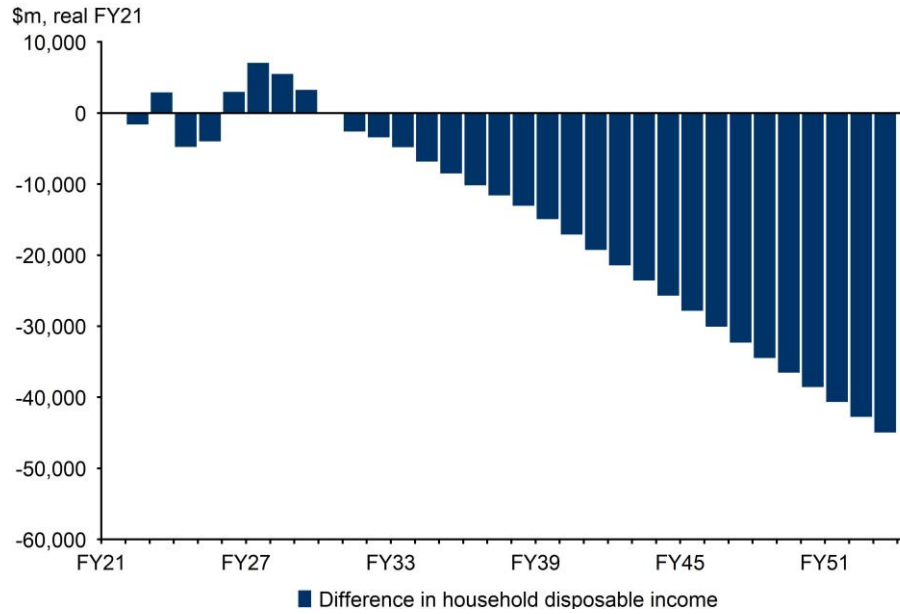
Figure. 54. GDP y/y Change, *Step Change* vs. Slow Global Decarbonisation, Australia



Source: BIS Oxford Economics/Haver Analytics

Real household disposable income is slightly lower compared to the *Step Change* scenario in the long-term. By 2054, household income is 1.5% lower than in the *Step Change* scenario, consistent with a slightly lower level of GDP by 2054.

Figure. 55. Change in Household Disposable Income: *Step Change* vs. Slow Global Decarbonisation, Australia



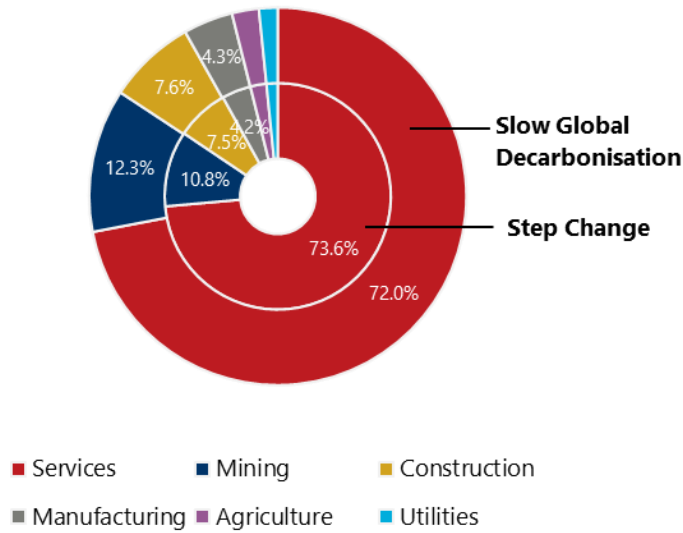
Source: BIS Oxford Economics/Haver Analytics

7.7 SECTOR BREAKDOWN

Like the *Progressive Change* scenario, the mining sector is expected to contribute a greater share towards GVA in Australia, relative to the *Step Change* scenario. Stronger global demand for fossil fuels will translate into greater demand for LNG and coal exports in Australia. This will consequently lead to higher levels of mining investment and activity.

On the flipside, the services sector is expected to contribute a lower share of GVA in this scenario. This is because there is less need for the economy to restructure away from mining and therefore mining retains a greater share of GVA in this scenario.

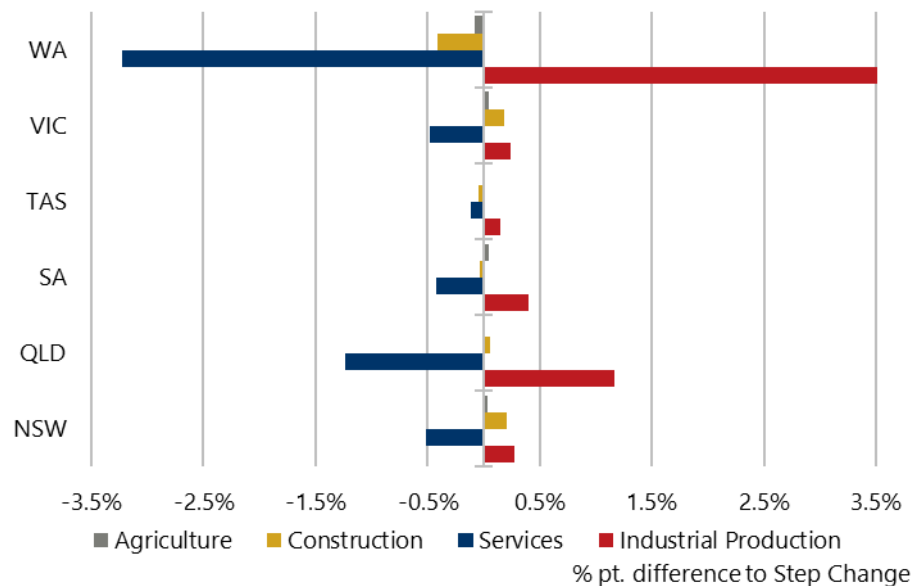
Figure. 56. Industry Share of Total GVA (FY54): *Step Change* vs. *Slow Global Decarbonisation*, Australia



Source: BIS Oxford Economics/Haver Analytics

At the state level, the changes in industry composition are broadly in line with the national trends. The compositional shift towards mining is the main narrative across the states. As such, the industrial sector has the most pronounced increase in the share of GVA in states where mining is more prevalent, particularly WA.

Figure. 57. Percentage point difference in state composition between *Slow Global Decarbonisation* and *Step Change* (FY54), by industrial sector

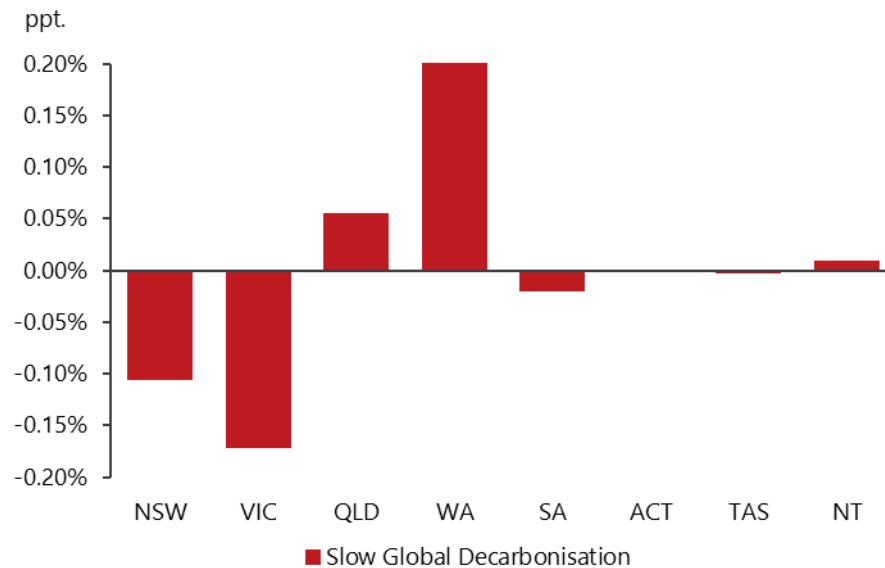


Source: BIS Oxford Economics/Haver Analytics

7.8 STATE COMPOSITON

Differences in the state composition of GDP are largely a result of the relative changes to the industry composition. Western Australia is expected to outperform the other states in this scenario as a result of a stronger outlook for mining compared to the *Step Change* scenario. Meanwhile, the economic outlook for New South Wales and Victoria is noticeably weaker. This is because both states are more services-oriented and would therefore benefit from a structural shift away from mining, particularly VIC.

Figure. 58. Percentage point difference in state composition of GDP from *Step Change* to *Slow Global Decarbonisation* (FY54)



Source: BIS Oxford Economics/Haver Analytics

Appendix B: Oxford Economics GEM Model and Australia State Forecasts

This section provides an overview of Oxford Economics Global Economic Model and Cities & Regions model which underpin our Australia macro and State forecasts.

Global Economic Model

The Oxford Global Economic Model (GEM) is the most widely used commercial International Macro Model, with clients including international institutions, Ministries of Finance and central banks around the world, and a large number of blue-chip companies. In addition, the GEM is used internally within Oxford Economics, for both baseline forecasting and simulating alternative scenarios for the world economy and individual economies.

The GEM has constantly evolved over the past three decades, reflecting continuous interaction between the Global Economic Model and changing conditions in the policy sphere, private sector, and global institutions. It is intended for use both by Oxford Economics and by clients to produce forecasts for a wide range of international macroeconomic and related variables, and for “what-if” scenario analysis. Clients can produce forecasts using the model either with a detailed internal forecasting exercise or simply by taking the Oxford Economics baseline and adjusting a small number of key inputs/assumptions. Scenario analysis can focus on the expected impact of a particular event or policy change or cover a wider range of alternative outcomes for stress testing.

It has long been one of Oxford Economics’ guiding principles that many of the most important and interesting macroeconomic issues are inherently international. Globalization means that policy makers and analysts must form judgements about developments in their domestic economy and in the economies of countries with which they have trade and financial ties. For instance, a shift in US monetary policy has global repercussions; fossil fuel and commodity price shocks are significant source of terms of trade movements in Europe; governments increasingly collaborate over monetary, fiscal and environmental policies. These stylized facts imply that single country econometric models, which treat world trade, world prices and exchange rates as exogenous, are not best suited to analysing some of the most important issues of interest to financial and business economists.

The root cause of this integration is the massive increase in trade and capital flows between countries in the post-war period, and Oxford Economics’ client base is testament to the growth in interest in international issues. With offices throughout the world, in the UK, elsewhere in Europe, the US and Asia, Oxford Economics aims to combine access to local information and expertise with a global outlook to provide a truly international service. The Oxford Global Economic Model reflects this priority, as coverage of the major trading countries has deepened and widened.

The current Oxford Model improves on previous vintages by incorporating descriptions of 80 individual countries. The model is “well-behaved” in the sense that it has a coherent long-run equilibrium embedded which the model will tend to converge to in the long run for a wide range of sensibly calibrated shocks.

It maintains the tradition of allowing for significant cross-country differences in economic structure, but ensures that those differences truly reflect economic, as opposed to

economic model-builders', idiosyncrasies. Where possible, and it is possible in the majority of cases, the functional form for equations is left the same across countries. The exceptions chiefly reflect examples where countries are heavily dependent on particular sectors such as oil and emerging market countries where Foreign Direct Investment (FDI) plays a major role in the economy. Where the data allow, some countries have more detail on trade, distinguishing fuel and non-fuel and modelling profit and dividend receipts.

Parameters across countries differ, and this means that different countries exhibit different behaviour in response to shocks (although economy structure also accounts for variations). Now, however, tracing the root cause of these differences, and attributing them to underlying behaviour or structure, is much simpler. For instance, real wage rigidity is higher in some countries than others, and specific coefficients in wage and price equations reflect this. Unemployment will tend to rise further and faster in these countries in response to an adverse demand shock, even though the functional form of wage and price equations is identical across countries.

Structure of the GEM

Very broadly, the Oxford Global Economic Model is Keynesian in the short-run and monetarist in the long-run. This means that increased demand will lead to higher output and employment initially, but eventually this feeds through into higher wages and prices. Given an inflation target, interest rates have to rise, reducing demand again ('crowding out'). In the long run, output and employment are determined by 'supply side' factors. Interactions between countries through trade, exchange and interest rates, capital flows and oil/commodity prices are modelled in detail.

Within this theoretical framework, the structure of each country in the Oxford Global Economic Model can be generalized as follows:

- Consumption - function of real income, wealth and interest rates.
- Investment - 'q' formulation with accelerator terms.
- Exports - depend on world demand and relative unit labour costs.
- Imports - depend on total final expenditure and competitiveness.
- Real wages depend on productivity and unemployment relative to NAIRU.
- Prices are a mark-up on unit costs, with profits margins a function of the output gap.
- Monetary policy endogenised. Options include Taylor rule, fixed money and exchange rate targeting.
- Exchange rate determined by uncovered interest parity (UIP) in the short run and equilibrium exchange rates in the long run.
- Expectations are generally adaptive, with an option to use forward-looking expectations on a model-consistent basis for certain key financial variables.
- Countries are linked in the Oxford Global Economic Model via:
 - Trade (Exports driven by weighted matrix of trading partners' import demand).
 - Competitiveness (IMF relative unit labour costs where available, relative prices elsewhere).
- Interest Rates and Exchange Rates.
- Commodity Prices (e.g. oil, gas and coal prices depend on supply/demand balance; metal prices depend on growth in industry output).
- World Price of Manufactured Goods.

Country model detail

The structure of each of the country models is based on the income-expenditure accounting framework. However, the models have a coherent treatment of supply. In the long run, each of the economies behaves like the classic one sector economy under Cobb-Douglas technology (production function). Countries have a natural growth rate, which is determined by capital stock, labour supply adjusted for human capital, and total factor productivity. Output cycles around a deterministic trend, so the level of potential output at any point in time can be defined, along with a corresponding natural rate of unemployment.

Firms are assumed to set prices given output and the capital stock, but the labour market is characterized by imperfect competition. Firms bargain with workers over wages but choose the optimal level of employment. Under this construct, countries with higher real wages demonstrate higher long-run unemployment, while countries with more rigid real wages demonstrate higher unemployment relative to the natural rate.

Inflation is a monetary phenomenon in the long run. All of the models assume a vertical Phillips curve, so expansionary demand policies place upward pressure on inflation. Unchecked, these pressures cause an unbounded acceleration of the price level. Given the negative economic consequences of this (as seen in the 1970s in developed economies and more recently in some emerging markets), most countries have adopted a monetary policy framework which keeps inflation in check. The model mirrors this, by incorporating endogenous monetary policy. For the main advanced economies, monetary policy is underpinned by the Taylor rule, captured using an inflation target, such that interest rates are assumed to rise when inflation is above the target rate, and/or output is above potential. The coefficients in the interest rate reaction function, as well as the inflation target itself, reflect assumptions about how hawkish different countries are about inflation. (A by-product of this system is that scenarios under fixed interest rates only make sense in the short run. A scenario which imposes a fixed interest rate, and therefore assumes a lack of monetary policy, in conjunction with a vertical Phillips curve, would result in accelerating - or decelerating - inflation after several years.)

Demand is modelled as a function of real incomes, real financial wealth, real interest rates and inflation. Investment equations are underpinned by the Tobin's Q Ratio, such that the investment rate is determined by the return relative to the opportunity cost, adjusted for taxes and allowances. Countries are assumed to be "infinitely small", in the sense that exports are determined by aggregate demand and a country cannot ultimately determine its own terms of trade. Consequently, exports are a function of world demand and the real exchange rate, and the world trade matrix ensures adding-up consistency across countries. Imports are determined by real domestic demand and competitiveness.

Expectations

The Oxford Global Economic Model standard mode assumes adaptive rather than forward looking expectations because we believe that introducing expectations on the basis of economic theory is more advantageous than using the forward-looking assumption ubiquitously. There is disagreement among economists about whether forward looking expectations are consistent with observed data, which become even more acute in light of the difficulties with obtaining accurate data on expectations for model-building purposes. Instead, we generally adopt adaptive expectations, which are introduced using a framework in which expectations are formed using the actual predicted values from the model. Exogenous variables are assumed to be known a priori.

Where appropriate, the model does introduce expectations implicitly and explicitly, therefore accounting for how and the extent to which agents respond to information about changes in fundamentals. An example of this includes our derivation of exchange rate forecasts which implicitly capture expectations: in the short run, the exchange rate is driven by movements in domestic interest rates relative to the US, therefore accounting for uncovered interest rate parity. Another example is our use of a variable for forward guidance to capture expected movements in interest rates. In addition, there is an option to use forward-looking expectations explicitly on a model-consistent basis for certain key financial variables.

Modelling the macroeconomic outlook for states

Forecasts at the state level are built up on an industry basis, to accurately incorporate state characteristics relative to the national picture.

To produce state level forecasts, we therefore begin by modelling national level forecasts for value added and employment for each industry, by combining the macroeconomic forecasts outlined above with an input-output framework to quantify the impact of changes in final demand and intermediate demand on each sector. For example, developments in public administration will be closely related to government spending and the retail sector is influenced by consumer spending.

The latest available data for each State and City is collected from the Australian Bureau of Statistics. All data is subjected to numerous checking procedures to ensure accuracy and timeliness. All sub-national data is aligned to national aggregates.

The forecasts and data produced above are fed into Oxford Economics' suite of sub-national models to produce forecasts for each State. These models predominately adopt a top-down approach, and flow from the macro level to the State. Forecasts for value added and employment by industry at the State level are produced by a set of equations that take account of the historical relationship between growth and productivity trends in each industry in each State compared with the performance of the industry at the national average. This means the States with the strongest forecast will be those who have an advantageous industrial structure (i.e. a relatively high concentration of activity in an industry which are expected to perform strongest in Australia), and those for which there is evidence that the State has a particular competitive advantage in a particular sector (this is illustrated by the historical data showing a stronger performance in an industry in the State than nationally).

The State forecasts produced by this 'demand side' approach is reviewed and adjusted where necessary to ensure they are consistent with long run supply side considerations, including demographic change (which incorporates official population projections) and labour market efficiency. Household incomes are influenced by demographic and employment trends, and consumer spending and retail sales by income trends.

Appendix C: Step Change compared to Centre for Population Forecasts

BIS Oxford Economics has produced population forecasts for this report. The forecasts were produced by using death rates from the ABS and from the assessments of total fertility rates. This forms a picture for natural increase, while also forming assessments of Net Overseas and Net Instate migration (NOM & NIM). NOM consider both recent trends and economic drivers of inflows by major type of migrant (students, temporary workers and permanent migrants), linking these flows to domestic and international and economic conditions. While NIM considers historic trends and local economic conditions, particularly the relativities in the labour market which we see as a major driver of migration regionally.

To form a projection for natural increase, assessments of birth rates are used, which incorporates cyclicity in the short-term relating to changes in uncertainty and economic conditions, a particularly important consideration given the size of the recent COVID-19 shock. Since the ABS Population Projections have not been updated recently, the population forecasts are compared with Centre for Population's forecasts in March 2022. Note, the *Step Change* population forecasts were most recently updated in late June 2022, following the release of the 2021 Census data. The assumptions underpinning the Centre for Population's forecasts can be summarised as:

- **NOM national:** International arrivals and departures remain lower than usual through to FY24. Economic conditions in source countries of international students leads to reduced demand to study in Australia in the near-term. Demand for extended travel (e.g. working holidays) remains low. Departures by Australian citizens and permanent residents to take jobs overseas is lower. In the long-run, net overseas migration is assumed to be 235,000 persons per year.
- **NOM state:** State arrivals and departures estimated based on historical and forecast trends that add to the national total.
- **NIM:** Interstate movement is assumed to return to normal by FY24, to 400,000 moves. The patterns of interstate flows are assumed to return to the 19-year long-run average by FY24 as well.

Comparison of assumptions for NI, NOM and NIM

NI in the *Step Change* scenario is anticipated to display a stronger profile compared to the Centre for Population forecasts. In the near-term stabilising economic and health conditions encourage the resumption of backlogged family plans. The fertility rate is assumed to settle to its long-run relatively quick at around 1.65 by FY24. In comparison, the Centre for Population assumes that fertility remains around 1.65 by FY25 before settling to 1.62 by FY31.

NOM in the *Step Change* scenario is generally more optimistic for its trajectory over the next ten years. The forecast sees national NOM pick up to 110,000 in FY22. This is much higher than the Centre for Population (41,300). This is partly due to the release dates of these forecasts, where the *Step Change* forecasts incorporate recent data on overseas migrations. The 2021 Census reaffirms a more optimistic outlook for NOM, with

a net inflow of around 29,000 overseas migrants in Q4 2021. Beyond this, NOM is anticipated to reach its long-term average of 250,000 p.a. in FY23. In comparison, the Centre of Population expects 180,000 in FY23 and a gradual return to their assumed long-run NOM level of 235,000 by FY25. This represents a more pessimistic outlook for NOM compared to the *Step Change* forecasts.

Several factors explain the differences in the assessment of NOM. Firstly, the *Step Change* scenario assumes a greater stock of students who are looking to come to Australia but have been unable to, in addition to Australia's relatively favourable economy and health pictures. Both factors bode well for a quicker resumption of NOM and importantly back to recent trend levels. Secondly, there have been areas of labour market stress with skilled labour shortages starting to appear. With Australia's outperformance, economically and on the health front, this is supportive of return to strong NOM when borders reopen.

In terms of the state distributions of NOM:

- NOM shares for NSW and SA largely similar.
- VIC's NOM share is materially lower than the Centre for Population's projections.
- QLD and WA have a stronger NOM share in our forecast.

For NIM, there are material differences in the distribution of NIM across the states and territories. It is worth noting that different profiles for NOM and NI would be expected to contribute to divergences in the levels of NIM, all other things equal. In terms of broad assumptions of directions of NIM, both sets of forecasts are similar i.e. NSW sees NIM net outflows, QLD receives NIM net inflows. The exception is WA which is expected to see modest net inflows, and the Centre for Population expects a small net loss of interstate migration. Again, these could be a result of different NI and NOM assumptions.

Implications for population projections

The charts below compare population growths for the states in *Step Change* with the Centre for Population forecasts.

At the national level, the *Step Change* forecast for total population growth is higher over the forecast period. This is due to a stronger rebound in recent NOM data as well as higher assumed levels of NOM in the long run. Growth rates converge around FY26 and remain broadly similar beyond this. The forecast for our total population is around 164,000 higher than the Centre for Population by 2026.

Across the states, the key points of comparison are:

- For NSW, the *Step Change* forecast for population growth is stronger in the short-term owing to a faster recovery of NOM. However, population growth for NSW in the *Step Change* forecasts slows considerably due to greater outflow of interstate migrants. As a result, the *Step Change* forecast for population in NSW is around 76,000 (0.9%) lower than the Centre for Population's forecast by FY26.
- For VIC, the story is similar to NSW, though the slower population growth in the *Step Change* forecasts is underpinned by a weaker NOM share for the state. By 2026, the *Step Change* population forecast for VIC is around 145,000 (2%) lower.
- For QLD, the *Step Change* population growth forecasts are higher throughout the forecast period. This is due to the scenario's assumptions of a higher share

of NOM and NIM for the state. By 2026, the *Step Change* population forecast for QLD is around 125,000 (2.2%) higher.

- For WA, the story is similar to QLD, though interstate migration is a less important driver of population growth in the state. The *Step Change* population forecast for WA is around 139,000 (4.9%) higher than the Centre for Population by 2026.
- The forecasts for population growth in SA, TAS and ACT in the *Step Change* scenario are higher in the near-term due to factors listed above. However, the *Step Change* forecast for growth is expected to converge towards a similar rate as the Centre for Population’s forecast in the long run.

Figure. 59. Population y/y% Change, Centre for Population vs. Step Change: Australia

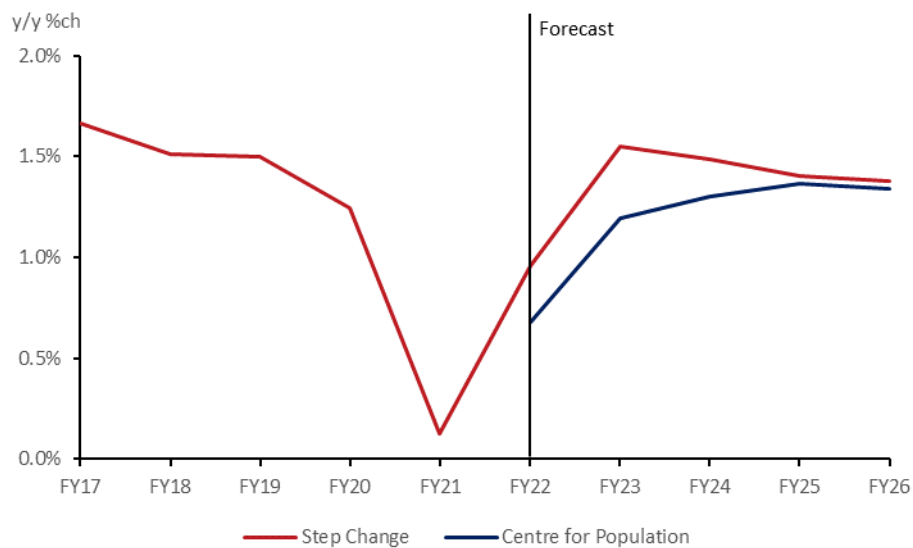


Figure. 60. Population y/y% Change, Centre for Population vs. Step Change: NSW

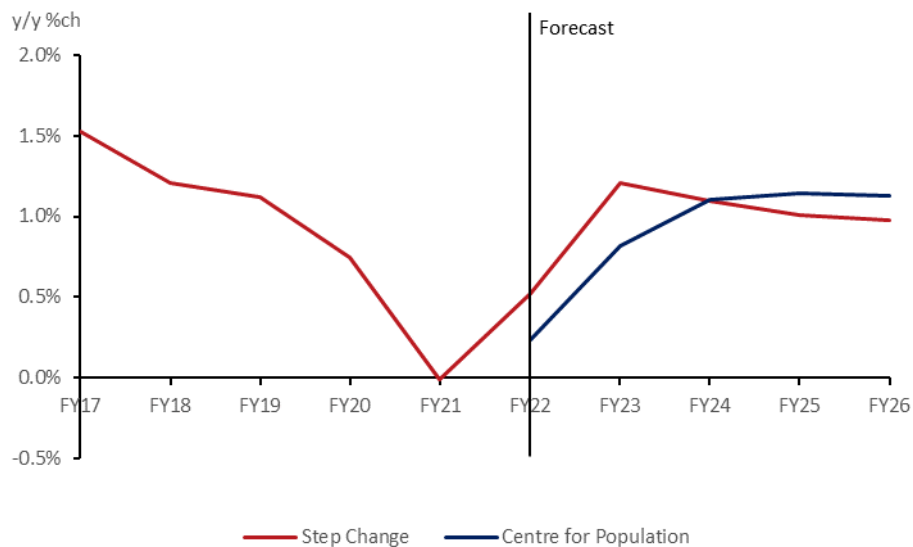


Figure. 61. Population y/y% Change, Centre for Population vs. Step Change: VIC

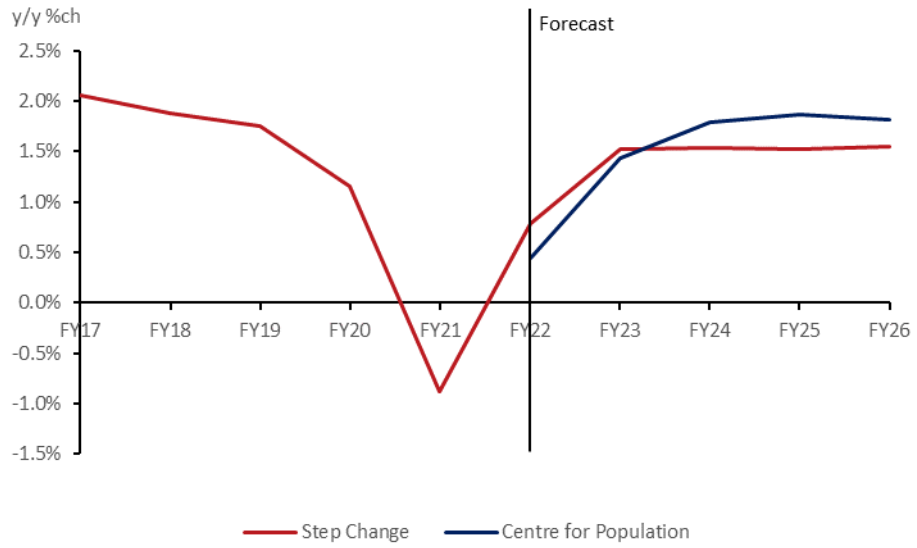


Figure. 62. Population y/y% Change, Centre for Population vs. Step Change: QLD



Figure. 63. Population y/y% Change, Centre for Population vs. Step Change: SA

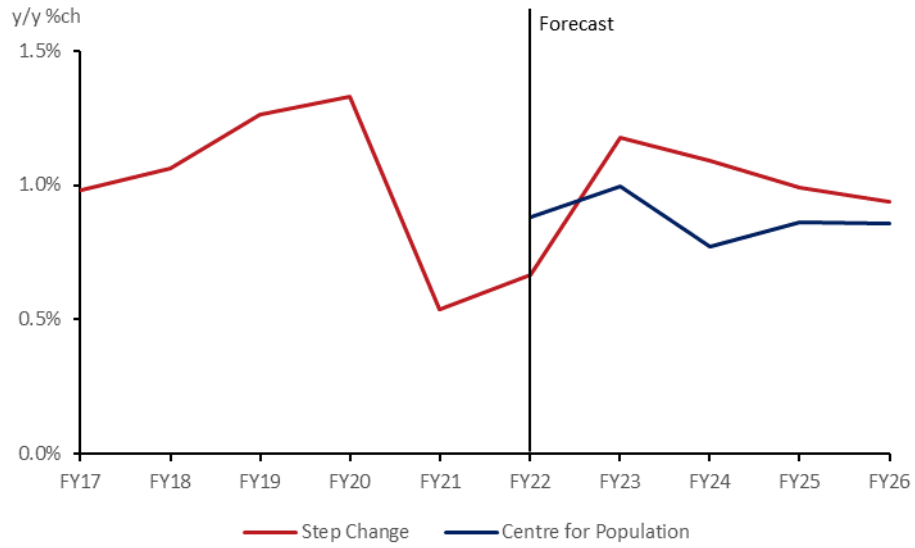


Figure. 64. Population y/y% Change, Centre for Population vs. Step Change: WA

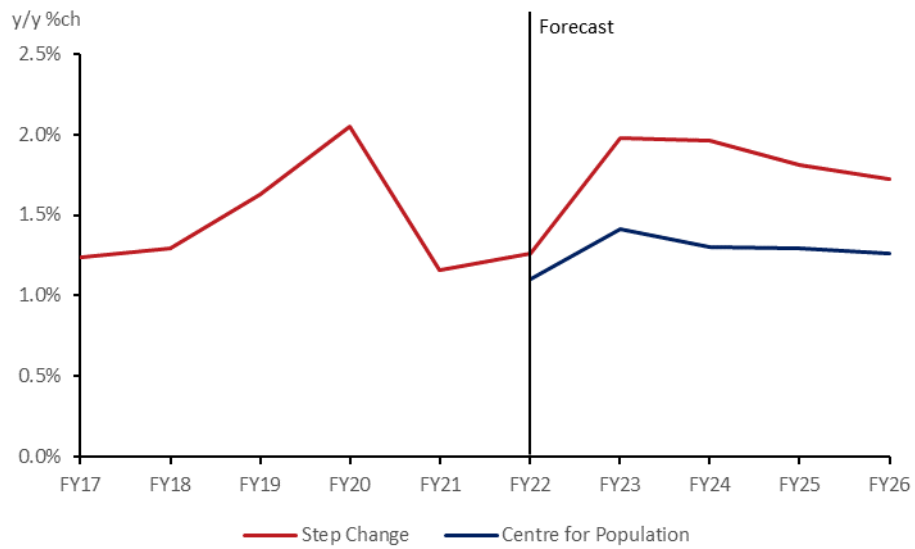


Figure. 65. Population y/y% Change, Centre for Population vs. Step Change: TAS

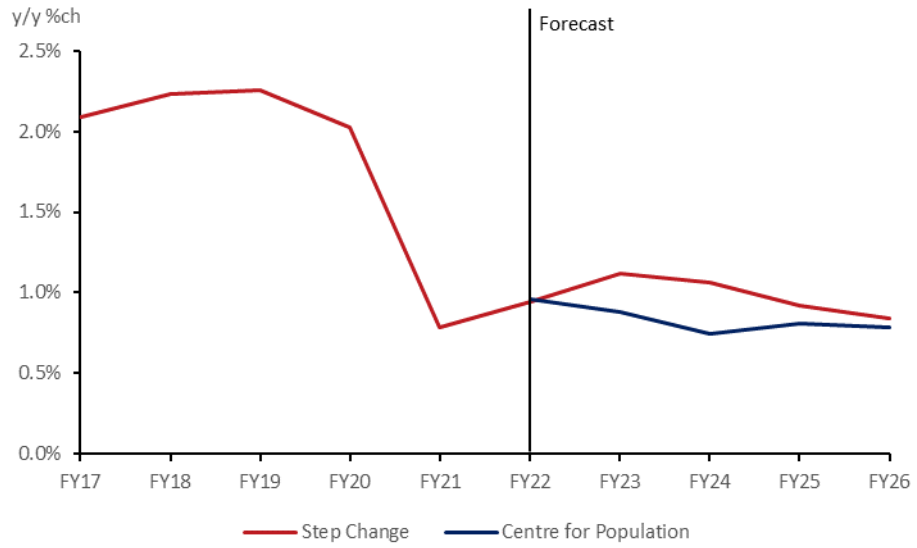
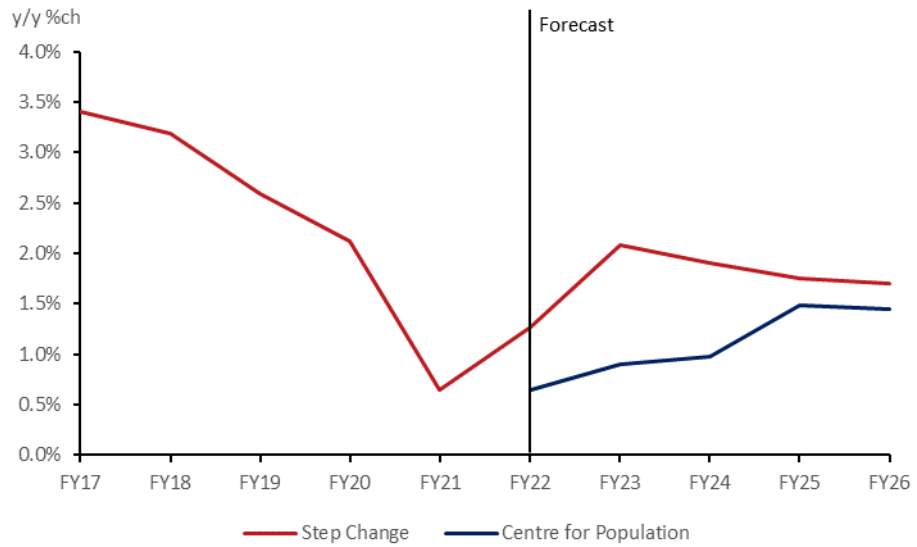


Figure. 66. Population y/y% Change, Centre for Population vs. Step Change: ACT



Appendix D: Comparison with Other forecasts

The forecasts produced in this report are benchmarked against the state Treasury departments. The projections are assessed based on Gross State Product (GSP) as a common metric.

In the medium term, the average annualised GSP growth forecasts are broadly in line with that of the State Treasury for NSW, SA, VIC, and ACT, albeit the timings are different for some states. The GSP forecasts in this report are generally more optimistic for WA and QLD, and less optimistic for TAS. This is largely driven by the near term and longer term views of the economic drivers, particularly investment and labour market outlook for these states.

The table below compares the *Step Change* GSP projections to the treasury department for each state, for all years possible. Note these numbers are all financial year figures. We note the following key differences:

- The outlooks for NSW are similar, though there is a slightly stronger recovery through the FY22 followed by weaker growth in FY23 in *Step Change*.
- *Step Change* has a weaker near-term outlook for VIC over FY22 but the projections are generally more optimistic than the state for the rest of the outlook period. While 4.7% growth is still solid economic performance for the state, capacity constraints is expected to weigh on the construction sector.
- The *Step Change* projections are more optimistic in the near term for QLD. This reflects the view that strong commodity prices will support the coal and LNG export sector. Over the remainder of the outlook, the *Step Change* projections are broadly similar to the state.
- Similarly for WA, the *Step Change* outlook for mining drives strong performance in FY22 followed by a wind-down in FY23. Beyond this, the *Step Change* projections are generally more optimistic on the outlook for WA.
- In SA, again the outlook for gross state product in FY22 is stronger for *Step Change*. Over the long run, the *Step Change* projections are generally more conservative on the growth outlook in comparison to the state. The *Step Change* projections see a net outflow of interstate migrants over the long run.
- For the smaller states of TAS, ACT and NT again the growth projections in FY22 are stronger. Beyond this, the growth outlook is more conservative relative to the respective State Treasuries. This largely reflects *Step Change*'s view of stronger migration into the bigger states, which drives weaker economic growth outcomes for the smaller states.

Table 2. Step Change projections vs. state treasury projections, GSP, Annual % Change

		FY22	FY23	FY24	FY25	FY26
NSW	Step Change	1.5	4.0	2.5	2.7	1.9
	State Treasury	1.5	4.3	2.8	2.5	1.5
VIC	Step Change	4.7	4.4	4.2	3.3	3.1
	State Treasury	5.5	3.3	2.3	2.8	2.8
QLD	Step Change	5.2	5.1	2.9	2.9	2.6
	State Treasury	3.0	2.8	2.8	2.8	2.8
SA	Step Change	6.4	1.1	1.1	1.9	1.7
	State Treasury	3.0	2.3	2.3	2.3	2.3
WA	Step Change	4.8	0.7	3.5	3.0	3.4
	State Treasury	3.8	2.0	1.0	1.5	1.5
TAS	Step Change	5.6	-0.4	1.7	1.9	1.7
	State Treasury	3.8	2.8	3.0	2.3	2.3
NT	Step Change	10.0	1.5	1.6	3.1	2.6
	State Treasury	4.4	3.7	-0.7	4.3	2.9
ACT	Step Change	3.7	1.6	2.9	2.2	2.2
	State Treasury	3.0	3.0	3.0	3.0	3.0

Source: BIS Oxford Economics/State/Territory 2022-23 Budgets

Forecast Accuracy

Oxford Economics forecast performance has been marginally closer to actuals than the panel average, sitting at 0.7% pt. average absolute forecast divergence (2009-21), while the panel average has been 0.8 % pt.

Real growth in Australia averaged 2.2% p.a. over this period.

Table 3. Oxford Economics Forecast Accuracy

Oxford Economics			
Forecast performance compared			
2009 - 2021			
<small>(average absolute forecast divergence for real GDP growth)</small>			
	Oxford Economics	Average*	Actual Average Growth
World	0.9	1.2	2.5
US	0.9	1.0	1.7
Australia	0.7	0.8	2.2
Japan	1.6	1.7	0.3
Eurozone	1.2	1.4	0.6
UK	1.5	1.7	1.1
China	0.8	1.0	7.4
Germany	1.5	1.6	0.9
France	1.1	1.3	0.7
Italy	1.6	1.7	-0.4
India	2.2	2.3	5.7
Brazil	2.0	2.1	1.2
Canada	1.3	1.4	1.5
Malaysia	2.2	2.0	3.8
Singapore	2.6	2.4	3.9

*Average includes: OECD, IMF, Consensus, EIU, IHS Global Insight forecasts expect for Malaysia and Singapore average, which do not include OECD and IMF

Source: BIS Oxford Economics

Appendix E: Framework for *Hydrogen Export Scenario*

The *Hydrogen Export* scenario considers the impact of the development of a commercial-scale, hydrogen production and exporting industry. To provide clarity on how we modelled the nascent industry, we have provided further details on the modelling framework used.

ABS Classification of Hydrogen

With the industry in its infancy and the expectation of substantial growth over the course of the forecast period, it is important to ensure it is mapped correctly within current economic indicators. According to the ABS 'Australian and New Zealand Standard Industrial Classification (ANZSIC)'⁷, it is clear that the appropriate GVA category classification is under Division C – Manufacturing. Within the manufacturing category, this captures:

- Hydrogen manufacturing and other gas variants that may be used for transport and storage, e.g. ammonia
- Hydrogen, fuel cell, hybrid, or electric vehicle manufacturing

Notably, the substantial investments in renewable electricity generation necessary to feed the electrolyzers would be classified in the ANZSIC Division D – Electricity, Gas, Water and Waste Services. In assessing the profiles for GVA in the alternative scenarios, it is important to understand these classifications.

Timing of scaling up the hydrogen industry

The expected trajectory for the scaling up of the hydrogen industry can be broadly split into two stages. The first stage, running over the next decade, will see the public sector drive much of the investment into hydrogen until cost competitiveness improves⁸ and key export market demand develops. Through 2025, likely actions to develop the industry include pilot, testing and demonstration projects and continue investing in developing cost-competitive production technology. From the government, this will likely mean providing green financing to these projects through groups such as CEFC and ARENA rather than outright operation or development. Over the first stage, production of hydrogen is expected to be modest, growing steadily. Demand will mostly be accommodated by domestic demand⁹ with additional exporting projects making up the remainder. During this period, the market rewards for this investment will be extremely

⁷ <https://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/D9AB3BD5751C3C52CA257B9500133B9D>

⁸ See the latest CSIRO GenCost report, https://www.csiro.au/-/media/EF/Files/GenCost2020-21_FinalReport.pdf

⁹ In this case, domestic demand is assumed to be driven by the displacement of natural gas and diesel. For natural gas, this means blending hydrogen into the natural gas network, and eventually through segmentation, hydrogen displaces natural gas altogether. For diesel, this means displacing its use in long-distance trucking and rail.

limited (if present at all). As such, the private sector is highly unlikely to undertake the substantial investment required to develop the sector, and government support will be vital to getting the industry off the ground.

The second stage sees the hydrogen industry accelerate significantly, underpinned by export demand for hydrogen and a shift in production technology to make the sector commercially viable. Consistent with the previous *Export Superpower* scenario assumptions in the 2021 report, the *Hydrogen Export* scenario sees domestic demand approximately equal to export demand until 2040 before export demand expands substantially over the rest of the forecast period.

Geographic distribution of production, investment, and exporting

All states and territories have now announced a hydrogen roadmap or strategy, making it clear that governments understand the potential opportunities for exporting hydrogen. While domestic demand is assumed to be delivered from near the regional load centre (likely within each state), some areas will naturally have competitive advantages in the exporting of hydrogen. These locations with nearby regional load centres and quality exporting access and infrastructure will likely be developed as Hydrogen Hubs.

ABBREVIATIONS

Abbreviation	Definition
ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AEMO	Australian Energy Market Operator
ANZSIC	Australia & New Zealand Standard Industry Code
ARENA	Australian Renewable Energy Agency
CAGR	Compounded Annual Growth Rate
CEFC	Clean Energy Finance Corporation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FY	Financial year, beginning 1st July
GDP	Gross Domestic Product
GSP	Gross State Product
GVA	Gross Value Added
NAIRU	Non-Accelerating Inflation Rate of Unemployment
NI	Natural Increase
NIM	Net Interstate Migration
NOM	Net Overseas Migration
NSW	New South Wales
NT	Northern Territory
% Pt.	Percentage point
QLD	Queensland
SA	South Australia
TAS	Tasmania
VIC	Victoria
WA	Western Australia
y/y	year on year



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