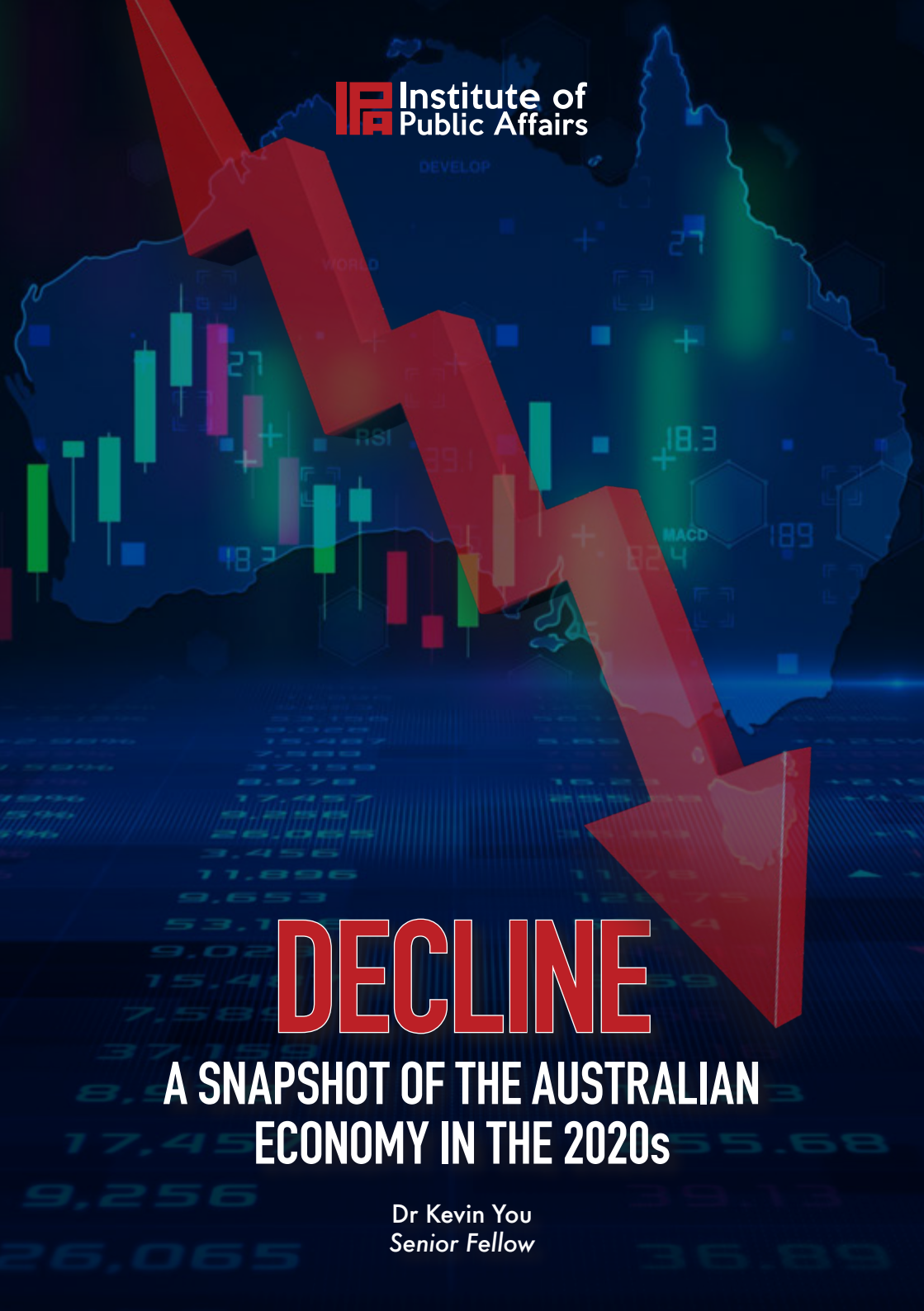


Dr Kevin You
Senior Fellow

SOURCE DATA AND METHODOLOGY

Data for this booklet were derived primarily from the Australian Bureau of Statistics' (ABS) *Australian National Accounts* database.

Supplementary data were sourced from:

- Volume One of the Productivity Commission's *Five-year Productivity Inquiry* report,
- The ABS' *Australian Population by Country of Birth* database,
- The ABS' *Total Value of Dwellings* dataset,
- The Australian Institute of Family Studies' *Population, Households and Families'* research brief, and
- The Parliamentary Budget Office's *2025-2026 Budget* fiscal dataset.

Preliminary analysis was conducted in September 2025, with updates made between December 2025 and February 2026.

Decadal analyses exclude data from 2020 and 2021 because of the distortionary effect the governmental response to the Covid-19 pandemic had on key measures.

Except for those relating to federal government finances, the economic data used in this booklet are based on real rather than current price values. This means that the dollar figures have been adjusted for inflation through a technique called chain volume measurement.

The chain volume measurement in the most up to date *Australian National Accounts* database, at the time of the analysis, was anchored to the Australian dollar as of the financial year ending 2024 (i.e., to FY2024 AUD).

THE AUSTRALIAN ECONOMY IS ON THE WRONG TRACK

Since the end of the pandemic, Australia's economy has slipped into a pattern of falling per capita growth, flat real wage growth, and a spiralling cost of living.

Australia is still growing on paper, but this is primarily due to record migration having the effect of growing its population; not because Australians are actually better off.

This has had the added flow-on effect of placing additional housing demand in a market with stagnating approvals for new construction.

Real wages – together with labour productivity – has been in a prolonged slump, while energy costs, rent, and the price of household essentials have all surged.

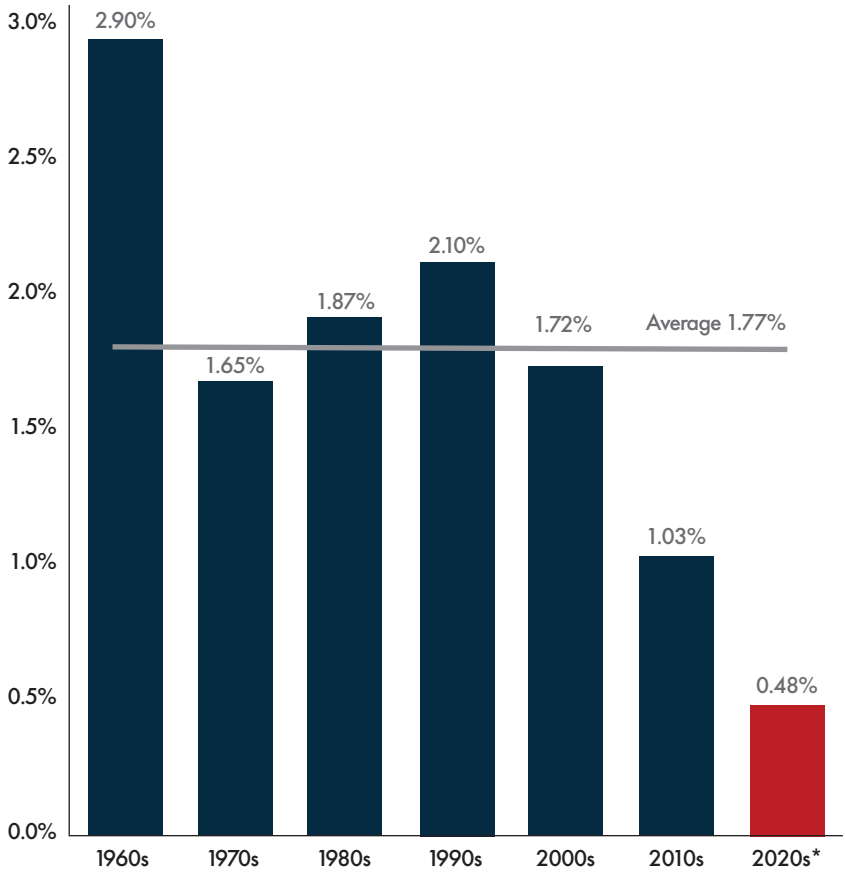
Australia is increasingly dependent on government spending and population growth to fuel headline economic growth. Meanwhile, the engine room of genuine economic growth in the private sector has been undermined by red tape and regulatory restrictions across all levels of government.

This publication uses key economic indicators to compare Australia's economic conditions in the post-pandemic years against previous decades. It finds:

- Annual per capita economic growth in the 2020s has been less than half the long-term average, and per capita growth has been negative in 10 of the last 13 quarters.
- Net overseas migration has totalled 1.3 million since the end of the pandemic. The growth of the overseas born population over the past 25 years – now at 9 million people – has been double the growth of Australia's housing stock.
- Government spending now constitutes 29 per cent of economic activity, up from 21 per cent at the start of the year 2000.
- Private investment and net export has declined since 2000, from 28 per cent of economic activity to about 20 per cent.

The Australian economy is going down the wrong path and must change course if we are to recover our economic competitiveness and dynamism.

CHART 1: AVERAGE ANNUAL (REAL) PER CAPITA ECONOMIC GROWTH BY DECADE



*SOURCE: IPA, ABS; *2020s FIGURE EXCLUDES THE PANDEMIC YEARS OF 2020 AND 2021 AND THE INCOMPLETE YEAR 2025*

AUSTRALIAN LIVING STANDARDS IN A SLUMP

Average per capita economic growth since the 1960s (up to 2024) in Australia was an estimated 1.8 per cent per annum – roughly four times the post-pandemic growth rate of 0.5 per cent.

Per person economic growth – measured by gross domestic product (GDP) per capita – has consistently been significantly less than growth in headline aggregate GDP and, as of writing, GDP per capita has been negative in ten of the most recent 13 quarters recorded.

Research by the Institute of Public Affairs (IPA) found that record levels of migration contributed to the decline in per capita GDP.[1] Much of this has been due to the downward pressure that increased migration placed on labour productivity. According to the Productivity Commission:

> The decrease in labour productivity was a result of large increases in [aggregate] hours worked for the whole economy ... This increase in hours worked is unprecedented ... [which] resulted in a decline in labour productivity as workers had access to less capital, and as a result were, on average, less productive.[2]

Lower productivity and lower per capita income go hand in hand. Conversely, increasing income per capita, all else remaining constant, requires an increase in productivity.[3]

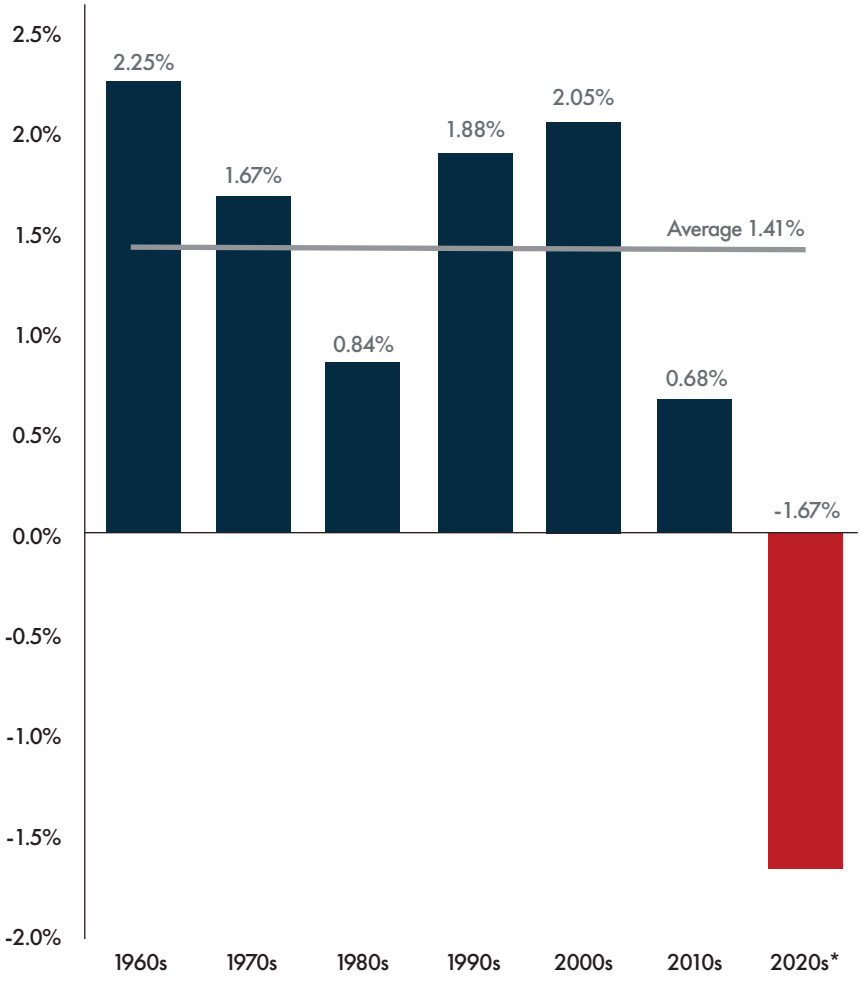
By statistical definition, this cannot come from simply working longer hours. Rather, the economy needs to produce more or higher quality output for every hour worked.

1 Kevin You and Morgan Begg, *Addicted to Migration: Australia's falling productivity and the cost of relying on migration for economic growth* (December 2023); Kevin You, *Australia's Declining Standard of Living* (May 2024).

2 Productivity Commission, *Annual productivity bulletin* (2024): https://www.pc.gov.au/ongoing/productivity-insights/bulletins/bulletin-2024/productivity-bulletin-2024.pdf.

3 Kevin You, 'We can work it out' (2025) 77(1) *IPA Review* 40.

CHART 2: ESTIMATED AVERAGE REAL GROWTH OF PER CAPITA HOUSEHOLD DISPOSABLE INCOME BY DECADE



*SOURCE: IPA, ABS; *2020s FIGURE EXCLUDES THE PANDEMIC YEARS OF 2020 AND 2021 AND THE INCOMPLETE YEAR 2025*

AUSTRALIANS HAVE LESS MONEY IN THEIR POCKET

Every parent wants their children's generation to be better off than their own generation. The opposite is in danger of happening, as Australian families are worse off than they were ten years ago.

High inflation, combined with low or negative productivity growth, contributed to the post-pandemic average annual decline of 1.7 per cent in estimated per capita household disposable income.[4]

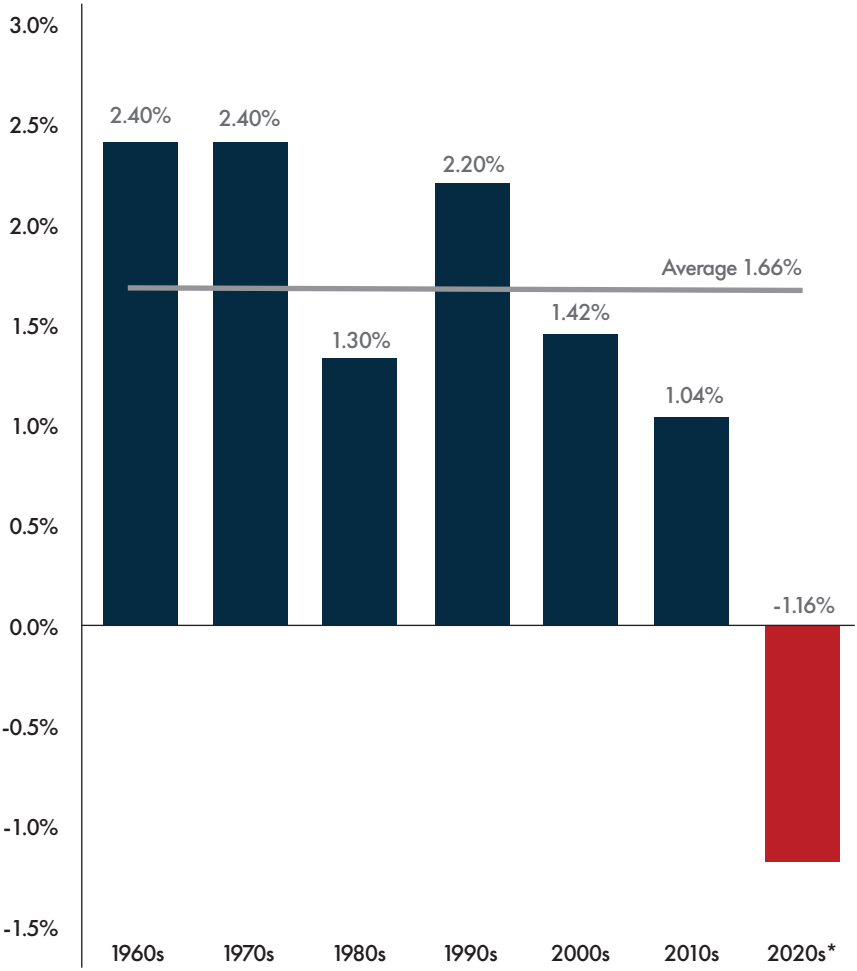
By contrast, long-term household disposable income per capita is estimated to have grown (in real terms) at the average annual rate of 1.4 per cent since the start of the 1960s.

The real disposable income of Australian families had consistently grown since 1960 but stagnated starting from the second half of the 2010s.

Since the end of the pandemic, real per capita household disposable income has collapsed and failed to materially recover. Estimated real household disposable income (per capita) in 2024, at about $60,000, was roughly the level it was more than a decade prior, in 2014.

4 Analysis of data from: Australian Bureau of Statistics, *Australian National Accounts* (3 December 2025): https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-national-income-expenditure-and-product/latest-release

CHART 3: ANNUAL AVERAGE PRODUCTIVITY GROWTH BY DECADE



*SOURCE: IPA, ABS, PC; *2020s FIGURE EXCLUDES THE PANDEMIC YEARS OF 2020 AND 2021 AND THE INCOMPLETE YEAR 2025*

PRODUCTIVITY COLLAPSED IN THE 2020s

Economic productivity is key to Australians getting ahead. Getting more out of what you put in leads to higher incomes, improved living standards, and stronger overall economic growth.[5]

Australia's productivity growth in the 1960s and 1970s was high, averaging 2.4 per cent per annum. This was driven by a combination of post-war industrial expansion, high levels of infrastructure investment, and technological innovation.

Manufacturing played a more prominent role in the economy compared to today, and capital deepening (through the uptake of machinery and harnessing of hydrocarbon fuels) contributed to productivity improvements.

Productivity growth dipped in the 1980s, due partly to global economic conditions and partly to domestic inefficiencies, including rigid labour markets and the growing complexity of the industrial relations system. The productivity benefits of the Hawke and Keating reforms were not fully felt until the 1990s.

While productivity growth slowed in the new millennium, it maintained a positive momentum. However, the post-pandemic period saw the rapid intake of low-skilled migrant arrivals from developing nations.

The federal government has also committed to policies that act as impediments to productivity growth. A series of amendments to the *Fair Work Act 2009* (Cth) imposed additional industrial regulation and uncertainty on Australia's already heavily regulated labour market.[6] The commitment to net zero by 2050 has reallocated resources from productive assets, such as coal-fired power stations to less productive wind and solar generators.[7]

Consequently, post-pandemic productivity growth averaged approximately negative 1.2 per cent per annum.

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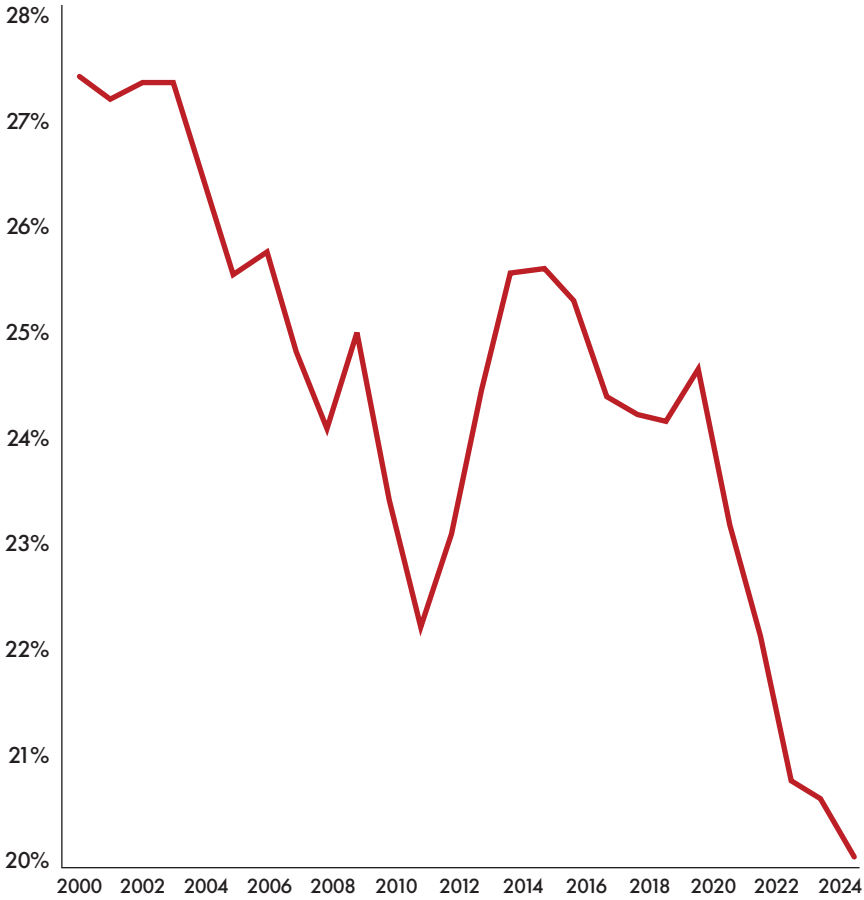
5 Patrick D'Arcy and Linus Gustafsson, *Australia's Productivity Performance and Real Incomes* (June Quarter 2012).

6 Kevin You, 'We can work it out' (2025) 77(1) *IPA Review* 40; Mark Mourell, 'IR Bill a Deal Breaker' (2023) 75(3) *IPA Review* 40.

7 Kevin You, Saxon Davidson, and Morgan Begg, *From Bad Idea to Bad Laws: The Five Pillars of Net Zero* (Institute of Public Affairs Research Report, June 2025).

CHART 4: PRIVATE INVESTMENT AND NET EXPORTS AS A SHARE OF GROSS DOMESTIC PRODUCT



SOURCE: IPA, ABS

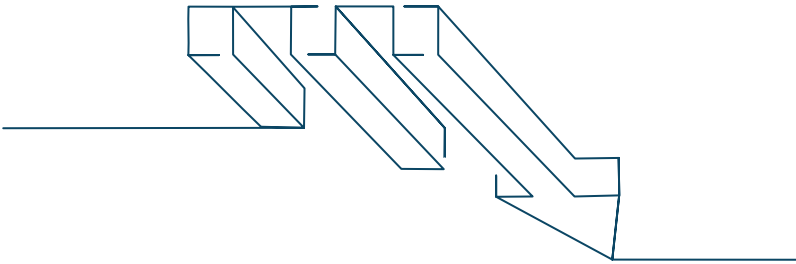
PRIVATE SECTOR STALLS AFTER THE MINING BOOM

In the financial year ending 2000, private investment and net export – which is an indicator of the health of private sector – constituted roughly 28 per cent of the Australian economy. As of the financial year ending 2025, its share in the economy had declined to about 20 per cent.

Between 2011 and 2015, the mining boom increased the role played by the private sector in the economy. But this was not to last. The overall decline in the role of the private sector is evidence of Australia's declining reputation as an investment destination and the volume of regulatory burdens deterring entrepreneurialism.

In 2004, Australia was ranked the 4th most competitive economy in the world by the International Institute for Management Development's (IMD) World Competitiveness Yearbook, behind only the US, Singapore, and Canada.[8] Since then, competitiveness and dynamism in the economy have collapsed while the public sector plays an increasingly larger role, dropping Australia's overall competitiveness ranking to 18th in 2025.

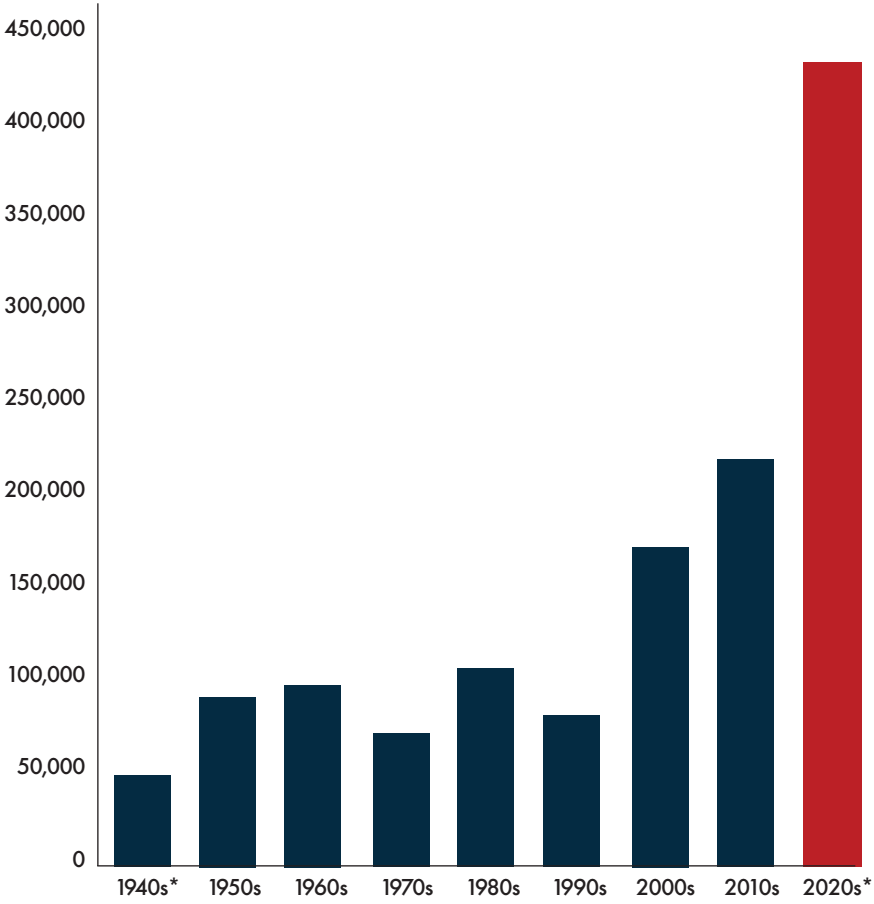
The private sector is increasingly subject to government mandates and attached to taxpayer funding. State and federal government contracts have entangled parts of the private sector into the public sector, while governments are frequently underwriting privately-owned projects, such as renewable energy projects.[9]



8 Kevin You, *Australia's Economic Competitiveness in Continuing Decline* (Parliamentary Research Brief, Institute of Public Affairs, November 2023).

9 Adam Morton, 'Albanese government substantially expands renewable energy scheme amid 2030 target concerns' (*The Guardian*, 29 July 2025); Alan Moran, 'Renewable energy subsidies undermine our economy' (*The Spectator Australia*, 6 June 2024); Gary Banks, 'Big builds, big problems' (2023) *75*(2) *IPA Review* 38.

CHART 5: AVERAGE ANNUAL OVERSEAS MIGRATION BY DECADE



SOURCE: IPA, ABS

**1940S FIGURE EXCLUDES THE WARTIME YEARS BETWEEN 1940 AND 1945; 2020S FIGURE EXCLUDES THE PANDEMIC YEARS OF 2020 AND 2021 AND THE INCOMPLETE YEAR 2025*

MIGRATION INTAKE HAS BEEN UNPRECEDENTED AND UNPLANNED

From January 2022 to December 2024, net overseas migration totalled approximately 1.3 million. This represented the largest three-year net migrant intake in Australian history. Although migration has moderated from the historic annual high in 2023 (of more than 530,000), net migration in 2024 was still higher than in any pre-pandemic year.

For context, net overseas migration in the 2010s averaged roughly 220,000 per annum. The federal government's 2025-26 Budget and Treasury's Centre for Population envisage a steady-state migration rate of 225,000 per annum from the 2027 financial year onwards.[10] The average net intake from the end of the Second World War until the end of the Howard government in 2007 was approximately 90,000 per annum.[11]

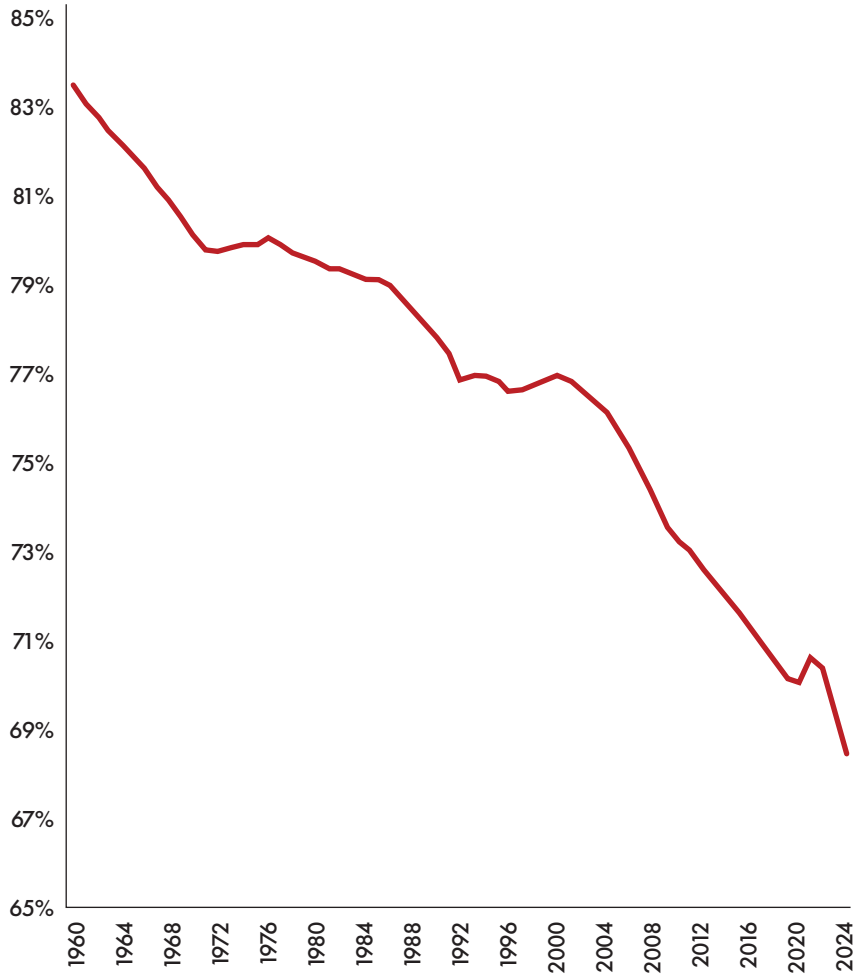
Net overseas migration in the 2025 financial year was 305,570.[12] A return to Australia's normal postwar pre-pandemic intake levels is not currently under consideration. Neither has there been a serious policy conversation about Australia's current level of overseas-born population. The assumption, then, is that the share of foreign-born residents, as a percentage of the population, will continue to climb, and the share of the Australian-born population will continue to fall in the foreseeable future.

10 Treasury, *Budget 2025-26: Budget Strategy and Outlook* (25 March 2025): https://budget.gov.au/content/bp1/download/bp1_2025-26.pdf.

11 Daniel Wild, 'Pushing our nation's intake to the limit' (*The Daily Telegraph*, 26 November 2025): https://ipa.org.au/read/pushing-our-nations-intake-to-the-limit.

12 ABS, *National, state and territory population* (18 December 2025): https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/latest-release.

CHART 6: PERCENTAGE OF THE POPULATION BORN IN AUSTRALIA



SOURCE: IPA, ABS

THREE IN FOUR NEW AUSTRALIAN RESIDENTS ARE BORN OVERSEAS

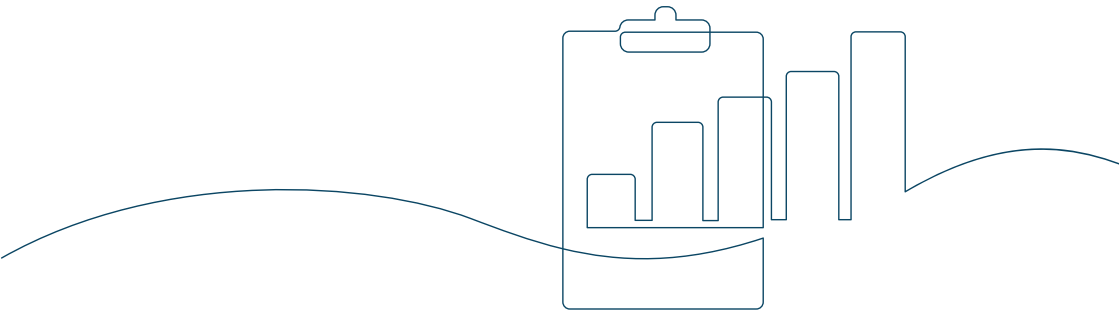
Australia's reliance on migration to maintain and increase its population has resulted in an ever-increasing share of overseas-born residents.

At its highest point, in the immediate years following the Second World War, native-born Australians made up approximately 90 per cent of the population. In 2024, native-born Australians made up approximately 69 per cent of the population.

The long-term average growth in Australia's overseas-born population since the 1960s is approximately 2.6 per cent per annum. This is more than double the long-term average growth in Australia's native-born population (about 1.2 per cent per annum).

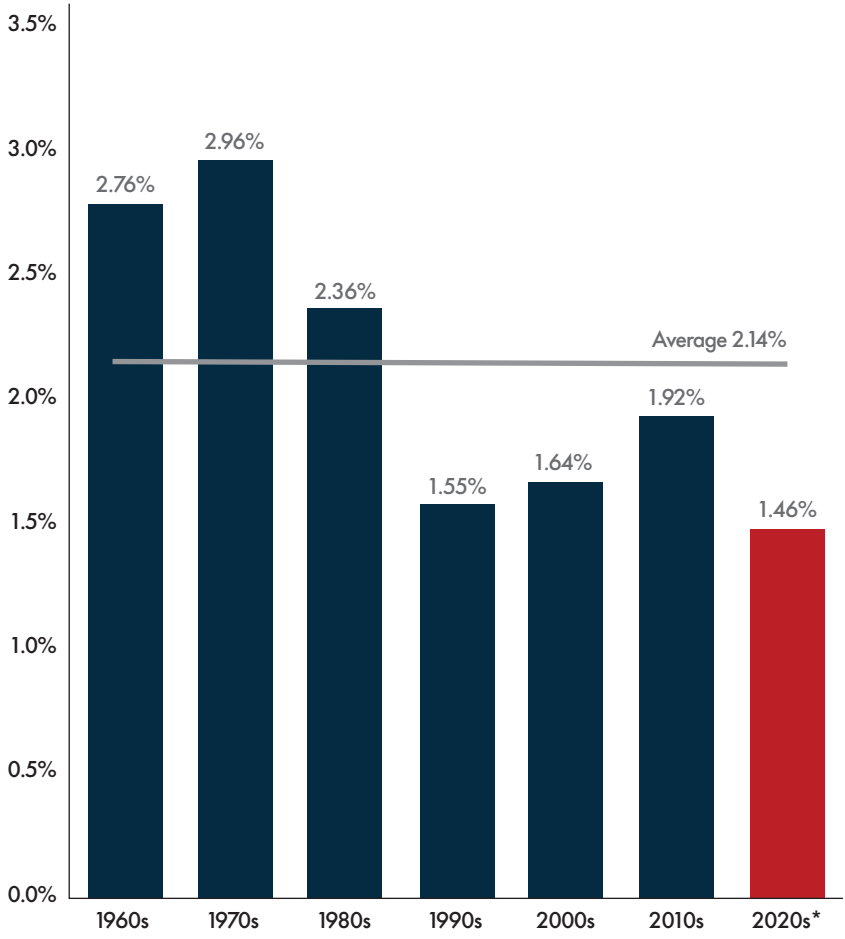
Between the end of the pandemic and the end of 2024, the growth in the Australian-born population averaged roughly 0.8 per cent per annum, whereas the number of Australia's overseas-born residents has grown by 4.5 per cent.

This is a symptom of what the IPA has dubbed an 'addiction to migration' to sustain economic growth, whereby aggregate GDP growth increasingly relies on immigration-led population growth rather than productivity growth.[13]



13 Kevin You and Morgan Begg, *Addicted to Migration: Australia's falling productivity and the cost of relying on migration for economic growth* (Institute of Public Affairs Research Report, December 2023).

CHART 7: ESTIMATED ANNUAL AVERAGE GROWTH IN DWELLING STOCK



*SOURCE: IPA; *2020S FIGURE EXCLUDES THE PANDEMIC YEARS OF 2020 AND 2021 AND THE INCOMPLETE YEAR 2025*

HOUSING SUPPLY STALLS DESPITE RECORD DEMAND

Growth in Australia's housing stock in the post-pandemic years, between 2022 and 2024, is estimated to be 1.5 per cent per annum, below the estimated long-term average of 2.1 per cent.

Previous IPA research has found that the time it takes to build a house has climbed markedly over the last decade.

In the financial year ending 2024, the time needed to build a new house was 50 per cent longer than in the financial year ending 2014. The material cost of building a house was also more expensive, by 53 per cent over the period.[14]

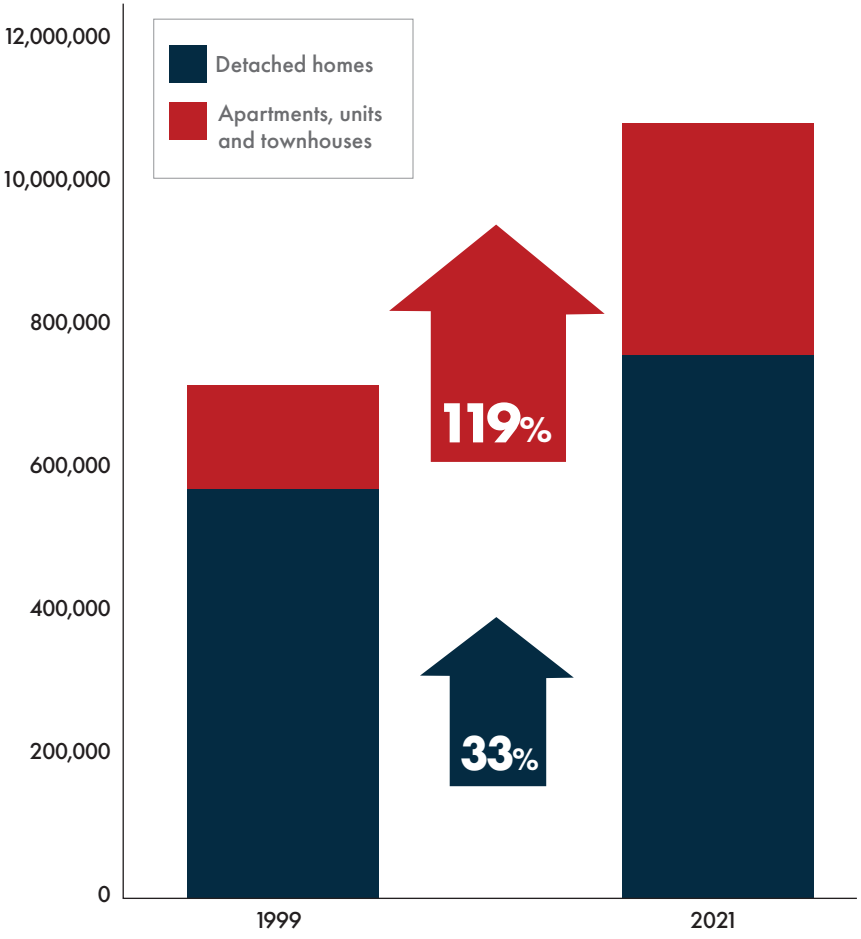
The combination of record migration levels, which accelerated housing demand, and a sluggish housing construction sector has resulted in an estimated cumulative supply shortfall of more than 179,000 homes between 2022 and 2024.[15]

One of the steps that state and federal governments have taken to address Australia's housing crisis has been to build high-density apartments and units in Australia's already densely-populated capital cities.

14 Kevin You, *Nationwide handbrake on housing construction* (Institute of Public Affairs Research Note, July 2025).

15 Kevin You, *Analysis of migration-induced housing supply shortfalls since 2022* (Institute of Public Affairs Research Note, June 2025).

CHART 8: HOUSING STOCK COMPOSITIONS IN 1999 AND 2021



SOURCE: IPA, ABS

THE GREAT AUSTRALIAN DREAM OF OWNING A HOUSE IS SLIPPING AWAY

Over the past two decades, Australia has undergone a deliberate shift toward planned urban densification, driven by state and local planning strategies that aim to curb the so-called 'urban sprawl' and supposedly maximise the use of existing (albeit strained) infrastructure.[16]

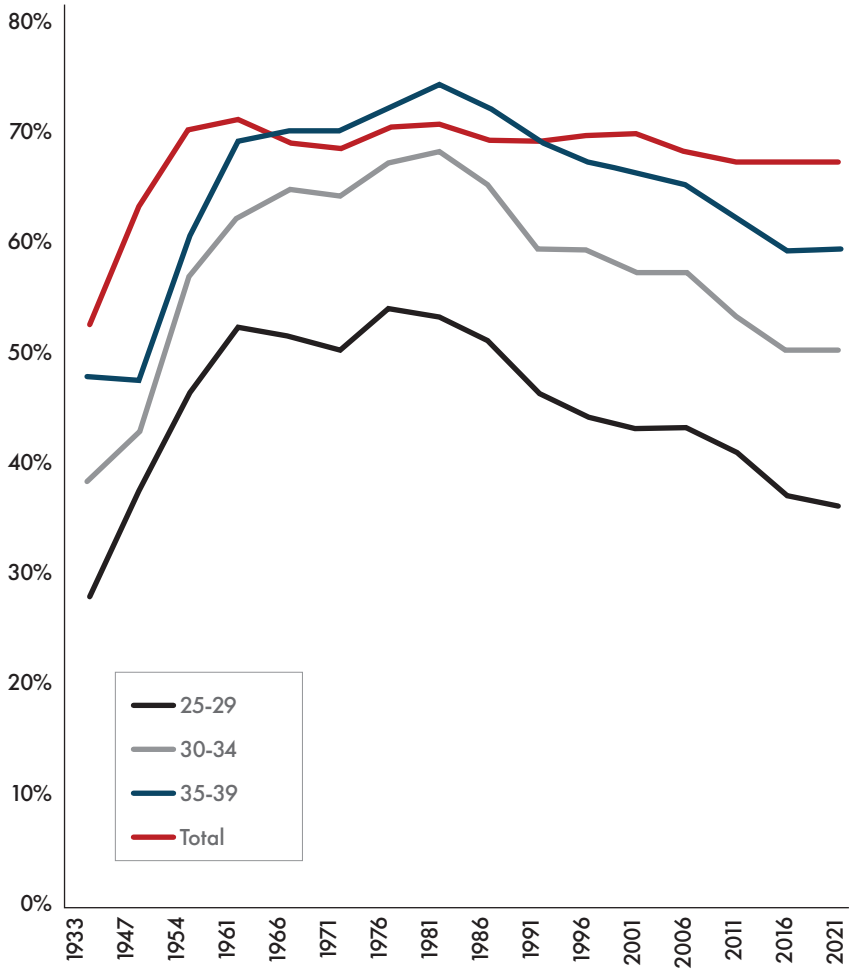
Over the two decades between 1999 and 2021, the proportion of detached homes (individual houses on a discrete parcel of land), as a share of Australia's housing stock declined from 80 per cent to 70 per cent – while the share of townhouses, units, and apartments increased from 20 per cent to 30 per cent.

Growth in building approvals between the 2024 and 2025 financial years reveal: only 29 per cent are attributable to detached homes, with the rest (71 per cent) attributable to other types of dwellings such as units and apartments.

Whatever meagre growth in housing approvals is occurring has been disproportionately focused on the types of dwellings that Australian families do not aspire to live in.

16 Rob Burgess, 'In Praise of Sprawl' (2024) 76(2) *IPA Review* 16: https://ipa.org.au/ipa-review-article/in-praise-of-sprawl; Kevin You, 'In Defence of the Burbs' (2025) 77(3) *IPA Review* 56: https://ipa.org.au/ipa-review-article/in-defence-of-the-burbs.

CHART 9: HOME OWNERSHIP RATE IN AUSTRALIA BY AGE GROUP



SOURCE: IPA, ABS

HOME OWNERSHIP COLLAPSES FOR YOUNG AUSTRALIANS

While the rate of home ownership in Australia has remained relatively stable, at approximately 70 per cent since the 1960s, homeownership among young Australians has been in decline since the early 1980s.

As of the latest census in 2021, home ownership among Australians aged 30 and 34 was only 50 per cent.

The median age of Australia's first home buyers in the year 2000 was 24.5. In 2022, it was 34.5.[17]

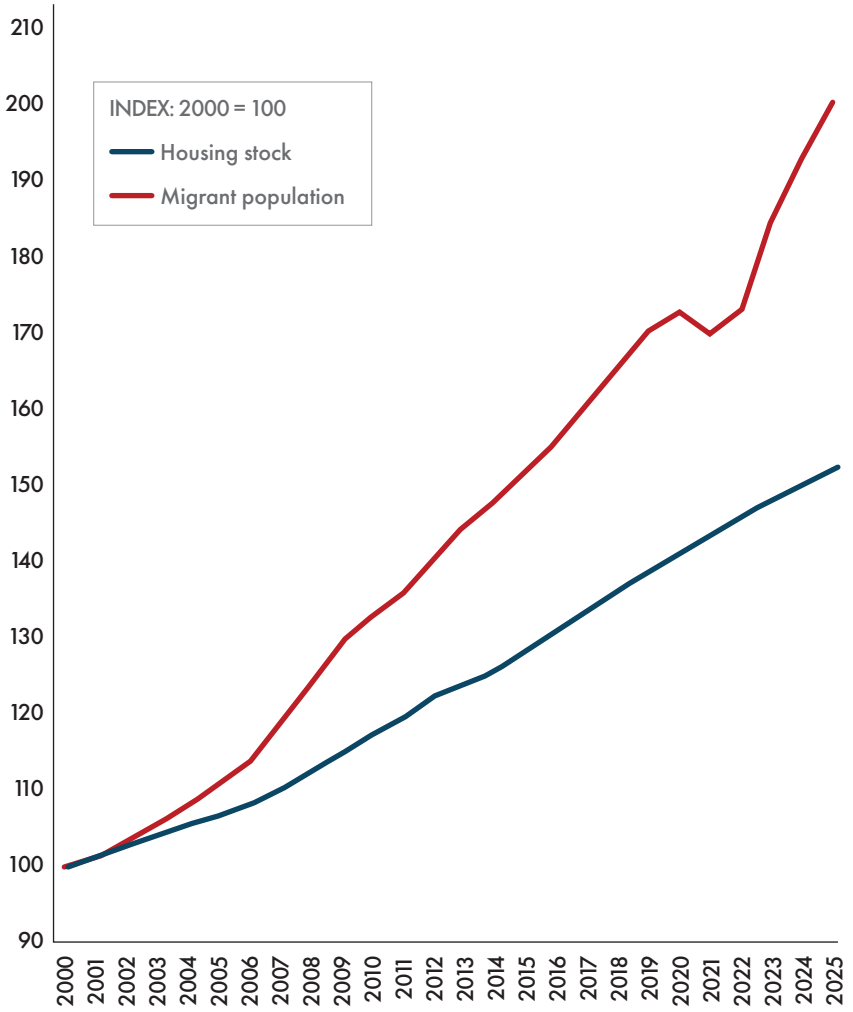
The average price of a home in Australia (including houses and apartments) exceeded $1 million for the first time in the December quarter of 2024.[18]

The average price of a home in New South Wales as of the end of the 2025 financial year, was $1.27 million, forming an intractable barrier to prospective first-time home buyers.

17 Tarric Brooker, 'Median age of Australia's first homebuyers shows how radically housing has changed' (*News.com.au*, 18 July 2022): https://www.news.com.au/finance/economy/australian-economy/median-age-of-australias-first-homebuyers-shows-how-radically-housing-has-changed/news-story/8c6ec01bae67823d323f362f3c53cd87.

18 ABS, *Total Value of Dwellings* (2 December 2025): https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/total-value-dwellings/latest-release.

CHART 10: CHANGE IN HOUSING STOCK VS MIGRANT POPULATION



SOURCE: IPA, ABS

MIGRATION GROWTH DOUBLE THE GROWTH IN HOUSING

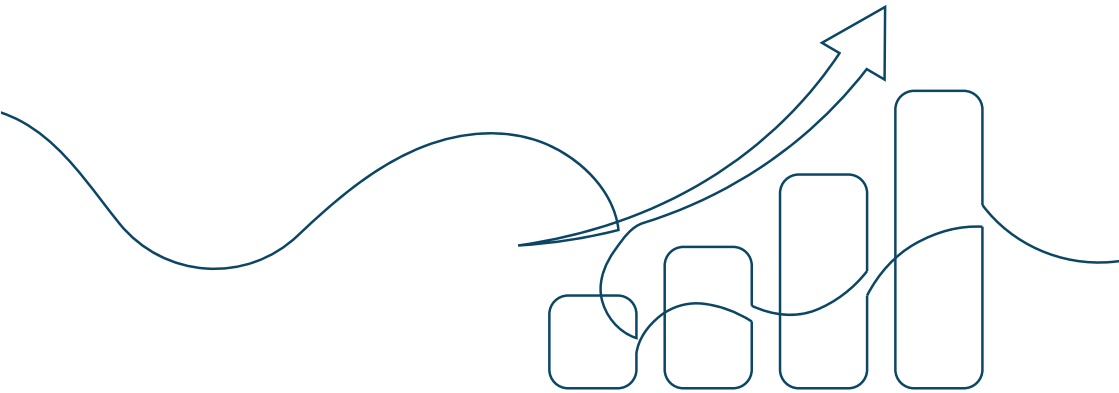
Since the (financial) year 2000, Australia's housing stock is estimated to have only increased by roughly 53 per cent, whereas its migrant population is expected to have more than doubled (increasing by 102 per cent) from 4.4 million to approximately 8.9 million.

The disparity between migration and housing supply has sharpened significantly since the end of the pandemic.

Australia's residential vacancy rates averaged about 2.4 per cent between the calendar years 2014 and 2019. Since the end of the pandemic, it has plummeted and hovered at barely 1 per cent, where it remains to this day.

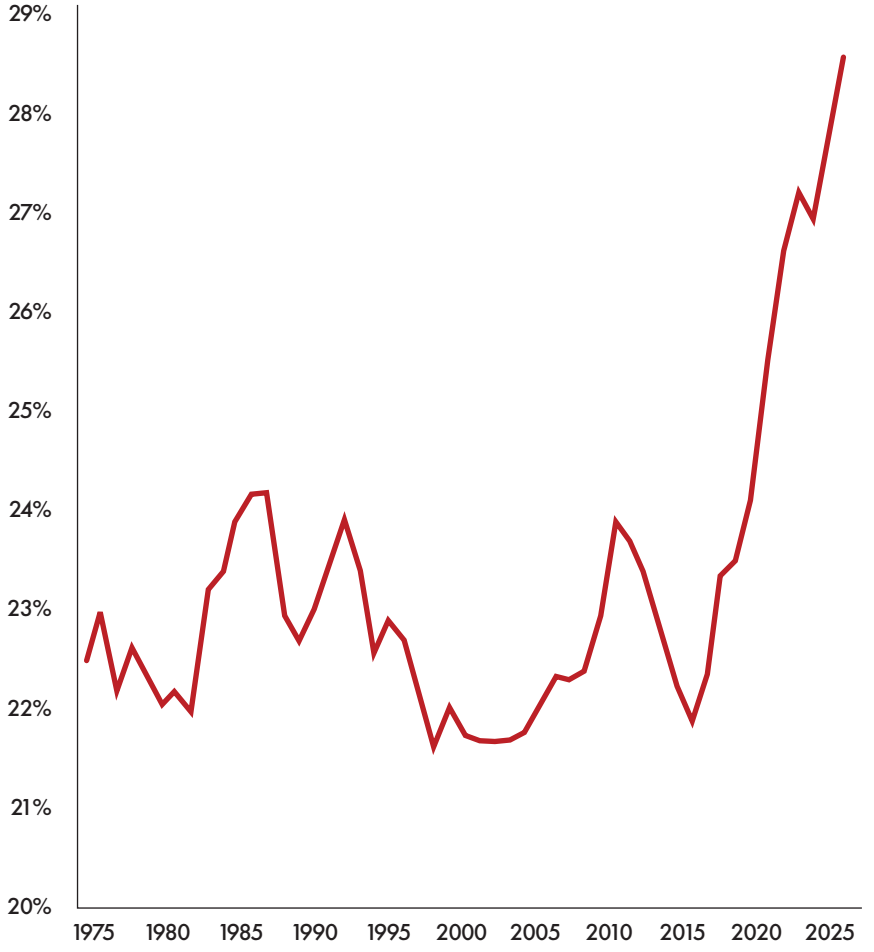
The latest data as of the time of writing shows the vacancy rate at 1.2 per cent in August 2025.[19]

ABS data show that population growth for the 2025 financial year was 420,100, which exceeded the increase in the stock of housing (of 156,800) by 263,300.



19 SQM, *Residential Vacancy Rates: National* (2025): https://sqmresearch.com.au/graph_vacancy.php?national=1&t=1.

CHART 11: ESTIMATED PUBLIC SECTOR SPENDING AS A COMPONENT OF GDP BY FINANCIAL YEAR



SOURCE: IPA, ABS

GOVERNMENT HAS A SPENDING PROBLEM

The latest federal budget projects that spending will continue to rise over the forward estimates to the financial year ending 2029, driven by growth in debt servicing, health, social security (including the National Disability Insurance Scheme), education, and infrastructure spending.

While taxes are still high, stagnant revenue driven by declining receipts from the resources sector will result in budget deficits into the foreseeable future.

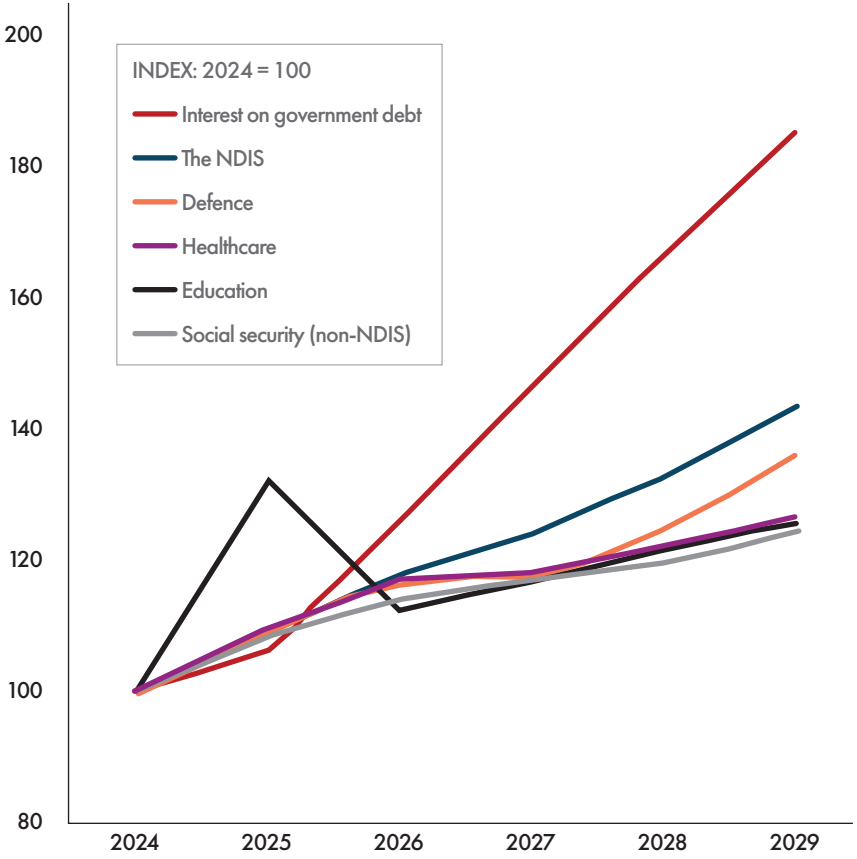
The budget deficit in the financial year ending 2028 is expected to exceed $37 billion, with another $37 billion deficit expected the following financial year.

If the budget problem were simply a shortfall in revenue, data would show private sector spending as a share of economic activity to be elevated. The opposite is occurring: IPA research has found that since the year 2000, the public sector has steadily been replacing the private sector in the Australian economy.[20]

- In the first quarter of 2000, federal and state government spending constituted roughly 21 per cent of Australia's GDP. By mid-2025, it had risen to about 28 per cent.
- In the first quarter of 2000, private sector (non-household) spending constituted roughly 28 per cent of GDP. By mid-2025, it had fallen to about 20 per cent.
- Since 2000, government spending has increased by 161 per cent in real, inflation adjusted dollar terms, while private sector (non-household) spending only increased by about 40 per cent.

20 Kevin You, *Big government getting bigger as private sector stagnates* (Institute of Public Affairs Research Note, February 2026).

CHART 12: GROWTH PROJECTION IN FEDERAL GOVERNMENT SPENDING BY KEY AREA



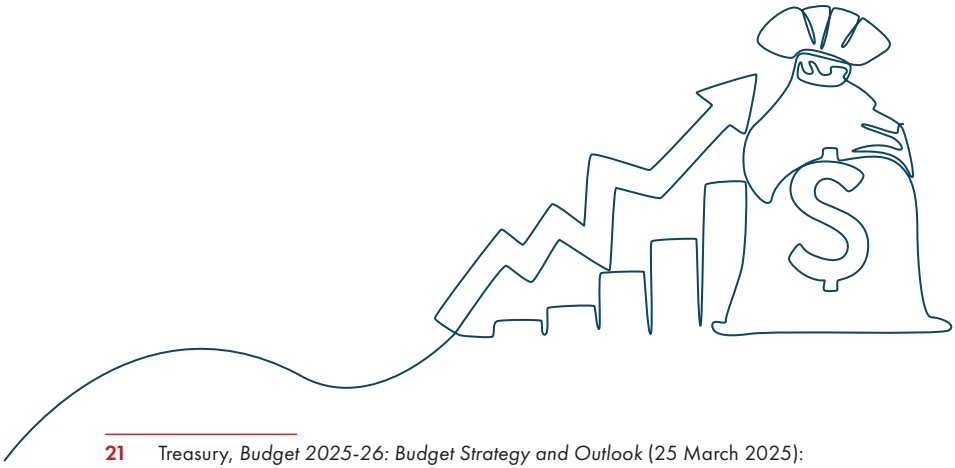
SOURCE: IPA, PBO

INTEREST PAYMENTS THE FASTEST GROWING SPENDING ITEM IN FEDERAL BUDGET

Because of the continuing deficits, gross federal debt is expected to exceed $1 trillion for the first time this financial year (ending 2026) and reach $1.22 trillion by the end of the 2029 financial year.[21] This will mean higher interest repayments on the government's debt.

In 2025, interest expense is expected to have cost taxpayers $23.9 billion. By 2029, it is expected to balloon further, to roughly $41.7 billion – an increase of 74 per cent.

This makes debt servicing the fastest growing expense item amongst all the federal government's major programmes. The National Disabilities Insurance Scheme comes second, ahead of government spending growth on schools, childcare, family support, and the Pharmaceutical Benefits Scheme.



21 Treasury, *Budget 2025-26: Budget Strategy and Outlook* (25 March 2025): https://budget.gov.au/content/bp1/download/bp1_2025-26.pdf.

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A SNAPSHOT OF THE AUSTRALIAN ECONOMY IN THE 2020s

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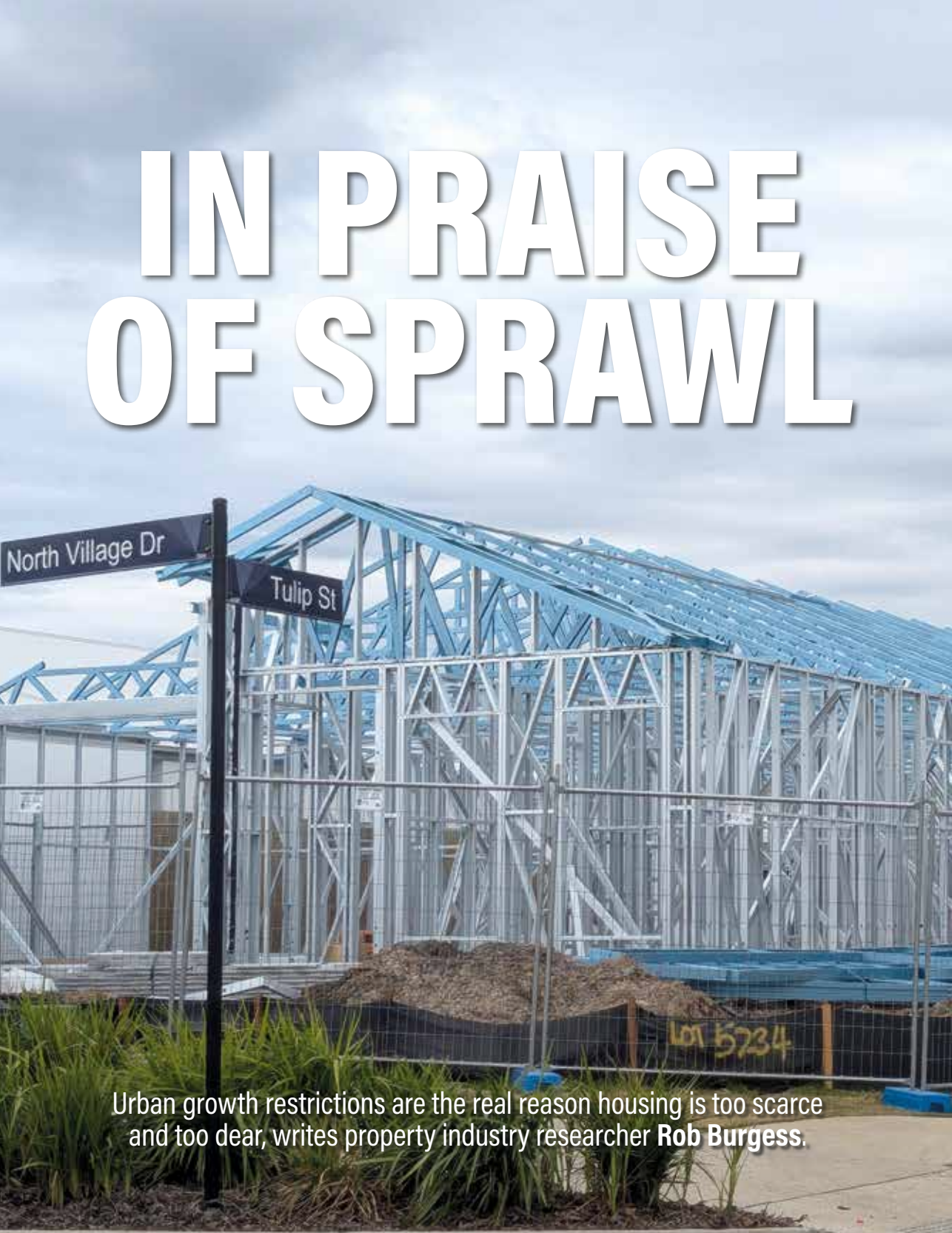


Urban growth restrictions are the real reason housing is too scarce and too dear, writes property industry researcher **Rob Burgess**.

Housing construction in Stockland's large Aura development west of Caloundra on the Sunshine Coast, Queensland.

Photo: Richard Conrad

Delayed decision-making, bureaucratic dithering, and the stubborn resistance of NIMBYs have all been frequently cited as planning-related barriers to the development of much-needed housing. Seldom, however, does the conversation shift to the impact that containment and densification policies are having upon Australia's escalating housing crisis.

Against a backdrop of rapid population growth, and in the face of rising social and economic costs, the 'contain-and-densify' approach to managing our cities is, simply, no longer fit for purpose. It is increasingly clear that a departure from this entrenched model is crucial. Left unaddressed, the downward spiral that is this nation's housing crisis will continue, leaving the aspirations of an ever-growing number of Australians in its wake.

The path forward demands a nuanced, evidence-based approach that reconciles the urgent need for affordable housing with practical urban development strategies. Only then can we ensure a future where housing affordability and accessibility are within reach of all Australians, marking a pivotal shift towards a genuinely successful model of urban growth.

BEYOND BOUNDARIES

Urban growth boundaries (UGBs) are artificial regional boundaries, enforced by authorities to contain the development of residential and other urban uses of land to mandated areas. They have been a cornerstone of urban planning policy in Australian cities since they were first introduced by the Victorian Government's *Melbourne 2030* policy in 2002. Since its introduction, the contain-and-densify model has been unable to deliver the number of dwellings required, the type of dwellings sought, or housing in the locations intended. The social engineering required to force households into smaller housing is proving to be both politically unworkable and financially unfeasible.

Unable to nullify the law of supply and demand, the UGBs have effectively turned housing into a good with fixed supply, distorting the market's ability to respond to changes in demand and price signals. This has resulted in detrimental economic and social consequences stemming from worsening affordability, declining ownership, an intergenerational wealth divide, and restricted labour mobility.

Policies that aim to increase development density or confine new housing have been shown to result in greater inelasticity of supply and thus higher prices. By superimposing an artificial boundary to limit development, governments are contributing to the skewing of wealth distribution and favouring the established at the expense of the aspirational. In doing so, they stifle opportunity and upward mobility.

Amid an intensifying housing crisis in Victoria, for which the government is substantially responsible, the onus is on the State government to rectify the cost of rising negative externalities resulting from the supply constraints imposed by its planning policy framework.

In his book, *Order Without Design: How Markets Shape Cities* (MIT Press, 2018), internationally acclaimed urban planning expert Alain Bertaud recognised that the phenomenon of placing arbitrary limits on city expansion through UGBs and greenbelts results in "predictably higher prices". The London School of Economics emeritus professor Paul Cheshire described a "fatal mismatch" between planning and the market, concluding that urban containment is irreconcilable with housing affordability and price stability.

In its attempt to redress the housing issues created by its UGBs, the State of Oregon—the poster child for urban containment—recently passed a bill permitting its cities to expand their boundaries without having to meet the legal conditions previously required under the State's land-use system. Recognising it could ill afford to persist with the rigidity of its containment policy if it were to deliver the 440,000 dwellings required over the next 20 years, the bill intends to increase the

flexibility of existing rules so new housing gets built. The Oregon decision serves as a critical signal to the Victorian government as it seeks to deliver an additional 2.24 million dwellings by 2051, as set out in *Victoria's Housing Statement: The decade ahead, 2024-2034*. The current planning system is bound to fail if it seeks to function without maintaining an adequate and competitive land supply, proper consideration of current population projections, and a robust understanding of the development capacity of existing urban areas.

THE URBAN SPRAWL MYTH

Contrary to planning mythology, not all greenfield land, nor the projects developed on it, are created equal. Pejoratively termed 'urban sprawl', the supposedly significant social, environmental, and economic costs associated with greenfield development are generally accepted as irrefutable truths but are often without basis in reality. The fact that urban sprawl has never been appropriately defined has not slowed the religious-like fervour directed against greenfield development, despite the significant role the concept has and will continue to play in halting the provision of much-need housing. Responding to its persistent misuse, the late Professor Patrick Troy, one of Australia's greatest champions of social justice through planning for better cities, rightly identified that the concept of urban sprawl has in fact "no objective meaning in a description of contemporary urban problems in Australia".

Troy's point was expanded upon in the OECD's report *Rethinking Urban Sprawl: Moving Toward Sustainable Cities*. The report found that the environmental, economic, and social problems intuitively associated with urban sprawl are not adequately substantiated by economic theory or empirical evidence. This hinders the ability to conduct proper cost-benefit analyses of greenfield

The Bapna family are typical of Point Cook residents: they very much enjoy living there in their own house rather than an apartment closer to the city.
Photo: supplied by Kamal Bapna

development and determine whether and when policy intervention is desirable.

The vast yet unsubstantiated variety of ills attributed to greenfield development continues to underpin the policy guiding the growth of the city of Melbourne. With Melbourne now larger and forecast to grow at a greater rate than any other city in the country, continued condemnation of this much-needed form of development is not only unfair but simply unsupported by facts.

Residents of growth areas like living there.

To begin with, it is commonplace for Melbourne's outer suburban growth areas to be developed at a greater density than that which exists in its established suburbs and at considerably higher volumes. Melbourne's growth areas also happen to be very culturally diverse, more so than most established suburbs. More than half of the population in suburbs such as Clyde North, Point Cook, and Wollert were born outside of Australia, and this figure continues to grow.

Often overlooked, residents of Melbourne's growth areas also happen to like living there. Informed by the largest survey of its kind ever conducted in Australia, *Our Home Choices,* Infrastructure Victoria's well-publicised report, found only one in five existing households would trade house and land to live in an established suburb in a medium-density home—if it was available at a more comparable price.

The report also found that the vast majority of households 'strongly prefer' detached houses over apartments. This preference has remained consistent across Greater Melbourne despite longstanding containment and densification objectives.

Often purported to be the root cause of poor health, growth areas have a considerably lower incidence of long-term health conditions, including heart disease. This suggests that a variable other than simply choosing to live within a growth area is to blame. Analysis of census data, together with long-accepted medical understanding, indicates that age rather than location is a more significant determinant in the health profile of the population.

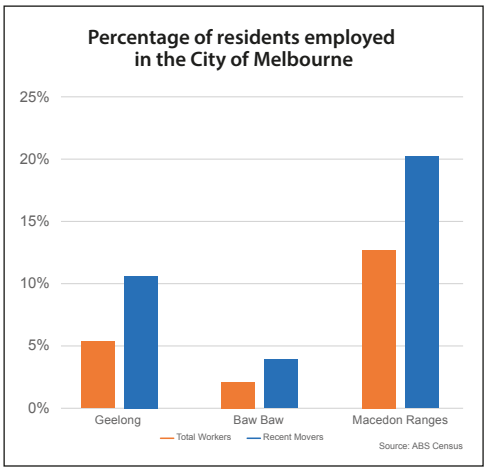
To the extent that it indicates a level of satisfaction with housing type and location, it is noteworthy that the incidence of mental health conditions is at its lowest in Melbourne's growth areas. Significantly, it is highest in the inner city, where the rate of incidence is between two to five times higher, in comparably younger populations, than their greenfield counterparts.

Criticisms that growth areas are dependent on cars and therefore 'unsustainable' are simply unreasonable and conveniently de-contextualised by those pushing an anti-greenfield agenda. There is not one local government area in metropolitan Melbourne—including those with a rich array of public transport options—where the car is not the most popular form of transport. Furthermore, government failure to deliver adequate public transport infrastructure to service outer-suburban growth areas is an insufficient basis upon which to delegitimise greenfield development. Disproportionate spending on infrastructure in established areas, based on the assumption they would accommodate a higher proportion of growth, has only amplified the underinvestment in the areas where more people want to live.

EXPORTING 'SPRAWL'

As affordability worsens, a growing proportion of households, particularly young families, are choosing more affordable housing options, typically on a larger lot, in areas offering a better lifestyle, increasingly beyond the UGB. Contrary to achieving containment and densification objectives, this

phenomenon is inadvertently exporting urban sprawl to regional or peri-urban locations which are, in turn, struggling to deal with unplanned growth. As an example, between 2016 and 2021, there was an 86 per cent increase in the outflow of people relocating from the City of Wyndham to the City of Greater Geelong, relative to the previous census period. Unsurprisingly, the largest age cohort to do this was the 30 to 34 years old, that is, millennials in the family-forming stage of life looking to purchase a family home.



An equally significant trend is the notable increase in the percentage of residents residing beyond the UGB, but whose place of work remains within the City of Melbourne. In part exacerbated by the pandemic lockdowns, the variety of 'push' factors driving this trend show few signs of abating. Changing work practices, technological innovation including AI, lifestyle preference, cost-of-living pressures, and the cost of doing business will only further reinforce this pattern of behaviour, which is in direct contrast to the outcomes sought by compact city objectives.

An analysis of new residents of the Shires of Macedon Ranges, Baw Baw, and the City of Greater Geelong—all local government areas abutting, but outside Melbourne's UGB—highlights the extent to which this is occurring.

INFRASTRUCTURE MYTHS

Governments increasingly cite higher infrastructure costs in greenfield areas as justification for restricting its development. This is based on the mistaken assumption that the densification of established suburbs will not require nearly as much infrastructure support and development. The assumption that established suburbs possess the infrastructure capacity required to accommodate forecast densification is frequently proven incorrect, especially in those areas where there is actual demand for higher-density housing.

With a proposed development contribution charge of almost $35,000 per dwelling, the recently prepared Fishermans Bend Urban Renewal Area Development Contributions Plan highlights the exorbitant cost of providing the requisite infrastructure in designated renewal areas.

While continuing to champion the economic and social benefits that come with high levels of migration, governments' unwillingness to fund the necessary infrastructure for accommodating a growing population in the outer suburbs is not just contradictory but continues to generate a significant cost to the Victorian community.

If the Victorian government genuinely intended to allocate resources to deliver infrastructure efficiently, then spending it where it is most required, for the greatest number of people, supporting the type of housing people want, in locations they can afford, would maximise welfare and provide the most fiscally responsible outcome.

THE FATAL MISMATCH

Australia's staunch attachment to the contain-and-densify model has proven to be a narrative of utopian aspirations rather than an effective framework to manage the complexities of rapid population growth and housing needs. No jurisdiction has solved its housing crisis by persisting with rigid urban containment policies.

In a country where the urban footprint currently takes up just 0.35 per cent of its land mass, UGBs are an unnecessarily blunt mechanism to manage a rapidly evolving and complex supply-and-demand relationship. A continuation of this policy will see housing become even more unaffordable, with highly undesirable distributional consequences. This will have major implications for future social and economic stability, particularly for low and middle-income individuals and families.

Housing will become even more unaffordable.

The success of good policy should be measured not by intent, but by outcomes. Acknowledging the lack of empirical evidence in support of rigid UGBs must be the first step to take if there is to be a genuine commitment to effectively manage the worsening housing crisis. Persisting with unrealistic aspirations with no idea of how to achieve them is nothing short of reckless. Rooted in physical determinism, such planning policy has little regard for market structures, trade-offs with different policy objectives, and its impact on the rest of the housing market. As long as there remains an underlying belief that the market should be subservient to the plan, then the existing approach to contain-and-densify will once again fail to achieve the housing targets necessitated by population growth.

Effective housing policy ensures the market viability of building new housing and an adequate supply of houses that people can afford. It is therefore imperative to adopt a new framework which addresses the fundamental conflict between current planning policies and underlying economic forces. Prices must be regarded as a material consideration within the governing planning framework if governments genuinely seek to address affordability. Addressing the issue of housing affordability necessitates changes that rejuvenate the competitive land market in areas with strict regulations while steering clear of land-use policies that could worsen affordability in places where competitive land markets are already in place.

Before developing a policy that seeks to deliver some 80,000 dwellings per annum, the Victorian government must first understand the reasons why the objectives and aspirations within its existing policy framework have failed. In a worsening housing crisis, simply announcing how many dwellings it aspires to deliver—without explaining how they are to be delivered—is not tenable.

It is increasingly clear that a departure from the entrenched contain-and-densify model is crucial. The path forward demands a nuanced, evidence-based approach that reconciles the urgent need for affordable housing with practical urban development strategies. Only then can we ensure a future where housing affordability and accessibility are within reach of all. This would mark a pivotal, and historically significant, shift towards a genuinely successful model of urban growth.

Rob Burgess is the Head of Research and Strategy at Quantify Strategic Insights.

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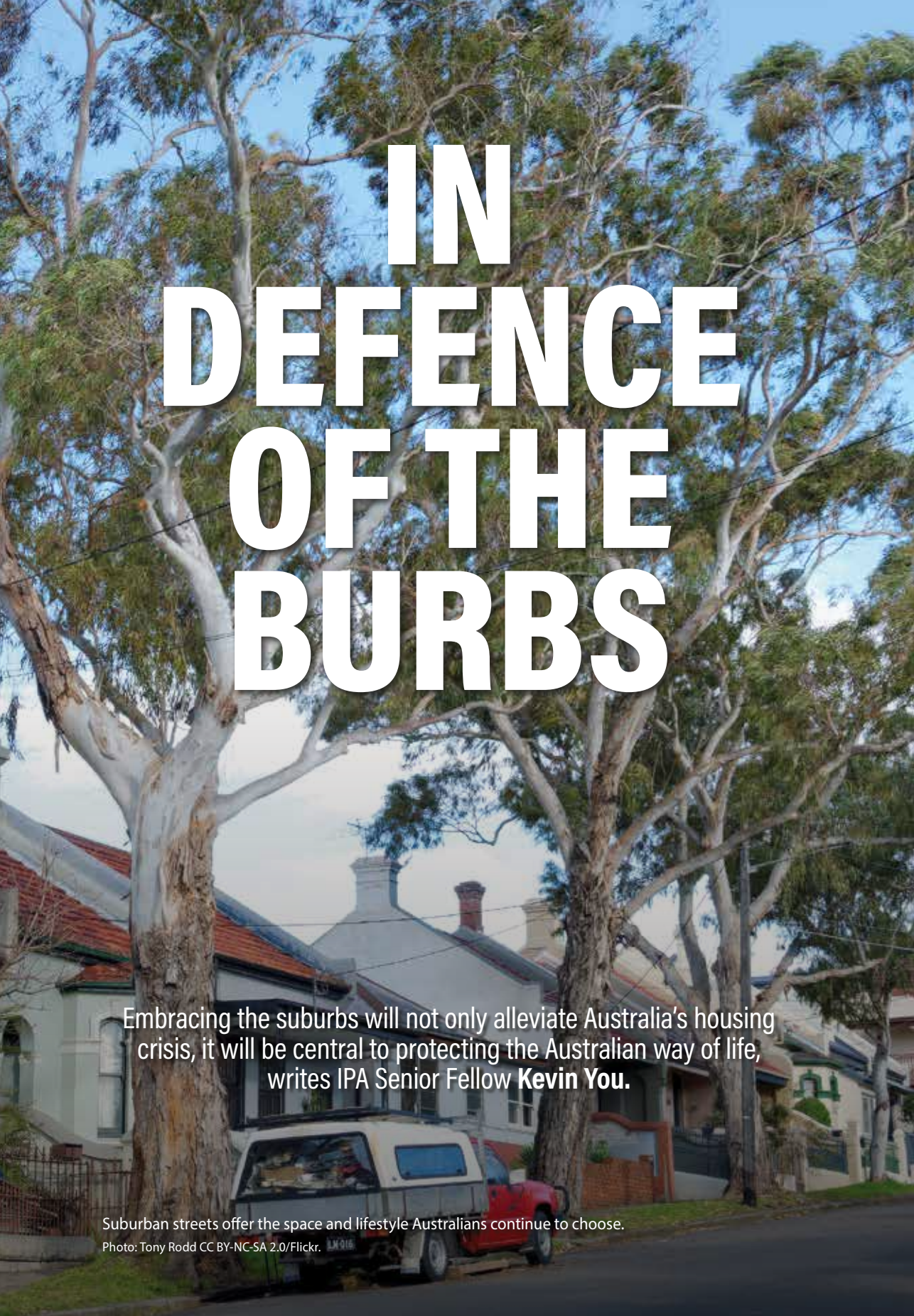
IN DEFENCE OF THE BURBS

Embracing the suburbs will not only alleviate Australia's housing crisis, it will be central to protecting the Australian way of life, writes IPA Senior Fellow **Kevin You.**



Suburban streets offer the space and lifestyle Australians continue to choose.
Photo: Tony Rodd CC BY-NC-SA 2.0/Flickr.

Suburban life offers space to raise a family, the opportunity to build local connections, and a more affordable lifestyle compared to the beating-heart of the city. That's why governments need to ditch the instinct to contain-and-densify. And, as a society, we need to change our mindset about what it means to build 'sustainably'.

A worthwhile contribution to the debate about planning is a new book, *The Next Australian City: The Suburban Evolution*. The book is about 'suburbs' and was compiled by a not-for-profit called 'Suburban Futures'. While the intention is commendable, to promote suburbs and what they have to offer, parts of the book are hit-and-miss—like the very title: 'The Next Australian City', which sounds very CBD-centric. It is just one of the work's interesting idiosyncrasies.

THE HOUSING CRISIS

Australia is in the midst of a chronic housing shortage. The rental vacancy rate was at 1.3 per cent at the end of the 2025 financial year. The average price of a home reached $1 million for the first time in that same year.

Between 2022 and 2024, net overseas migration reached 1.3 million people, making up 80 per cent of Australia's population growth. Institute of Public Affairs (IPA) research estimated that out-of-control migration bore primary responsibility for a housing supply shortfall of more than 179,000 homes over that period.

While demand-side pressures created this crisis, supply-side sluggishness exacerbated it. The average time taken to build a house rose by 50 per cent over the decade between the 2014 and 2024 financial years, while the cost of construction material increased by 53 per cent over the same period.

Federal and state white elephant projects—such as Victoria's Suburban Rail Loop and the federal government's Snowy 2.0—have been sucking construction resources out of the market, when they could otherwise have been directed to the housing construction

Book Review

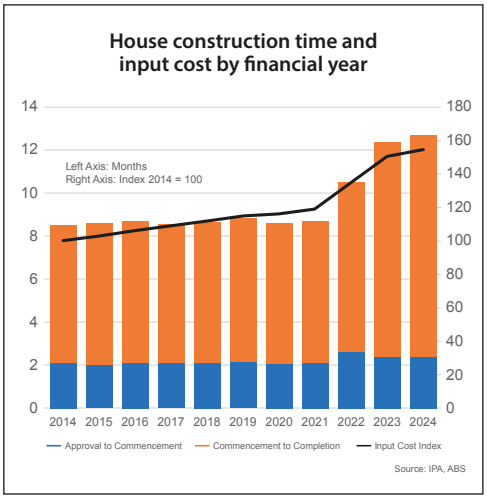
The Next Australian City: The Suburban Evolution

Edited by Guy Gibson and Ross Elliott

Connor Court Publishing 2024

300pp

sector. So too are privately-operated but often publicly financed renewable projects being imposed on regional Australia.



The contain-and-densify model of managing urban growth is also a source of concern. The pejorative term 'urban sprawl' is often associated with an image of human settlements encroaching into productive agricultural land and pristine ecosystems. But Australia's agricultural land and pristine wilderness are in fact more threatened by the net zero-driven expansion of powerlines, wind and solar farms, and energy storage projects. New family homes being built on the outskirts of our cities and regional centres pose little threat to farming communities or delicate habitats.

IPA research has estimated that achieving net zero and replacing all hydrocarbon exports with "renewable" energy could require an area equivalent to a third of Australia's agricultural land. Assuming the use of existing solar and wind technology, this could include 70 per cent of Victorian farmland according to the Victorian government's own Offshore Wind Policy Directions Paper.

In contrast to the vast swathes of land needed for "renewables", data from the Department of Agriculture, Fisheries, and Forestry show that only about 0.2 per cent of Australia's landmass is used for urban residential purposes.

THE CASE FOR 'SPRAWL'

Australia is not at risk from excessive urban sprawl. The opposite is true: we are packed like sardines, despite access to vast territories. At just four people per square kilometre, Australia is the second least densely populated country on Earth, just behind Mongolia. We live on the sixth largest country by landmass, larger than India, Indonesia, and Mongolia. Yet most of us are barricaded into Sydney, Melbourne, Perth, Adelaide, and the Brisbane-Gold Coast corridor.

The Next Australian City: The Suburban Evolution, highlights that much of this is attributable to the professional class dismissing suburbia as inferior to large, centralised metropolises with high density commercial cores and a population serviced by a 'hub and spoke' transit model. But Australians by-and-large prefer suburban living and are voting with their feet, moving away from city centres to new growth areas on the fringes of capital cities.

This phenomenon is not unique to Australia. An insightful chapter by Canadian authors Antony Lorius and Associate Professor Laura Taylor documents Canada's own struggle to reconcile the demonisation of suburban 'sprawl' with families' unceasing demand for a peaceful life outside of the bustling metropolis.

Their chapter, which—in my view—is the highlight of the book, busts common myths about suburban growth and expansion. One of the more predominant of such myths is that urban intensification is "free"—or at least costs considerably less than suburban growth. The authors give the following example to address this misconception:

> With greater [urban] intensification, there will be more high-rise buildings, suggesting a need for specialised high-rise firefighting equipment. The local road and transit network will also be used more intensely, which generates new costs and service[s] need[ed] to maintain a state of good repair. Community services also tend to be more challenging, complicated, and costly to deliver within an intensified urban environment.

Another common misconception is that suburban life necessitates heavy car dependency, fewer opportunities to walk outside, and general isolation. Chapters by Emeritus Professor Robin Goodman and Dr Annette Kroen, and by Dr Peter Walters show that this is not the case. Deregulated, mix-use, master-planned neighbourhoods allow families to be grounded in their local communities. Walkable access to shops and public amenities incentivises walking, sun exposure, and day-to-day local interactions. As Dr Walters notes:

> Central to promoting a sense of place and belonging is the recognition that suburbs are increasingly diverse places, expressed not just in housing tenure but culturally and occupationally. The flexibility to work and run small businesses from home is already transforming people's relationships with their local community.

But he warns that strict single-use zoning "needs to change if we hope for vibrant neighbourhoods rather than dormitories".

Only about 0.2 per cent of Australia's landmass is used for urban residential purposes.

What is needed, then, are deregulation and suburban reform rather than strict adherence to containment and densification. A manifestation of this uncompromising approach is the build-to-rent program, which is designed to turn Australians, according to IPA Adjunct Fellow Professor Sinclair Davidson in the Winter 2025 issue of the *IPA Review,* into "a nation of tenants, fully dependent on the state".

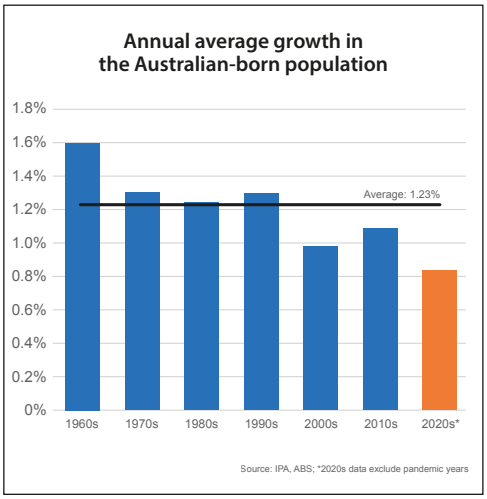
PRESERVING THE AUSTRALIAN WAY OF LIFE

Australia is a suburban nation, and Australian cities were "suburban almost from birth", according to Professor Robert Freestone in the opening chapter of *The Next Australian City.*

> There were no grand plans. Suburban life developed organically and opportunistically with the ubiquity of the humble freestanding cottage as the dominant British dwelling chosen to claim and colonise a 'wide brown land'.

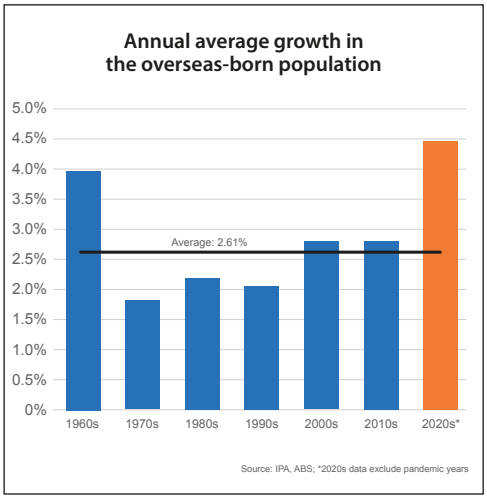
The stigmatisation of the suburbs is a more recent phenomenon, led by inner-city elites who seek to reorder society as they see fit—glamorising *schick* apartment living while dismissing backyards in which to raise children as selfish and wasteful.

Over the years, the densification of Australian capital cities has coincided with a gradual decline in fertility and household size. Annual average growth in the Australian-born population in the 2020s has been the lowest of any other decade since at least the 1960s.



In contrast, net migration has skyrocketed, resulting in the annual average growth of the overseas-born population in the post-pandemic years being almost double the long-term average since the 1960s. New migrants tend to settle in big cities, creating ever-increasing demand for public investment in urban centres, risking neglect of the outer suburbs, and exacerbating problems associated with high density in major cities like Sydney and Melbourne. Moreover, as IPA Chief Economist Adam Creighton has observed:

> The vast bulk of these new arrivals are from developing nations, where English isn't a first language nor Christianity a majority religion. A cynic could think the political class is seeking to destroy Australian culture.



Without making any judgment about the intent of the political class vis-à-vis mainstream Australian culture, values, and identity, the outcome is self-evident. The uniqueness of Australia's character is being diluted and the Australian way of life put at risk of disappearing.

Emissions reduction and the pursuit of net zero are uncritically assumed.

But new technology promises to jumpstart Australians' return to the suburbs, where the identity of modern Australia was forged. Author and geographer Joel Kotkin and Professor Alan Berger's chapter in *The Next Australian City* imagines the rise of autonomous cars providing supplementary means to connect outer suburban areas with the city centre (and one another), thus supporting the role played by conventional public transport systems. The ability of Australia's information and communication technology infrastructure was stress-tested during the pandemic, when more than 40 per cent of Australian workers worked from home. It proved to be largely adequate, and the lessons learned will deliver further improvements to the current network.

New technology does not necessarily render city centres obsolete, but it does offer suburbs a greater level of independence. Moreover, the ability to work from home, being able to bypass peak-hour traffic, and the potential to cut travel time between work, school, and daycare, are all conducive to raising a family. And suburban living is key to making it happen.

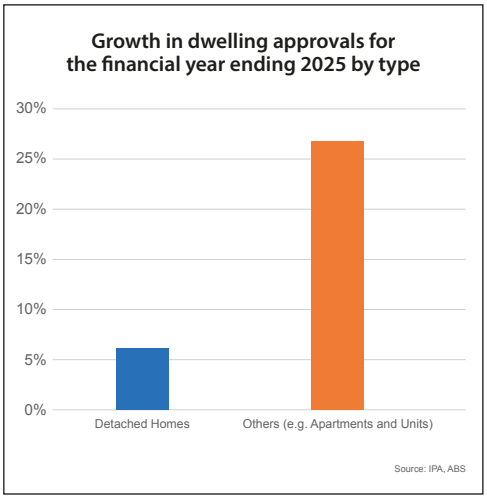
ELITE UNDERMINING OF SUBURBAN EXPANSION

In the Winter 2024 issue of the *IPA Review,* property industry researcher Rob Burgess identified red tape, in the form of urban growth boundaries, as a key inhibitor of suburban growth expansion. *The Next Australian City* references inner-city elites' disdain for the suburban lifestyle as a factor which undermines mainstream aspirations. Such an attitude might also account for the fact that units and apartments, rather than detached homes, have dominated the growth in housing approvals over the last year.

This elite disdain was echoed in an ABC Australia video, featuring the fresh-faced Youtuber Sharath Mahendran, which offered the following warning about living in the suburbs:

> Where you feel safe at any hour of the day in many bustling cities, many are scared to walk home at night in a dimly lit suburbia, for they're likely the only one doing so … those in Australian suburbia must endure long suffocating commutes to work, often spending hours each week in a car that's

definitely not working to save the environment.



The Next Australian City attempts to paint modern suburbs as responsive to the supposed sustainability and environmental challenges that the world faces from rising emissions. But, unfortunately, it overlooks the risk that speculative climate alarmism could sabotage Australia's suburban aspirations.

We need to wake up to the potential that suburbs offer.

Emissions reduction and the pursuit of net zero are uncritically assumed, in this book, to be good and necessary. So-called 'mitigation' measures, at the local level, are accepted as meaningful despite the fact that Australia contributes barely one per cent to the world's annual carbon emissions. It promotes electrification as a means to reduce emissions despite independent research showing that electrification is likely to increase emissions in many homes, at least in the immediate term. And it neglects the reality that higher electricity bills, as a result of net zero-driven initiatives, will result in families paying $118,000 more for the median-priced house, just to protect themselves from ever-increasing power bills—making homes more expensive and the suburban dream increasingly unattainable.

The book's sympathy with fringe, inner-city elite concepts—the idea that "our cities and suburbs are built on stolen land" and the notion that urban planning should be a means to achieve social justice—is out of touch with the values and attitudes of mainstream Australians.

A quantifiable indicator of *The Next Australian City's* imbalance is how many pages it dedicates to Canberra compared to the rest of the country in the second part of the book, which is structured around Australia's eight states and territories. A whopping count of 34 pages is dedicated to just Canberra alone—more than is afforded to all of New South Wales, Victoria, and Queensland combined.

Such reverence for the temple of the elites is remarkable in a book purportedly seeking to challenge the dismissive inner-city-centric narrative regarding the suburbs in which most mainstream Australians want to live.

KEEPING THE FOCUS ON HOUSING

State and federal governments around the nation have committed to building 1.2 million new, well-located homes between 2024 and 2029. Whatever 'well-located' might mean, this will not be achieved because even in just the first year, residential building approvals—for all homes, well-located and otherwise—have fallen short of the minimum annual target by more than 52,000 units.

Rather than simply declaring outrageously ambitious goals, state governments should get out of the way of housing development by cutting environmental and industrial red tape, easing regulatory restrictions in the residential construction sector, and ceasing their intensification of competitive

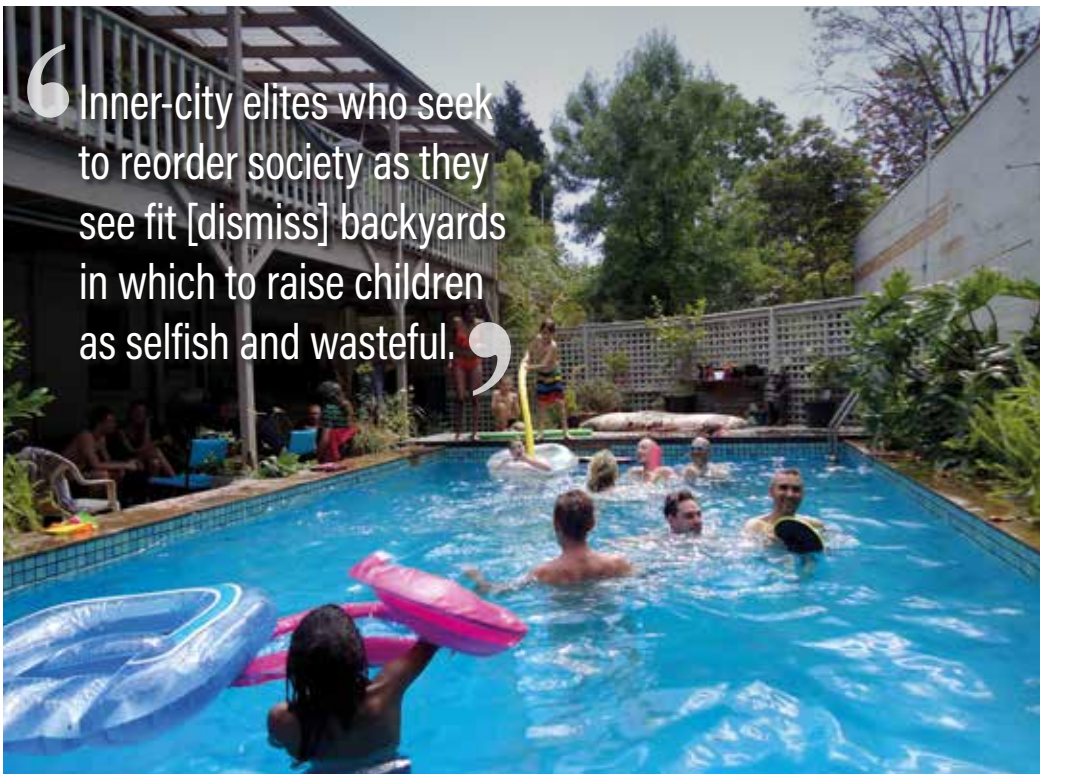
pressures on construction skills and material. This means stepping away from costly white elephant projects, as the new Queensland government has done with respect to the Pioneer-Burdekin Pumped Hydro project. It means streamlining planning and approval systems to empower developers to deliver the homes that Australians need. And it means eschewing decisions based on gutfeel and conjecture, whether it be around speculated impacts on species habitats or Australia's contribution to the earth's temperatures. Observed reality and hard evidence must be placed front and centre in development approval decision making.

Developers, residential planners, and housing commissions must focus on delivering homes—not indulge the fancy of housing and urban development as a means to achieve so-called racial, sexual, or gender-based justice. Ideological goals should be left to ideologues, not home builders and urban planners.

The federal government must recognise that bringing in unprecedented waves of migrants with no construction skills, in the hope that they might somehow build more homes than they occupy, is simply ridiculous.

And, as a nation, we need to wake up to the potential that the suburbs have to offer.

My critique of *The Next Australian City* does not detract from the fact that it is an important book, which contributes to the much-needed pushback against the notion that Australian suburbs are dangerous, dimly lit, and rat-infested squalor—and against the falsehood that there is no alternative to increased densification. The housing supply crisis is real, and development in new growth areas provides a viable solution. Technological prowess has mitigated many of the downsides of suburban living, and books like *The Next Australian City* can open our eyes to how we might make the most of the plentiful land around us and build a better future for our children and grandchildren.



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HELP NOT HINDER HOUSING DEVELOPMENTS

Australia's abundance of developable land urgently needs to be freed from red tape to boost housing supply, write IPA Senior Fellow **Kevin You** and IPA Research Director **Morgan Begg**.

We all know there is a problem with the supply of housing in Australia, but we should be wary of the solutions being proposed by the bureaucrats and activists who control the levers of power and twist the national debate. For example, a new report released in October, 'OECD Economic Surveys: Australia 2023', correctly notes that Australia faces a series of protracted housing supply challenges, but troublingly recommends amending zoning and planning laws to promote higher-density housing.

That the Organisation for Economic Co-operation and Development should recommend high density housing in the Australian context is peculiar given the vastness of the continent on which we live. In New South Wales, the most highly populated State in the Commonwealth, only approximately 0.1 per cent of the land area is used for residential purposes. Similarly, housing takes up only a minute portion of the area of each of the other States. High-density housing ought to be a last resort in a country as vast and sparsely populated as Australia. The call for ever-denser urban centres reflects a radical green attitude that prefers cramming more people into smaller spaces.

No doubt there is a market for high-density housing, particularly for those who wish to live in extremely close proximity to other people in population centres such as inner-city Sydney and Melbourne. However, this is not the ideal form of housing for families and for building local communities, which is generally served best by detached houses with backyards. The root cause of Australia's housing crisis is the successive policy failures of the Federal, State and local governments, which have created artificially high levels of demand while also imposing punitive restrictions on the construction of housing that the country needs.

AUSTRALIA'S HOUSING CRISIS

On census night in August 2021, the Australian Bureau of Statistics found that 122,494 people were experiencing homelessness across the nation. Those affected by homelessness either slept rough, out on the streets, or were sheltered in a range of temporary lodgings such as hostels and homeless shelters. Back then Australia's rental vacancy rate—defined as the percentage of all available rental units that are unoccupied or available for lease—was 1.92 per cent, according to property market research house SQM Research. According to the latest data from October, the rental vacancy rate has since collapsed further to below one per cent.

The ANZ and CoreLogic's May 2023 'Housing Affordability Report' found:

> The median income household would require 30.8% of income to service a new rent lease nationally, though at the lower household income and rent level, an unmanageable 51.6% of income would be required.

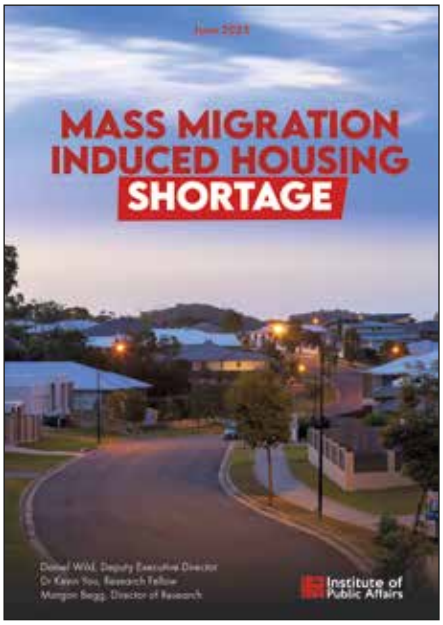
Rental stress is defined in the Rental Affordability Index (RAI) as housing costs exceeding 30 per cent of a family's income, with anything over 38 per cent representing severe unaffordability. Australian renters are going through a period of stress. Not just renters are feeling the pinch. The portion of income required to service a new mortgage was found to be higher still at 42.7 per cent, with houses in Sydney demanding 62.6 per cent of household income.

Recent data from the International Monetary Fund reveals that Australia now has the highest level of mortgage stress in the developed world. Another survey released in July 2023 called 'Brutal Reality: The Human Cost of Australia's Housing Crisis' conducted for the Everybody's Home campaign group shows that 75 per cent of mortgagees and renters are scared about their financial security because of the housing crisis.

The chart on page 27 shows the impact of Australia's housing supply problems on rental vacancy rates. This situation is unsustainable. Governments, at all levels, are to blame.

EXACERBATING THE CRISIS

The price and the quantity of a good or service in a market are determined by the interactions of the supply of and demand for the good or service. In the case of housing in Australia, government policies have simultaneously elevated demand and repressed supply—resulting in price inflation and a chronic undersupply.



A June 2023 research report by IPA, 'Mass Migration Induced Housing Shortage', highlighted the failure of the Federal government to rein in unsustainable levels of migration. Australia is a tolerant and welcoming nation, and sustainable immigration has been an important part of its success. But an immigration program must be complemented by the policies and planning for housing and other social and economic infrastructure to accommodate the resultant population increase.

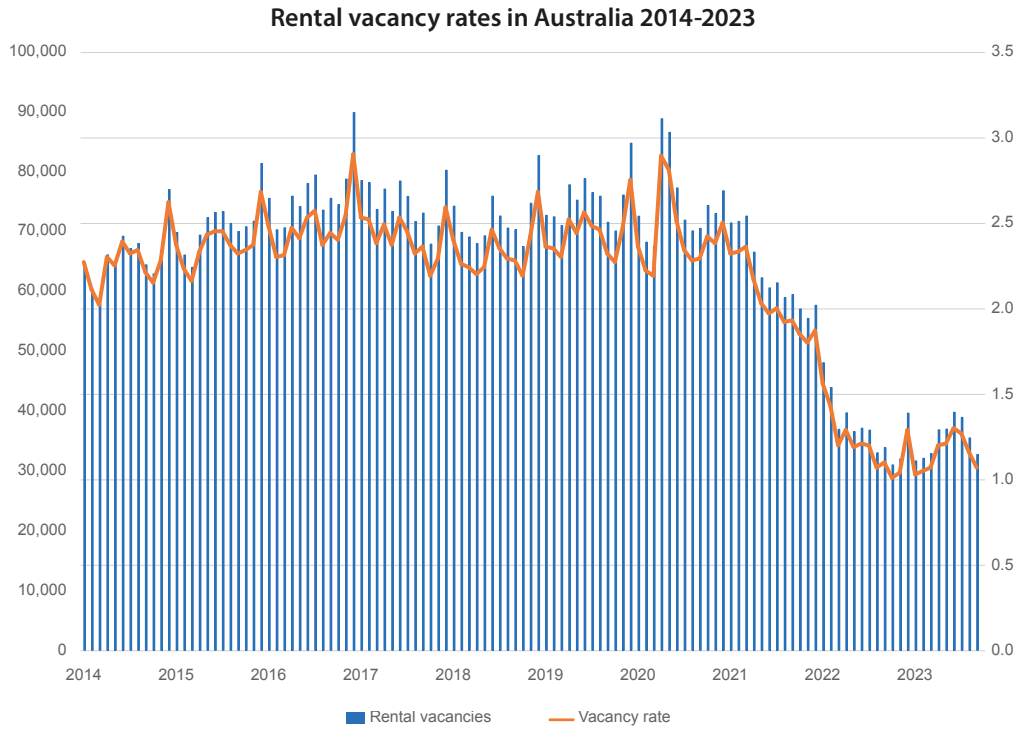
The failure by the State governments and the Federal government to manage the intake has contributed to persistent housing availability and affordability challenges, and also has undermined community support for migration.

> Australia has no shortage of developable land.

Currently, the Federal government does not enforce a limit on long-term arrivals to Australia. Rather, a permanent migration target is set each year. This target is broken into three streams: skilled migration, family migration, and special eligibility. In November 2022, the permanent migration target was increased from 160,000 to 195,000 people. In May 2023, it was adjusted to 190,000 people to arrive as part of the 2023-24 permanent migration program.

But 'permanent migrants' are only one category of people Australia takes in each year. There is no limit to how many long-term, non-permanent migrants can come into the country. They include international students and temporary work visa holders. Unlike short-term travellers, who normally stay in temporary lodgings such as hotels and youth hostels, long-term migrants compete with Australians and one another for housing, resulting in higher prices and fewer available dwelling units.

The unplanned surge in net overseas migration between the financial years ending 2023 and 2028 was estimated to result in the net intake of 1.755 million migrants. IPA research estimated the number of households formed by net long-term and permanent arrivals to Australia would account for about 81 per cent of all new houses added to the market from 2023 to 2028, and would contribute significantly to the cumulative housing shortfall of 252,800 homes over that period.



Source: SQM Research

The migration-induced growth in the labour force and increased working hours are the only factors keeping the Australian economy growing, with labour productivity having declined by 3.5 per cent in the financial year ending 2023. To put this into context, annual labour productivity growth in the two decades between 1960 and 1980 was positive at 2.4 per cent per annum. In the 1990s, it averaged a positive 2.2 per cent per annum. Between 2010 and 2020, labour productivity only averaged 1.1 per cent per annum; but at least it remained positive. Labour productivity in the last full financial year entered negative territory for the first time in 12 years.

The government's addiction to economic growth through immigration—rather than productivity—needs to be addressed. A consequence of growth relying on population growth rather than productivity growth is that the benefits of economic growth are not being felt by Australians on the ground. Indeed, Australia has just undergone two consecutive quarters of per capita negative economic growth, meaning that on a per person basis Australia has just experienced a recession despite nominal growth floating above zero. Keeping nominal growth above zero through increased population has come at a cost. IPA research estimated that about $142 billion worth of housing development will be required to address the aforementioned housing shortfall to 2028.

BARRIERS TO LAND DEVELOPMENT

Australia's residential developers are willing to take on the challenge of ramping up housing supply, but they are continuously met with resistance from government bodies. Developers and builders are now persistently confronted by a shortage of development-ready land. This shortage, according to a statement released in August by the Urban Development Institute of Australia, is

"created by a lack of enabling infrastructure, zoning, integrated planning, and approvals":

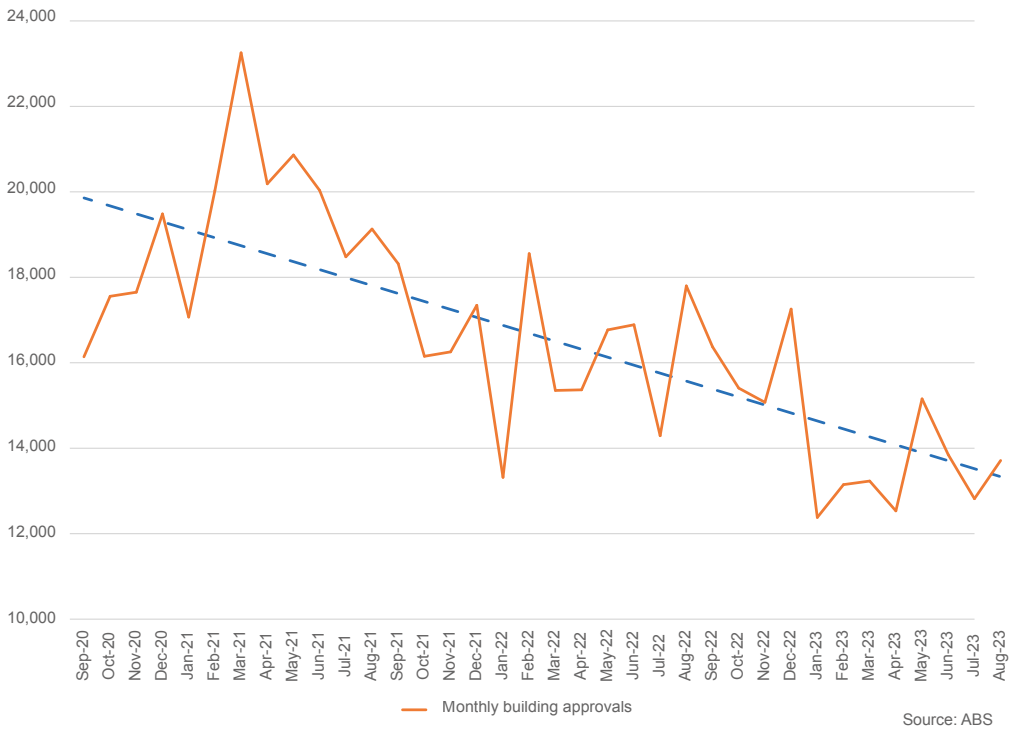
> UDIA National urges political leadership across the nation to lock in housing targets, streamline planning systems and deliver enabling infrastructure, and most critically, facilitate the types of housing that Australians need and can afford.

Australia has no shortage of developable land. The shortage is in available land that is ready to develop. Excessive planning and other red tape rules are locking up parcels of land outside of Australia's overcrowded metropolitan areas, often for unjustified environmental reasons. Despite the increasing demand, the latest ABS data on dwelling approvals, as of the time of writing, shows a declining trend over the last three years. Taking a broader overview, the number of annual building approvals for residential dwellings per 1,000 population has also declined markedly from a high of about 10 dwellings per 1,000 people in the financial years ending 2015 and 2016, to below seven in the financial year ending 2023.

In reality high-density housing is more expensive.

Modelling by the National Housing Finance and Investment Corporation's 'State of the Nation's Housing' report, released in April 2023, anticipates a continuous decline in the supply of new dwellings. In fact, new housing supply is expected to fall from a high of

Monthly building approvals for residential dwellings



Source: ABS

197,104 in the year 2018 to a low of 127,500 in 2025. This aligns with the continuing decline in the number of building approvals shown in the charts.

A recent case study from the Lismore City Council in NSW illustrates the hoops that residential developers have to jump through before they even get to start building on their own land. The award-winning developer, the McCloy Group, recently lost an appeal in the NSW Land and Environment Court to overturn the Council's refusal to allow for an expansion of the developer's proposed 196-lot Eastwood Estate. The purported reasoning for the rejection revolved around risks of environmental impacts, including the potential impact of the expansion on koala habitats, and, apparently, the interest of the public. What is critical to note is that the Council's decision to reject McCloy's development application was taken despite Council staff and external consultants recommending the development's conditional approval. That recommendation followed extensive rounds of environmental assessments of the development application.

The refusal came not from the Council's secretariat but rather from its political arm, in a controversial split decision. It is believed the McCloy Group's legal bill alone already exceeds $1.5 million. The more it costs to get development going, the more costs end up being passed onto homebuyers. In this case, it could be in the form of an $8,000 increase in the price of each lot.

A BAND-AID RESPONSE

The tragedy is that Australia has swathes of land that could readily be developed into housing for families. In Australia, most dwellings are standalone houses on a block of land, known as detached homes. This accounts for 65 per cent of housing in NSW, and up to 80 per cent of all housing in Western Australia. The other form of housing is units and apartments, which are higher density housing on smaller blocks of land. When it comes to land use, detached housing takes the lion's share of the area reserved for residential development in Australia.

An analysis of housing in the five mainland States shows detached housing only accounts for a very small portion of available land, ranging from 0.02 per cent of all land in Western Australia to 0.48 per cent in Victoria. These pale in comparison to the amount of land permanently locked up for biodiversity, cultural, or environmental reasons. According to the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW), 22 per cent of all of Australia consists of protected areas, the equivalent to 1.7 million square kilometres. Also, about 40 per cent of Australia's landmass is covered by native title, according to an analysis published in the *Guardian Australia* in 2021.

Punitively restrictive administrative and environmental red tape imposed on developing the rest of Australia's landmass will have the effect of cramming more and more people into its already crowded capital cities. It has, however, found support from authorities such as the OECD, and figures like then Victorian Premier Daniel Andrews, whose near-to-last act was to launch a new housing strategy—but with supposed red-tape cutting measures focussed almost entirely on medium and high-density developments.

In September 2023, ABC News reported:

> Medium and high-density development in established suburbs is being spruiked as the solution to Australia's housing crisis. In suburbs across the nation, apartment blocks are popping up everywhere, providing homes for new residents and headaches for some of the more established residents.

A common assertion by advocates of high-density housing is that it is more cost effective. But, as noted in the recent report commissioned by the IPA, 'The Once Lucky Country: Can It Be Again?',

> In reality high-density housing is more expensive. (In the USA) going from five to 10 stories increases the cost of each square foot by over 50 per cent, notes the Breakthrough Institute's Judge Glock, in large part due to the need for more expensive, energy hungry materials like steel rather than wood. To this problem, regulators have added fees and other costs that further bloat prices. Local and State governments began charging up-front per-housing-lot fees and charges and regulatory regimes exploded in complexity, which added further compliance costs and inevitable delays [to construction].

Joel Kotkin, an author of that report and previously, *The Coming of Neo-Feudalism* (2020), describes the drive to build upwards and not outward as a self-serving mechanism for urban elites and the upper echelons of the political and media establishment. This has the effect of entrenching the class divide between property owners and renters, and binding young people to the crowded capital cities where home ownership is near impossible—thus giving rise to a class of lifelong renters. Morevoer, this shifts the political pendulum towards the radical progressive ideology advocated by inner-city elites.

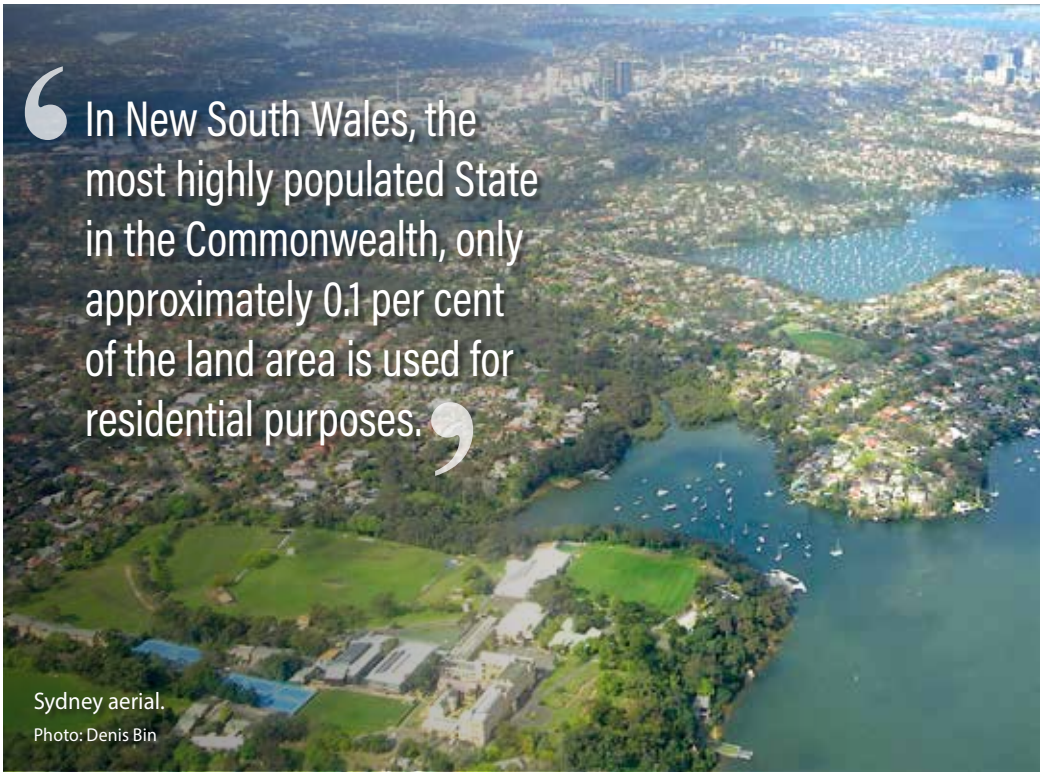
The housing issue reveals the hypocrisy of activists.

One need only consider the results of the 2023 Voice referendum, which showed that the views and agenda of the inner-city elites and the insiders of the Canberra bubble deviate remarkably from the views and aspirations of mainstream Australians in the suburbs and the regions.

ENVIRONMENTAL HYPOCRISY

The housing issue reveals the hypocrisy of activists and the political elites, who dominate the inner cities of Australia's capitals. They demand less housing development and an increase in housing density in inner-urban areas, usually on the basis that residential land use is detrimental to the environment. In January 2023, NSW Greens Member of the Legislative Council Cate Faehrmann launched a campaign against housing development along the NSW coastline. In the report at the centre of her campaign, *Concreting our Coast*, the MP accused developers of instigating an "onslaught destroying our coastal villages and environment".

The campaign, aimed at characterising builders as greedy and irresponsible villains "who just want to make a quick buck with scant regard for the communities and habitat they'll destroy in the process", is ironic given



Sydney aerial.
Photo: Denis Bin

the Greens' relentless advocacy in favour of renewable projects, which Net Zero Australia says will:

> … have significant environmental impacts including land damage, habitat loss, wildlife destruction and displacement, and other pollutants (e.g., noise, reflections, heat, waste) … land clearing for renewables and transmissions will generally reduce [biodiversity].

The Greens' proposed solutions of a rent freeze, the Victorian government's proposal to increase housing density, and the increase in the Commonwealth Rent Assistance by $31 per fortnight cannot possibly amount to anything more than a makeshift response to a severe problem requiring a real solution. This is because throwing money at renters and having government intervene even more in the market do not result in homes magically appearing from the ground up. Cutting red tape and streamlining developer approval processes, on the other hand, will.

WHAT NEEDS TO BE DONE

The Housing Industry Association estimates Australia will need 1.66 million new homes by 2030 just to keep up with demand from population growth, the majority of which will come from migration. This is one part of the broader issue of Australia's economic and social infrastructure failing to keep up with unplanned migration.

In the immediate term, the Federal government must commit to properly planning for its migration program. This means aligning government policy with a comprehensive targeted intake number so that home ownership is no longer out of reach for young Australians, and renters are not left in a perpetual state of stress and uncertainty. Addressing the migration

issue will dampen skyrocketing demand for housing, as well as challenges to other social and economic infrastructure.

Australian hospitals are failing and its health systems are crumbling, despite health expenditure continuing to climb and, over the years, Australians' out-of-pocket health spending increasing by more than the growth in the wage price index. A report this year by the Australian Medical Association, titled 'Australian public hospitals in logjam', found that only three of the 201 public hospitals analysed were delivering care within recommended timeframes.

Governments at all levels must stay out of the construction sector's way.

Australian schools are failing our students, despite all levels of government together spending around $120 billion each year on education. The 2023 NAPLAN results revealed a system in steady decline, with a third of all students not reaching the minimum standard in literacy and numeracy

Stress is also being placed on Australia's energy system. A survey of experts conducted by the International Institute of Management Development found Australia's global energy infrastructure ranking has fallen dramatically over the last two decades. Out of the 64 countries observed by the IMD, Australia's energy infrastructure ranks 52nd today—way down from 15th back in 2003. Increasing energy demand from higher population is putting considerable strain on infrastructure already made increasingly vulnerable because of the ill-considered rapid switch to renewables. Australia's economic and social infrastructure—including housing, hospitals, schools, and energy networks—are struggling to cope with the influx of migration to which the Australian government has become addicted and without which economic growth cannot be sustained. This addiction needs to be overcome by taking back control of our borders through a sustained and controlled immigration program.

This is consistent with the views of the Australian community. IPA polling in April 2023 found that 60 per cent of Australians agree that a temporary pause should be placed on Australia's intake of new immigrants until more economic and social infrastructure is built to accommodate them better.

Moreover, governments at all levels must commit to a red tape reduction program with respect to residential land development. Local councils should be compelled to work together with developers to streamline residential development approval processes. And a framework should be created whereby the burden of proof when challenging the approval for residential development—on social, environment, or public interest grounds—is returned to the objecting party rather than being placed on the developers, who are effectively subject to an adverse presumption that their development should not go ahead unless they can prove otherwise.

The construction sector is ready and willing to take on the challenge in front of it and play its role in addressing Australia's housing shortage by boosting supply. What is needed right now is for governments—at the Federal, State, and local levels—to stay out of its way. Across the nation—rather than being beholden to inner-city elites and environmental activists—governments need to show leadership by putting their constituents first, making tough decisions to cut red tape and take advantage of the abundance of land with which Australia and Australians are blessed.

You have just read an article from the *IPA Review*

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IPA RESEARCH NOTE

Housing construction slowdown continues into 2025

OCTOBER 2025

Dr Kevin You
Senior Fellow

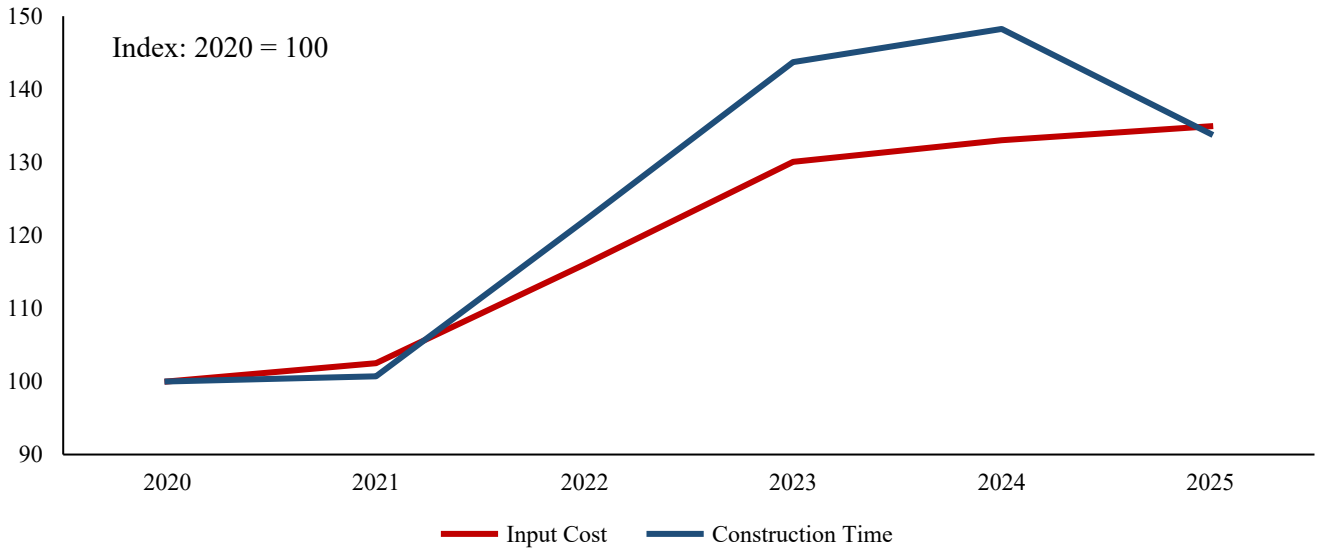
Key findings

Across the nation, there has been a slowdown in housing construction. Between 2020 and 2025, the number of months it takes to build a house increased by 34 per cent across Australia, while building material costs increased by 35 per cent – partly due to increased demand.

The time it takes to build a house, on average across Australia, increased from about eight months and a half to about a year. Between 2020 and 2025, the average time required to build a house has increased by:

- 71 per cent in Western Australia (with material costs 37 per cent more expensive);
- 34 per cent in South Australia (with material costs 35 per cent more expensive);
- 34 per cent in Queensland (with material costs 37 per cent more expensive);
- 31 per cent in New South Wales (with material costs 32 per cent more expensive);
- 16 per cent in Victoria (with material costs 36 per cent more expensive); and
- 15 per cent in Tasmania (with material costs 37 per cent more expensive).

Chart 1: *Annualised housing construction input cost and house construction time indices from FY2020 to FY2025*



Source: IPA, ABS

Methodology

The construction time data analysed in this research note were sourced from the Australian Bureau of Statistics' (ABS) 'Building Activity Australia' database for the financial year ending June 2025.[1] Specifically, it is the sum of the estimated average time it takes to get a construction project (for a house) from approval through to commencement, and then from commencement to completion.

Housing construction input price data were derived from the ABS' 'Producer Price Indexes' database, which provides input price indices for each state capital.[2] The ABS noted that each index "measures changes in [the] prices of products (materials) used in house construction".[3] It includes the prices of ceramic, cement, and steel products among others. Labour costs are not included.

Analysis

In recent years, Australia's housing market has been under significant strain. Institute of Public Affairs (IPA) research has estimated that the housing supply shortfall between January 2022 and December 2024 was approximately 179,000, due to unprecedented demand attributable to population growth.[4]

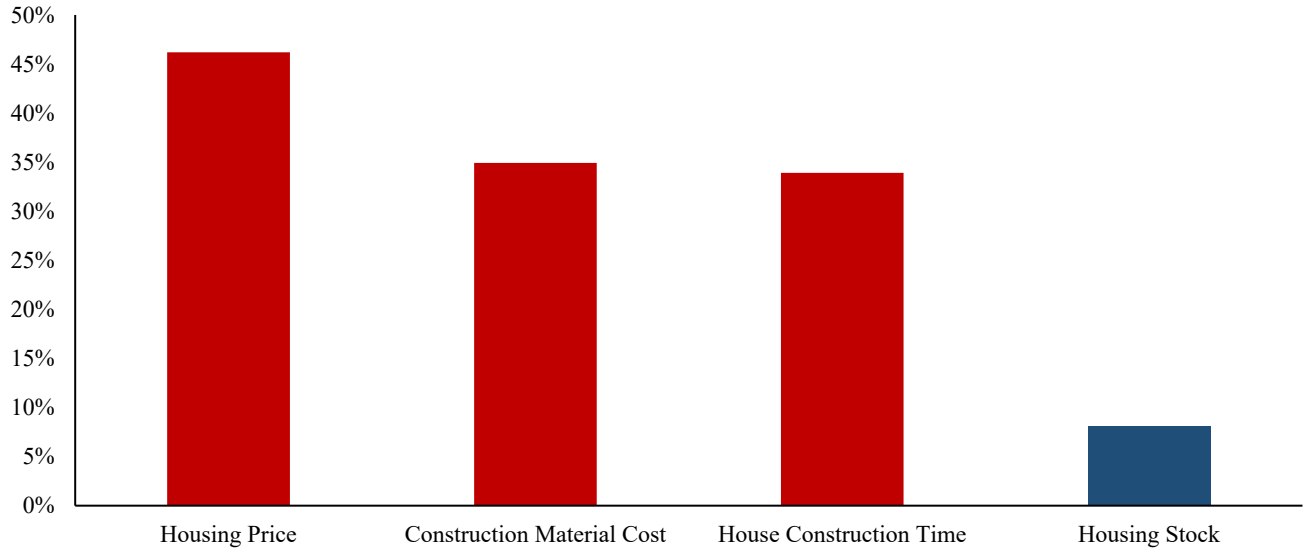
Net overseas migration to Australia in the period was approximately 1.3 million, which elevated total demand for housing above the level of supply added to the market in every state, except Tasmania.

Concerningly, while demand has been at historically high levels, housing supply has stagnated, as a consequence of supply chain challenges, overregulation in housing and construction, the absorption of resources by large, inefficient government projects, and worker shortages in the construction sector.[5]

IPA research published in July 2025, *Nationwide Handbrake on Housing Construction*,[6] found that in the decade to 2024, housing construction slowed by 50 per cent, while material costs increased by 53 per cent. The present analysis, which provides an update to the aforementioned research note with new data, focuses on the period between the financial years ending 2020 and 2025.

In the five years between the financial years ending 2020 and 2025, the length of time it took to build a house, on average across Australia, increased from about eight months and a half to roughly about year; an increase of 34 per cent in just five years.

Chart 2: *Comparative changes from FY2020 to FY2025*



Source: IPA, ABS

In the meantime, the average price of a home climbed by 46 per cent to more than $1 million, and material (input) costs increased by 35 per cent.

The increase in the stock of housing in Australia over the five-year period, by contrast, was only 8 per cent.

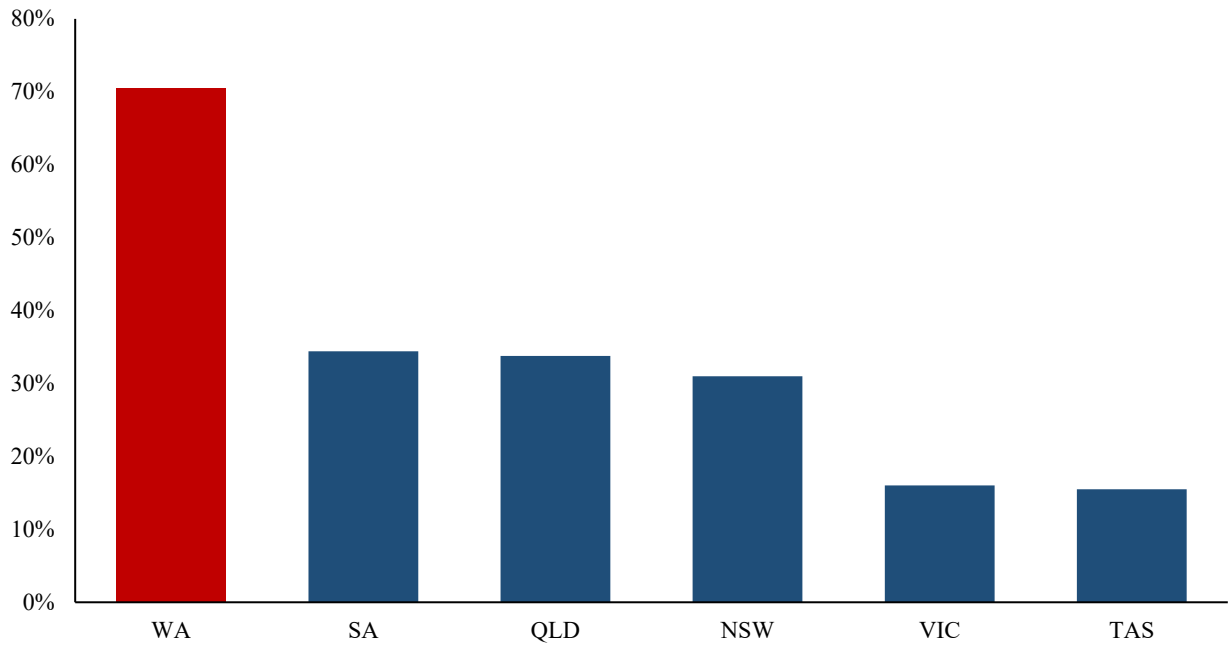
Table 1 breaks down the construction time data by state in the financial years ending 2020 and 2025.

Table 1: *Average time to build a house in Australia by state*

State	Time from approval to commencement	Time from commencement to completion	Time from approval to completion
New South Wales	2020: 2.28 months 2025: 2.79 months	2020: 7.11 months 2025: 9.51 months	2020: 9.39 months 2025: 12.30 months
Victoria	2020: 1.83 months 2025: 1.83 months	2020: 6.60 months 2025: 7.95 months	2020: 8.43 months 2025: 9.78 months
Queensland	2020: 1.68 months 2025: 2.07 months	2020: 5.16 months 2025: 7.08 months	2020: 6.84 months 2025: 9.15 months
South Australia	2020: 3.45 months 2025: 3.57 months	2020: 6.75 months 2025: 10.14 months	2020: 10.20 months 2025: 13.71 months
Western Australia	2020: 1.95 months 2025: 2.34 months	2020: 7.11 months 2025: 13.11 months	2020: 9.06 months 2025: 15.45 months
Tasmania	2020: 2.55 months 2025: 3.18 months	2020: 7.71 months 2025: 8.67 months	2020: 10.26 months 2025: 11.85 months
Australia	2020: 2.04 months 2025: 2.28 months	2020: 6.54 months 2025: 9.21 months	2020: 8.58 months 2025: 11.49 months

Source: IPA, ABS

Chart 3: *House construction time increase (i.e., slowdown) between FY2020 and 2025 by state*



Source: IPA, ABS

Housing completions in the financial year ending 2025 totalled 174,271, representing a 2 per cent decline from the previous financial year and a 9 per cent decline from the financial year ending 2020.

The number of housing completions in the financial year ending 2024 is comparable to the number of completions 30 years ago in 1995, at 173,197, when the demand for housing was significantly lower than it is today.

Moreover, the increase in build times and material costs have had an expected impact on the cost of housing. The average price of a home in each state, as of the last quarter of the 2025 financial year, was as follows:

- Queensland: $977,300 (compared to $524,800 in 2020; an 86 per cent increase).
- South Australia: $854,400 (compared to $467,400 in 2020; an 83 per cent increase).
- Western Australia: $897,500 (compared to $499,100 in 2020; an 80 per cent increase).
- Tasmania: $670,900 (compared to $460,300 in 2020; a 46 per cent increase).
- NSW: $1,256,200 (compared to $888,000 in 2020; a 41 per cent increase).
- Victoria: $909,100 (compared to $748,600 in 2020; a 21 per cent increase).

For more information contact Morgan Begg, Director of Research at

End Notes

1. Australian Bureau of Statistics (ABS), *Building Activity, Australia* (Reference period June 2025, 15 October 2024): https://www.abs.gov.au/statistics/industry/building-and-construction/building-activity-australia/latest-release.

2. ABS, *Producer Prices Indexes, Australia* (Reference period June 2025, 1 August 2025): https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/producer-price-indexes-australia/latest-release.

3. ABS, *Producer Prices Indexes, Australia methodology* (Reference period June 2025, 1 Aug 2025): https://www.abs.gov.au/methodologies/producer-price-indexes-australia-methodology/jun-2025.

4. Morgan Begg, *Australia's post-pandemic housing shortfall balloons to 179,000* (Institute of Public Affairs Media Release, 19 June 2025).

5. See Institute of Public Affairs, 'Facts about the costs of housing' (2025) Vol. 50(1) *IPA Facts* 8-9; Saxon Davidson, *Cut immigration and red tape to expand home ownership* (Institute of Public Affairs Research Submission, 8 August 2024) 2; Micheal Read and John Kehoe, 'Infrastructure splurge exacerbating housing shortage: RBA' (*The Australian Financial Review*, 10 November 2023); GJ Gardner Homes, 'Australian construction material supply causing delays for home builders' (2021) https://www.gjgardner.com.au/learn/building-with-gj/australian-construction-material-supply-causing-delays-for-home-builders/.

6. Kevin You, *Nationwide handbrake on housing construction* (Institute of Public Affairs Research Note, 2 July 2025)

Institute of Public Affairs

DECEMBER 2023

ANALYSIS OF LAND USE BY VARIABLE RENEWABLE ENERGY PRODUCTION BY 2050

Dr Kevin You
Senior Research Fellow

Morgan Begg
Director of Research

Contents

Executive summary

As part of the policy of achieving net zero carbon emissions by 2050, the federal government has declared its ambition for Australia to be a 'renewable energy superpower' and 'renewable energy export superpower'.

The purpose of this research report is to calculate the amount of Australian land that will be required to generate the energy needed for Australia to become a 'Renewable Energy Superpower' by the year 2050. The estimates are based on four scenarios.

Scenario 1: All renewable energy produced in Australia to replace energy from coal, gas, and oil will be derived from solar power:

The land required could amount to **57 million hectares**.

This is equivalent to over **7 per cent of Australia's landmass**, over **15 per cent of Australia's agricultural land**, or an area equal to eight Tasmanias.

Scenario 2: All renewable energy produced in Australia to replace energy from coal, gas, and oil, will be derived from wind power.

The land required could amount to **181 million hectares**.

This is equivalent to **23 per cent of Australia's landmass**, approximately **half of all Australia's agricultural land**, or an area approximately the size of the entire state of Queensland.

Scenario 3: All renewable energy produced in Australia to replace energy from coal, gas, and oil is derived from wind and solar based on a solar-intensive renewable expansion.

In the third scenario, we assume that the renewable energy produced in Australia to replace energy from coal, gas, and oil will be a combination of both solar and wind power with much greater reliance on solar (at a ratio of approximately 9:1) as considered by Net Zero Australia.

The land required could amount to **68 million hectares**.

This is equivalent to **9 per cent of Australia's landmass**, over **18 per cent of Australia's agricultural land**, or an area equivalent to ten Tasmanias.

Scenario 4: All renewable energy produced in Australia to replace energy from coal, gas, and oil is derived from wind and solar in equal proportion.

In the fourth scenario, we assume that the renewable energy produced in Australia to replace energy from coal, gas, and oil will be 50 per cent solar and 50 per cent wind power.

The land required could amount to **119 million hectares**.

This is equivalent to **15 per cent of Australia's landmass**, approximately **one-third of all Australia's agricultural land**, or an area larger than the size of South Australia.

Becoming a net zero superpower

At the Asia Pacific Economic Forum in November 2023, Prime Minister Anthony Albanese reaffirmed 'Australia's vision for becoming a renewable energy superpower for our region ... [And] in exporting clean energy' to countries like Singapore and Indonesia.[1] Earlier in the year, Climate Change and Energy Minister Chris Bowen boasted about Australia's ambition to become a renewable energy superpower, with a vision to produce 'not just raw minerals—but ... of exported renewable energy itself'.[2]

While Australia does not directly import or export energy into and out of its electricity grids, it does trade in energy-producing commodities such as coal and gas. Energy contained in these commodities are used to produce energy both domestically and overseas.

The commitment by successive federal governments to meet a net zero emissions target by 2050 will have a significant impact not only on the composition of domestic energy production, but also Australia's export of coal and gas. Changing the composition of energy production to less efficient sources such as wind and solar will be more land intensive.

In 2021, following the United Nations Climate Change Conference in Glasgow, the federal government published *Australia's Long-term Emissions Reduction Plan: A whole-of-economy plan to achieve net zero emissions by 2050*.[3] This document outlined the broad policies that the government would implement to meet Australia's net zero by 2050 target, and speculated on the future of Australia's energy export.

At the time, the federal government's net zero plan expressed an intention that 'Australia's coal and gas export industries will continue through 2050 and beyond', but even then raised the possibility of a reduction in the share of coal and gas in Australia's overall energy export.[4] Despite Australia's natural comparative advantage in coal, gas, and oil production, the plan sought to justify creating a new source of trade advantage in green energy, which revolves around wind, solar, and green hydrogen.[5]

In the years after Australia's initial commitment to the policy of net zero by 2050, the conversation has shifted away from complementing traditional energy production and export, towards replacing them altogether under a green 'superpower' plan under various iterations.

In April 2023, academics from Australia and Princeton University in the United States, working under the banner of Net Zero Australia, released a study that models various pathways to achieving Australia's net zero carbon equivalent emissions target by 2050 (the Net Zero Australia Study).

Net Zero Australia's report highlights the magnitude of the undertaking, which seems to have been underestimated by policy makers to date. One of its key findings is that achieving net zero in Australia requires up to $9 trillion worth of cumulative capital investment to 2060, which translates to approximately $243 billion per year. Moreover, solar photovoltaic devices will need to be installed on 80 per cent of private buildings across the nation.

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1 Anthony Albanese, 'APEC Press Conference' (San Francisco, United States, 17 November 2023): https://www.pm.gov.au/media/apec-press-conference.

2 Chris Bowen, 'Speech on Australia as a Renewable Energy Superpower, Australian Embassy, Japan' (Speech delivered to the Australian Embassy, Japan, 26 July 2023): https://minister.dcceew.gov.au/bowen/speeches/speech-australia-renewable-energy-superpower-australian-embassy-japan.

3 Department of Industry, Science, Eneregy and Resources, *Australia's Long-term Emissions Reduction Plan: A whole-of-economy plan to achieve net zero emissions by 2050* (Commonwealth of Australia, 2021).

4 Ibid.

5 It should be noted hydrogen energy storage, whether it be green, grey (produced with natural gas), blue (natural gas supported by carbon capture technology), or pink (nuclear), is a chemical energy storage mechanism and is not, in itself, a means to produce kinetic electricity. Green hydrogen is produced by way of converting solar radiation or the wind's kinetic energy into storable and transportable chemical potential energy.

The report also identifies that large parcels of land in Australia must be apportioned for the construction of solar and wind farms and their associated transmission and energy storage facilities.[6]

The study confirmed earlier Institute of Public Affairs research, *The Economic and Employment Consequences of Net Zero Emissions by 2050 in Australia,* that achieving the net zero by 2050 target is inconsistent with the commencement of new coal and gas projects. Indeed, Net Zero Australia envisions the replacement of not just Australia's domestic consumption of hydrocarbons (coal, gas, and oil) but also its export with energy derived from wind and solar.

The Australian Energy Market Operator's 2022 Integrated System Plan introduced an ambitious 'hydrogen superpower' scenario, mapping out a path towards Australia becoming a large renewable energy exporter through the production of green hydrogen. The present government has consistently expressed its determination for Australia to become a renewable energy superpower.[7] It has committed to investing an additional $2 billion in Hydrogen Headstart, a new program to support hydrogen production, bringing total government investment in becoming a renewable energy superpower to more than $40 billion.[8] Projects such as Sun Cable's Australia-Asia PowerLink seek to bypass the use of green hydrogen altogether and create mega-infrastructure aimed at allowing the direct export of renewable energy to Southeast Asia from mainland Australia.[9]

Accordingly, this study is concerned with the impact of a complete replacement of Australia's coal, gas, and oil production with renewable energy on Australian land. A paper by Nøland et al, published in *Scientific Reports*, finds that wind and solar are among the most land area-intensive sources of electricity generation.[10] Among renewable sources of power, hydroelectricity is the most energy dense and therefore the least land area-intensive. Non-renewable sources, such as nuclear and gas, are by far the least area-intensive and the most energy dense, meaning that non-renewable sources of power use land much more efficiently to generate energy.[11]

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6 Net Zero Australia, *Final modelling results* (April 2023): https://www.netzeroaustralia.net.au/wp-content/uploads/2023/04/Net-Zero-Australia-final-results-full-results-pack-19-April-23.pdf; Net Zero Australia, *How to make net zero happen: Mobilisation report* (July 2023): https://www.netzeroaustralia.net.au/wp-content/uploads/2023/09/Net-Zero-Australia-Mobilisation-How-to-make-net-zero-happen-updated-19-Sep-23.pdf.

7 Graham Readfearn, 'Labor promises to "grab this opportunity" to become renewable energy superpower', *The Guardian* (22 April 2023): https://www.theguardian.com/environment/2023/apr/22/labor-promises-to-grab-this-opportunity-to-become-renewable-energy-superpower.

8 Commonwealth of Australia, 'Budget 2023-24: Becoming a renewable energy superpower' (Online): https://budget.gov.au/content/03-economy.htm.

9 Sun Cable, 'About us' (Website, 2023): https://suncable.energy/.

10 Jonas Kristiansen Nøland, Juliette Auxepaules, Antoine Rousset, Benjamin Perney and Guillaume Falletti, 'Spatial energy density of large-scale electricity generation from power sources worldwide' (2022) Vol. 12 Article 21280 *Scientific Reports* 1-26.

11 Coal was not included as a part of the study.

Modelling by Net Zero Australia estimates that five Tasmanias' worth of solar farms will be needed to produce the energy necessary to replace Australia's current hydrocarbon fuel exports in addition to domestic consumption.[12] This will be in addition to the existing wind, solar, and hydroelectricity generators, as well as the wind turbines and transmission lines that will need to be built to service the renewable facilities.

Our estimate suggests that the solar land use necessary to replace hydrocarbon fuel energy production by 2050 will be slightly more than anticipated by the aforementioned study—at approximately 7.5 times the size of Tasmania, in addition to land needed to accommodate windfarms and renewable transmission facilities. Should solar power be relied on exclusively to replace hydrocarbon fuels, the necessary land area will be larger.

In this research report, we study how much land will be required if energy from wind and solar were to replace all the energy contained in the hydrocarbon fuels (coal, gas, and oil) produced in Australia each year. Furthermore, it estimates the amount of land that will be required to satisfy Australia's and the world's growing energy demand by 2050.

It is estimated that renewable facilities in Australia today can produce approximately 84 TWh of electricity annually.[13] Under ideal conditions and assuming the presence of sufficient storage and transmission facilities, they will be able to meet the needs of less than half of Australia's domestic electricity consumption.

In order to proportionally replace all the energy attributable to Australia's hydrocarbon fuel production as of today, including for export purposes, roughly 5,025 TWh of electricity per annum will need to be generated by wind and solar farms. However, to replace all the energy attributable to Australia's hydrocarbon fuel production by 2050, this number will treble to 15,459 TWh.

To calculate how much land will be required to generate renewable electricity of such magnitude, we considered four scenarios and found between 57 million hectares of land and 181 million hectares of land could be required by 2050.

Importantly, this calculation is conservative in that it only considers the land that would be required by wind farms and solar farms, but does not include an assessment of land use by the new transmission networks that will need to be built to support the rapid transformation of Australia's energy system, nor does it consider the land use by green hydrogen production facilities or other storage mechanisms such as batteries.

12 Loz Blain, 'Five solar farms, each as big as Tasmania: Australia's path to net zero', *New Atlas* (19 September 2023): https://newatlas.com/energy/net-zero-australia/; Net Zero Australia, *Final Modelling Results* (2023, April).

13 Clean Energy Council, *Clean Energy Australia Report 2023* (2023): https://assets.cleanenergycouncil.org.au/documents/Clean-Energy-Australia-Report-2023.pdf.

Research methodology

Four scenario analyses pertaining to the use of land to produce renewable energy for export and domestic consumptions were conducted in this study.

In the first scenario, we assume that all the renewable energy produced in Australia to replace energy from hydrocarbon fuels (coal, gas, and oil) will be derived from solar power.

In the second scenario, we assume that all the renewable energy produced in Australia to replace energy from hydrocarbon fuels will be derived from wind power.

In the third scenario, we assume that the renewable energy produced in Australia to replace energy from coal, gas, and oil will be a combination of solar and wind power with a greater reliance on solar power as considered by Net Zero Australia.

In the fourth scenario, we assume that the renewable energy produced in Australia to replace energy from hydrocarbon fuels will be a combination of solar and wind power with a 50-50 share between wind and solar.

Data source and assumptions regarding energy resources

The data on resource production were derived from September 2023's Resources and Energy Quarterly dataset, released by the Commonwealth Department of Industry, Science and Resources.[14]

In the said database, the volume of natural gas production is measured in units of billion cubic metre; the volume of coal production is measured in units of megatonne (i.e., one million tonnes); and the volume of oil production is measured in units of thousand barrels per day.

The energy estimate for each type of input is based on the energy output of the relevant resource. We utilised publicly available online conversion tools to arrive at our estimates.[15] For instance, a tonne of coal produces the equivalent to 8.14 MWh of energy. Therefore, 216 Mt of thermal coal produced in Australia in the financial year ending 2023 can be expected to produce 1,758 TWh of electricity.

DISR provides forecast data stretching to the financial year ending 2025. However, due to uncertainties in the global market, forecast reliability is somewhat limited. We opted, therefore, to anchor our annual production assumption on actual data from the most recent full financial year—namely the financial year ending 2023.

Data source and assumptions regarding renewables' land use

The upper limit of land use by silicone on-ground solar panels, utilised in solar farms, per MWh of energy generation is 0.0037 hectares—or 3,700 hectares per TWh of energy.[16] We assume, therefore, that 3,700 hectares of land will need to be occupied by solar panels each year in order to produce this much energy.

The land area usage of wind farms varies considerably depending on factors such as the size of the wind turbines, layout of the farm and wind availability at each location. Wind farms require considerably more land than other power generation facilities such as solar farms—but the land required is not used exclusively.

14 Department of Industry, Science and Resources, *Resources and Energy Quarterly: September 2023* (3 October 2023): https://www.industry.gov.au/publications/resources-and-energy-quarterly-september-2023.

15 Unit Juggler v.40 (2023): https://www.unitjuggler.com/index.html; JustinTOOLs, Unit converter (2023): https://www.justintools.com/.

16 Hannah Ritchie, 'How does the land use of different electricity sources compare?', *Our World in Data* (Online, 16 June 2022): https://ourworldindata.org/land-use-per-energy-source; Consumer Ecology, 'How Much Land Does Solar Use': Available from https://consumerecology.com/solar-land-use/.

For instance, land covered by solar panels generally cannot be used for growing crops in a practical sense because it receives little sunlight. Moreover, land under solar panels is required to accommodate the densely packed infrastructure needed to support the panels. Land around wind turbines, on the other hand, can be used for growing crops and grazing, though its utilisation is affected by the presence of the turbines and supporting infrastructure. Such infrastructure includes power lines criss-crossing between the turbines (including underground power lines), storage facilities and the main energy network, such as eastern Australia's National Electricity Market and Western Australia's South West Interconnected System.

Information on land area coverage and average historical or forecast generation output of wind farms and wind project are not readily accessible to the public. So, for the purpose of the present analysis, an assumption is made that land use per MWh of electricity is comparable to New South Wales' Sapphire wind farm, one of the largest wind farms in Australia, which uses approximately 11,677 hectares per TWh of annual energy generation.[17]

Australia does not currently have any offshore wind farms nor is electricity from an offshore wind farm likely to start contributing to the energy grid to a significant extent in the near future. Renewable energy analyst 4C Offshore notes that none of Australia's proposed offshore wind farm projects is currently in operation. Moreover:

> [There is] none where construction has progressed enough to connect the turbines and generate electricity, none are in the build phase, and none are either consented or have applied for consent.[18]

Furthermore, offshore wind farms carry significant environmental risks, impose unacceptable risks to marine life and face stiff local opposition.[19] Offshore wind turbines are expected to each reach up to 300 metres tall—as tall as the Eiffel Tower or Sydney's Centrepoint Tower. Their effect on the wildlife, tourism and the natural landscape will be significant and, for many local residents, unacceptable.

This report assumes that all Australia's future wind-powered energy generation will come from onshore rather than offshore facilities.

17 Sapphire's total site area is estimated to be 8,921 hectares and is estimated to produce 764GWh of energy per annum. See: Squadron Energy, 'Our Porjects: Sapphire Wind Farm (2023): https://www.squadronenergy.com/our-projects/sapphire-wind-farm.

18 4C Offshore, 'Offshore Wind farms in Australia' (2023): https://www.4coffshore.com/windfarms/australia/..

19 Sky News, 'Central Coast controversy over planned windfarm construction ten kilometres offshore' (5 July 2023): https://www.skynews.com.au/business/energy/central-coast-controversy-over-planned-windfarm-construction-ten-kilometres-offshore/video/7e274408fd4efcb00f1ada50a56ac7f4; Jordyn Beazley, 'Windfarm plans in choppy waters as Coalition and One Nation whip up doubts', *The Guardian* (2 December 2023): https://www.theguardian.com/environment/2023/dec/03/windfarm-plans-in-choppy-waters-as-coalition-and-one-nation-whip-up-doubts.

Australia's energy production

Australia's production of coal, oil, and gas (known as hydrocarbons or hydrocarbon fuels) as of the 2022-23 financial year and the annual energy equivalent is presented in the table below.

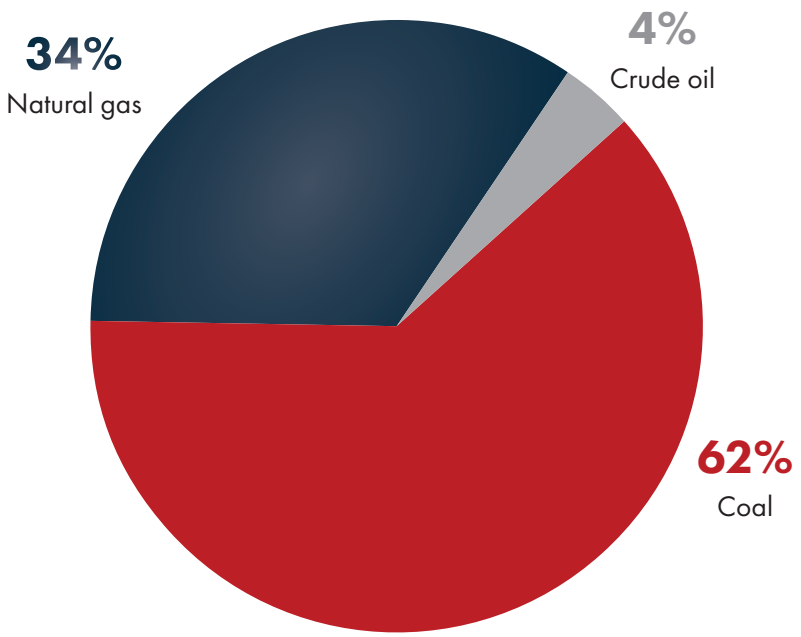
TABLE 1: Australia's coal, gas, and oil production in the 2023 financial year

ENERGY RESOURCE	PRODUCTION VOLUME	UNIT	ANNUAL ENERGY EQUIVALENT
Natural gas	165	bcm	1,722 TWh
Metallurgical coal	168	Mt	1,368 TWh
Thermal coal	216	Mt	1,758 TWh
Crude oil	298	kb/d	177 TWh
Total			**5,025 TWh**

Source: DISR, IPA
Note: bcm = billion cubic metres; Mt = megatonnes; kb/d = thousand barrels per day

The energy production covers export as well as domestic use. Australia's total energy production from natural gas, coal, and crude oil is equivalent to approximately 5,025 TWh. This amounts to roughly one-fifth of the world's current entire electricity consumption.[20]

Chart 1: Share of Australia's coal, gas, and oil production in the 2023 financial year



Source: DISR, IPA

20 Statista, 'Net electricity consumption worldwide in select years from 1980 to 2022', (19 September 2023): https://www.statista.com/statistics/280704/world-power-consumption/.

Estimated energy production in 2050

Projection of the future of Australia's energy production is based on the expected growth in international energy demand. The rationale for this is that the government has endorsed the concept of Australia being a renewable energy superpower,[21] so domestic production will be driven by demand not only from Australia but from our trading partners, most of whom are in the Asia Pacific.

Global electricity consumption in the immediate year after the pandemic was five per cent higher than in the previous year.[22] Growth in electricity consumption in the Asia Pacific in the five years leading to 2022 was approximately five per cent per annum. The International Energy Agency's World Energy Outlook 2022 report suggests that under net zero, global electricity demand is expected to grow by 3.5 per cent per ammum.[23]

For the purpose of this report, we assume that growth in energy consumption over the next 27 years up to 2050 is right in between the 3.5 per cent and 5 per cent figures above: namely, at 4.25 per cent per annum. Compounded, this will amount to an increase of 208 per cent, by 2050, over and above the 2023 level.[24]

This means that by 2050, the total amount of energy production—to meet increased export and domestic consumption levels—could be up to 15,459 TWh. This will be equivalent to roughly one-fifth of the world's expected electricity consumption by 2050 according to the IEA.

We recognise that there is a tendency for future forecast to under-estimate growth in energy demand, especially among non-OECD nations.[25] For this reason, demand for Australian energy export may, in fact, be considerably higher. The implication is that replacing Australia's energy exports from hydrocarbon fuel-derived sources to renewable sources may in fact require a larger total land area.

TABLE 2: Australia's estimated coal, gas, and oil production by 2050

ENERGY RESOURCE	PRODUCTION VOLUME	UNIT	ANNUAL ENERGY EQUIVALENT
Natural gas	506	bcm	5,297 TWh
Metallurgical coal	516	Mt	4,208 TWh
Thermal coal	665	Mt	5,410 TWh
Crude oil	917	kb/d	544 TWh
Total			**15,459 TWh**

Source: IPA
Note: bcm = billion cubic metres; Mt = megatonnes; kb/d = thousand barrels per day

21 Graham Readfearn, 'Labor promises to "grab this opportunity" to become renewable energy superpower', *The Guardian* (22 April 2023): https://www.theguardian.com/environment/2023/apr/22/labor-promises-to-grab-this-opportunity-to-become-renewable-energy-superpower.

22 Enerdata, 'Total energy consumption' (World Energy & Climate Statistics, 2023): https://yearbook.enerdata.net/total-energy/world-consumption-statistics.html.

23 International Energy Agency, *World Energy Outlook 2022* (October 2022).

24 Economic growth in Asia Pacific is expected to be 4.6 per cent in 2023, per International Monetary Fund, *Regional Economic Outlook: Asia and Pacific: Challenges to Sustaining Growth and Disinflation* (October 2023). While growth is expected to slow down in subsequent years, we assume that growth in electricity and metallurgical coal demand continue at around 4.25 per cent due to an increase in electrification (including the production of green steel).

25 Lucian Pugliaresi, Balancing Energy Security, Affordability and Decarbonization, *What Would Net Zero Mean for the Economy and Geopolitics?* (Energy Policy Research Foundation Online Seminar, 16 June 2023).

Results from scenario analysis

Four scenarios were analysed pertaining to the use of Australian land to produce renewable energy for export and domestic consumptions to replace hydrocarbon fuels. Each of the four scenarios is presented in this section.

TABLE 3: Results of analysis of various renewable land use scenarios

SCENARIO	TOTAL AUSTRALIA LAND AREA	TOTAL AGRICULTURAL LAND AREA	ESTIMATED LAND USED BY WIND/SOLAR BY 2050	% TOTAL AUSTRALIA AREA USED	% TOTAL AGRICULTURAL LAND USED
Scenario 1: All solar	769 million hectares	369 million hectares	57 million hectares	7.4%	15.5%
Scenario 2: All wind			181 million hectares	23.5%	48.9%
Scenario 3: Solar intensive			68 million hectares	8.8%	18.3%
Scenario 4: Equal wind and solar			119 million hectares	15.5%	32.2%

Note: Land area figures rounded to the nearest million hectares, and percentages rounded to the first decimal point

SCENARIO ONE: All energy from coal, oil and gas is replaced by solar-generated electricity

As earlier noted, the upper limit of land use by silicone on-ground solar panels, used in solar farms, per TWh of energy generation is 3,700 hectares.

Today, Australia's hydrocarbon fuels produce approximately 5,025 TWh of energy per annum.

Should current energy generation from all of Australia's coal, gas and oil be replaced by solar-powered electricity, the land required could amount to:

5,025 × 3,700 = 18,592,740 hectares

By 2050, Australia's hydrocarbon fuels would need to produce approximately 15,459 TWh of energy per annum to meet the expected needs of domestic and international consumers.

Should energy generation from all of Australia's coal, gas and oil be replaced by solar-powered electricity, the land required could amount to:

15,459 × 3,700 = 57,200,142 hectares

This is equivalent to **7.44 per cent of Australia's landmass**,[26] or **15.50 per cent of Australia's agricultural land**, or an area equal to the land area of eight separate Tasmanias.

SCENARIO TWO: All energy from coal, oil and gas is replaced by wind-generated electricity

The land area usage of wind farms, as noted earlier in this report, varies depending on factors such as the size of the wind turbines, layout of the farm and wind availability at each location. Compared to solar farms and hydrocarbon-fuelled power generators, wind farms require a larger area of clearance in order to allow for wind power to flow and spin the blades on each installation.

In this report, we have based our assumptions on the land use and generation output of one of Australia's largest wind farms, namely the 270 MW Sapphire wind farm in New England.

Sapphire's estimated net annual output is 764 GWh or 0.764TWh.[27] It stretches across 8,921 hectares of land within the Inverell Shire Council and Glen Innes Severn Council.[28] This equates to 11,677 hectares per TWh of annual electricity generation.

Should current energy generation from all of Australia's coal, gas, and oil be replaced by wind-powered electricity, the land required could amount to:

5,025 × 11,677 = 58,677,682 hectares

By 2050, Australia's hydrocarbon fuels would need to produce approximately 15,459 TWh of energy per annum to meet the expected needs of domestic and international consumers.

Should energy generation from all of Australia's coal, gas and oil be replaced by wind-powered electricity, the land required could amount to:

15,459 × 11,677 = 180,520,558 hectares

This is the equivalent to **23.47 per cent of Australia's landmass**, approximately **half (48.92 per cent) of all Australia's agricultural land**, or an area approximately the size of the entire state of Queensland.

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26 Australia's land area is 7,692,024 km2, which is the equivalent to 769,202,400 ha.: Geoscience Australia, 'Australia's Size Compared' (Online, 7 June 2023): https://www.ga.gov.au/scientific-topics/national-location-information/dimensions/australias-size-compared.

27 Squadron Energy, 'Our Porjects: Sapphire Wind Farm (2023): https://www.squadronenergy.com/our-projects/sapphire-wind-farm.

28 Power Technology, 'Sapphire Wind Farm, New South Wales': https://www.power-technology.com/projects/sapphire-windfarm-new-south-wales/

SCENARIO THREE: Energy from coal, oil and gas is replaced by wind and solar under a solar-intensive renewable transition

The Net Zero Australia Study envisions a future in which hydrocarbon fuel energy consumption and export are replaced by renewable energy generation featuring 1 TWh of wind generation for every 10.75 TWh solar power generation.

Today, Australia's hydrocarbon fuels produce approximately 5,025 TWh of energy per annum. In this scenario, the breakdown of wind and solar generation is as follows:

- Solar generation: 4,597 TWh
- Wind generation: 428 TWh

The amount of land needed would amount to:

- Solar:4,597 × 3,700 = 17,010,379 hectares
- Wind: 428 ×11,677 = 4,993,845 hectares
- Total solar and wind: = 22,004,224 hectares.

By 2050, Australia's hydrocarbon fuels would need to produce approximately 15,459 TWh of energy per annum. In this scenario, the breakdown of wind and solar generation is as follows:

- Solar generation: 14,144 TWh
- Wind generation: 1,316 TWh

The amount of land needed would amount to:

- Solar: 14,144 × 3,700 = 52,332,045 hectares
- Wind: 1,316 ×11,677 = 15,363,452 hectares

For a total of 67,695,497 hectares.

This is equivalent to **8.80 per cent of Australia's landmass**, or **18.35 per cent of Australia's agricultural land**, or an area the equivalent to roughly ten Tasmanias.

SCENARIO FOUR: Energy from coal, oil and gas is replaced by a wind and solar (equal distribution)

Today, Australia's hydrocarbon fuels produce approximately 5,025 TWh of energy per annum. If they are to be replaced with energy from wind and solar in equal measure, the breakdown of wind and solar energy generation will be as follows:

- Solar generation: 2,513 TWh
- Wind generation: 2,513 TWh

The amount of land needed would amount to:

- Solar:2,513 × 3,700 = 9,296,370 hectares
- Wind: 2,513 ×11,677 = 29,338,841 hectares
- Total solar and wind: = 38,635,211 hectares.

By 2050, Australia's hydrocarbon fuels would need to produce approximately 15,459 TWh of energy per annum. In this scenario, the breakdown of wind and solar generation is as follows:

- Solar generation: 7,730 TWh
- Wind generation: 7,730 TWh

The amount of land needed would amount to:

- Solar: 7,730 × 3,700 = 28,600,071 hectares
- Wind: 7,730 ×11,677 = 90,260,279 hectares

For a total of 118,860,350 hectares.

This is equivalent to **15.45 per cent of Australia's landmass**, approximately **one-third (32.21 per cent) of all Australia's agricultural land**, or an area larger than the size of South Australia.

Additional factors affecting land use

The estimated land use for renewable energy production, covered in this report, represents a conservative estimate because it only covers land that will be occupied by solar and wind farms. It does not include land use associated with the new transmission network that will need to be built to support just the domestic market in the transition.

Up to an additional 28,000 km of new electricity transmission will need to be built by 2050 under AEMO's Hydrogen Superpower plan for the NEM.[29] More electricity transmission lines will be needed in Western Australia and the Northern Territory.

Furthermore, Net Zero Australia calls for up to 14,839 km of green hydrogen pipeline to be built to support the green energy export.[30] For context, Australia is approximately 3,860 km long from its most northerly point to its most southerly point in Tasmania, and approximately 4,000 km wide from east to west.[31]

Land to be occupied by green hydrogen production facilities and other storage mechanisms such as batteries and pumped hydro facilities have also not been taken into account. Pumped hydro, the most mature, long-lasting and proven energy storage solution needed to support large-scale wind and solar facilities, requires 12 hectares for every GWh of energy storage.[32]

Workforce relocation and the associated cost and land use are also outside the scope of the present study, but can be further explored in future research. The Western Australian Government has committed over $662 million to support the town of Collie and surrounding regions through the renewable transition as it plans the decommissioning of both state-owned coal-fired power stations, namely Muja and Collie.[33] Without this cash injection, which consists of renewable subsidies, and funding for retraining and career transitions, the town risks disappearing altogether.

29 Australian Energy Market Operator, *2022 Integrated System Plan for the National Electricity Market* (June 2022).

30 Net Zero Australia, *Final Modelling Results* (2023, April).

31 Geoscience Australia, 'Continental Extremities' (Commonwealth of Australia, 7 June 2023): https://www.ga.gov.au/scientific-topics/national-location-information/dimensions/continental-extremities.

32 Andrew Blakers, Matthew Stocks, Bin Lu and Cheng Cheng, 'A review of pumped hydro energy storage' (2021) Vol. 3(022003) *Progress in Energy* 1-18.

33 Department of Premier and Cabinet (Western Australia), 'Collie Just Transition' (Last accessed 7 December 2023): https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/collie-just-transition.

The initiative, however, cannot address the need for workforce and regional communities to be established along the vast renewable energy corridors that will take up a significant chunk of Australia's landmass.

A landmark study by the IPA, *Unprecedented Nationwide Jobs Crunch*,[34] measures the ratio of job openings to working-aged Australians not in the labour force in various regions throughout the country (i.e., the extent local employment must expand to meet the number of jobs available for immediate filling). It finds that regional communities are disproportionately affected by worker shortages; four of the five geographic zones most severely impacted by worker shortages are in regional Western Australia and Queensland. The rapid push for an energy transition will worsen the situation.

Moreover, the rapid push for an energy transition to wind and solar calls for the resettlement of workers around renewable projects, which, in turn, will need to be supported by local communities, all of which add to the land area needed to support the transition. Land required to access renewable infrastructure post-construction, for maintenance purposes and asset disposal among others, will also be in addition to the land use estimates covered in the present study.

It cannot simply be assumed that renewable infrastructure and access ways will be designed in the most efficient manner to minimise land use and resources, as well as their negative impact on the local environment. This is because the location of renewable infrastructure needs to be directed by wind and solar availabilities, geography, and, according to proponents, the demands of Indigenous communities.

The effect of all the aforementioned factors in the renewable land use necessary for Australia's energy transformation is likely to add to the land coverage discussed in this report.

34 Saxon Davidson, *Unprecedented Nationwide Jobs Crunch: Geographic analysis of worker shortages in Australia* (Institute of Public Affairs Research Report, September 2023).

Conclusion

Renewable facilities in Australia today are capable of producing approximately 84 TWh of electricity annually. Under ideal conditions and assuming the presence of sufficient storage and transmission facilities, they will be able to meet the needs of less than half of Australia's domestic electricity consumption.

Another 5,025 TWh of electricity per annum will need to be generated by wind and solar farms, however, if they are to replace all the energy attributable to Australia's hydrocarbon fuel production, including for export purposes. By 2050, this number will more than treble to 15,459 TWh.

To calculate how much land will be required to generate renewable electricity of such magnitude, we considered four scenarios.

In the first scenario, we assume that all of the renewable energy produced in Australia to replace energy from hydrocarbon fuels will be derived from solar power.

> Should energy generation from all of Australia's coal, gas and oil be replaced by solar-powered electricity, the land required could add up to 57 million hectares.
>
> This is equivalent to over 7 per cent of Australia's landmass, over 15 per cent of Australia's agricultural land, or an area equal to eight Tasmanias.

In the second scenario, we assume that all of the renewable energy produced in Australia to replace energy from hydrocarbon fuels will be derived from wind power.

> Should energy generation from all of Australia's coal, gas and oil be replaced by wind-powered electricity, the land required could amount to 181 million hectares.
>
> This is equivalent to 23 per cent of Australia's landmass, approximately half of all Australia's agricultural land, or an area approximately the size of the entire state of Queensland.

In the third scenario, we assume that the renewable energy produced in Australia to replace energy from hydrocarbon fuels will be a combination of both solar and wind power with a greater reliance on solar power as per Net Zero Australia's forecast.

> Should energy generation from all of Australia's coal, gas and oil be replaced by a combination of wind and solar-powered electricity, the land required could amount to 68 million hectares.
>
> This is equivalent to 9 per cent of Australia's landmass, over 18 per cent of Australia's agricultural land, or an area equivalent to ten Tasmanias.

In the fourth scenario, we assume that the renewable energy produced in Australia to replace energy from hydrocarbon fuels will be a combination of both solar and wind power in equal parts.

> Should energy generation from all of Australia's coal, gas and oil be replaced by a combination of wind and solar-powered electricity in equal parts, the land required could amount to 119 million hectares.
>
> This is equivalent to 15 per cent of Australia's landmass, approximately one-third of all Australia's agricultural land, or an area larger than South Australia.

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