



Name: MFAA

Submission date: 6/06/2025

1. Reduce the cost of meeting carbon targets

1. What could be done to improve the cost-effectiveness and alignment of policies to reduce emissions across the industrial, electricity and transport sectors?

The participant did not respond to this question.

2. Are there gaps in the emissions-reduction policies in the industrial, electricity and transport sectors which should be addressed?

The participant did not respond to this question.

3. Are there any duplicative emissions-reduction policies in the industrial, electricity and transport sectors which could be streamlined?

The participant did not respond to this question.

2. Speed up approvals for new energy infrastructure

1. Are planning and approvals processes for large energy infrastructure taking too long? If so, what causes the most delay?

The participant did not respond to this question.

2. How can planning and approvals processes be sped up without unduly compromising regulatory standards?

The participant did not respond to this question.

3. Should clean energy projects be treated differently to other projects for the purpose of environmental and other approvals? If so, how?

The participant did not respond to this question.

4. What can be done to build local community support for new energy infrastructure projects?

The participant did not respond to this question.

5. Please outline any evidence showing the productivity benefits of faster approvals for energy projects.

The participant did not respond to this question.

3. Encourage adaptation by addressing barriers to private investment

1. What are the barriers and enablers impacting decisions by owner-occupiers, landlords and developers about how housing is built and updated over time so that it is resilient to the effects of climate change?

- Information is disparate, not readily available, and the impact of climate resilient investment can be difficult for a homeowner to grasp – whether it's short-term impact or

medium to long-term. Homeowners and buyers often do not have access to trusted or timely advice on what are climate-resilient features of a home, available upgrades and how to finance any improvements they wish to make.

- Renters are at a further disadvantage as they may become aware of climate resilient housing, but are ultimately reliant on their property manager or landlord to consider the investment. With Australian Census data showing a decline in home ownership (67% in 2021 versus 70% in 2006), there is a potentially a growing barrier to improving the climate resilience of Australia's housing stock that is for rent.
- Brokers are a critical distribution channel for home lending and can guide borrowers toward energy-efficient solutions if equipped with the right education and tools. Brokers could be empowered as key enablers—if armed with training, tools and lender partnerships that reward homeowners who make upgrades to improve their home or investment property's resilience. In Deloitte's Value of Mortgage and Finance Broking report, attached as a supporting document, research notes brokers are increasingly linking customers to sustainable lenders and/or finance products, noting green loans are an emerging focus.
- Key enablers include a broad range of competitive green loan products, better energy rating/use disclosure at point-of-sale, and trusted educational resources integrated into mortgage processes. Broader access to green finance options (including incentives and subsidies) can accelerate energy efficiency upgrades and renewable adoption at household level.
- There is opportunity to learn from those that are most effective at generating the desired change and use this to streamline emissions-reduction policies nationally. The end user (the consumer) is the ultimate driver of the change, and making it simpler for them to understand and implement emission-reduction strategies is a critical step to achieving emissions reduction targets.

2. What information do people need to make decisions about where to live, how to build and how to upgrade their homes to appropriately factor in climate change?

- Consumer-level emissions (e.g. housing energy use) are under-leveraged—mortgage finance presents a scalable mechanism to fund climate adaptation and help meet decarbonisation goals.
- The latest MFAA data reports that 76.8% of residential mortgages are facilitated by mortgage brokers. Brokers are ideally placed to help consumers make informed borrowing decisions, including those that reduce emissions, but policy support and [climate resilience] education are lacking.
- The Residential Energy Efficiency Disclosure Initiative (REEDI) tasked with the delivery of a residential energy disclosure framework for existing dwellings (the built economy), and similar initiatives, need stronger integration with broker channels to reach scale.
- Consumers need clarity on the financial value of resilience upgrades (e.g. impact on bills, property value, and insurance premiums).
- Broker education programs—co-designed with industry and government—should include how to interpret residential home energy assessments, identify potential upgrades and their value, and connect borrowers with relevant government schemes.

3. What are the most cost-effective retrofitting options for improving the resilience of Australia's existing housing stock? What are their costs and benefits?

- Common upgrades include insulation, double glazing, solar and battery systems, shading, and water drainage improvements.
- While upfront costs vary, financing through a home loan or refinance spreads the cost over time and makes upgrades more accessible. Brokers are well-placed to facilitate this

financing to help home-owners. However, tools that pre-calculate a return-on-investment for upgrades would help brokers advise their clients more meaningfully.

4. What role might minimum standards play in ensuring the resilience of Australia's housing stock?

- Minimum resilience standards in construction and renovation would provide a foundation, but financial incentives and financing options are also essential.
- Minimum standards should be paired with guidance for lenders and brokers on how to support customers transitioning to compliant or improved homes.
- Minimum standards will go some way to help address the fragmentation between federal and state schemes (e.g. household solar incentives, disclosure requirements) which currently make it hard for brokers and consumers to understand, compare, and engage with.
- A harmonised national framework for energy performance disclosures and product eligibility (such as the work of REEDI), and installation of any upgrades, would help brokers deliver better outcomes.

5. The impacts of climate change are being factored into the regulation of where and how houses are built in different ways around Australia. What does leading practice look like? Where is there room for improvement? Are there lessons we can learn from other countries?

- Planning and zoning frameworks should integrate with financial systems—for example, ensuring lenders and brokers can see whether a new development meets energy or resilience benchmarks. Disclosure of climate-related property risks (e.g. flood zones) at point of sale or loan application should be standardised nationally.
- Other jurisdictions (e.g. New Zealand, parts of the EU) provide standardised energy ratings and upgrade calculators at point of property listing—Australia should follow suit.

Cover sheet: Supporting document #1



Final Report | Mortgage & Finance Association of Australia







Foreword

Deloitte Access Economics consulted the Mortgage & Finance Association of Australia (MFAA) for this report. We also worked closely with industry partners through an established Mortgage & Finance Broking Industry Steering Group. Deloitte Access Economics would like to thank the Steering Group for their feedback and contributions to this report.

Other organisations contributed through this research through participation in an industry consultation or through their promotion of our broker survey. A full list of these organisations is included in the Appendices.

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22,031 brokers
operating at the end
of March 2024



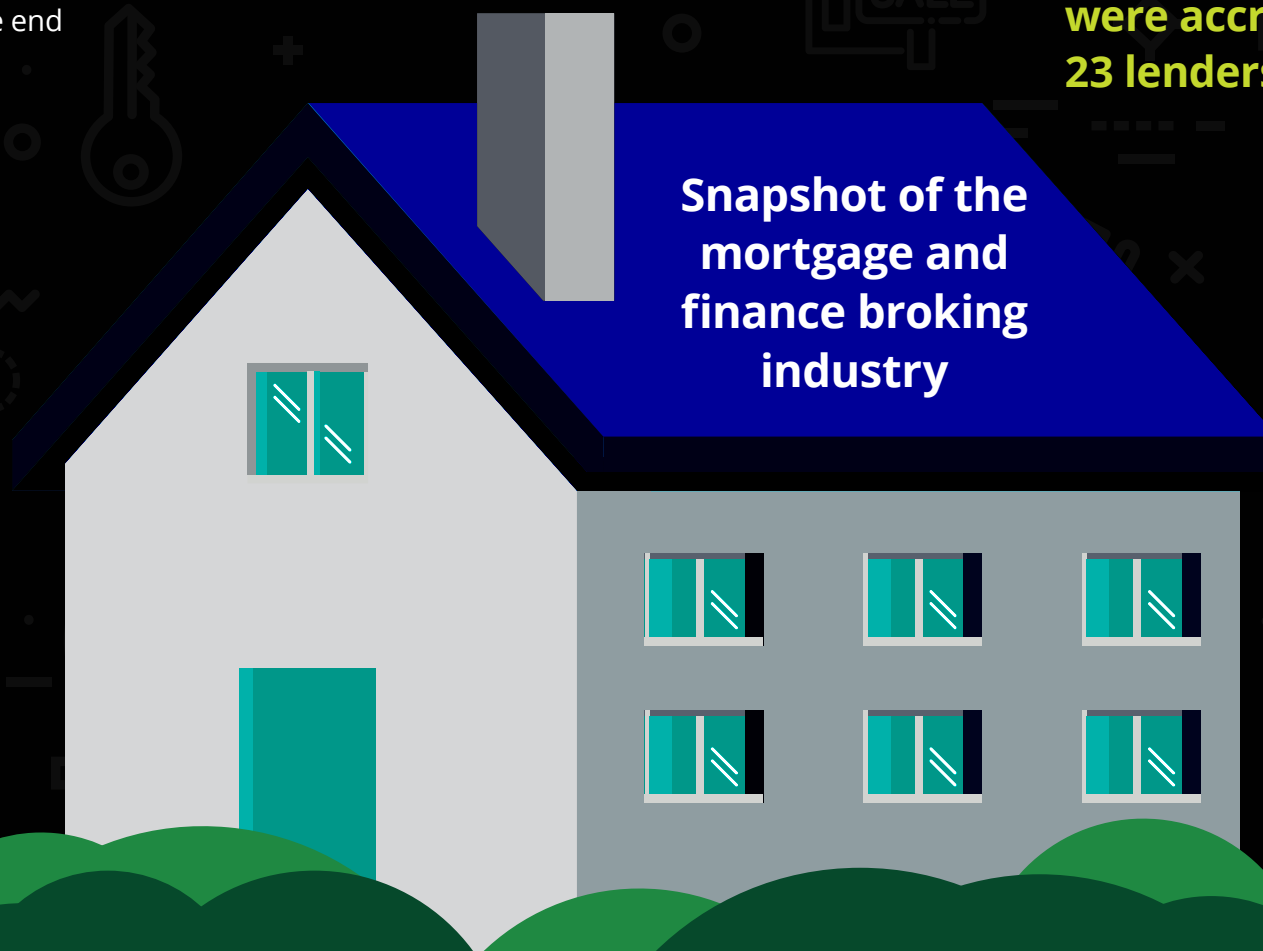
Repeat customers (44%)
and **referrals (28%)**
are the key leads for generating
broker business



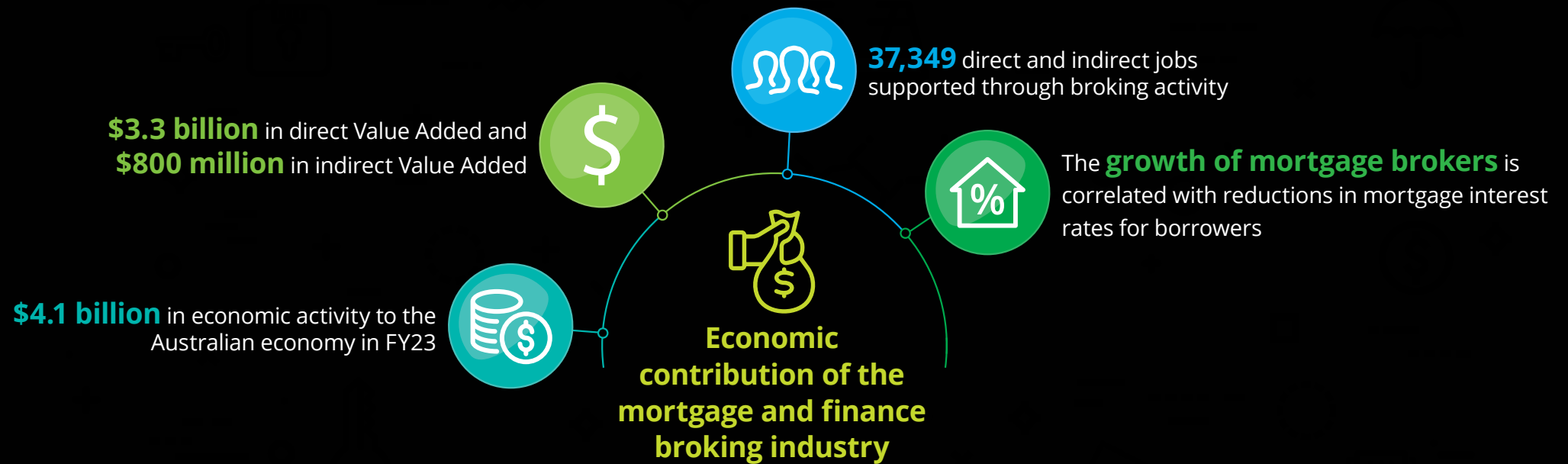
Surveyed brokers
were accredited with
23 lenders on average in 2023-24



75% of all new
residential loans in
Australia are arranged
by mortgage brokers.



13% of surveyed brokers
are commercial lending
focussed, writing **25%** or
more commercial loans



Key benefits of the mortgage and finance broking industry

- 45%** of brokers' owner occupier customers are first home buyers, compared to **30%** in the market
- 0.35% average reduction in interest rates** achieved for those who are successfully repriced
- Brokers **expand lender market reach** and help new players to enter the market
- Brokers spend **11% of time educating** customers for mortgage applications
- 86% hold qualifications equal to or above a Diploma** in Mortgage Broking Management Services

Executive Summary

The mortgage and finance broking industry plays a pivotal role in Australia's economy, linking consumers and businesses to lenders. By facilitating access to residential and commercial loans, financial products and services, brokers support millions of Australians to secure homes, gain access to finance for their businesses and achieve their financial goals. In doing so, the broking industry makes a significant contribution to economic growth and stability and ensures a competitive marketplace.

This report

Deloitte has been engaged to produce a report that provides an evidence base about the role of the mortgage and finance broking industry and its value to the Australian economy. This research provides an update and expansion to the previous Value of Mortgage Broking Report, published by the industry in 2018.

Six key changes set this report apart from previous analysis:

- **The introduction of Best Interests Duty in January 2021 has assisted in continuing to raise industry professionalism** and maintaining strong consumer protections by requiring brokers to act in the best interests of their customers when providing credit assistance. Brokers have embraced changes, with 56% of respondents reporting the changes have improved trust in the sector- ten times more than reported negative impacts.
- **Mortgage brokers have increased their role in the market**, with 75% of all new Australian residential loans arranged by brokers in 2024, up 18 percentage points from 2017.¹ This corresponds with rising interest rates and cost of living pressures, with borrowers seeking the best deal possible.
- **The mortgage broking industry has grown.** By March 2024, the number of mortgage brokers had reached 22,031 according to latest Industry Intelligence Survey data.² There were 17,040 brokers in 2018, representing an increase of 29%.³

- **Economic analysis** developed for this report finds that the growth of mortgage brokers is correlated with reductions in mortgage interest rates for borrowers and enabled more competition in the banking sector, along with other factors.
- **Commercial and asset finance broking remain emerging growth areas for the profession.** Specialist brokers serving the financing needs of small to medium sized businesses have grown since the last report, expanding out the role of brokers in the community to service a more diverse range of financing needs in addition to residential mortgages.
- **The broker role is evolving, enabled by technological adoption.** Brokers are using technology to streamline their operational tasks, resulting in more time being spent with their clients on upfront education and ongoing proactive assessment of best mortgage terms for their clients. Surveyed brokers reported a **0.35% average reduction in interest rates** achieved for those who are successfully repriced.

Sources informing this research

The report is based on a variety of public and commercial data sources and specific information collected for this report, including a nationally representative survey of 454 individual mortgage brokers and 393 mortgage broking businesses, and twelve one-to-one consultations with key industry participants.

GROWTH WITHIN THE MORTGAGE AND FINANCE BROKING INDUSTRY



Increased role in mortgage market

75% of all new residential loans in Australia are arranged by mortgage brokers.



Number of brokers

22,031 brokers operating at the end of March 2024, according to latest Industry Intelligence Survey data.



Key leads

Repeat customers (44%) and referrals (28%) are the key leads for generating broker business.



Consumer choice

Surveyed brokers were accredited with 23 lenders on average in 2023-24.



Regulatory changes

Brokers are 10 x more likely to report a positive impact to their business than negative from the introduction of Best Interests Duty.

Executive Summary continued

Enhancing competition and choice

Mortgage brokers play a crucial role in enhancing competition and choice by offering consumers access to diverse loan products across multiple lenders, empowering them to secure the best terms tailored to their unique needs.

In 2023-24, surveyed mortgage brokers reported that, on average, they are accredited with **23** different lenders through their aggregator and settled loans with 8 different lenders. Beyond this, brokers can access up to 65 lenders through their aggregator panels.⁴ Brokers present **three options** on average to each customer, aligned to their customers' best interests.

Brokers are also pro-actively assessing whether consumers are receiving competitive rates. Survey respondents reported a **0.35% average reduction in interest rates** achieved for customers who are successfully repriced.

In the long term, growth in mortgage broker-arranged loans has helped facilitate a more competitive banking sector. Since the early 1990s, major banks' Net Interest Margins (NIMs) have more than halved, falling by nearly 3 percentage points to below 2%.

Lenders have continued to be profitable by becoming more efficient, using technology, and using the mortgage broker channel to grow the loan market overall. Analysis for this report suggests that, alongside other factors such as digitisation, changes to regulation and wholesale funding, and more players in the market, mortgage brokers have helped to facilitate greater competition.

Economic contribution of the mortgage broking industry

Mortgage and finance broking is a significant industry, contributing **\$4.1 billion in gross value added to the Australian economy each year** and supporting the employment of over 37,349 employees.

The industry directly employed an estimated 31,899 people across Australia at the end of March 2024, and indirectly supports the employment of a further 5,450 workers in other Australian businesses through broking activities.

Unlocking benefits for lenders

The broking industry is helping to realise important benefits for lenders by enabling new players to enter the market, expanding their market reach and connecting them with a broader pool of prospective customers. Brokers also benefit larger lenders by improving their ability to make costs more variable, invest in technology that can be used at scale by brokers and customers alike and improve qualification of applications.

Driving improved outcomes for Australian consumers

A healthy mortgage broking industry drives significant benefits for lenders and consumers by promoting competition between lenders, expanding choice for consumers and providing them with the knowledge and expertise to navigate a complex marketplace.

Mortgage brokers are driving benefits for different consumer segments such as first home buyers and customers in regional areas. Our survey finds 45% of brokers' owner occupier customers are first home buyers, compared to 30% in the overall market. Brokers also make a significant contribution across Australia's regional areas. 1 in 4 mortgages arranged by brokers are for customers located in regional and rural areas, reflective of the national population distribution (27% in regional and remote).

Mortgage brokers help consumers to navigate a complex loan market, delivering important **efficiency and equity benefits for Australian consumers**. This role is more important than ever as cost of living pressures continue to impact consumers.

ECONOMIC CONTRIBUTION OF THE MORTGAGE AND FINANCE BROKING INDUSTRY



Economic contribution

\$4.1 billion in economic activity to the Australian economy in FY23.



Value Added

\$3.3 billion in direct Value Added and **\$800 million** in indirect Value Added.



Total workforce

37,349 jobs supported including 31,899 direct and 5,450 indirect through broking activities.



Driving competition

0.35% average reduction in interest rates achieved for those who are successfully repriced.



Consumer benefits

The growth of mortgage brokers is correlated with reductions in mortgage interest rates for borrowers.

Executive Summary continued

In addition to traditional broking services, brokers provide important education support, spending approximately **11% of their time educating and preparing each customer** for mortgage applications. In doing so, brokers are helping Australians to overcome barriers to access and boost low financial literacy levels, with brokers reporting that 41% of their customers had lower perceived financial literacy. Australia is ranked in the top 10 countries for financial literacy, yet 8.5 million or 45% of adults were estimated to have low financial literacy levels in 2020.⁵

The strong retention of existing customers

demonstrates the valuable role brokers play in serving their clients. Repeat customers (44%) and referrals from customers (28%) are the key leads for generating new business, according to surveyed brokers.

Commercial and asset finance

Residential lending continues to be the core business of most broker portfolios for businesses surveyed, yet the industry has observed trends towards commercial and asset lending.

Commercial lending refers to financial products provided to businesses for purposes such as property acquisition, development, and operational financing. Based on our survey, 13% of brokers are commercial lending focussed, writing 25% or more of their settlements as commercial loans in FY23/24, however this remains an emerging growth areas for the profession.

Extending mortgage broking services to include asset finance and commercial lending provides broader benefits to broker customers across a more diverse range of financing needs. This is particularly noticeable within the Small and Medium Enterprise (SME) segment where there are residential and business financing needs.

Where to next for the industry?

The future of the mortgage and finance industry in Australia is expected to be shaped by evolving customer expectations, technological adoption and regulatory changes.

Mortgage brokers have **experienced rapid change in technological adoption**, with digital platforms such as Artificial Intelligence (AI) and data analytics streamlining processes and enabling brokers to offer more personalised and efficient services. Brokers now conduct **three times more communication on a digital platform** during the broking process since the 2018 report, enabling them to reach a wider customer base. Staying up to date with these trends will be crucial for maintaining a competitive edge.

Economic factors including shifting interest rates, rising cost of living and the impacts of constrained housing supply will continue to impact consumers and drive demand for broker services. Brokers must remain responsive to these changes to effectively meet client needs. A strong commitment to ongoing professional development will be essential to maintaining quality of service, building customer relationships and attracting a strong and diverse pipeline of brokers into the workforce.

By focusing on offering a professional and personalised service, leveraging emerging technologies and keeping step with regulatory changes, mortgage and finance brokers can harness the opportunities ahead and continue to support Australians on their home ownership and business financing journeys.

Deloitte

KEY BENEFITS OF THE MORTGAGE AND FINANCE BROKING INDUSTRY



Consumer benefits

45% of brokers' owner occupier customers are first home buyers, compared to 30% in the market.



Commercial lending

13% of surveyed brokers are commercial lending focussed, writing 25% or more commercial loans.



Lender benefits

Brokers expand lender market reach and help new players to enter the market.



Guiding consumers

In addition to traditional broking services, brokers spend 11% of time educating customers for mortgage applications.



Education and regulation

86% hold qualifications equal to or above a Diploma in Mortgage Broking Management Services.

Introduction+



Introduction

The mortgage and finance broking industry plays a pivotal role in Australia's economy, acting as a crucial link between consumers, businesses and lenders. By facilitating access to residential and commercial products and services, brokers support millions of Australians to secure homes and achieve their financial goals. In doing so, the broking industry makes a significant contribution to economic growth and stability.

A healthy mortgage and finance broking industry drives significant benefits for lenders, consumers and business owners through providing greater transparency, promoting competition between lenders, expanding choice for borrowers and providing them with the knowledge and expertise to navigate an increasingly complex marketplace.

The industry is growing, having reached 22,031 brokers at the end of March 2024.¹ The industry's growth has been driven by a combination of a strong customer value proposition, strong demand for housing and business finance, evolving customer needs and an increasingly competitive financial services sector.

The financial services sector and mortgage and finance broking industry are closely regulated by the Australian Securities and Investment Commission (ASIC) and other regulatory bodies. The industry has experienced significant regulatory changes, including the introduction of the Best Interests Duty in January 2021 which gives statutory recognition to consumer protections and requires brokers to act in the best interests of their consumers when providing credit assistance.

Brokers have responded well to regulatory changes, with 56% of brokers reporting that the changes have improved trust in the sector - **ten times as many as reported a negative impact to their business**.

More recently in March 2022, the Council of Financial Regulators and the Australian Competition and Consumer Commission (ACCC) announced a review into mortgage broker remuneration was no longer required due to a lack of evidence of consumer harm or broker misconduct from the current remuneration structure.

Deloitte has been engaged to produce a report that provides an evidence base about the role of the mortgage and finance broking industry and its value to the Australian economy. This research provides an update and expansion of the previous Value of Mortgage Broking Report, published in 2018.²

This edition explores the impact of current and emerging trends including the rising prominence of Environmental, Social and Governance (ESG) considerations, shifts in technological adoption for consumers and brokers, the changing face of the broker industry and evolving consumer needs in response to challenging economic circumstances.

About this report

The report demonstrates the importance of the mortgage and finance broking industry to the Australian economy and the value of brokers to Australian consumers and small businesses.

This analysis is informed by a range of quantitative and qualitative evidence including:

- Economic Contribution modelling of the contribution of the mortgage and finance broking industry to the economy in terms of Value Added, and employment;
- Analysis of Australian Financial Complaints Authority data;
- Publicly available and industry data on workforce composition;

- Survey and consultation evidence collected on the services mortgage and finance brokers provide;
- Analysis of the relationships between broker market share and net interest margins (recognising that brokers are just one of the forces impacting competition in recent decades).

A bespoke survey was conducted with responses received from a nationally representative sample of 443 individual mortgage brokers and 393 mortgage broking businesses, as well as 7 aggregators and sub-aggregators. Appendix A contains further information related to the survey methodology.

Chapter 3 examines the outcomes and benefits brokers provide to consumers including through their role in improving education and financial literacy, technology adoption and their contribution to sustainability.

Appendices present the survey methodology, further detail on the economic contribution analysis and information on industry participants consulted as part of this work.



The mortgage and finance broking industry in Australia



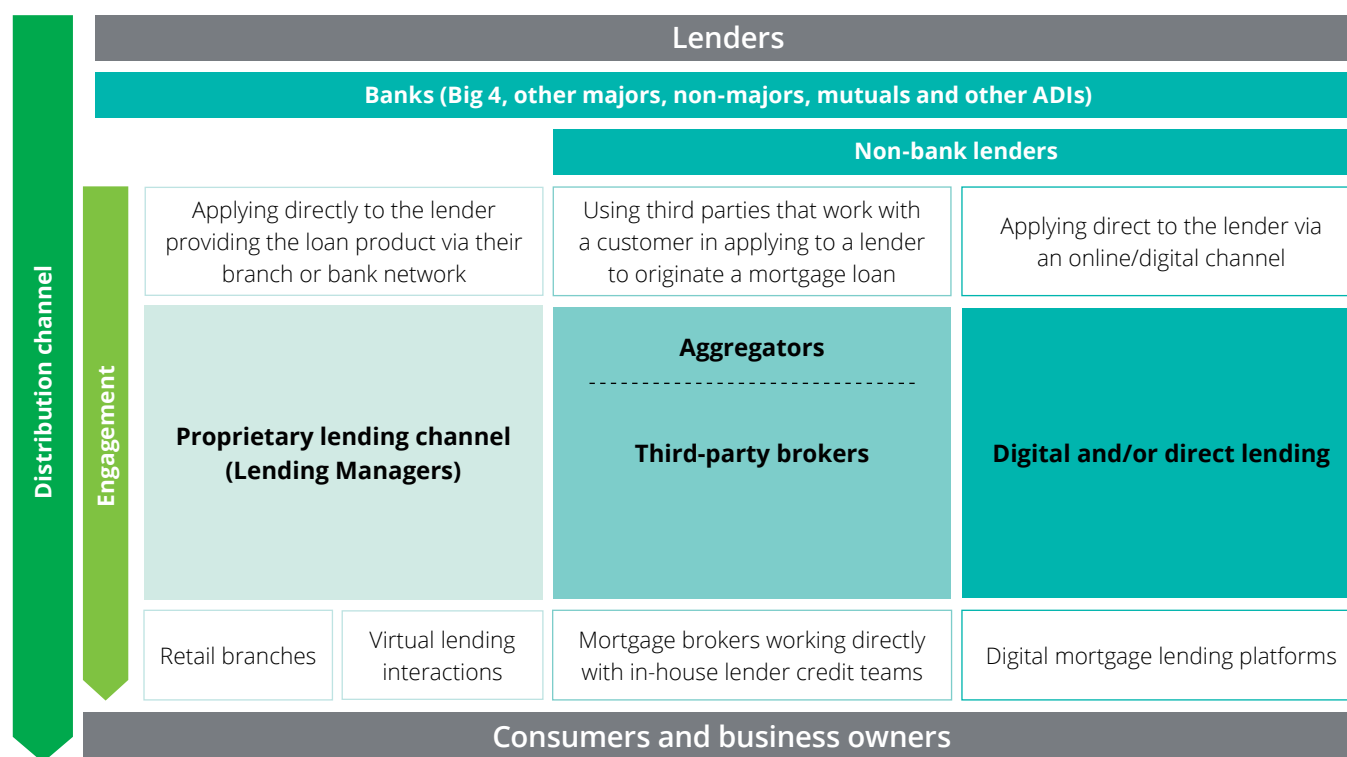
The mortgage broking ecosystem in Australia

Brokers are increasingly playing a larger role in the distribution of credit products to consumers and business owners.

The broking ecosystem

Brokers play a critical role in connecting consumers to a variety of different lenders. Lenders can distribute their products directly to the end borrower or via a broker. The presence of brokers in the Australian lending market has made it possible for new lenders to build presence without the need to establish a retail branch network.

Figure 1.1 Consumer access to lender finance via different channels



Key participants in the broking ecosystem

Lenders provide finance to borrowers seeking to buy a home. The Australian home loan market has a range of active lenders including the four major banks, a mix of mid-tier banks, international banks, credit unions and non-bank lenders.

Lending managers are employed by lenders and sell home loans on behalf of a particular organisation. They only have access to their lender's products.

Mortgage brokers work as sole traders or within multi-broker businesses to facilitate access to residential mortgages and/or other financial services credit products (e.g. asset finance, commercial loans).

Aggregators act as an intermediary between lenders and mortgage brokers and may also hold an Australian Credit License (ACL) under which mortgage brokers can seek authorisation as credit representatives.

Other notable participants

Referrers are individuals or businesses that collect details of consumers and refer them to brokerage businesses or to lenders. Unlike brokers, referrers are unlicensed so cannot provide credit services to consumers or assist them in applying for a loan.

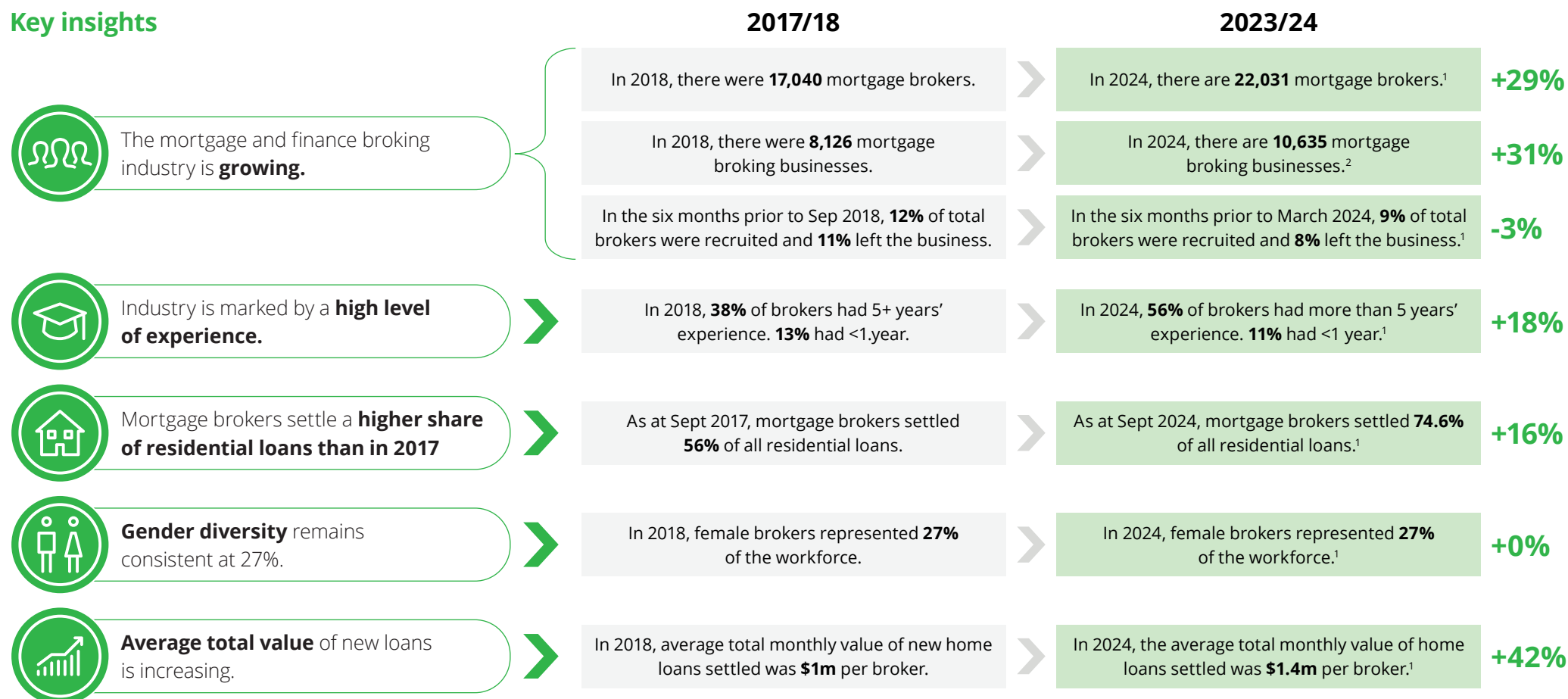
Comparison websites contain information on loan interest rates and product attributes to generate sales for lenders. Website owners are remunerated by lenders based on the number of click-throughs by consumers to the lender's website.

Evolution of the mortgage and finance broking workforce in Australia

Finance and mortgage brokerages have undergone significant change over the last seven years driven by regulatory changes, technological advancement and shifts in consumer expectations.

Our analysis of industry and publicly available data highlights changes in the industry workforce over the past seven years:

Key insights



¹ Of responding brokers, according to latest IIS data (2024)

² According to latest IbisWorld data

Evolution of the mortgage and finance broking industry in Australia

Finance and mortgage brokers have changed in terms of their growing role and increasing professionalisation.

Role of mortgage and finance brokers

Mortgage and finance brokers help lenders without physical retail branches and help lending markets operate more efficiently. They act as intermediaries to provide consumers and businesses with information and assist them to apply for credit products. For lenders, brokers provide an additional channel to consumers and businesses, allowing less established lenders to reach new customer segments.

Brokers who deal predominantly in commercial finance and asset finance are referred to as commercial and asset finance brokers.

Mortgage brokers provide their credit services to customers under the National Consumer Credit Protection Act 2009 (National Credit Act). This Act regulates the activities of institutions that engage in credit activities, including providing credit assistance to consumers and acting as an intermediary.

Mortgage brokers can hold their own credit licence or be authorised as a representative of another's credit licence, often their aggregator. All mortgage brokers must go through competence assessments and periodic conduct reviews.



Commercial finance brokers help clients secure commercial and asset finance solutions tailored to the needs of small businesses and consumers.



Mortgage brokers help clients secure consumer credit, predominantly home loans.

Education and standards

Broker education and training

Mortgage brokers that engage in lending regulated by the National Credit Act must have, as a minimum, a Certificate IV in Finance and Mortgage Broking.⁴ Industry bodies such as the MFAA also require mortgage brokers to have a Diploma in Finance and Mortgage Broking Management.

By statutory requirement, mortgage brokers are required to spend a minimum of 20 hours per year in continuing professional development (CPD) activities. The MFAA also requires a minimum of 30 hours.⁵ As part of accreditation processes, many lenders and aggregators also require membership of an industry body.

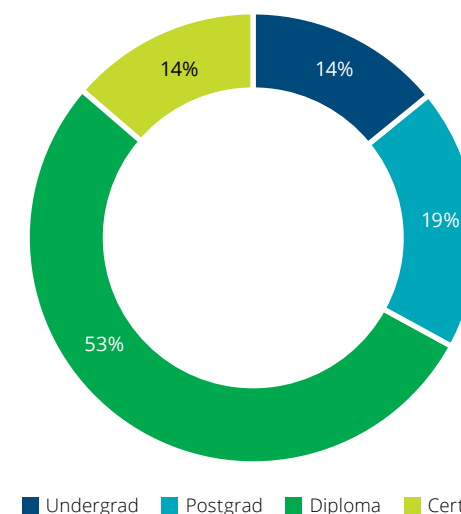
For commercial brokers, requirements are generally more specific to the skillset required to deal with commercial customer needs. Often this requires direct commercial lender accreditation and/or aggregator group specific training for such brokers. Many are members of the industry association Commercial and Asset Finance Brokers Association (CAFBA).

Most brokers have a diploma as their highest qualification (53%), however our survey found that 86% of brokers hold qualifications equal to or above a diploma in Mortgage Broking Management Services, as shown in Chart 1.1. Within this cohort, over one third of responding brokers held an Undergraduate or a Postgraduate degree qualification, meaning brokers represent a highly qualified industry.

Key insights:

- **86% of surveyed brokers hold qualifications equal to or above a Diploma** in Mortgage Broking Management Services. One third of brokers hold an Undergraduate or Postgraduate degree (33%).

Chart 1.1: Share of brokers with the following as their highest qualification



Note: Cert IV and Diploma refer to qualifications in Finance and Mortgage Broking Management

Source: Deloitte Broker Survey

Broker remuneration and business models

Mortgage broker remuneration is aligned with securing of finance for their customers.

A commission-based model

Mortgage brokers are remunerated by lenders once a customer has their finance needs fulfilled and a loan is entered into. The broker remuneration model comprises three key components:

- an **upfront commission** – which is a percentage of the drawn loan amount and net of any offset account, paid to the broker (via their aggregator) at the time of settlement;
- a **trail commission** – an ongoing payment calculated as a percentage of the outstanding drawn loan balance monthly over the life of loan (or shorter if stipulated by the lender); and
- **clawback provisions** – which allow lenders to reclaim part or all of the upfront commission if the loan is repaid, refinanced, or discharged within a specified period, typically up to two years.

Whilst the Banking Royal Commission also recommended changes to mortgage broker remuneration - specifically shifting from lender-paid commissions to a consumer-pays model, this proposal was not implemented due to concerns that it could reduce competition in the lending market and limit borrower choice.

A proposed review by the Council of Financial Regulators and the Australian Competition and Consumer Commission into broker remuneration was subsequently cancelled, with the Federal Government citing sufficient progress in addressing conflicts of interest through existing reforms, such as the introduction of the Best Interests Duty and to a lack of evidence of broker misconduct and consumer harm from the current remuneration structure.⁶

Broker incomes

Analysis of our bespoke broker survey identified the following key dimensions and facts about broker remuneration:

- Within our survey sample, sole trading brokers had an average revenue (before business expenses), of \$182,040 after weighting for experience.
- This represents 11.5% growth in real terms on levels reported in the 2018 report- increasing from \$163,200, when adjusted for inflation.

More experienced brokers, who tend to have higher revenues, were overrepresented in the survey, with 77% of surveyed brokers having 5 or more years experience compared to 56% overall. Just 5% of respondents had fewer than 2 years, compared to 15% overall. We have normalized for this in our average revenue calculation above.

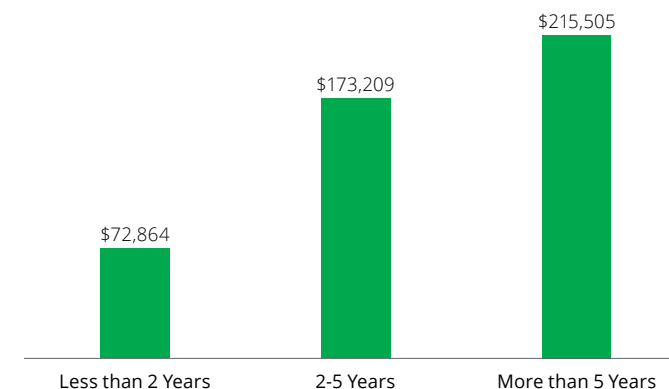
For the period April 2023 to September 2023, the MFAA estimates that average gross annual commission (prior to costs) is around \$192,354.⁷ Out of these gross commission figures, brokers pay fixed costs for their business including premises, service fees paid to aggregators, marketing and communications expenses, support staff salaries and wages, and other costs.

Increases in broker remuneration can be associated with increases in the national average dwelling price and the average value of owner occupier loans, as well as productivity improvements.

Key insights:

- Average revenue (before expenses) for sole traders in our survey with two to five years of experience is **\$173,209**,
- For surveyed brokers with more than five years experience, the average revenue before expenses is **\$215,505**.
- This is consistent with average income reported in Industry Intelligence Survey 17.

Chart 1.2: Average revenue (before expenses), by broker experience



Source: Deloitte Broker Survey (2024)

Growth of the mortgage and finance broking industry in Australia

Mortgage and finance brokers are responding to meet the evolving needs of clients and the dynamic financial landscape.

Industry snapshot



22,031 mortgage brokers in 2024



56% of brokers have 5+ years' experience



27% of brokers are female



2 brokers per average business

Growth of mortgage broking

The role of mortgage brokers are continuing to evolve in response to customer needs. Initially, brokers provided price comparison services and prepared applications for loans. Now, brokers are increasingly investing in upfront education of consumers, helping them to navigate lending policy and requirements, as well as ongoing optimisation based on changing customer needs.

Shifting first and third-party channels – Together with larger banks reducing their proprietary channel footprints, particularly in regional areas, brokers provide a critical service to enable lending choice for these customers. Brokers provide smaller and specialised lenders the ability to meet specific customer needs that would be a struggle to do so directly.

Mortgage brokers now account for 75% of all residential loans written in Australia, up 18 percentage points from 2017.⁸ Mortgage brokers arranged an estimated \$353 billion of new residential home loans in Australia for the year to March 2024.⁹

Brokers are adapting to new regulations, embracing digital tools, expanding their services, facing increased competition, and pursuing more personalised guidance and product recommendations to better serve the best interests of their customers.

Changing face of the broker workforce

As the role of an Australian broker has evolved, so to has its workforce. The industry has reached new heights with 22,031 brokers in 2024, following strong growth in both the share of loans written by brokers and recruitment into the industry.¹⁰

This report analyses both the shape and composition of the industry:

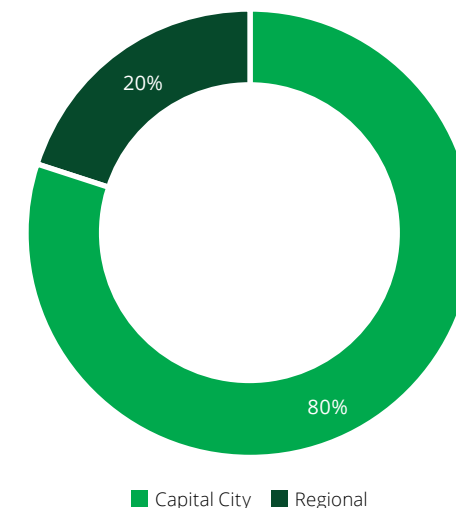
- **Growth of brokers across regions** – One fifth (20%) of brokers are located now outside of Australian capital cities (Chart 1.3).
- **Gender diversity has remained low with 27% of brokers being women, the same level as in 2017.** Efforts to improve gender diversity are ongoing. When contextualised against the broader finance industry, the broker workforce performs similarly.

Our survey asked brokers which strategies they believe are the most effective for promoting increased diversity and inclusion in the industry. Brokers selected training, mentorship and leadership development programs first and foremost (24%), followed by remote working options (23%) and flexible working (15%). The MFAA acknowledges the need to improve workforce diversity and continues to advocate and champion strategies for Diversity, Equity and Inclusion.

Key insights:

- One fifth (20%) of brokers are located **outside of capital cities**, slightly lower than the proportion of Australia's population that live in regional areas (26%)
- Gender diversity remains low with mortgage brokers identifying **training, mentorship and leadership development programs** as the most effective strategy to promote diversity and inclusion in the industry.

Chart 1.3: Location of Brokers



Source: Deloitte Broker Survey (2024)

Regulatory reform context

Regulatory reform was codified by legislation introduced following the Banking Royal Commission.

The regulatory environment prior to this report is highlighted in the 2018 report. This section discusses key regulatory updates in the period since the previous report.

Regulatory reform context

Mortgage brokers in Australia operate within a stringent regulatory environment designed to ensure customer protection and market integrity. Brokers are required to adhere to ongoing compliance requirements, responsible lending obligations, training standards and report any breaches to ASIC. This is particularly the case following the Royal Commission into the Banking, Superannuation and Financial Services industry in 2017 (Banking Royal Commission), which identified compliance issues resulting in poor customer outcomes across the financial services sector.

In 2017, the Combined Industry Forum (CIF) implemented key self-regulatory reform initiatives in response to the ASIC Report 516 Review of Mortgage Broker Remuneration to improve customer outcomes, reduce conflicts of interest, and strengthen governance within the mortgage broking industry.

These initiatives included changing the commission structure to "net of offset" or utilisation-based payments and banning volume-based and campaign-based incentive payments. The CIF addressed soft dollar benefits and volume-based incentives, recommending education-focused conferences and restricting entertainment benefits.

Further reforms included clearer disclosure of ownership structures, introducing a public reporting regime on customer outcomes and competition, and enhancing governance frameworks with regular reviews, broker monitoring, and customer feedback mechanisms.

The majority of these self-regulatory initiatives were codified by legislation introduced as a result of the Banking Royal Commission, as set out in Table 1.1 and below.



Design and distribution obligation rules intended to help consumers obtain appropriate financial products by requiring issuers and distributors to have a consumer-centric approach to designing and distributing products,¹¹ noting that only record keeping and notification obligations will apply to mortgage brokers.¹²



Established role of industry bodies through existing association codes of practice and membership requirements relating to learning and development.



Changes to Consumer Data Right (CDR) saw mortgage brokers listed as 'trusted advisers,' enhancing data access for brokers, while providing customers with improved, personalised advice and greater data control.



The expansion of the reference checking protocol now allows mortgage aggregators to share references about brokers, enhancing due diligence.



Establishment of ASIC's **Regulatory Guide 271: Internal Dispute Resolution (IDR)** outlines mandatory reporting requirements for brokers and aggregators to submit bi-annual complaints data to ASIC, including information on volumes, types, resolution timeframes, and outcomes.

Table 1.1: Key reforms codified by the Banking Royal Commission

Key reform	Description
Best Interests Duty (BID) and Conflict Priority Rule	Brokers must act in the best interests of their clients and in the case of a conflict prioritise the interests of their clients over their own.
Net of Offset Commission Structure	Upfront commissions are based on the drawn-down loan amount, net of offset balances, to discourage brokers from recommending unnecessarily large loans.
Clawback Provisions	Brokers are prohibited from passing clawback costs to customers, holding brokers accountable for loans repaid or refinanced within a set period.
Ban on Volume-Based and Campaign-Based Payments	Volume-based bonuses and campaign incentives were eliminated to reduce conflicts of interest and ensure brokers focus on achieving good customer outcomes.
Restrictions on Soft Dollar Benefits	Educational and business-focused requirements for conferences, hospitality, and gifts were introduced, along with caps on entertainment and benefit values, to minimise undue influence.
Reference Checking Protocol	A formal reference checking system was introduced for mortgage brokers, requiring licensees to share key information about broker conduct to prevent individuals with poor records from moving unchecked within the industry.

Source: The MFAA (2024)

Regulatory reform context

Regulatory reforms over the last 6 years have assisted in maintaining strong protections for consumers.

What does this mean for consumers?

- **Improved service quality** with a focus on ensuring customers' needs are prioritised.
- **Consumer confidence.** Changes to conflicted remuneration mean greater confidence that brokers are providing unbiased assistance, free from incentives that may compromise the quality or suitability of products.
- **Data shared more easily.** For customers, the Consumer Data Right means greater control over their financial information, enabling them to securely share data with brokers as trusted advisers for more personalised services.

What does this mean for brokers?

- **Obligation to consumers.** Brokers have a legal obligation to act in the best interests of the customer. This is a powerful marketing vehicle and customer value proposition as best interests duty applies to brokers, and not banks or lenders.
- **Reinforced commission-based remuneration model,** having removed volume bonus and 'soft dollar' payments to address risks associated with conflicts of interest.
- **Increased compliance costs.** Evidence of compliance with the best interests obligations will come mainly from broker records.¹⁰ Brokers are required to report breaches to ASIC.
- **Changing business models** to be able to meet ongoing professionalism and compliance requirements, encouraging more broking businesses rather than sole practitioners and encouraging greater leveraging of data and technology.
- **Industry professionalisation.** There has been a push to improve the professional standards and education requirements within the industry, with most aggregators and lenders requiring association with MFAA, FBAA or CAFBA.

The impact on brokers

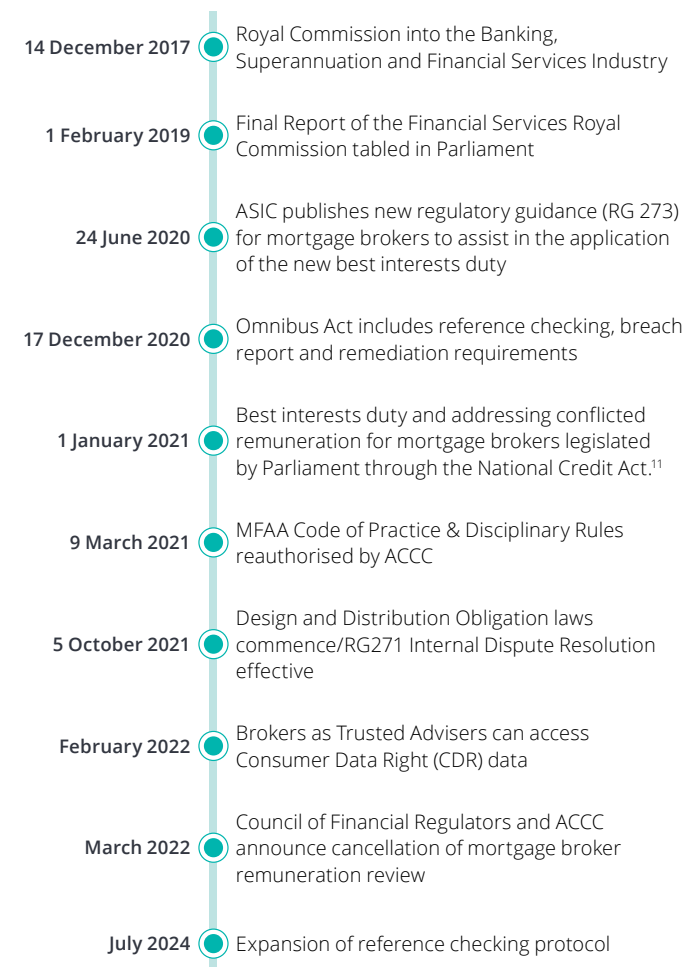
The industry is responding well to regulatory changes, supporting a better broking industry. Our survey found the Best Interests Duty has improved trust and quality in the industry, without harming financial performance or workload (Chart 1.4).

Chart 1.4: Impact of regulatory changes on brokers' businesses



Source: Deloitte Broker Survey (2024)

Figure 1.2: Key regulatory changes for mortgage brokers since 2017



Source: Deloitte (2024)

Contribution to the Australian economy



Economic contribution of the mortgage and finance broking industry

The mortgage and finance broking industry makes a substantial contribution to the Australian economy.

Contribution to the Australian economy

The mortgage broking industry contributed an estimated \$4.1 billion to the Australian economy in 2023/24 and supported the employment of 37,349 workers.

This includes **\$3.3 billion** in direct Gross Value Added (GVA) and 31,899 employees in direct employment, including brokers and support staff. The mortgage broking industry indirectly supported Australian businesses in other industries in the economy, contributing **\$801 million** in indirect Gross Value Added and employing **5,450 workers**, as shown in Table 2.1.

This section summarises the results of the economic contribution analysis, with detailed methodology presented in Appendix C.

What does this mean for brokers?

The direct economic contribution of mortgage broking comprises of the wages (the income earned by individual brokers and support staff) and profits (gross operating surplus (GOS)) of mortgage broking businesses, plus taxes. To calculate the direct economic contribution of the mortgage broking industry, we made the following assumptions:

- Revenue per broker (prior to costs) across the industry is equal to \$192,000, as per the MFAA IIS data (17th Edition).¹
- The shares of revenue allocated to wages, non-wage costs and profits reported in our survey are representative of the entire industry;
- The ratio of FTE support staff to FTE brokers is 0.44 to 1.

Based on our survey and latest IIS data, direct employment in the mortgage and finance broking industry is estimated to be 31,899. This includes 22,031 brokers (8,963 sole traders and 13,068 brokers working in a business) and 9,868 support staff.

The **direct economic contribution** of the mortgage broking industry in 2023-24 is estimated to be \$3.3 billion.

Indirect economic contribution

The indirect economic contribution of mortgage broking is the economic activity and jobs created in service industries supplying inputs to the mortgage broking industry.

The **indirect economic contribution** of the mortgage broking industry is estimated to be \$801 million in Gross Value Added and 5,450 indirect jobs supported in the broader supply chain.

Our estimates assume:

- the structure of broking businesses' non-wage costs in our survey is representative of all mortgage broking businesses;
- Expenditure by mortgage brokers is spent as per the ABS IO industry 'Auxiliary Finance and Insurance Services'.²

Chart 2.2 on the following page shows the share of expenditures of this industry as per the ABS I-O table (2021-22). Share of expenditures data provides valuable insights into the flow-on industries which are supported by the mortgage and finance industry, through the purchase of goods and services.

What is economic contribution?

The economic contribution of the mortgage broking industry is measured in terms of the gross value added (GVA) to the economy and the number of workers the industry employs. GVA is the difference between the value of the inputs (i.e. labour, capital) into the mortgage broking industry and the value of the outputs (i.e. the services they provide). The sum of GVA across all entities in the economy equals gross domestic product (GDP).

Table 2.1: Total economic contribution of the mortgage broking industry, 2023-24

	Direct	Indirect	Total 2023/24	Total 2016/17*
Gross Value Added (\$m) (GVA)	\$3,304	\$801	\$4,104	\$3,472
Employment	31,899	5,450	37,349	27,144

* 2024 dollars.

Source: Deloitte Broker Survey, ABS IO tables 2021-22, IIS (2024)

Economic contribution of the broking industry

The broking industry makes a substantial contribution to the Australian economy.

Total contribution

The total annual economic contribution of the mortgage broking industry is \$4.1 billion in Gross Value Added, with \$3.3 billion of this is being direct Value Added. The industry supported 37,349 total jobs in 2023-24 including direct employees such as aggregators, sole traders, brokers working in a business and support staff, as well as indirect jobs supported through broking activities.

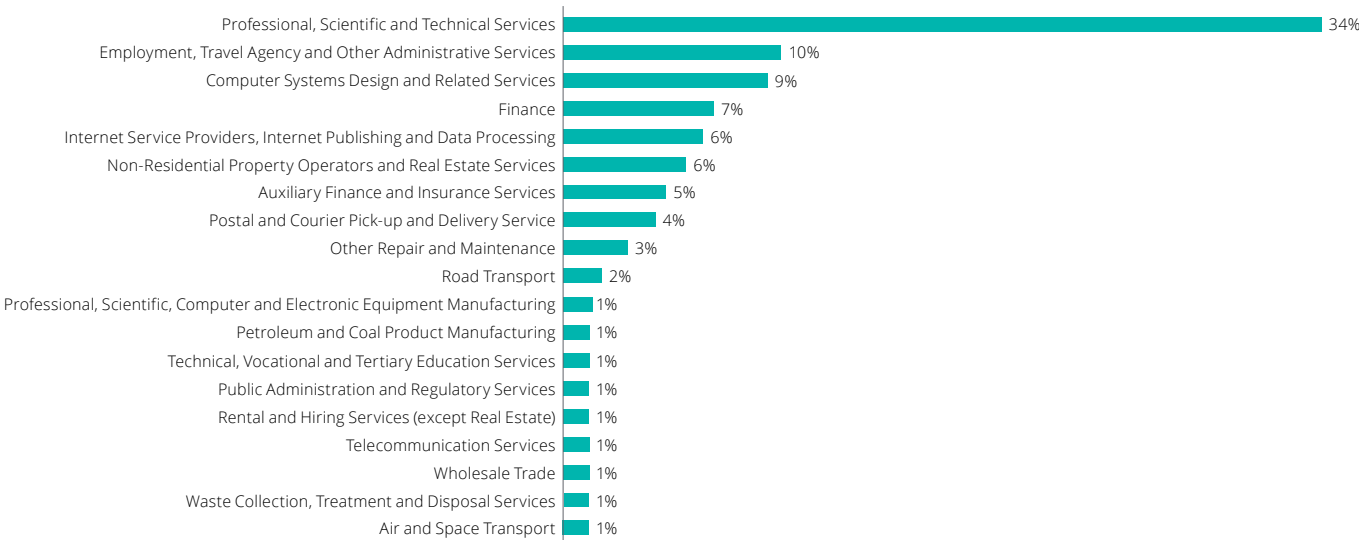
This represents an 18% increase in total contribution since 2016-17, when adjusted for inflation. This can be attributed partially to workforce growth, expanding market share and loan values.

Broader social benefits

The mortgage and finance broking industry also generates substantial social benefits beyond its quantified economic contribution. The industry creates high-value job opportunities in rural and remote communities across Australia, as well as supporting increased home ownership for first time buyers or other vulnerable consumer segments.³ Many brokers also have social responsibility strategies in place to give back to their respective communities.

Brokers work with their customers to enhance their financial literacy levels and improve understanding of the consumer credit and mortgage market, protecting vulnerable customers against the risk of fraud. These benefits are discussed further in Section 3.

Chart 2.2: Share of goods and services purchased by the Auxiliary Finance and Insurance Service industry, 2021-22.



Source: ABS Input-Output tables, 2021-22, Deloitte analysis (2024)

KEY FIGURES FOR THE ECONOMIC CONTRIBUTION OF THE BROKING SECTOR



Economic contribution

\$4.1 billion in economic activity to the Australian economy in FY23.



Direct contribution

\$3.3 billion in direct contribution to the Australian economy.



Indirect contribution

\$801 million in indirect contribution supported through broking activities.



Workforce

37,349 total jobs supported in 2024 including **31,899** direct employees (brokers and support staff) and **5,450** indirect jobs.

Consumer value proposition



Value proposition for consumers

Brokers are delivering value to consumers in the face of evolving customer needs and challenging economic circumstances

Evolving customer needs

Customers are increasingly seeking out more personalised financial solutions, driven by a desire for tailored mortgage products. There is a strong preference for digital convenience, personalised service, coupled with clear communication about loan terms and fees. Customers expect brokers to act in their interests, provide proactive guidance and offer ongoing support to ensure mortgages remain competitive.

Navigating challenging economic times

In the past several years, challenging economic circumstances have put pressure on household incomes and driven increased demand for brokers' expertise. With fluctuating interest rates, mortgage stress, stricter lending criteria and heightened market uncertainty, brokers are now more crucial than ever in guiding clients through complex financial decisions. In response to these challenges, brokers have adapted to help clients navigate refinancing options and manage financial risks.

Key outcomes for consumers

Strong retention of existing customers: Most brokers receive the bulk of their business through repeat customers and referrals. Consumers that use mortgage brokers value the personal relationships and support offered throughout the life of the loan.

Our survey finds **72% of a broker's business comes from existing customers or referrals** from a customer, demonstrating high levels of customer satisfaction (Chart 3.1).

Brokers are simplifying a complex marketplace and improving consumer choice. By leveraging their expertise and understanding of individual needs, mortgage brokers provide clients with tailored advice to guide them in identifying the best solution for them.

Mortgage brokers reduce the time, effort and resources involved in finding the right loan for customers by helping them compare deals across lenders. This is especially valuable for time-poor clients, helping them navigate the complexities of expanded choices. Brokers play a crucial role in educating clients on the process, empowering them to make informed financial decisions. Brokers present three options on average to each customer.

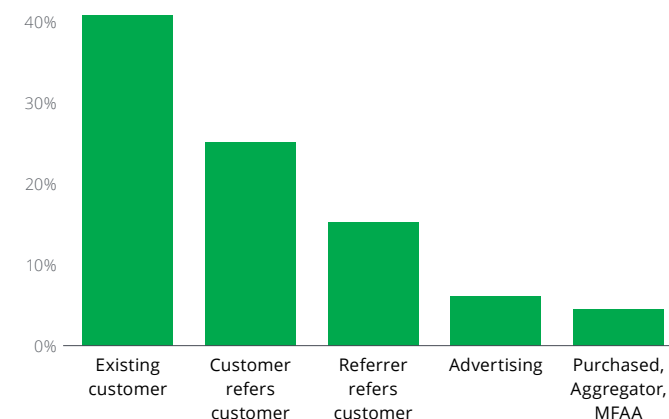
Mortgage brokers provide access to a wider range of products across multiple lenders, ensuring that the clients view the most competitive options for their circumstances. In 2023-24, surveyed mortgage brokers reported that, on average, they are accredited with 23 different lenders through their aggregator and settled loans with 8 different lenders. Beyond this, brokers can access up to 65 lenders through their aggregator panels.¹ Aggregators are the key source of brokers' relationships with lenders. While most brokers are not accredited with lenders outside their aggregator panel, off panel relationships can exist.

Brokers are pro-actively assessing whether consumers are receiving the best rates. Brokers have an informed understanding of the level of competition between lenders and are thus able to provide guidance on better deals available in the market. Survey respondents reported a 0.35% average reduction in interest rates achieved for customers who successfully repriced.

Key insights:

- Strong retention of existing customers and referrals from existing customers demonstrates the ongoing value customers associate with their broker relationships.

Chart 3.1: Repeat customers and referrals from customers are the most common sources of leads for brokers



Source: Deloitte Broker Survey (2024)

Value proposition for consumers

Rapid technological adoption is enabling increased broker efficiency and driving improved consumer outcomes.

Technology as a key industry enabler

Mortgage brokers have experienced rapid change in technological adoption. Brokers are now able to offer faster, more efficient services, providing customers with quicker access to tailored mortgage options. Digital platforms have streamlined loan applications and increased competition, while consumer demand for personalised services has led brokers to diversify offerings.

The top tools currently being used by brokers are typically admin-focused technologies, including digital signing services (84% of brokers), CRM (77%) and cybersecurity (70%). Brokers are planning to implement more advanced technologies in the future, with Open Banking/Consumer Data Right being the most planned for technology (34% of brokers). Generative AI (32%) and mobile apps (31%) were also heavily planned for.

Brokers report that new technologies have sped up the borrowing capacity assessment and client identification stages of the broking process the most (Chart 3.2). These stages typically require manual effort, so technologies such as digital identification verification **reduce application processing times and increase accuracy.**

In another example, CRM software streamlines the broking process by automating and organising customer data into one central place, allowing brokers to more efficiently manage clients and enhance their service offerings.

By reducing the time needed for administrative tasks, brokers can spend more time providing **personalised support** to improve the customer experience.

Generative AI has also been leveraged by brokers to record client meetings, generate marketing, and to assist with client communications.

Mortgage brokers are increasingly using multiple digital communication channels to provide their services, enabling them to reach a wider customer base than previously before. Brokers conduct **three times more communication on a digital platform** than face to face during the broking process.

Digitising the broking process particularly benefits regional and rural customers, as it allows brokers to offer more accessible and timely support, regardless of location.

Future of technology

The broking industry will likely continue to embrace technology as a way to create a more efficient and customer-centric mortgage broking experiences

Brokers have indicated that opportunities for more digital information sharing to allow for consistency in data access between brokers and lenders will assist with offering faster, more accurate loan solutions to customers.

Brokers must remain responsive to changes in technological adoption to remain competitive and effectively meet client needs. A strong commitment to ongoing professional development and digitisation will be essential for maintaining quality of service and strong customer relationships.

Chart 3.2: Areas of broking process most impacted by technology

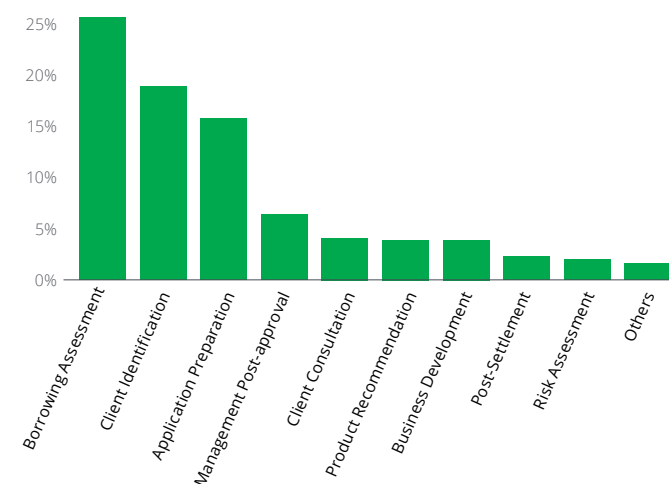
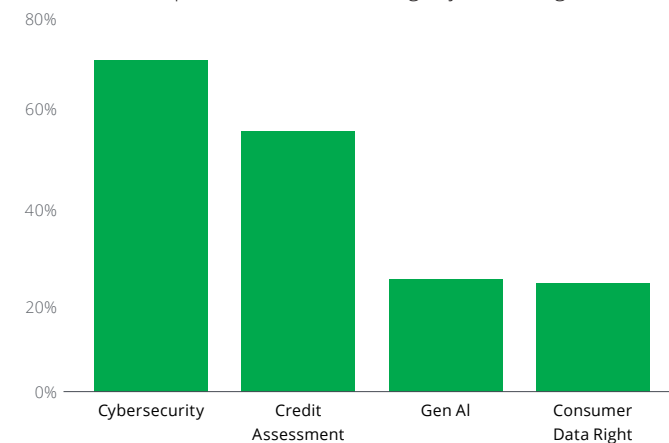


Chart 3.3: Proportion of brokers using key technologies



Source: Deloitte Broker Survey (2024)

Value proposition for consumers

Brokers play a critical role in educating consumers and enabling access to finance

Supporting improved financial literacy

Mortgage brokers play a valuable role in helping consumers to navigate a complex loan market.

Customers benefit significantly from the additional support and education provided by brokers, helping them to navigate financial decisions more effectively. Mortgage brokers tailor processes to equip customers with a better understanding of the home buying process.

Brokers are investing more time upfront educating consumers and seeing efficiencies in the latter stages of managing process to settlement and post settlement contact. In addition to traditional broking services, surveyed brokers reporting spending 11% of their time educating and preparing each customer for mortgage applications, empowering them to make more informed and confident financial decisions long term. One third of broker time is spent on assisting a client before they commit to finding a loan (Chart 3.4).

In facilitating greater home ownership, brokers help to achieve a higher standard of living across a wide range of communities.

Increased home ownership has been linked to social benefits, including mental and physical health outcomes, stronger family cohesion, and increased civic engagement.² Many of these benefits have positive spillover effects in Australian neighbourhoods.³

Reducing access barriers

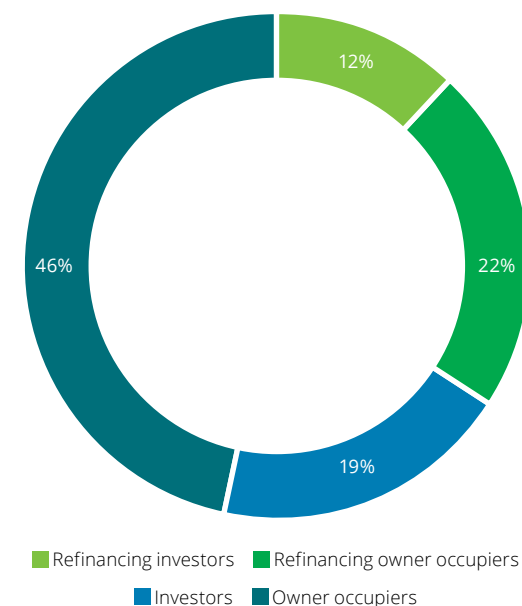
Mortgage brokers help **reduce barriers to entry for customers** that face unique challenges in accessing the housing market, such as first home buyers, regional customers or customers with unconventional lending history. Many have affordability concerns in a competitive market and are less able to access finance alone.

First home buyers represent 45% of mortgage brokers' owner occupier clients (Chart 3.5), compared to 30% in the overall market. As property prices rise, mortgage brokers provide guidance on available grants and loan options to help them with securing a loan.

Regional customers can face similar housing affordability challenges, coupled with fewer bank branches, meaning limited lender choice. Mortgage brokers help to increase access to a greater range of mortgage products. **More than 1 in 4** mortgages arranged by brokers are for customers in regional and rural areas (26%).

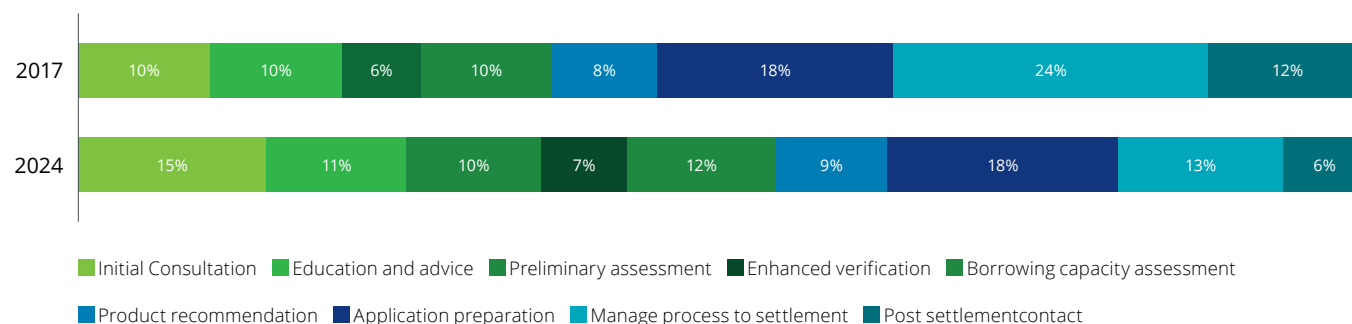
For these consumer segments, brokers offer access to an expanded lender panel for the most appropriate option, and work to expedite mortgage approval within tight timeframes.

Chart 3.5: Breakdown of customer base



Source: Deloitte Broker Survey (2024)

Chart 3.4: Share of time spent on each stage of the broking process, 2017 vs 2024



Source: Deloitte Broker Survey (2024)

Brokers are receiving low levels of complaints

Brokers attract a small number of complaints in proportion to banking and finance, indicating a higher quality of customer experience and greater value delivered to consumers.

Delivering customer satisfaction

Brokers historically have attracted a small number of external dispute resolution (EDR) complaints and despite the growing role of brokers in the lending market, the number of complaints has experienced a steady decline. This suggests broker customers are having a more positive experience compared to customers seeking mortgages through other channels.

Data from EDR body, Australia Financial Complaints Authority (AFCA), suggest changes since the Banking Royal Commission may be improving customer satisfaction for broker businesses. The number of complaints regarding mortgage businesses and brokers shows a reduction in total complaints and proportion of AFCA complaints overall since the Banking Royal Commission.

Chart 3.6 shows the number of complaints from FY20 to FY24 received against mortgage brokers and aggregators (likely reflecting complaints against brokers who operate as credit representatives under aggregator ACLs) is trending downwards. Despite the continued increase in home loans facilitated by brokers, complaints against mortgage brokers and aggregators continue to represent less than 1% of banking and finance complaints.

Complaints against mortgage broking businesses have reduced on average faster than all banking and finance businesses combined. Notwithstanding year-on-year volatility, total complaints relating to mortgage broking businesses dropped 19% between FY20 and FY23. In the period, overall total complaints dropped by 4%.⁴

Key insights:



Customers coming through third party channel are having a positive experience. In FY24, mortgage brokers attracted **less than 4 complaints per 1,000 brokers**.



Mortgage brokers and aggregators consistently represent **less than 1%** of all complaints relating to banking and finance, every year from FY20 to FY24 inclusive.



From FY20 to FY24 **total complaints about mortgage brokers and aggregators reduced by 40%**, recognising the small sample sizes for comparison purposes (Chart 3.6). Over the same period, complaints regarding banks fell 2%.



Complaints regarding housing finance across institutions have **decreased**, from 24% of all banking and finance complaints in FY20 to 19% of complaints in FY23 (Chart 3.7).



Over the same period, the number of complaints relating to banking and finance more generally have fallen by 5% (Chart 3.7).

Chart 3.6: AFCA complaints for brokers and aggregators by FY

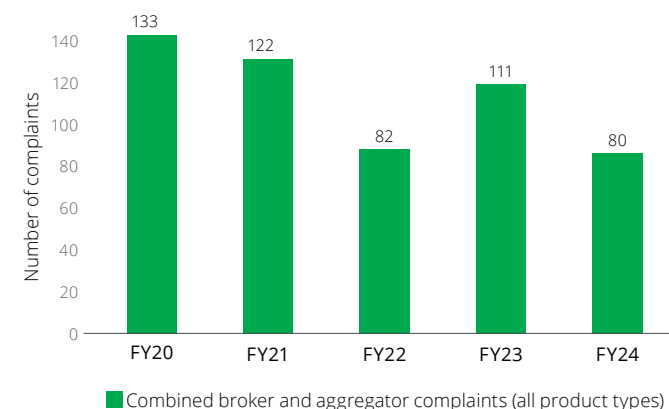
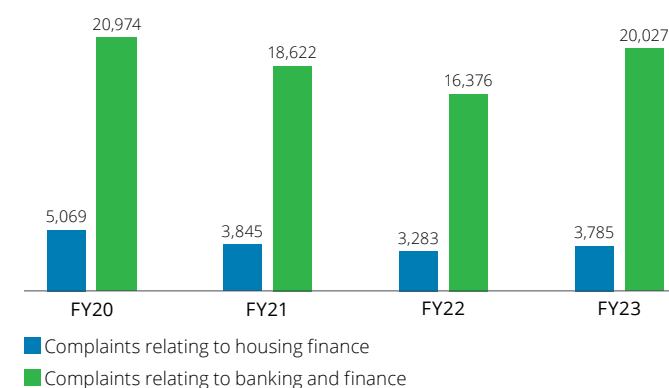


Chart 3.7: Total AFCA complaints for banking and finance entities by FY



Source: AFCA (2024)

Contribution to sustainability

Brokers are linking customers to sustainable lenders and/or finance products that align with their values.

Contribution to sustainability

Recent years have seen strong growth in consumer interest in Environmental, Social and Governance (ESG) factors, demonstrated by a rapid increase in the number of Google searches for ESG (Chart 3.8). ESG is an investing principle that considers the broader impacts of an investment on the environment and social outcomes as well as its financial performance. For example, many investors choose not to invest in fossil fuels or weapons companies.

The rise of ESG is impacting the mortgage market as well, with some borrowers choosing to use lenders that align with their personal values. Aiming to attract these borrowers, many lenders make sustainability and social responsibility a central component of their advertising campaigns and branding.

Chart 3.8: Google Searches related to ESG, 2004-2024. 2023=100



Source: Google Trends (2024)

With many sources of ESG information, brokers play a key role in ensuring that their customers are well informed and able to access a loan from a lender that meets their standards.

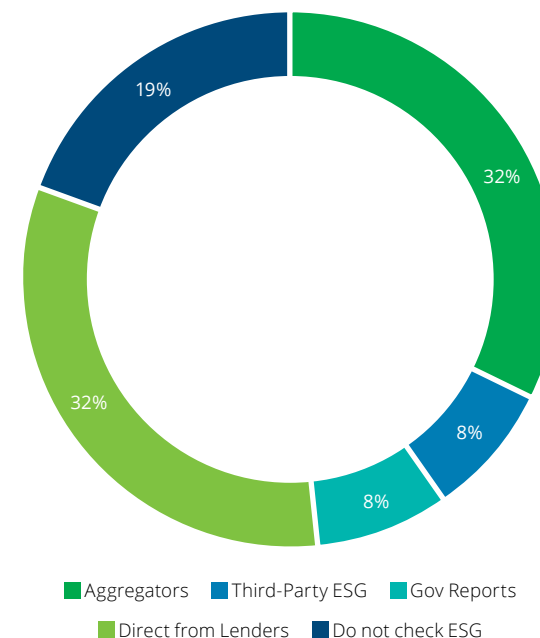
Brokers leverage their relationships with lenders and aggregators to gather information about ESG performance- with **32% of brokers nominating these as their main sources of ESG information (Chart 3.9)**. A further 8% used each of government reports and third-party ESG analytics services. Only 19% of brokers reported never checking ESG performance.

The broker survey revealed that ESG remains a small consideration for most customers, with **just 3.5% of customers asking their broker about potential lenders' ESG performance**. While this is a relatively small share of the total market, the large size of the Australian mortgage market means that ESG-concerned customers represent more than \$600 million of borrowing each month.

For some brokers, ESG-concerned customers are a significantly greater part of their customer base, with **20% of brokers reporting more than 5% of their clients asked about ESG** and 5% of brokers reporting more than 20%.

As sustainability and social responsibility continue to grow in prominence in the finance industry, brokers will play an important role in simplifying complex information and educating customers. Australian mortgage products that are linked to key sustainability goals may be in high demand over the coming years as consumers seek to align their financial decisions with their values. **Green loans** are an emerging focus, offering consumers with financing options for upgrades to make homes more energy-efficient.⁵

Chart 3.9: Aggregators and lenders are the most common sources of ESG information for brokers



Source: Deloitte Broker Survey (2024)

Lender value proposition



Lender value proposition

Brokers offer lenders support in distribution of their products, educating and qualifying customers and broadening market reach.

Brand Presence

In Australia, there are a **total of 138 Authorised Deposit-Taking Institutions (ADIs)**, comprising of 98 banks and 40 credit unions and building societies.¹ There are also many more non-ADI financial institutions in Australia.² The big 4 banks (CBA, NAB, ANZ, Westpac) and other major lenders (such as Macquarie) are well known due to their market share, however, often smaller lenders are lesser known and not necessarily household names. This presents a gap in public awareness and knowledge of these smaller lenders by the general public.

Per chart 4.1, **brokers, on average, are accredited with 23 lenders through their aggregator.** Without brokers, customers could face reduced choice as they are likely to have less ability to directly access such a range of lenders. They may also be unaware of alternative lenders or lack the confidence to trust them.

Brokers play a crucial role in providing a fair playing field for smaller lenders and supporting their sustainability and growth by improving their awareness with customers. While brokers are accredited with the big 4 banks, the average surveyed broker is accredited with 19 other lenders.

Chart 4.1: Average Broker Lender Panel (Number of Lenders)



Source: Deloitte survey (2024)

Accessibility

For smaller and non-bank lenders, brokers play a key role in introducing customers to their brand propositions and product offerings, while expanding their distribution footprint. By improving awareness of lesser-known lenders, trusted brokers enhance such lenders credibility in the eyes of consumers.

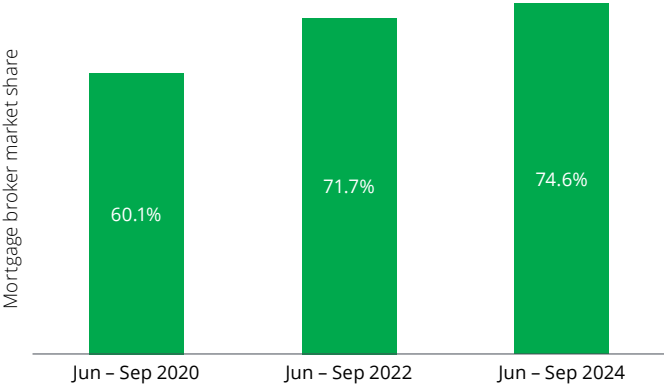
Chart 4.2 demonstrates that, in the September quarter of 2024, **mortgage brokers wrote 75% of all new home loans**³ illustrating the importance of the broker channel for all lenders. This is especially for non-major lenders where a greater proportion of their loans are typically sold through brokers, although smaller lenders still need the systems to provide services and support to the broker channel.

Brokers are also important for major lenders for many reasons, including that they are versatile and mobile, enabling them to assist customers in accessing finance with major lenders outside of standard branch and bank business hours and in areas where lenders may not have branches due to a lack of economic viability.

Technology has enabled accessibility improvements, with brokers experiencing rapid change in technological adoption. This has been most noticeable for brokers in their Customer Relationship Management systems, their ability to communicate with customers remotely and digital collation and verification of identification and customer information.

Brokers provide an additional line of defence and oversight when evaluating customer documents, for instance being the first screen for detection of fraud and assessing customer borrowing capacity.

Chart 4.2: Quarterly mortgage broker market share



Source: MFAA media release (2024)

Lender value proposition

Brokers provide a flexible sales channel for lenders, promoting innovation and relationships

Variable Cost Model and Flexibility

The broking channel provides lenders with a model for offering loans which can be scaled up or down, without significant additional effort on the lender's part. This channel does not require the same degree of fixed overhead costs as proprietary channels, such as office space and salaries, and is directly proportional to the size of loans written by the brokers.

After taking into account corporate overheads and fixed costs for permanent staff, premises and systems, for many lenders it may be as or more cost efficient for lenders to write loans through brokers. For example, smaller lenders do not have access to a large revenue and capital base to weather periods of low originations, and may not be able to support a fixed cost base in these circumstances. Using the broker channel can circumvent this issue and still allow fast upscaling when sales increase again.

Brokers streamline the borrowing application process, ultimately directing a customer to apply with a single lender instead of individuals going through the application process with multiple lenders (and incurring cost for such multiple lenders).

The broker channel is a convenient lever to pull when a lender's priorities change in terms of product offerings and target sales volumes. This is done on the basis of improved value for consumers with the lender's offering, as opposed to any form of remuneration-based incentive following regulatory reforms.

Innovation

Brokers encourage lenders to be more innovative by promoting competition, providing feedback on pain points in the application process, adopting emerging technology in how they interact with their customers and giving lenders valuable feedback on lender's products and features.

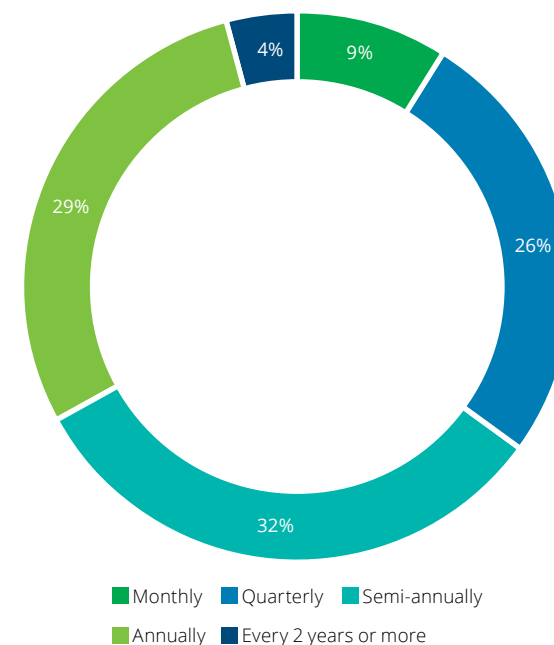
The increased adoption of technology by brokers has not only enabled brokers to reach a wider customer base and communicate with customers more efficiently but also given lenders the confidence to invest in their technology improvements to be used by brokers and customers. This can range from customer submission of information and other exchanges with the lender being digitally managed, through to customers having the confidence to use digital platforms for future servicing needs on their loan and other self-service interactions with the lender.

Support lender relations with customers

Brokers recommend lenders to a customer on an informed basis, aligning the customer's needs and objectives with the right lenders in terms of the lenders' product offerings, systems and services. This **supports improved outcomes for the customer** (a more targeted and suitable lender and loan product) and **improved outcomes for the lender** (a customer that has been pre-qualified and educated around the lender's product and processes). This results in a positive engagement at commencement of the loan for the lender with the customer.

Brokers also maintain regular ongoing contact with their customers, with 96% reporting being in contact with their customers annually or more frequently post settlement, with most being in contact semi annually (Chart 4.3). This contact supports engagement of the customer with their lender, as their experience with the loan product and lender is proactive. Brokers, customers and lenders then have an opportunity to directly address any concerns around ongoing suitability, pricing or service levels rather than the customer potentially looking to alternative lenders.

Chart 4.3: Frequency of contacting customers post-settlement



Source: Deloitte Broker Survey (2024)

Lender value proposition

Aggregators serve as a critical link between lenders and brokers

Lenders access brokers via aggregators

Aggregators and sub-aggregators connect lenders to brokers and vice versa. They provide services that include supplying the information, tools and platforms that help brokers to assess their clients’ needs and match them to the best product for them, and they provide lenders with a single interaction source to access many brokers rather than having to have individual relationships with all brokers across the industry.

The average aggregator has **45 lenders on its panel, including 18 non-Big 4 banks and 23 non-bank lenders.** Aggregators facilitate brokers to become accredited with these lenders. In particular, aggregators provide a connection to brokers for smaller lenders and new entrants to the market.

It is far easier for a new lender, such as an overseas-based bank, to join an aggregator’s panel and build relationships with brokers, than it is to build a physical branch network and build a brand and awareness with consumers.

Operationally, lenders also find it more efficient and scalable to use aggregators to pay the commission owing to individual brokers rather than having to pay all of them individually.

Aggregators enhance the broker service

The services that aggregators offer for brokers support the broker in their interactions with the end customer, as well as assist the brokers to be better business operators.

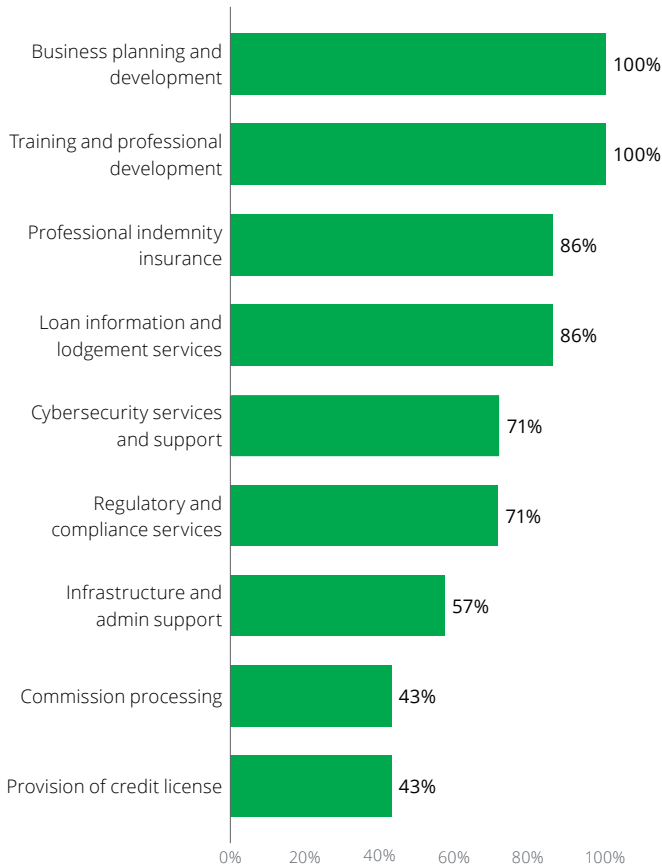
Aggregators provide technology and services to brokers to enhance the customer experience, with **96% of brokers reporting using technology tools provided by aggregators.**

This can range from education collateral to share with customers at the start of their home financing journey, right through to advanced digital and AI tools to collect information from the customer required by lenders (e.g. expenditure analysis tools).

Other commonly provided services to brokers by aggregators include ongoing training and professional development, business planning and development, and administration support services (especially to sole brokers). Many aggregators also provide marketing and lead generation systems to support their broker’s business growth and customer access, depending on the aggregator business model and services provided.

Aggregators also support brokers and lenders, and ultimately customers, by their various compliance and conduct monitoring tools and increasingly of late, cyber security services to protect their broker’s clients’ confidential information.

Chart 4.4: Services provided by aggregators (beyond standard technology tools)



Source: Deloitte Broker Survey (2024)



Mortgage Brokers in Australia

Brokers have become the primary distribution channel for most Australians when applying for a residential mortgage

Broking over time

Since their emergence in the early 1990s, mortgage brokers have grown rapidly, now writing almost 75% of new residential loans in Australia. The late 1990s and early 2000s was when brokers truly established themselves, and more banks began to use broker-arranged loans. For example, Westpac first began using brokers in 1998.¹

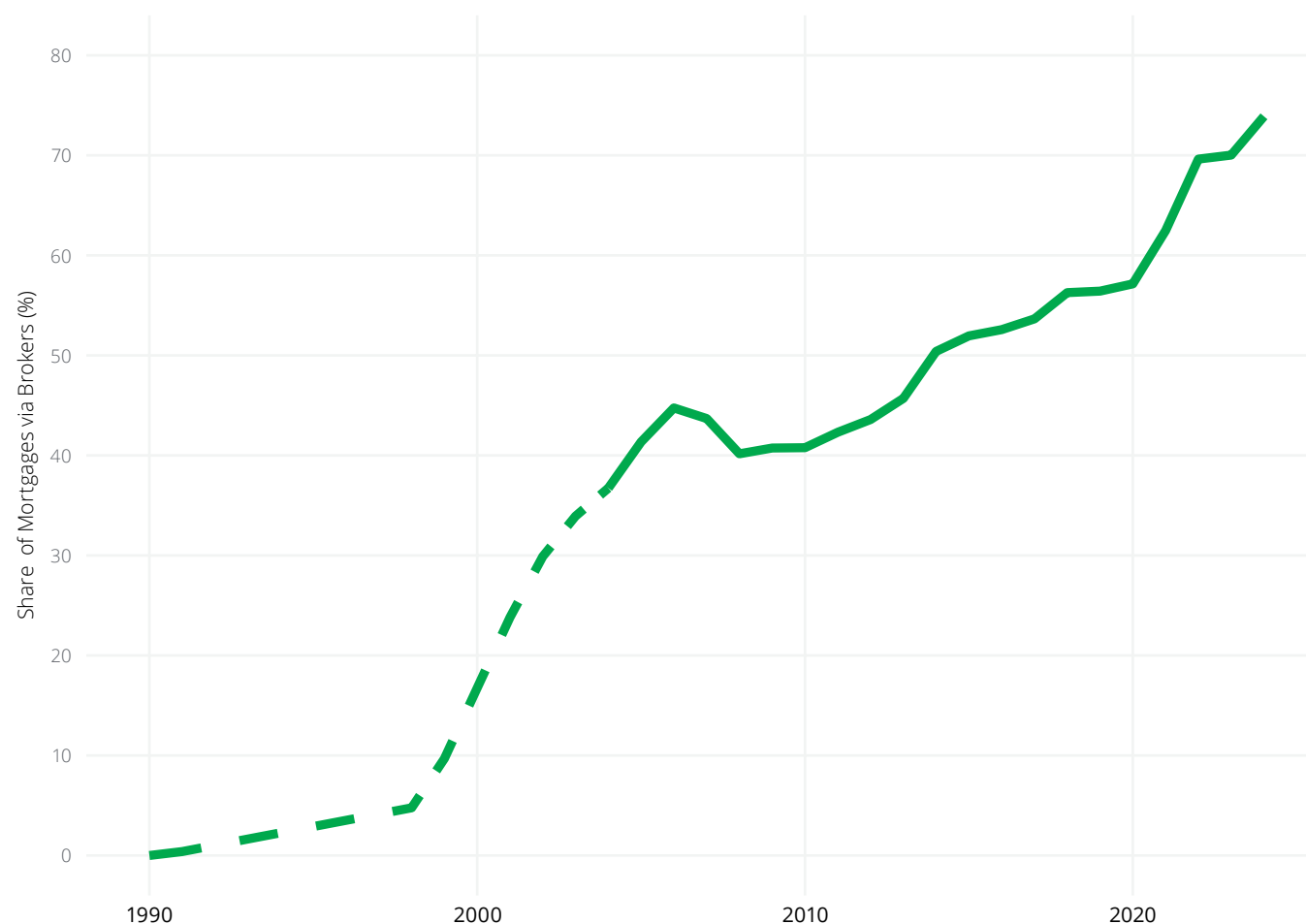
Following a period of stagnation in the late 2000s, broking grew strongly through the 2010s, continuing in the 2020s as brokers' market share hit record highs.

As has been highlighted throughout this report, reforms to the industry prior to and following the Banking Royal Commission have driven increased confidence in the sector. It is likely that this increased trust has contributed to the strong growth in recent years.

Chart 5.1 shows the trajectory of new mortgages arranged by mortgage brokers over time. It has been collated by Deloitte drawing on a range of historical datasets. It is important to note that broker market share may be defined differently across different datasets although where there were overlaps, figures appeared broadly consistent.

By improving competition in the overall lending market, brokers can reduce the cost of loans made through a direct channel, encourage lenders to find new efficiencies as well as encourage innovation in non-price features of banking services. This chapter examines how the rise of brokers has interacted with broader trends in the mortgage market to contribute to improved competition and better outcomes for borrowers.

Chart 5.1: Share of new mortgages written by brokers, 1990-2024



Source: Deloitte analysis of Corelogic, Fujitsu Consulting, MISC and other data.

Note: Data is annual averages, dotted line represents that pre-2004 estimates are highly uncertain and should be interpreted as indicative only.

Major trends in the Australian mortgage market

Brokers are contributing to increased competition in the Australian mortgage market

Facilitating greater competition

Recent decades have seen several factors combine to increase competition in the Australian mortgage market, including changes to technology, regulation and financial markets. The rise of mortgage brokers is another significant factor over this period, interacting with broader trends to further facilitate greater competition and better outcomes for borrowers.

Mortgage brokers play a critical role in helping new and smaller lenders to enter the market, as well as supporting existing lenders to reach new customer segments:

- Broker-written loans are more likely to be with non-Big 4 banks than direct approach loans. **38% of brokers' loan portfolios are with banks outside of the Big 4 and their sub-brands**,² despite the Big 4 representing 75% of the market.³
- **The number of banks active in Australia has almost doubled since 2004, from 50 to almost 100**,⁴ following significant changes to banking regulation which eased legal barriers to new banks entering the market.

New technologies such as online banking and comparison websites have reduced the need for physical branches, making it easier for customers to find information about lending products and helping new lenders (either start-up ADIs, international banks or non-bank lenders) to expand in Australia.

Brokers are a key channel for new entrants to the mortgage market to establish themselves and compete with established lenders. It may be easier for a new lender to attract customers by offering competitive rates on a broker's panel than by establishing physical branches.

Equipping borrowers with information

Today, borrowers are more easily able to compare products from different lenders. Equipped with more information, borrowers are in a better position to choose the product that best suits their needs, rather than just the product from a lender with a local branch. With more information available than ever, brokers play a valuable role in helping to identify and explain mortgage options in line with consumers' unique circumstances, needs and preferences.

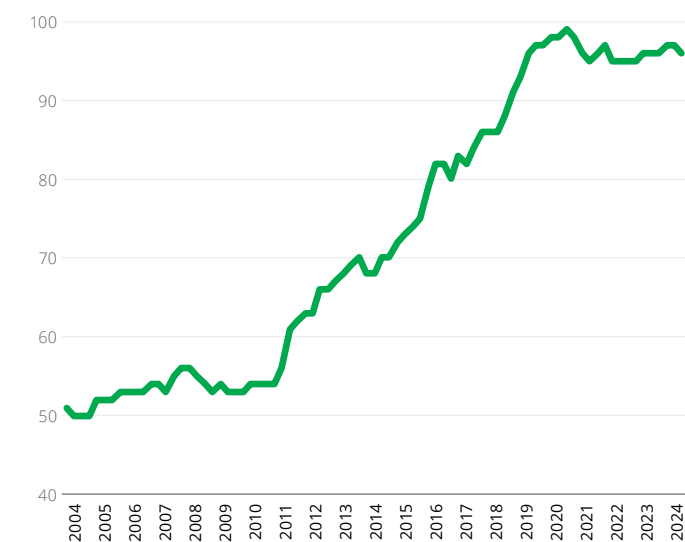
Brokers encourage competition in the Australian mortgage market by facilitating comparison, switching, repricing and refinancing of loans for consumers. By shopping around for the best deal for their clients, both at the outset and during the term of the loan, brokers can drive better outcomes for borrowers.

Improving lender efficiency

Technology adoption and changes to lender business models have substantially reduced operational costs. Recent decades have seen banks reduce operational expenditure per dollar of their loan book by more than half, through branch network changes and automation of loan management processes.⁵

Industry consultation revealed that brokers have played a key role in smoothing the transition from in-person bank branches, particularly in regional and rural areas. By enabling lenders to quickly scale up or down, brokers can lower fixed operating costs and drive efficiency. For example, ING Australia spent less on advertising and physical premises in 2023 than it did in 2011, despite holding almost twice as many assets.⁶

Chart 5.2: Number of Banks, 2004-2024



Source: APRA (2024)

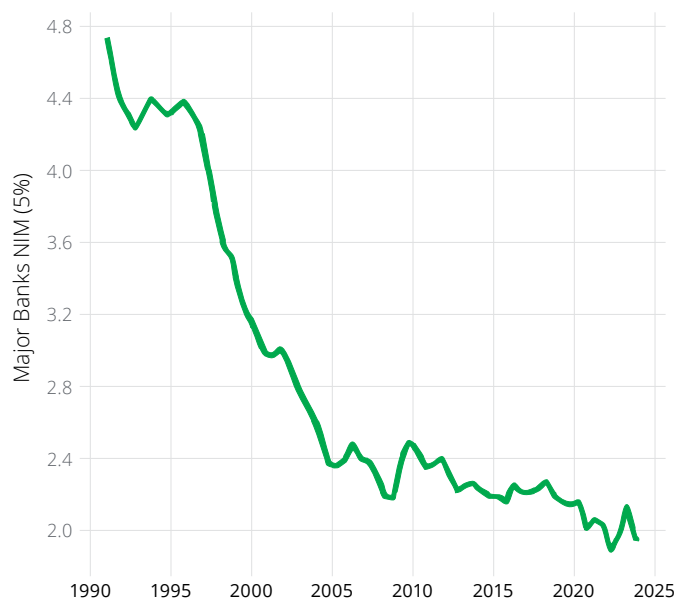
Major trends in the Australian Mortgage Market

Net Interest Margins have reduced, benefitting consumers, while bank returns on capital have remained above 10%

Benefits for borrowers

One way that the increased competition mortgage brokers have brought to the lending market has benefited borrowers is through lower net interest margins (NIMs). A bank's NIM is the average difference between interest charged on loans and the interest paid on bank funding sources. Since 1990, NIMs for major banks have fallen by almost 3% (Chart 5.2), representing substantial savings for borrowers.

Chart 5.2: Major banks' net interest margin (NIM), 1990-2024



Source: Reserve Bank of Australia (2024)

Changes in banks' funding sources have also significantly impacted banks' costs. Throughout the 1980s and 90s, banks became less reliant on domestic deposits to fund loans and increasingly were able to raise funds more cheaply through wholesale markets, including from overseas. For example, the Commonwealth Bank saw deposits fall from 76% of liabilities in 1980 to 51% in 2007. Following the GFC and changes to regulation, this has since largely reversed, with CBA's deposits rising to 75% of its liabilities in 2024.⁷

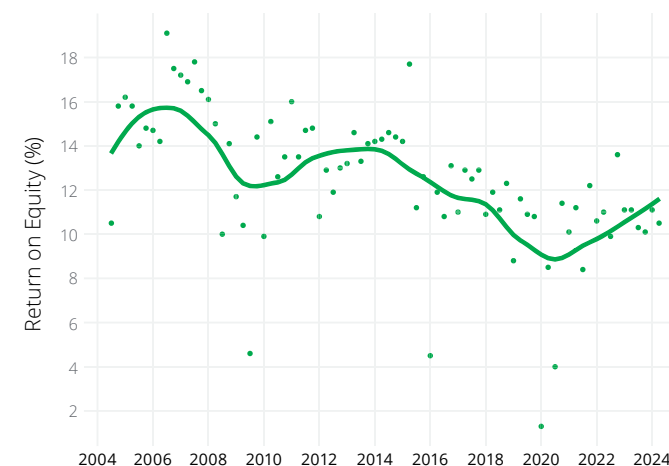
Bank return on capital

Increased competition in the banking sector and lower NIMs has reduced return on equity, a key measure of profitability, for Authorised Deposit-taking Institutions (ADIs). It declined from an average of around 15% in the early 2000s to around 11% today (Chart 5.3). However, as a result of cost savings and improved efficiency, the impact has been more muted than otherwise, and helped banks recover from downturns such as during the GFC. By international standards, Australian banks' return on equity remains high.⁸

Over this period, capital ratios for banks have substantially increased, with tier 1 capital ratios increasing from less than 8% of risk-weighted assets for most of the 2000s to now sit at around 14% - further weighing on returns.⁹

Overall, this suggests that although increased competition has contributed to somewhat lower profitability for banks, Australian banks remain in a strong position, with robust profitability and substantial capital funding, by international standards.

Chart 5.3: ADIs Return on Equity (after tax), 2004-2024



Note: Points represent quarterly data, line is LOESS smoothed curve.

Source: APRA

Commercial and asset finance broking+



Commercial and asset finance landscape

Brokers are expanding into commercial lending and asset finance broking to support broader customer needs

Commercial lending

Commercial lending refers to financial products provided to businesses for purposes such as **property acquisition, development, and operational financing**. This focuses primarily on property and business financial needs, including:

- **Commercial Mortgages:** Loans for commercial real estate. This may include mortgages to self managed super funds (SMSFs).
- **Business Financing:** Funding for business operations, such as cash flow, working capital, and other non-asset related needs.
- **Construction and Development:** Loans specifically for property-related construction and development projects, generally larger value loans.

Asset finance

Asset finance involves funding for the acquisition of physical assets needed by businesses or individuals.

This encompasses a wide range of items, including:

- **Consumer asset finance:** a range of personal assets, from vehicles to boats.
- **Business asset finance:** including motor vehicles for business use, trucks, and other vehicles; yellow goods such as heavy machinery (eg forklifts) and business-related equipment, from coffee machines to office fit-outs.

Commercial finance broking growth

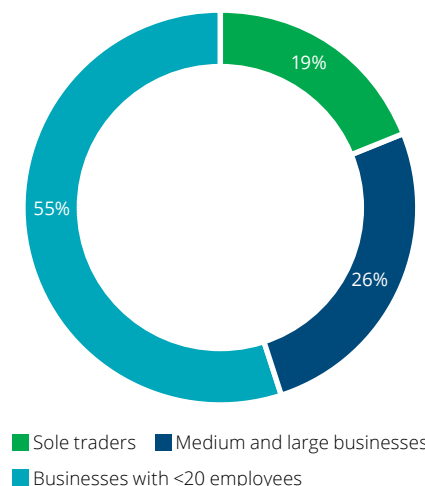
There has been **increasing interest in commercial and asset finance broking** in recent years. Brokers have identified the opportunity to holistically support customers who have an increasingly diverse and complex set of needs.

For example, residential mortgage clients may be small business owners with some form of commercial lending or asset finance need.

The range of business customers spans sole traders all the way through to larger businesses. The majority however are businesses with up to 20 employees. The commercial broker is the intermediary between lenders and business customers, understanding the specific business needs and the various finance options available, e.g. cashflow financing, financing for premises fit-out, acquisition financing.

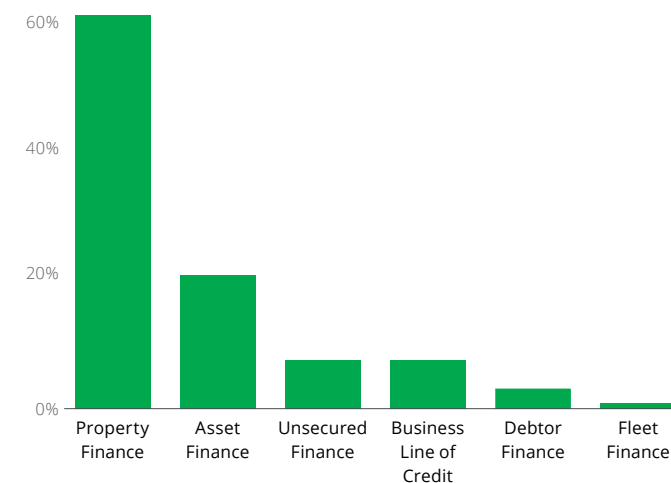
The mix of commercial broker lending through the Deloitte Broker Survey showed the majority is property finance, per Chart 6.2. However, there is range of other specialised lending services, such as business line of credit and debtor finance, where brokers also assist commercial clients.

Chart 6.1: Types of commercial loan broking customers



Source: Deloitte Broker Survey (2024)

Chart 6.2: Proportion of commercial loans in each category



Source: Deloitte Broker Survey (2024)

Commercial Broker Participation

There are limited published statistics to measure broker participation in commercial and asset finance lending. However, based on industry consultations, major aggregators noted year on year growth in their commercial broking volumes of 20% or more. Aggregators' total commercial loan volumes are lower than residential loans, at generally 10% of residential settlements by loan value. Based on our broker survey, **13% of brokers are commercially active, writing 25% or more of their settlements as commercial loans in FY23/24.** However, there is strong support from industry bodies and aggregators for brokers seeking to grow in this area in future.

Commercial and asset finance landscape

Commercial broking is more specialised than residential broking, requiring higher education to address the diverse needs of clients and the complexity of products involved.

Broker pathways

Most commercial and asset finance brokers come from a business banking background. Through our industry consultations, it was **noted by brokers, aggregators and lenders that commercial and asset finance broking requires a specialised focus** due to the nature and complexity of commercial broking, such as the need to understand business cashflows, tax implications and company structuring. Currently, the most traditional pathway for commercial brokers therefore is to move across from business banking, leveraging their prior experience and knowledge from the banking sector.

In terms of driving reasons for commercial brokers to commit to the sector, from our survey as seen in Chart 6.3, 59% of brokers working in this space stated their personal interest as the key reason. This underscores brokers' passion for understanding and supporting their clients' complex needs. Other reasons for commercial broking focus included the opportunity to diversify income streams and the growth potential of commercial lending.

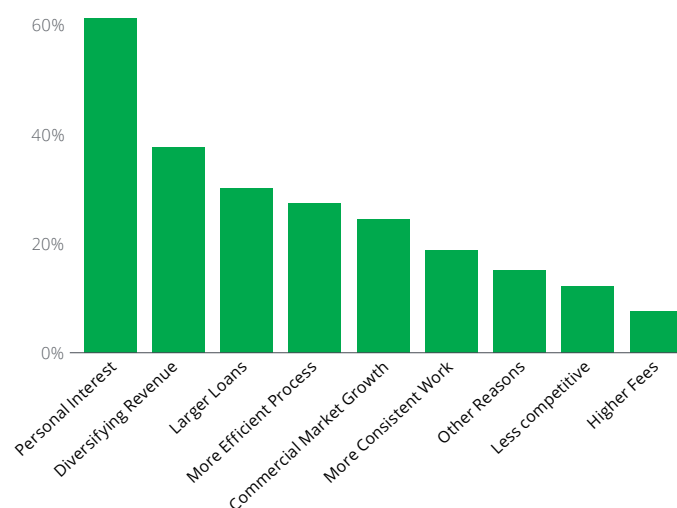
Industry consultations affirmed the generally more complex nature of commercial and asset finance lending. It was observed that customers often require more bespoke solutions given specific business needs, and it is onerous for the broker to stay abreast of the range of specific products available, and the services and rates offered by different lenders.

As a result, brokers tend to focus on chosen lending areas as opposed to offering products across all of residential, commercial and asset finance.

An emerging pathway for new commercial brokers to enter the industry is directly from university, working with specialised commercial and asset finance brokers to build the required knowledge and experience to become accredited. Recruits from universities often have relevant financial training which provides a foundation to learn from more experienced brokers.

Few brokers are currently transitioning from residential broking into commercial and asset finance due to the differences in skills and knowledge required. While some are successfully making the transition, this is mainly doing smaller scale commercial property lending rather than broader commercial financing.

Chart 6.3: Reasons for commercial broking focus



Source: Deloitte Broker Survey (2024)

For broader needs, such brokers are often using referrals to specialist commercial or asset finance brokers to ensure customers are appropriately supported.

A middle ground which has become apparent is **consumer asset finance**. As an adjacent area, the industry is seeing residential brokers exploring asset finance by first offering and arranging consumer asset finance, such as vehicle finance options, to their residential mortgage customers. They may also facilitate commercial loans at the smaller end of commercial lending sizes to customers who own small businesses, where the process is more familiar with that of a residential mortgage. This familiarity allows brokers to leverage their existing skills whilst expanding their service offering to meet the needs of their clients.

As brokers become comfortable facilitating applications for wider lending areas, it provides a pathway to expand their knowledge of lending products and what they can offer to their customers.

Accreditation process

Although brokers may be associated with a particular industry body, lenders typically have their own standards for commercial and asset finance broker accreditation which, in some cases, is stricter than an industry body association. For example, commercial brokers may be required to demonstrate competency and years of experience in commercial finance broking before they can be accredited with the lender. This sets an entry bar for residential brokers interested in moving into commercial and asset finance broking.

Commercial and asset finance landscape

Industry participants are working together to address current growth constraints driven by technology and size of broker pool

The role of aggregators, lenders and industry bodies

Aggregators, lenders and industry bodies are working together to improve and expand the commercial and asset finance broker offering. They each have specialist requirements and support for their brokers looking to facilitate commercial and asset finance loans. However, all acknowledge that it is a journey for brokers to gain the required specialisation in these areas, and it takes particular focus from a broker to transition across.

Specialised lenders often require specific accreditation for brokers looking to arrange commercial and asset finance loans given the knowledge required to confidently offer products in these areas. Some lenders specifically require CAFBA membership to gain confidence that the broker has appropriate training in the commercial and asset finance areas, as well as aggregator group accreditation for commercial lending.

Product offerings can vary widely by lender, ranging from lower size commercial loans offered by specialised lenders, which follow a similar broking process to residential mortgages, to complex business financing loans by large banks which require specialist broker knowledge to facilitate. This provides a range of areas for brokers to support their customers, some which may be reasonable for a broker to service directly, and others where a broker may need to refer to a specialised broking partner.

Industry bodies (MFAA, FBAA and CAFBA) provide brokers with training, education and mentorship programs which can support them in building knowledge and experience in the commercial and asset finance areas.

Aggregators also provide a range of support, education and training for brokers in the commercial and asset finance spaces.

Aggregators support brokers looking to move into these areas by offering specialist referral models and accreditation pathways. In some cases, aggregators are recruiting specialised teams to service customers in commercial and asset finance areas. However, there are still a number of aggregators which are not offering commercial and asset finance loans, presenting an opportunity for them to support their brokers in expanding into these growth areas.

Some aggregators offer referral models to allow brokers to support their customers' holistic needs and potentially support the upskill into a new broking area. This is achieved by referring their customers to other specialist brokers associated with the aggregator where it is not currently an area the broker services.

Accreditation pathways include shadowing and mentorship programs, where a broker can work closely with another specialised broker to build sufficient skills and knowledge in an area to gain accreditation. This ensures they can confidently offer loans to customers in that area which meet customer needs.

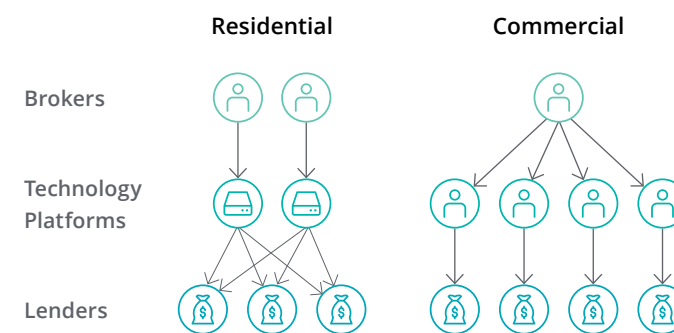
Technology improvements

Technology platforms used by commercial and asset finance brokers, offered by aggregators and lenders, are not as standardised as those used in residential broking.

This is due to bespoke technology and product offerings by different lenders, the wide range of products available, and a requirement for more complex customer information to be assessed and stored, such as business cashflows.

Aggregators are working with lenders to improve and standardise their commercial and asset finance technology offerings, which will improve efficiencies for brokers in future and allow faster loan approvals for customers.

Figure 6.1: Ecosystem of broker technology platforms



Source: Deloitte (2024)



Case Study – Smartmove Professional Mortgage Advisors

Smartmove merged with Viridian Financial Group to offer its customers more holistic lending and investment advice in one place.



The specialist
lending service of



Introduction and background

This case study demonstrates a residential mortgage broking business that has successfully diversified into commercial and asset finance broking. It has faced into the challenges we have highlighted in doing so, such as the need for further education and lender accreditations, by partnering with specialised brokers and uplifting its broker education programs.

Founded over two decades ago, Smartmove has established itself in the Australian broking industry, specialising in broking for various financial products including home loans, investment properties, car finance, and commercial loans to name a few. It currently has close to 100 employees in the lending team servicing approximately 8000 clients with a total book size of close to \$4 billion.

Business structure

Predominantly a residential mortgage broking business, Smartmove merged with Viridian Financial Group in 2023 to become the specialist lending service of the Viridian Financial Group. This coming together has created a genuine diversified financial services business at scale across Australia. Smartmove was strategic in selecting its partner, working to ensure there was cultural alignment between the two entities, and saw it as an opportunity to further build trust with its customers.

The merger provided Smartmove brokers with access to a broader range of clients, including those with commercial and asset finance borrowing needs which Smartmove brokers did not historically focus on. By combining financial planning and broking in one offering, it identified opportunities for expansion of its offering to ensure the dual benefits of improved customer servicing and business growth.

To support its growth in commercial and asset finance broking, it used two channels – the first being expanding the capability of the residential brokers through training programs and bringing in a technology solution to help write the commercial lending; the second being to identify a reliable partner Smartmove's brokers can make referrals to in the asset finance space. This has seen good results for their clients when dealing with a dedicated professional.

Smartmove has been successful in its first year of efforts to ensure that, if a mortgage broker or financial advisor across the group can identify a need for the client, the ability to assist exists within the team. This can further improve as the technology platforms make it more seamless to work together for the good of the client.

Innovations



Salaried model. The compensation structure is one where brokers receive a fixed salary plus a monthly bonus rather than earning straight commissions based on the loans they originate. As one of the largest independent broker groups in Australia to use this model, it enables team members to focus on client outcomes and work together as a team. Smartmove allows employees to purchase shares in the overall Viridian group, which unites the team approach and the aim to grow a sustainable and profitable business and offer valuable long-term service to customers.



Staff education (Broker Academy). This is a fully paid 26-week training program to train new employees and provide better services to customers. The majority of students in the broker academy are new to the industry and come from a diverse range of cultural backgrounds, providing a pathway for diversity improvements in the broking community. This also enables Smartmove to engage and service a larger proportion of the market.



International Support. Overseas resources improve efficiency, reducing processing times for loan applications. Smartmove owns its own facilities in Nepal and the Philippines which support the brokers.



Appendices



Appendix A: Survey methodology and findings

Industry participants are working together to address current growth constraints driven by technology and size of broker pool

Approach

Qualtrics was used to field the survey and collect data, which was then analysed by Deloitte Access Economics. Data was collected via an online portal and took respondents approximately 30 minutes to complete. The survey was in field from early October to early November 2024, with 842 responses collected in total.

The survey questionnaire was developed by Deloitte Access Economics in consultation with mortgage broking industry stakeholders. The survey asked a series of questions about the way mortgage broking businesses operate, the types of customers they serve, the services they provide and financial information on the operation of their business (such as loan sizes, upfront payment margin, trail commission margin, operating costs, wages, and other information).

The questions were specifically tailored for aggregators, individual sole trading mortgage and finance brokers and mortgage broking businesses with more than one staff member.

Sample population

The survey included a random sample of 454 individual sole trading mortgage broking businesses and 393 mortgage broking businesses with more than one staff member, covering a total of 842 brokers (Table A.1).

This should be compared with a national population of 10,635 mortgage broking businesses¹ and 22,031 mortgage brokers.²

Definition of survey participants

For the purpose of this survey, the survey participants are defined as follows to avoid double counting and to extract a good cross-sectional representation of the mortgage broking industry:

- individual sole trading mortgage broking business – a mortgage broker providing service to customers as a sole trading business, owns and operates the business and does not employ or contract other staff to work for the business
- mortgage broking business with more than one staff member – a mortgage broking business that has more than one staff member working for the business and can include mortgage brokers and administrative and support staff; and
- aggregator – a party that has more than one individual mortgage broker and/or mortgage broking business aligned to its service.

Table A.1: Sample Coverage

	Number of broking businesses	Number of sole trader brokers
Sample total	393	454
Population	13,068	8,963

Source: Deloitte analysis (2024)

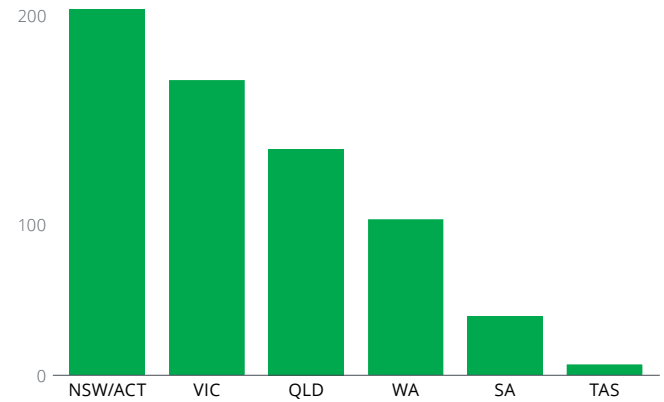
Summary of survey findings

Survey analysis findings are included throughout this report and were presented as a standalone deliverable to the MFAA and aggregator representatives in the interim stages. 17 key survey findings were identified through analysis of survey responses, grouped across six key focus areas.

Figure A.1 includes a summary of key survey headlines derived from our bespoke broker survey. Survey findings were iterated in collaboration with the MFAA and informed quantitative components of this report.

Surveyed brokers are similarly distributed to Australia's population, as shown in Chart A.1.

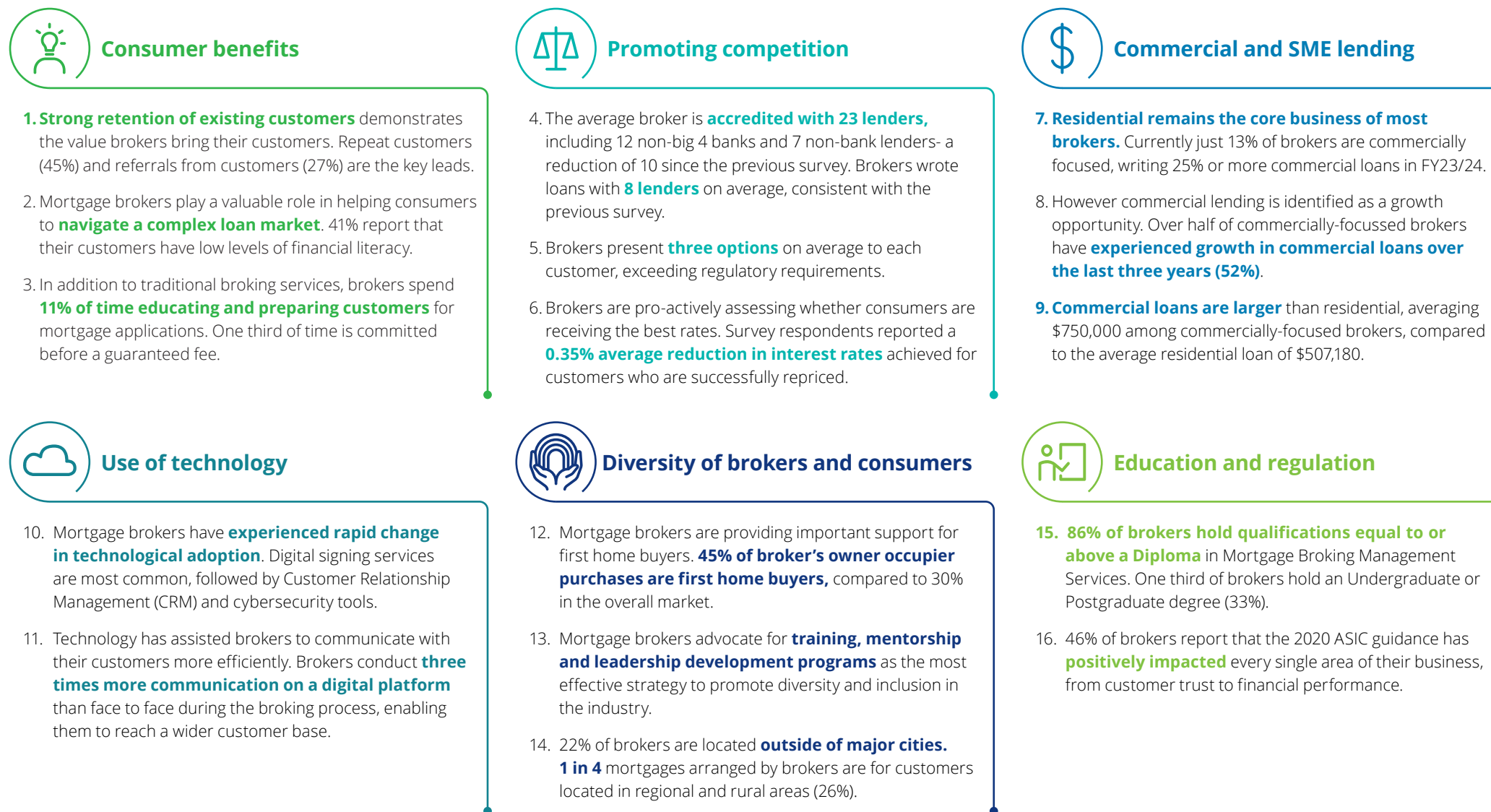
Chart A.1: State distribution of surveyed brokers



Source: Deloitte analysis (2024)

Appendix A: Survey methodology and findings

Figure A.1: Survey headlines



Appendix B: Stakeholders consulted

Approach

Deloitte conducted 12 one-to-one consultations with industry stakeholders including a combination of individual brokers, broker groups, major lenders, industry associations and non-bank lenders. Stakeholder consultations were semi-structured lasting approximately 60 minutes in duration.

In designing the methodology approach for this research project, the purpose of industry consultations was to provide nuanced understanding of key issues, challenges and opportunities facing the mortgage and finance broking sector.

One lesson from the previous report is that one-on-one consultations provided the greatest opportunities for businesses to discuss sensitive issues. This learning informed our approach to consultation, which focused on select one-on-one interviews, as opposed to broader industry workshops.

Information collected from the consultations informed the qualitative evidence supporting our analysis.

In these consultations, stakeholders shared their ideas and insights on the role of mortgage brokers, the services that mortgage brokers provide and how that has changed over time, and how the services that mortgage brokers provide are of importance and value to lenders and customers. There were also insightful discussions about the growth of commercial lending and the impediments to growth.

Consultation coverage

Lines of questioning were broadly based around the below key themes, based on consultation guides and data collection instruments designed in collaboration with the MFAA:

- Introduction and context of the MFAA/Deloitte report.
- Stakeholder’s history in the mortgage and finance broking industry.
- Background on stakeholder’s organisation including business set up, optimal team structure, ongoing learning and training; and challenges such as managing compliance burden.
- Perspectives on the key value proposition of brokers to customers and lenders.
- Perspectives on key opportunities over the coming 3-5 years for brokers including emerging technologies; shifts in customer behaviour and expectations and commercial and asset finance lending trends.

Broader stakeholder input

In addition to participation in an industry consultation, other organisations contributed to this research through their promotion of our broker survey, or other related activities.

These organisations include the MFAA, AFG, Astute Financial Management, Connective, Finsure, Lendi Group, Loan Market Group, Moneyquest, Mortgage Choice (REA Group), NAB, National Mortgage Brokers, NextGen, Outsource, Pepper Money, Specialist Finance Group, Teachers Mutual Bank and Yellow Brick Road.

Table B.1: Stakeholders consulted as part of this research

Stakeholder	Date
Individual brokers	
Individual broker	October 2024
Smartmove	October 2024
Broker groups	
AFG Ltd	September 2024
Connective	October 2024
REA Group	October 2024
Resolve Finance	September 2024
Loan Market Group (LMG)	September 2024
COG Finance	October 2024
Major lenders	
NAB	October 2024
Macquarie Bank	November 2024
Industry association	
CAFBA	October 2024
MFAA	Throughout project duration
Non-bank lenders	
Pepper Money	October 2024

Appendix C: Economic contribution analysis

Approach

The total economic contribution of the mortgage broking industry is based on direct and indirect value add derived from survey results and data from ASIC, IBISWorld and the MFAA.

The estimations are based on the following ABS definitions:

- economic contribution is value added to the economy and jobs created by mortgage broking;
- direct contribution is wages (which is reflective of the income earned by individual brokers and support staff) and profits (gross operating surplus or GOS) of broking businesses, plus taxes; and
- indirect contribution is economic activity and jobs created in service industries supplying inputs to the mortgage broking industry, derived from broking businesses' non-wage costs.

Based on our estimation, the mortgage broking industry is associated with a total economic contribution of \$4.1 billion in 2023-24, including a direct economic contribution of \$3.3 billion and an indirect contribution of \$800 million. The mortgage broking industry also supports the employment of 37,459, which includes 31,899 FTEs directly employed by the industry and 5,450 FTEs indirectly supported in other Australian businesses.

Methodology overview

Data for this survey is drawn from the MFAA's Industry Intelligence Service Report published in 2024, supplemented with data from the bespoke survey of brokers.

The central data point is taken from the IIS survey, which reveals that, for the period April 2023 to September 2023, the MFAA estimates that average gross annual commission (prior to costs) is around \$192,354.¹ This overall average was attributed between sole trading brokers and broking businesses based on their share of loan value written in the latest IIS data.

Out of these gross commission figures, brokers pay the costs of their business including premises, service fees paid to aggregators, marketing and communications expenses, support staff salaries and wages, and other costs.

According to the MFAA, there are 22,031 mortgage brokers in Australia as of March 2024, of which 8,963 are sole traders and 13,068 are in a business. Expenditure and revenue figures were scaled to these levels.

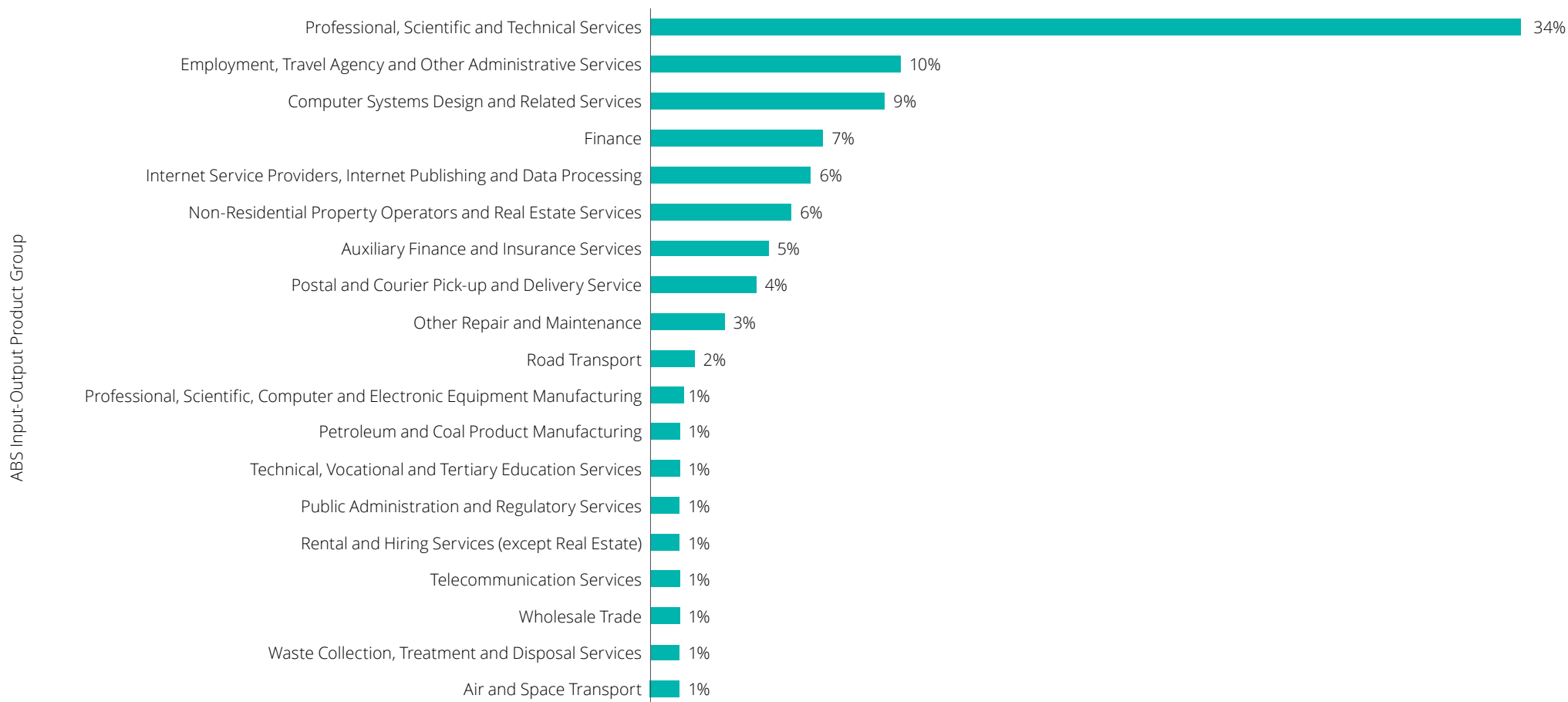
Indirect contribution

The indirect contribution was calculated based on brokers' reported average expenditure on goods and services. Applying a similar approach as in the direct contribution calculation to extrapolate to the full population of brokers, we estimate the total expenditure for the mortgage broking industry to be \$1.2 billion.

Input-Output tables were used to approximate the types of goods and services, such as office supplies and utilities, typically purchased by brokers. It was assumed that the brokers' expenditure profile mimics the wider Auxiliary Finance and Insurance Services industry. This industry covers Financial Asset Broking Services as well as other auxiliary services such as Stock exchange operation, executor service and finance consultant service. Fig C.1 shows the assumed share of expenditures of the mortgage and finance industry based on the ABS I-O table (2021-22). This expenditure was input into Deloitte Access Economics' Regional Input-Output model to calculate the indirect contribution.

Appendix C: Economic contribution analysis

Chart C.1: Share of goods and services purchased by the Auxiliary Finance and Insurance Service industry, 2021-22.



Source: ABS I-O tables 2021-22, Deloitte analysis (2024)

References



References

Executive Summary

1. CoreLogic Comparator, MFAA's Quarterly Survey of leading mortgage brokers and aggregators for July, August, September 2024, November 2024.
2. Mortgage and Finance Association Australia, Industry Intelligence Service (IIS) Report 18th Edition, (2024), 1 Oct 2023 to 31 Mar 2024.
3. Deloitte Access Economics, The Value of Mortgage Broking, (2018). Available at: <https://cdn.sanity.io/files/t0x3ukgp/production/a0293d4390be194e713db024e0c3c93b96c2e782.pdf>
4. Loan Market Group, About LMG, (2025). Available at: <https://img.broker/about-lmg>
5. Preston, A. The University of Western Australia. *Financial Literacy in Australia: Insights from HILDA Data*, (2020).

Introduction

1. Mortgage and Finance Association Australia, *Industry Intelligence Service (IIS) Report 18th Edition*, (2024), 1 Oct 2023 to 31 Mar 2024.
2. Deloitte Access Economics, The Value of Mortgage Broking (2018). Available at: <https://cdn.sanity.io/files/t0x3ukgp/production/a0293d4390be194e713db024e0c3c93b96c2e782.pdf>

1. The mortgage and finance broking industry in Australia

1. Mortgage and Finance Association Australia, *Industry Intelligence Service (IIS) Report 18th Edition*, (2024), 1 Oct 2023 to 31 Mar 2024.
2. IBISWorld, Mortgage Brokers in Australia – Number of Businesses 2008 – 2031 (2024). Available at: <https://www.ibisworld.com/au/number-of-businesses/mortgage-brokers/1821/>

3. CoreLogic Comparator, MFAA's Quarterly Survey of leading mortgage brokers and aggregators for July, August, September 2024, November 2024.
4. Mortgage and Finance Association Australia, CPD requirements (2024), Available at: <https://www.mfaa.com.au/professional-development/cpd-requirements>.
5. Ibid.
6. Mortgage and Finance Association Australia, MFAA welcomes Government's cancellation of 2022 Review (2022). Available at: <https://www.mfaa.com.au/news/mfaa-welcomes-government-s-cancellation-of-2022-review>.
7. MFAA (2024), Industry Intelligence Service 17th Edition, 1 April 2023 – 30 September 2023. Accessed at: <https://cdn.sanity.io/files/t0x3ukgp/production/86ad362f54c8e7ac23ca67a27c6e2bb3c75a0866.pdf>
8. Mortgage and Finance Association Australia, Industry Intelligence Service (IIS) Report 18th Edition, (2024), 1 Oct 2023 to 31 Mar 2024.
9. CoreLogic Comparator, MFAA's Quarterly Survey of leading mortgage brokers and aggregators for July, August, September 2024, November 2024.
10. Mortgage and Finance Association Australia, Industry Intelligence Service (IIS) Report 18th Edition, (2024), 1 Oct 2023 to 31 Mar 2024.
11. Australian Securities and Investments Commission, "RG 273 Mortgage brokers: Best interests duty", (24 June 2020) <<https://asic.gov.au/regulatory-resources/find-a-document/regulatory-guides/rg-273-mortgage-brokers-best-interests-duty/>>
12. Ibid.

2. Contribution to the Australian economy

1. MFAA (2024), Industry Intelligence Service 17th Edition, 1 April 2023 – 30 September 2023. Accessed at: <https://cdn.sanity.io/files/t0x3ukgp/production/86ad362f54c8e7ac23ca67a27c6e2bb3c75a0866.pdf>.
2. Australian Bureau of Statistics, Australian National Accounts: Input-Output Tables (27 March 2024). Available at: <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-input-output-tables/latest-release>.
3. Parliament of Australia, 'Social aspects of home ownership', https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Former_Committees/hsaf/report/c02;

3. Consumer Value Proposition

1. Loan Market Group, About LMG, (2025). Available at: <https://img.broker/about-lmg>
2. Parliament of Australia, 'Social aspects of home ownership', (2008) https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Former_Committees/hsaf/report/c02;
3. National Association of Home Builders Housing Policy Department, 'The Benefits of Homeownership', (2022) https://www.internationalhousingassociation.org/fileUpload_details.aspx?contentTypeID=3&contentID=266313&subContentID=721506&channelID=38488#:~:text=Another%20social%20impact%20of%20homeownership,a%20loss%20from%20criminal%20activity.
4. Australian Financial Complaints Authority (2024), Annual overview of complaints. Available at: <https://www.afca.org.au/annual-review-overview-of-complaints>
5. ABC News (2024), Green loans offer a cheap option to make your house more efficient. Available at: [Green loans offer a cheap option to make your house more efficient - ABC News](https://www.abc.net.au/news/2024-09-12/green-loans-offer-a-cheap-option-to-make-your-house-more-efficient/105444444)

References

4. Lender Value Proposition

1. APRA (2024), 'Quarterly authorized deposit-taking institution performance statistics – highlights', <https://www.apra.gov.au/sites/default/files/2024-06/Quarterly%20authorised%20deposit-taking%20institution%20performance%20statistics%20-%20highlights.pdf>.
2. RBA (2024) 'Main types of financial institutions', Main Types of Financial Institutions | RBA
3. MFAA (2024), 'Mortgage broker market share reaches new record highs', <https://www.mfaa.com.au/news/mortgage-broker-market-share-reaches-new-record-highs>

5. Enhancing Competition and Choice

1. McLachlan (2001), 'Brokers increase slice of home loans pie', <<https://www.afr.com/politics/brokers-increase-slice-of-home-loans-pie-20010312-k0rrh>>
2. ACCC summary of APRA (2022), 'Authorised deposit-taking institution statistics', <<https://www.accc.gov.au/system/files/public-registers/documents/Annexure%2030.1%20-%20APRA%20market%20share%20data%20-%202002.12.22%20-%20PR%20-%20MA1000023%20ANZ%20Suncorp.xlsx?ref=0&download=y>>
3. APRA (2024), 'Monthly Authorised Deposit-taking Institution Statistics', www.apra.gov.au/monthly-authorised-deposit-taking-institution-statistics
4. Ibid.
5. Ibid.
6. ING Australia (2011) and ING Australia (2023), Annual Reports.
7. Commonwealth Bank of Australia (1980, 2007 & 2024), Annual Reports.
8. APRA ADI Statistics

9. Productivity Commission (2018), 'Competition in the Australian Financial System', <https://www.pc.gov.au/inquiries/completed/financial-system/report>
10. Ibid.

Appendix A: Survey Methodology

1. Ibis World (2024), Mortgage Brokers in Australia - Number of Businesses 2008–2031'.
2. MFAA (2024), Industry Intelligence Service 17th Edition, 1 April 2023 – 30 September 2023. Accessed at: <https://cdn.sanity.io/files/t0x3ukgp/production/86ad362f54c8e7ac23ca67a27c6e2bb3c75a0866.pdf>

Appendix C: Economic Contribution

1. MFAA (2024), Industry Intelligence Service 17th Edition, 1 April 2023 – 30 September 2023. Accessed at: <https://cdn.sanity.io/files/t0x3ukgp/production/86ad362f54c8e7ac23ca67a27c6e2bb3c75a0866.pdf>

Notes

Notes





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Cover sheet: Supporting document #2

MARCH 2025

OUR UPFRONT OPPORTUNITY:

Australia's policy roadmap to reduce
upfront embodied carbon in the built
environment



asbec
AUSTRALIAN SUSTAINABLE
BUILT ENVIRONMENT COUNCIL

FOREWORD

To address the built environment's impacts on our planet, we need to reduce all carbon emissions across the entire lifecycle of an asset.

As we add this report to our collective repository on ways the built environment can lower its carbon emissions, I am both humbled and energised by the challenge before us.

We are focusing on upfront embodied carbon in this project because its impacts are significant, measurable, and verifiable. More importantly, they are occurring on a large scale right now. While reducing carbon emissions across every life stage of an asset remains important, we believe that tackling upfront emissions provides us with immediate, actionable steps towards decarbonisation.

This doesn't mean we lose our focus on reducing operational energy, and we also recognise that this is not the only solution to a decarbonised built environment. Indeed, through embracing circularity*, designing out waste, keeping materials in use and regenerating natural systems, Australia can unlock innovation, drive economic diversification and support the global transition to net zero.

This report continues the great work already started by government and industry, mapping out a policy ecosystem that can support the consistent upfront embodied carbon measurement methodology developed by NABERS.

OUR VISION FOR THE FUTURE IS CLEAR:

- > Reuse and refurbishment are standard practices in the construction industry
- > New builds are resource-efficient, designed to minimise materials and space
- > A low-carbon circular economy optimises resources and reduces waste
- > A skilled, empowered workforce delivers projects with minimal emissions
- > Transport and construction are fossil-fuel free
- > Building products have transitioned to very low or zero carbon emissions, prioritising eliminating emissions at the source

Why did ASBEC embark on this work? We need champions, we need leaders, but we also more importantly need everyone to come along the journey with us and collectively work out solutions.

This transformation is not an event, but a long-term process.

It requires transparency, clear communication, and advance planning. By quantifying emissions from materials and construction processes early, we empower ourselves to make informed decisions that minimise our carbon footprint.

With clear and consistent targets and policies that make reducing upfront embodied carbon a priority, the supply chain can invest in innovation to develop circular*, low or zero carbon products and practices that will be in demand domestically and internationally. Certainty, focus and innovation investment will be transformative for the market and supply chain, setting up Australia to thrive.

ASBEC's work is designed to complement and enhance the exciting government and industry initiatives already underway across the sector, in buildings and infrastructure. While the strategies put in place might differ between commercial property, residential buildings and infrastructure, we share the same value chains and will all achieve benefits from a unified approach.

I invite you to engage deeply with this report. The strategies outlined here are our roadmap to a sustainable built environment. Together, we can drive meaningful change, reduce our impact on climate change, and create a legacy of responsible, innovative construction for the future.

Let's build a better world, starting today.



Alison Scotland
Chief Executive Officer
ASBEC



* See [The Circular Advantage](#) report, DCCEEW 2024, and [Australia's Circular Economy Framework](#), DCCEEW 2024

EXECUTIVE SUMMARY

To achieve our national net zero commitments, the Australian built environment needs to reduce its embodied carbon emissions by at least 60% by 2035%.

Reducing embodied carbon requires a systemic approach across the built environment sector – from project decisions (e.g. adapt/reuse), to design improvements, to how we build, to investing in the decarbonisation of our supply chains.

There are different levels of engagement and competency within industry, but working collaboratively with government will help scale up progress and take everyone on the journey to net zero.

Countries across the globe are working on decarbonisation strategies for their built environments. Strategies to reduce emissions in the built environment have previously focused on operational emissions. These need to extend to embodied carbon. The rapid decarbonisation of the electricity sector means up to 85% of a building's lifetime emissions will be from embodied carbon by 2050 if no action is taken*.

Embodied carbon from buildings and infrastructure now accounts for 10% of national emissions# and without action will grow. Embodied carbon emissions occur during construction, from materials and site activities, in-use emissions from maintenance works, and end-of-life emissions. Out of these, upfront embodied carbon is the most critical to reduce, as it is large (around 70% of all embodied carbon emissions#) and cannot be changed once a building or asset is built.

We recognise that early design decisions – such as building smaller, using prefabricated, modular, flexible layouts and designing for longevity, reuse, decommissioning and repair – can dramatically lower the need for new resources, cut emissions and reduce waste. We also recognise that transitioning this sector towards a circular economy will require significant collaboration and coordination across industry, and up and down supply chains.

Action is needed now. Most embodied emissions occur upfront, in contrast to operational emissions, which accumulate over time. Tackling upfront carbon in the built environment provides immediate emissions savings and huge opportunities for Australian industry. It's also a team sport and requires government and industry to actively work together on solutions.

NABERS has developed an upfront embodied carbon measurement methodology and tool, which has been shaped through extensive collaboration and consultation with industry since 2021, as well as in partnership with the Green Building Council of Australia (GBCA). It is consistent with work underway in Australia's infrastructure sector and is aligned with international standards for measuring embodied carbon in buildings and infrastructure.

Read in conjunction with our [Issues Paper](#), ASBEC's comprehensive policy framework aims to reinforce and amplify government and industry efforts to reduce upfront embodied carbon across buildings and infrastructure.

HOW DO WE ACHIEVE AT LEAST 60% REDUCTION IN EMBODIED CARBON BY 2035?

By acting on the following policy levers:



Reform **planning and procurement** to encourage low carbon projects



Reduce demand for carbon-intensive materials by **improving building design and material efficiency**



Scale up **supply chain decarbonisation** to increase the supply of low embodied carbon materials



Transition to **fossil fuel free transport and construction**

% Based on 2020 emissions values – see figure 3, page 18

* [Embodied Carbon & Embodied Energy in Australia's Buildings](#), Green Building Council of Australia and Thinkstep ANZ, 2021

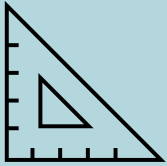
[Embodied Carbon Projections for Australian Infrastructure and Buildings](#), Infrastructure Australia, 2024

KEY RECOMMENDATIONS

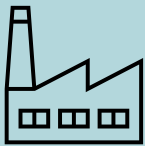
PRIORITIES FOR GOVERNMENT* AND INDUSTRY TO START RIGHT NOW, WORKING TOGETHER AND CONTINUING THE MOMENTUM OVER THE NEXT DECADE:



1. Update the Trajectory for Low Energy Buildings policy to include upfront embodied carbon measurement and reporting, and a staged approach to mandating minimum standards. Develop an **aligned, nationally-consistent policy approach for the infrastructure sector.**



2. Increase and continue investment in aligned national framework and tools to baseline, measure, benchmark, disclose, and reduce embodied carbon through a unified methodology and common database. These need to be consistent across commercial property, residential and infrastructure.

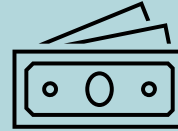


3. Support Australian manufacturers and provide market drivers to:

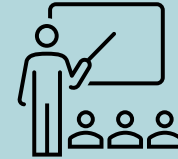
- > Reduce the embodied carbon of their materials and products via support for technology transitions and low-emissions manufacturing practices.
- > Understand and disclose the embodied carbon of their materials and products through trusted and verified processes such as Environmental Product Declarations (EPDs).



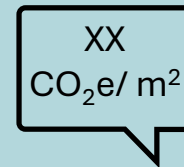
4. Prioritise a re-use, repurpose, or “retrofit-first” approach through brownfield development projects, infrastructure renewals, and major retrofits of existing structures. This includes reforming and aligning planning policies and development strategies.



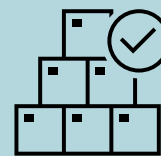
5. Demonstrate leadership by updating government funding, tender and procurement requirements or processes to include embodied carbon minimum standards, and transition towards fossil-fuel free transport and construction processes.



6. Build capability, awareness and skills by developing aligned training and education materials, and professional development, across the construction sector and its value chain, including practical guidance for reducing embodied carbon and achieving more with fewer resources.



7. Resource the inclusion of a minimum standard for upfront carbon for all new commercial buildings in NCC 2028 using NABERS methodology, with increases to minimum standards over time. Start collecting aligned data on residential buildings and consider a simplified **calculator to assist residential design decisions.**



8. Implement policies that secure a level playing field for Australian manufacturers of building and construction products, underpinned by consistent and comparable emissions data in line with international standards, and incentivise low carbon products made or re-made, in Australia.

* “Government” includes federal, state/territory and local, as many of the policy mechanisms require cross-jurisdictional agreement and collaboration



1.

Update the Trajectory for Low Energy Buildings policy to include upfront embodied carbon measurement and reporting, and a staged approach to mandating minimum standards.

Develop an aligned, nationally-consistent policy approach for the infrastructure sector.

Policy Levers:



OPPORTUNITY

FOR GOVERNMENTS

A forward schedule of increases to minimum National Construction Code (NCC) upfront embodied carbon emissions standards should be built into the updated Trajectory for Low Energy Buildings, which is an agreement between federal and state/territory governments. This important signalling device will provide industry with visibility and certainty on future changes to requirements and allow them to proactively adjust their designs, construction methods and supply chains.

Australia's Infrastructure and Transport Ministers Meeting (ITMM) has approved a nationally consistent set of carbon values for consideration in transport infrastructure project decision making. In June 2024, ITMM also agreed to a nationally consistent approach for measuring embodied carbon for use in transport infrastructure projects, called the *Embodied Carbon Measurement for Infrastructure: Technical Guidance*.

Building on ITMM's ongoing initiatives, the infrastructure sector should work towards nationally consistent policy from states and territories to reduce embodied carbon in infrastructure. This policy would establish clear signalling and emissions reduction pathways and consider specific business case, funding and procurement levers and actions to address embodied carbon.

FOR INDUSTRY

Industry leaders are voluntarily reducing embodied carbon emissions, but minimum standards are required so nobody is left behind as our economy decarbonises. Players across the built environment value chain can share data and knowledge, align voluntary tools to the NABERS consistent methodology, and invest in training and education.

[Materials & Embodied Carbon Leaders' Alliance \(MECLA\)](#) brings together organisations from industry, academia and government to reduce embodied carbon in the building and construction industry. One of its working groups is focused on sending clear, consistent and increased demand signals for low/no embodied carbon materials so that suppliers are confident to invest in decarbonisation innovation. Activities include industry assistance with procurement policy, a low-carbon toolkit to support policy makers, and guidance on effective ways to provide alternative solutions in tendering responses.

WHY THIS MATTERS

Australia's commitment to decarbonise the built environment will be greatly enhanced by measuring the size of the changes needed, and monitoring progress against the goal of net zero over time. Requiring embodied carbon measurement and reduction through government policy significantly impacts the market. Manufacturers receive a demand signal to develop low-carbon materials. Designers and builders receive a signal to prioritise materials and methods that minimise environmental impact from the start. This drives innovation in both design, construction practices and manufacturing.

Targets defined by government play a crucial role in decarbonisation by defining clear standards that must be met. When supported by effective nationally-agreed mechanisms (such as the Trajectory), they articulate short, medium, and long-term goals, establishing a clear signal for policy and action. For targets to drive decarbonisation effectively, they must be measurable, reportable, and enforceable.

Clear minimum standards provide predictability and drive market transformation. With clear signals, industry can continue to collect data in a consistent way, helping to inform our understanding about the built environment's carbon footprint. Industry can also continue to learn and understand the carbon impact of their design decisions.

CASE STUDY:

Many countries across the European Union **adopt a signalling approach for levers** that become mandatory as jurisdictions /sectors mature. This allows those developing to catch up while setting high expectations for those which are already performing well.

A typical process includes:

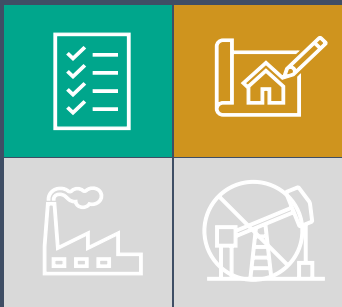
- Policy signalled
- Reporting requirement
- Limit imposed
- Reduced limit
- Limit change based on data
- Limit further changes based on needs



2.

Increase and continue investment in aligned national framework and tools to baseline, measure, benchmark, disclose, and reduce embodied carbon through a unified methodology and common database. These need to be consistent across commercial property, residential and infrastructure.

Policy Levers:



OPPORTUNITY

FOR GOVERNMENTS

A consistent, comparable system of measurement is the foundation of credible embodied carbon disclosure and reduction. NABERS has already developed a methodology and tool to measure upfront embodied carbon, which is widely endorsed by industry and aligned with the Green Building Council of Australia requirements.

Through the Infrastructure and Transport Ministers' Meeting (ITMM) Infrastructure Decarbonisation Working Group, government infrastructure representatives are working to harmonise measurement and reporting of carbon in infrastructure. This includes working with NABERS and aligning with international lifecycle assessment-based standards (PAS 2080, EN 15978 and EN 17472). This enables data aggregation and development of carbon intensity benchmarks to enable earlier measurement, comparisons and budget or target setting. There is also broad alignment with the Infrastructure Sustainability Council (ISC) rating tool requirements and ongoing collaboration to seek even more compatibility.

Australia should continue to invest in a freely-accessible common national database covering emission factors, benchmarks and calculation assumptions for construction products. This should incorporate and expand upon existing databases, such as the NABERS emission factor database. Ongoing maintenance is vital to support data collection and benchmarking as more information is gained. Government funding, support, and oversight is required to ensure that the governance of the database is robust, and that data is maintained regularly with clear data quality requirements.

FOR INDUSTRY

Property developers, operators and owners should use these nationally consistent pathways for their own business case, procurement verification, and other development strategies to foster uptake of these tools.

If manufacturers/suppliers wish to demonstrate their product has lower carbon than the default emissions factor used in the national framework, they need to provide robust and trusted data. Using trusted, consistently measured and verified emissions information (such as via EPDs) ensures that the data is comparable.

WHY THIS MATTERS

Methodologies and tools need to be integrated (not just aligned) across Australian jurisdictions and across the buildings and infrastructure sectors, to enable comparability and tracking of performance towards Australia's Net Zero target.

Using NABERS' national framework can enable the alignment of new and existing calculation tools, which often vary in underlying data and methodology. A national building and infrastructure emission factors database, including data for known construction product carbon emissions, makes trusted data easier to find and helps industry understand the options available to make the best choices for projects. This includes design configurations, comparing products with equivalent performance and durability, etc.

To unlock the industry's potential to rapidly adopt low-carbon design and construction practices, measurement of embodied carbon should be integrated into existing building and infrastructure delivery models.

National consistency and alignment of upfront embodied carbon frameworks and tools enhance productivity and efficiency in the construction industry by establishing uniform standards and reducing regulatory differences across jurisdictions.

CASE STUDY:

The **Inventory of Carbon and Energy (ICE) Database**, developed by the University of Bath, provides an international example of how a unified methodology and common database can help scale-up action. It is a freely accessible resource providing embodied carbon data for materials used in construction and infrastructure. With early funding by the UK Environmental Trust, it is periodically updated and serves as a national tool widely used across buildings and infrastructure projects, supporting carbon reduction efforts through a unified methodology. By offering consistent, transparent data, it enables practitioners to compare material impacts and make informed, low-carbon choices in project planning and procurement. Its role in driving decarbonisation in the built environment makes it a key reference in the UK's net-zero transition strategy.



3.

Support Australian manufacturers and provide market drivers to:

- ✓ Reduce the embodied carbon of their materials and products via support for technology transitions and low-emissions manufacturing practices.
- ✓ Understand and disclose the embodied carbon of their materials and products through trusted and verified processes such as Environmental Product Declarations (EPDs).

Policy Levers:



OPPORTUNITY

FOR GOVERNMENTS

A nationally coordinated program of measures to support the decarbonisation of construction materials is crucial for accelerating the pace of change and providing confidence and long-term market signals to manufacturers. These need to be continually supported by Australian government initiatives such as:

- **Knowledge sharing:** e.g. [ARENA's Knowledge Bank](#) supports publication and dissemination of decarbonisation best practice.
- **Market drivers:** incentives e.g. [Future Made in Australia](#) package, [National Reconstruction Fund Corporation](#), or [Powering the Regions Fund](#) and penalties e.g. applied through the [Safeguard Mechanism](#) and other [Clean Energy Regulator](#) schemes.
- **Transparency:** e.g. [Commonwealth Guarantee of Origin Scheme](#) is intending to expand into claims for low carbon fuels and products (e.g. green steel).

FOR INDUSTRY

Australian manufacturers across all construction product sectors have developed (or are developing) their unique decarbonisation trajectories. These are based on different needs and technologies. [MECLA](#) provides resources on its website designed to share knowledge and help construction materials decarbonise (e.g. steel, concrete/cement, aluminium, building services, engineered timber, assemblies, etc.).

Given the extent to which embodied carbon reductions depend on reliable measurement, Australia will need a robust and standardised verification process, based on international standards. NABERS accepts product-specific emission factors derived from a third party-verified process lifecycle assessment, such as an EPD.

Developing process-based EPDs for certain industry sectors could lower the incremental cost of generating EPDs for products with similar manufacturing processes. Industry associations could develop common EPD models, tools and reporting structures for members with very similar processes.

A collaboration of Australian industry organisations have developed an implementation guide for the traceability and digitalisation of construction product information across the supply chain*. It will facilitate the sharing of accessible, verifiable, timely and harmonised information as to a product's attributes (such as embodied carbon) in association with its physical movement along the construction supply chain.

* Traceability and Digitalisation of Building Product Information 2024
<https://industrycoalition.wixsite.com/building-products-co/about-6>

WHY THIS MATTERS

Producing materials is responsible for the largest share of embodied carbon in the built environment. The 2024 Infrastructure Australia report found that a 23% reduction in upfront carbon emissions is possible by 2026–27 by applying like-for-like decarbonisation strategies that that can be achieved by industry and government actively working together.

Clear and consistent government/industry policies and funding support are crucial to incentivise manufacturers to invest in low carbon technologies and provide long-term market signals. If done well, tax credits or subsidies can kick-start a market for green products and give companies the certainty to take the plunge. Once running effectively, the government can then remove the incentives. While these government incentives will start the process, it will take steady work from industry and government to make it a reality.

Carbon penalties provide strong market signals that drive business adoption of lower carbon solutions. Lowering the baselines of the Safeguard Mechanism in line with Australia's targeted emissions reductions will continue to drive investment in decarbonisation pathways, particularly for reporting entities.

Designers and specifiers trust EPDs and know that EPD data is useful to inform specific product choices and for driving down emissions. EPDs make carbon intensity visible for practitioners, so they can make more informed choices. Having trustworthy EPDs available enables better evaluation of design options.

CASE STUDY:

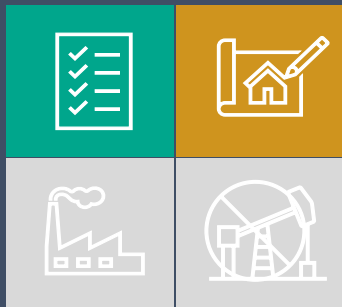
The **NSW Net Zero Manufacturing Initiative – Low Carbon Product Manufacturing Fund** supports NSW businesses and industries to lead in the net zero transition by increasing their competitiveness, attracting investment and opening new growth opportunities. From the total \$275 million in grant funding available, \$100 million is allocated to the Low Carbon Product Manufacturing Program to expand and increase local manufacturing capacity for low carbon products and materials.



4.

Prioritise a **re-use, repurpose, or “retrofit-first” approach** through brownfield development projects, infrastructure renewals, and major retrofits of existing structures. This includes reforming and aligning planning policies.

Policy Levers:



OPPORTUNITY

We often expect products and materials to be the key to decarbonising construction. While this is partly true, it is not the only way to abate carbon. Using material-efficient design to enable lower carbon outcomes is a key step to minimising upfront embodied carbon emissions.

Consideration of circularity, sufficiency and design optimisation from the concept stage onwards has significant carbon reduction potential, even before specific materials are selected. Assessing options to reuse and retrofit, as well as whether we can build more simply, on a smaller footprint, or whether we need to build at all, are fundamental in the earliest stages of a project and can be powerful tools to drive embodied carbon reductions at the planning stage; particularly in brownfield or urban infill development. It can also save on construction time.

Recommendations for both governments and developers to consider in their decision making:

- Assess strategic options in early project development and site selection to consider “no-build” and “reuse” options through brownfield developments and retrofit or repurposing of existing assets. This optioneering process is very important, as proposals are quite firm by the time authorities receive planning applications.
- Require planning applications to consider reuse and low build options and demonstrate how these have been considered in decision-making.
- Consider design solutions long before individual products and materials are considered. Decisions about column grid spacing, cantilevers, building spires and façade types are just a few design choices in buildings that can have a major impact.
- Encouraging planning mechanisms to consider and encourage Modern Methods of Construction (MMC) such as prefabrication, Design for Manufacture, Assembly and Disassembly, or offsite construction. These MMC practices can provide greater production efficiency, higher productivity, reduced waste and higher utilisation, and shorter construction times. We also know that design for disassembly, re-use and longevity also have long-term carbon benefits when considered appropriately.

* See Quay Quarter Tower case study, <https://www.architecturalrecord.com/articles/16041-3xns-quay-quarter-tower-in-sydney-transforms-and-expands-an-outmoded-1970s-skyscraper>

WHY THIS MATTERS

Better planning presents an opportunity to integrate decarbonisation into the local methods councils and state/territory governments use to assess projects. This allows for smaller-scale adoption and more granular control.

Deferring decarbonisation considerations until the product selection stage can lead to increased resource consumption, cost, as well as unnecessary embodied carbon impacts. An exclusive focus on using material substitution to achieve lower embodied carbon emissions can also lead to perverse outcomes, such as decreasing durability or increasing maintenance costs by choosing inferior materials.

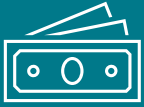
In the residential space, the immediate opportunity for upfront embodied carbon reduction is in design, retrofits and better waste management. Substitution with low carbon materials is important, but the earlier decisions are made the better, long before product selection occurs.

Use of structural components prefabricated off-site reduces on-site construction activities and limits the movement of heavy machinery and materials, minimising the impact on local biodiversity and the emissions associated with transportation and on-site operations.

Using case studies to illustrate the benefits of re-use and retrofit options help industry to visualise low-carbon solutions. Green Star rated Quay Quarter Tower in Sydney is one great example of how an existing planning regulation around height restrictions* led to sustainable design innovations, reuse of the existing structure and huge reductions in upfront embodied carbon.

CASE STUDY:

The **NSW Government’s Sustainable Buildings SEPP** shows how a state’s planning system can control the measurement of embodied carbon. The Sustainable Buildings SEPP covers new residential and non-residential buildings, and alterations and refurbishments over certain thresholds. As the policy elevates expectations for the design and delivery of buildings in NSW, it will influence targets, processes, reporting and skills development across the country.



5.

Demonstrate leadership by updating government funding, tender and procurement requirements or processes to include embodied carbon minimum standards, and transition towards fossil-fuel free transport and construction processes.

Policy Levers:



OPPORTUNITY

FOR GOVERNMENTS

To establish reliable demand, assets need to be designed and procured differently. Governments' collective purchasing power can be used to transform the product supply market, creating economies of scale for the manufacture of lower-carbon products.

The Australian government's [Environmentally Sustainable Procurement Policy](#) requires high value procurements in specific categories to address environmental impacts, such as circularity and upfront embodied carbon emissions. This includes reporting and contract management obligations.

By taking proactive steps to lead the market, federal and state/territory governments can normalise low carbon construction design and practices, encouraging industry to learn on the job.

One effective lever to achieve faster decarbonisation on projects is for the decision-maker (government or private) to signal embodied carbon reduction expectations and reward decarbonisation on projects. This can be done by setting carbon objectives, targets and requirements for the project and providing incentives to go further, such as through tender evaluation criteria, financial incentives or accelerated approvals processes.

Government projects should also establish a clear expectation that low carbon options are to be considered in decision-making through business case and procurement processes, so that they can be embedded from the early stages of project planning.

FOR INDUSTRY

Early market engagement with contractors and suppliers is critical to establishing expectations and collaborating with the supply chain on decarbonisation. Industry can also signal embodied carbon reduction expectations via corporate objectives and procurement policies.

Industry can share lessons learnt through piloting low carbon design and construction methods, de-risking creating demand through adoption of innovative new technologies. Sharing knowledge or lessons learned on how barriers have been overcome is also important in establishing new techniques and innovations.

WHY THIS MATTERS

Government leadership is key to establishing minimum acceptable standards of decarbonisation and in developing the needed scale of market capacity for lower-carbon products. Some products that can lower carbon in construction are already available today. However, more will need to be developed, and manufacturing practices will transition faster when economies of scale are established through consistent demand.

The built environment sector needs the confidence to pursue change with speed and certainty, and to leverage investor confidence in government policy settings arrived at to meet legislated Net Zero commitments.

It is only when we are all heading in the same direction, all lending momentum to each other, that our potential for rapid decarbonisation will be achieved. Anything less will achieve much less, both for our nation and our planet.

CASE STUDIES:

Infrastructure NSW (INSW) released its **Decarbonising Infrastructure Delivery Policy** in April 2024. This policy applies to public buildings over \$50 million and other infrastructure projects over \$100 million. It requires carbon to be assessed and reported and key stages in the project lifecycle to inform decarbonisation efforts and decision-making. Carbon must be considered in early options analysis and monetised as part of the Cost Benefit Analysis, in line with NSW Government Business Case Guidelines. Agencies must also incorporate low carbon design and construction methods into procurement requirements, consider carbon in tender evaluation, and allow tenderers to challenge the brief to provide innovative ways to reduce carbon.

City of Oslo's Clean Construction Leadership policy demonstrates how to implement clean construction practices such as:

- Prioritising retrofit of existing buildings over demolition
- Ambitious energy performance and decentralised renewable production
- Construction material reuse targets
- Zero-emission construction sites



6.

Build capability, awareness and skills by developing aligned training and education materials across the construction sector and its value chain, including practical guidance for reducing embodied carbon and achieving more with fewer resources.

Policy Levers:



OPPORTUNITY FOR GOVERNMENTS

Infrastructure NSW undertook a decarbonisation capability survey in 2024, which identifies high priority areas to uplift capability in government and industry. States, territories, and local governments must play an active role in shaping the timeline and development of decarbonisation policies and the mechanisms that will enforce them. Local governments, in particular, need support to clearly communicate these requirements to end users. This will empower building and development applicants to maximise opportunities for decarbonisation at every project stage.

FOR INDUSTRY

Peak bodies and professional associations have a key role to play in leadership and education, and in providing their members with a national and potentially international competitive advantage. Practical advice is required on reducing carbon intensity, designing out waste, embracing circularity principles, enhancing material efficiency and reducing embodied carbon.

ASBEC and its industry body members should develop common foundational 'carbon literacy' training resources that are aligned to best practice carbon management standards*. This should be built upon with role specific training resources (e.g. for designers, construction managers and procurement teams). Industry peak bodies can also play a role educating on low carbon design and construction solutions specific to buildings and various infrastructure assets.

The built environment value chain could incorporate training and education into existing university degrees, as well as industry programs such as Continuing Professional Development (CPD). It should also continue supporting aligned embodied carbon content across industry bodies that deliver embodied carbon training.

Built environment stakeholders can all play a role in building awareness of and creating confidence in using lower carbon materials for their projects. MECLA provides guides to procuring low carbon concrete, aluminium, steel, engineered timber and other materials, allowing contractors and people in the industry to better understand what is available and how to ask for products with equivalent performance and durability.

*Example of international carbon management standards include [PAS 2080](#) and the [RICS whole life carbon assessment](#)

WHY THIS MATTERS

There is a diverse range of occupations contributing to decarbonising buildings and infrastructure, each with a distinct mix of supply and skills challenges. Further work and collaboration between government and industry is required to build workforce capacity, such as defining the skills we need at a national level, filling in knowledge gaps, raising awareness and skilling our future workforce.

Decarbonising the built environment requires the acquisition of new knowledge and skills across the entire construction value chain, from product manufacturing to design, procurement, construction, maintenance, and deconstruction. A systematic and coordinated approach to education and training is essential to ensure that the industry and all stakeholders understand the significance of low-carbon construction and how it can be successfully implemented.

Training and education resources based on a consistent regulatory framework are the foundations of more sustainable practices crucial for Australia to meet its environmental goals and also foster economic resilience.

There is a high level of upfront carbon awareness in the built environment sector, but government and industry require additional support to apply this to the decarbonisation of projects. As change is perceived to involve risk, the consistency of expectations, regulations, practices, specifications and both local and global standards reduces the risk of making changes in the wrong ways.

CASE STUDIES:

The Green Building Council of Australia's [practical guide to reducing upfront carbon](#) outlines steps to be taken during the design and construction process and offers solutions for common challenges. It is also about to release a guide specific to residential upfront carbon considerations.

NABERS is now providing [training resources](#) to help the uptake of their embodied carbon methodology and tool. Participants learn how to apply the NABERS methodology for consistent and comparable results.

XX
CO₂e/ m²

7.

Resource the inclusion of a minimum standard for upfront carbon for all new commercial buildings in NCC 2028 using NABERS methodology, with increases to minimum standards over time.

Start collecting aligned data on residential buildings and consider a **simplified calculator to assist residential design decisions**.

Policy Levers:



OPPORTUNITY

FOR GOVERNMENTS

Establishing broad, consistent, reliable demand for low carbon construction will support faster industry transformation. Setting minimum standards will mean that it is clear that Australia is committed to decarbonising the built environment, while not creating onerous requirements for compliance.

In June 2024, building ministers agreed to include a voluntary pathway in National Construction Code (NCC) 2025 for commercial buildings to measure and report on embodied carbon utilising the National Australian Built Environment Rating System (NABERS) method. Ministers also asked the Australian Building Codes Board to investigate how to incorporate and fund inclusion of a future minimum standard for embodied carbon in NCC 2028 to further support Australia's transition to net zero.

Any performance requirements for upfront embodied carbon in commercial buildings should be separated from existing performance requirements in the NCC. This would help to avoid unintended trade-offs (e.g. energy efficiency, structural performance).

Design-stage decisions should be documented properly* and included in regulatory frameworks. This can be achieved by jurisdictions adopting the Building Confidence Report model guidance for design documentation.

Preliminary action for the residential sector needs to focus on data collection and sector upskilling. NatHERS (Nationwide House Energy Rating Scheme), and other aligned frameworks and tools (such as BASIX) should be adapted to estimate and compare embodied carbon in houses. Clear links and alignment with the NABERS common methodology are still required.

FOR INDUSTRY

Mandatory measurement allows for data collection from projects, providing insight into current industry practices and informing the development of benchmarks, easy wins and innovative design practices.

Developing a simplified and NABERS-aligned voluntary calculator to assist residential design decisions can have immediate effect and help the sector understand more about how size, design and product selection (of equal performance and durability) can impact upfront carbon emissions for homes.

* As per [Building Confidence Report model guidance](#), recommendations 13 to 16.

WHY THIS MATTERS

While many embodied carbon reduction opportunities occur at the concept/planning/design stages, setting embodied carbon targets through building regulation creates a clear path for sector-wide decarbonisation. Any embodied carbon measurement/disclosure mechanisms will rely on effective design documentation processes, as recommended in Australia's [Building Confidence Report](#).

Having a clear pathway and signals for increasing minimum standards over time is international best practice. It helps to signal to industry that a change is coming. This staged approach to considering embodied carbon in policy (i.e. voluntary > signalling > mandatory measurement and reporting > targets or benchmarks) has worked in countries across the world and allows for industry to adapt and evolve over time.

The use of well-defined and enforceable targets is essential for supporting Australia's broader decarbonisation goals in the built environment, driving meaningful change across the sector. Targets establish expectations and enable continuous improvement, ensuring that progress is made at a steady pace while allowing the industry to adapt to lower-carbon solutions.

Manufacturers also need confidence in the future demand for their low-carbon offerings so that they can build a business case and economies of scale to bring down the price for low-carbon solutions. This can greatly enhance market opportunities for businesses that do produce low-emissions products.

CASE STUDIES:

In 2023, **Denmark set a lifecycle analysis requirement in their building code**, including carbon emissions limits of 12 kg CO₂/m²/year. That limit reduced in 2025 and now applies to smaller buildings.

Since 2020, over 700 commercial, industrial, public, and apartment buildings have been **voluntarily reducing their upfront carbon emissions as they seek a Green Star Buildings rating**. To achieve a rating, they must show a reduction of at least 10% compared to a reference building, with higher star ratings needing a 20% reduction. Green Star Buildings rewards reductions through better material selection, reuse, and design improvements. Upfront carbon reductions are also required for precincts in development through Green Star Communities v2. In 2025, a minor update to Green Star will result in the adoption of the NABERS Embodied Carbon tool. These reductions are a critical step in aligning with Australia's net zero ambitions and supporting a low-carbon construction industry.



8.

Implement policies that **secure a level playing field for Australian manufacturers of building and construction products**, underpinned by consistent and comparable emissions data in line with international standards, and incentivise low carbon products made or re-made, in Australia.

Policy Levers:



OPPORTUNITY

FOR GOVERNMENTS

We need information on construction products that is consistent, comparable, and competitive. Trusted data and information exchange protocols need to be followed.

If the Australian government makes any attempt to create a level playing field for imported construction products and materials, having reliable and third-party verified process lifecycle assessments will be critical to establishing a level playing field of carbon measurement. The Australian government should ensure strong, consistent standards of carbon measurement for all forms of supply, whether domestic or imports.

The Australian Government could explore reestablishing Australia's National Greenhouse Gas Consumption Inventory (last updated June 2019 – DCCEEW). Regular measurement would allow Australia's scope 3 emissions to be better estimated, essentially including imports and excluding exports. It would assist estimation of embodied emissions in capital formation in the construction industry.

FOR INDUSTRY

Given the extent to which genuine embodied carbon reductions depend on reliable measurement, Australia will need a robust and standardised verification process for embodied carbon data.

The built environment industry needs to work collaboratively with the life cycle analysis (LCA) sector to encourage consistency and reliability in the delivery of LCA assessments. Professional industry standards for the LCA community would greatly assist with trust and integrity – both within Australia and internationally. Align the sector with the frameworks that have been established.

As mentioned in Recommendation 3, having reliable carbon emissions information requires transparent, trustworthy and verifiable information exchange across the construction products value chain. Some Australian organisations are collaborating to provide an industry framework on facilitating the sharing of accessible, verifiable, timely and harmonised information on construction product attributes in association with its physical movement along the construction supply chain.

WHY THIS MATTERS

Coordinated, strategic action will be necessary to future-proof our supply chain. In ASBEC's consultation, stakeholders expressed concern about imported products, and particularly the carbon impacts coming in across the border without credible data or consideration. They specifically requested a "level playing field".

Australian manufacturers are working hard to reduce their carbon footprints. Transparency of carbon impacts, which are declared on a credible and trusted basis (such as in EPDs), will allow suppliers of building and construction products to compete on a level playing field.

Maintaining the integrity in measuring the emissions of building and construction products depends on rigorous professional industry standards. Strengthening quality assurance, auditing processes, and accountability measures will safeguard consumer confidence and program credibility.

Currently there are no agreed standards for building product manufacturers supplying the Australian construction industry to follow in relation to the creation, storage, management and exchange of product information. This makes it impossible for the industry to efficiently share reliable and trusted information about building products in a consistent way.

Consistency and comparability is so important to achieving emissions reduction targets – that's why NABERS developed a consistent method for measuring, benchmarking and verifying embodied carbon.

CASE STUDY:

The US Environmental Protection Agency wanted to help ensure that manufacturers have a consistent method of reporting on their embodied carbon emissions across the country, instead of facing a confusing and costly patchwork of requirements in different markets and regions. Their [*Implementation Approach for the U.S. EPA Label Program for Identifying Low Embodied Carbon Construction Materials*](#) lists construction products (whose manufacturers have invested in reporting and reducing their embodied carbon emissions) in a central, publicly accessible registry, making it easier for customers to identify and purchase these products. They are implementing their program in two phases:

1. Standardising and improving the quality of data underlying and provided by EPDs
2. Establishing standardized methodologies and definitions for low embodied carbon, based on robust EPDs and other credible, relevant data

BACKGROUND AND RATIONALE



WHY ACTION IS NEEDED

Countries across the globe are working on decarbonisation strategies for their built environments. While strategies to reduce emissions in the built environment have previously focused on operational emissions (see Scopes 1 and 2 in Table 1), there is a growing emphasis on also addressing embodied carbon (see Scope 3 in Table 1) due to the rapid decarbonisation of the electricity sector.

Embodied carbon is defined as the embodied carbon emissions that occur upfront during construction from materials and site activities, in-use emissions from maintenance works, and end-of-life emissions. Out of these, upfront carbon is the most critical, as it is large (around 70% of all embodied carbon*) and cannot be changed once the building opens, as it is spent.

Most embodied emissions occur upfront, in contrast to operational emissions, which accumulate over time. In general, the built environment’s “Scope 3” emissions can generally be considered as the manufacturing sector’s “Scope 1” emissions – which is why it’s important for the built environment sector to create demand for low-carbon materials and stimulate its industrial/manufacturing supply chain to offer decarbonised solutions.

*Source: *Embodied Carbon Projections for Australian Infrastructure and Buildings*, Infrastructure Australia, 2024

WE STILL NEED TO REDUCE THE BUILT ENVIRONMENT’S OPERATIONAL CARBON EMISSIONS

The largest source of carbon emissions in the Australian built environment today is operational emissions. We must continue to decrease these emissions for both existing and new assets.

We know how to reduce operational carbon:

- Reduce the energy needed to operate the asset
- Electrify to reduce fossil fuels needed
- Adopt renewable electricity or other renewable energy sources.

Greenhouse gas emissions in 2022	Residential (Mt CO2-e)	Commercial (Mt CO2-e)	Total Built Environment# (Mt CO2-e)
Scope 1 Stationary combustion ¹	11	6	17
Scope 1 Refrigerants ¹	-	-	9
Scope 2 Electricity use ¹	41	35	77
Scope 3, upfront embodied carbon emissions ²	-	-	21
Estimated total emissions in the built environment across Scopes 1, 2 and 3 in 2022			128

Table 1: Scope 1, 2 and 3 emissions from Australia’s Built Environment

1. Climate Change Authority (CCA) (2024), [Sector Pathways Review – Built Environment Sector Summary](#)
2. Infrastructure Australia (2024), [Embodied Carbon Projections for Australian Infrastructure and Buildings](#)

As defined by the Climate Change Authority (2024 – above), the “Built Environment” consists of “... residential and commercial buildings, and physical infrastructure (such as footpaths, roads and bridges), that provide the settings for human activities.

EMBODIED CARBON WILL BECOME THE DOMINANT SOURCE OF CARBON EMISSIONS FOR THE BUILT ENVIRONMENT UNLESS EFFECTIVE ACTION OCCURS AT THE NATIONAL SCALE.

Embodied carbon emissions are those that occur:

- Upfront during construction from materials manufacturing, transport to site, and site activities.
- From maintenance activities and refurbishment of the asset.
- At the end-of-life as the building is disposed of and demolished.

Out of these, upfront carbon is the most critical, as it is large (around 65 to 75% of all embodied carbon – see Figure 1*) and is emitted before the asset opens its doors for business. This is because most of these emissions occur from the manufacturing emissions for the steel, concrete and other materials used, and the emissions from fuels in transport and construction equipment.

Decisions at the upfront stage serve to determine the overall amount of carbon in other stages:

- The more that is built, the more emissions will occur upfront, and in the maintenance and end-of-life stages.
- A decision upfront to not demolish an existing asset and refurbish or repurpose saves not just its end-of-life emissions but significantly reduces the need for carbon upfront.

Emissions from embodied carbon mostly come from materials, but decisions about the design of the building, and whether to reuse an asset, are just as important and all are valuable levers that can be used in our decarbonisation journey.

For more information about GHG emissions and their relation to asset life stages (e.g. used in PAS 2080 Carbon management in buildings and infrastructure), see ASBEC's Infrastructure Net Zero paper, *A solid foundation: A common definition for net zero infrastructure and how to get there* (2025).

*Source: *Embodied Carbon Projections for Australian Infrastructure and Buildings*, Infrastructure Australia, 2024
life cycle modules as described in EN 15978:2011 *Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method*

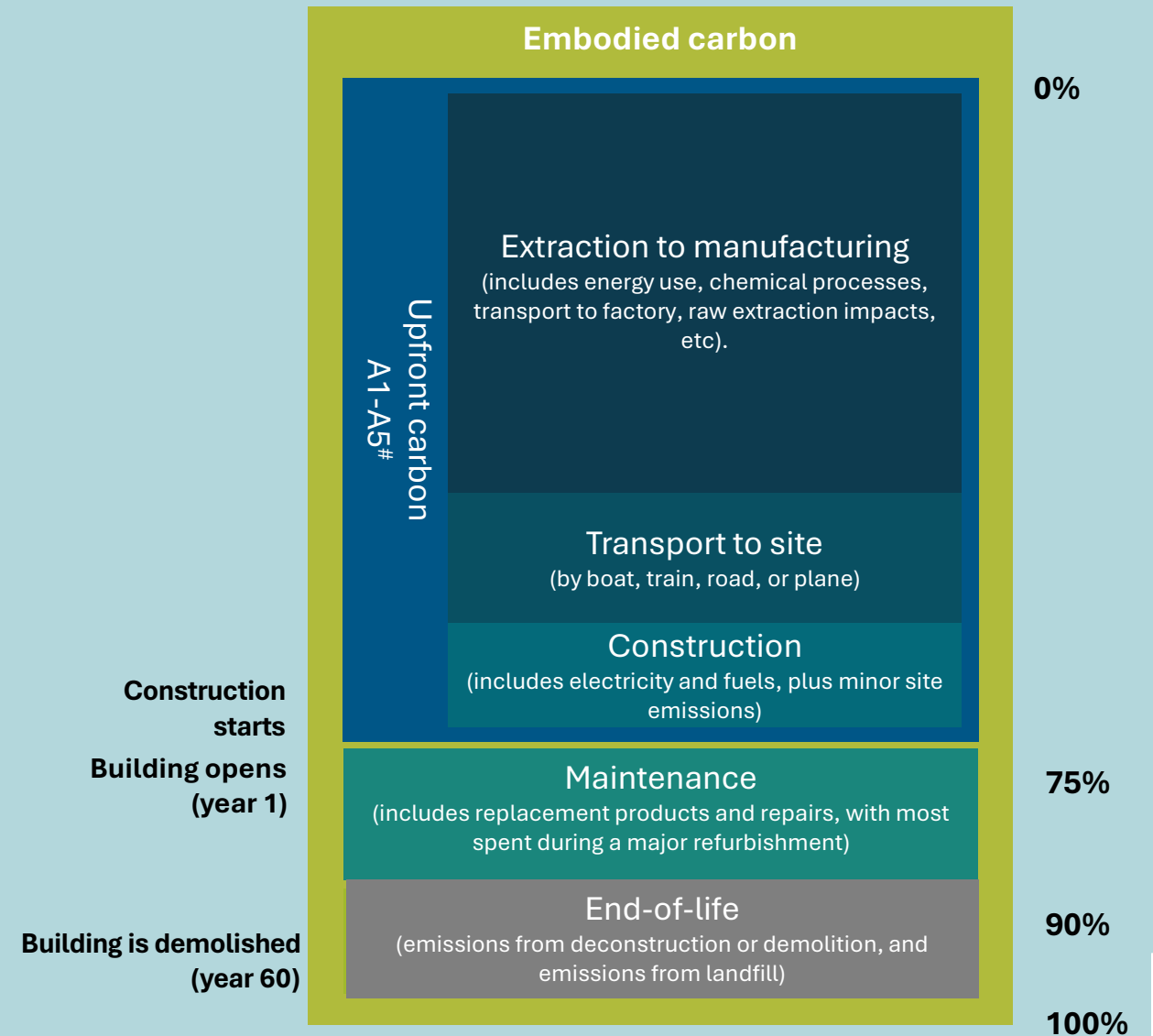


Figure 1: Where is the embodied carbon?*

EMBODIED CARBON HAPPENS IN ALL THE SECTORS OF THE BUILT ENVIRONMENT AND INFRASTRUCTURE

Residential construction alone sits at 32%*. This means that smaller projects are responsible for over a quarter of national embodied carbon emissions from the built environment. This is a significant proportion, illustrating that the contribution from smaller projects cannot be left behind. The residential sector can benefit from tools that help designers understand the upfront carbon consequences of their decisions (using the decarbonisation hierarchy outlined in the next page). Builders can also reduce upfront carbon emissions by minimising waste and employing more circularity principles.

Infrastructure collectively (road, rail and including large scale utilities) makes up 35%*. There is also strong case for greater alignment with the built environment sector for action.

The biggest impact on embodied carbon can happen at the beginning of any type of construction – especially at concept stage. It is a large amount, happens once, and cannot be changed afterwards.

There are many quick-wins available – and some which also have significant material cost savings:

- Encouraging better measurement and management of the quantities of materials ordered in projects, to produce less waste.
- Simple design changes, such as structural steel designed in a shape with less mass but similar strength.
- Avoiding emissions intensive choices, such as cantilevers in buildings.
- Optimising the size and simplicity of the engineering and design.

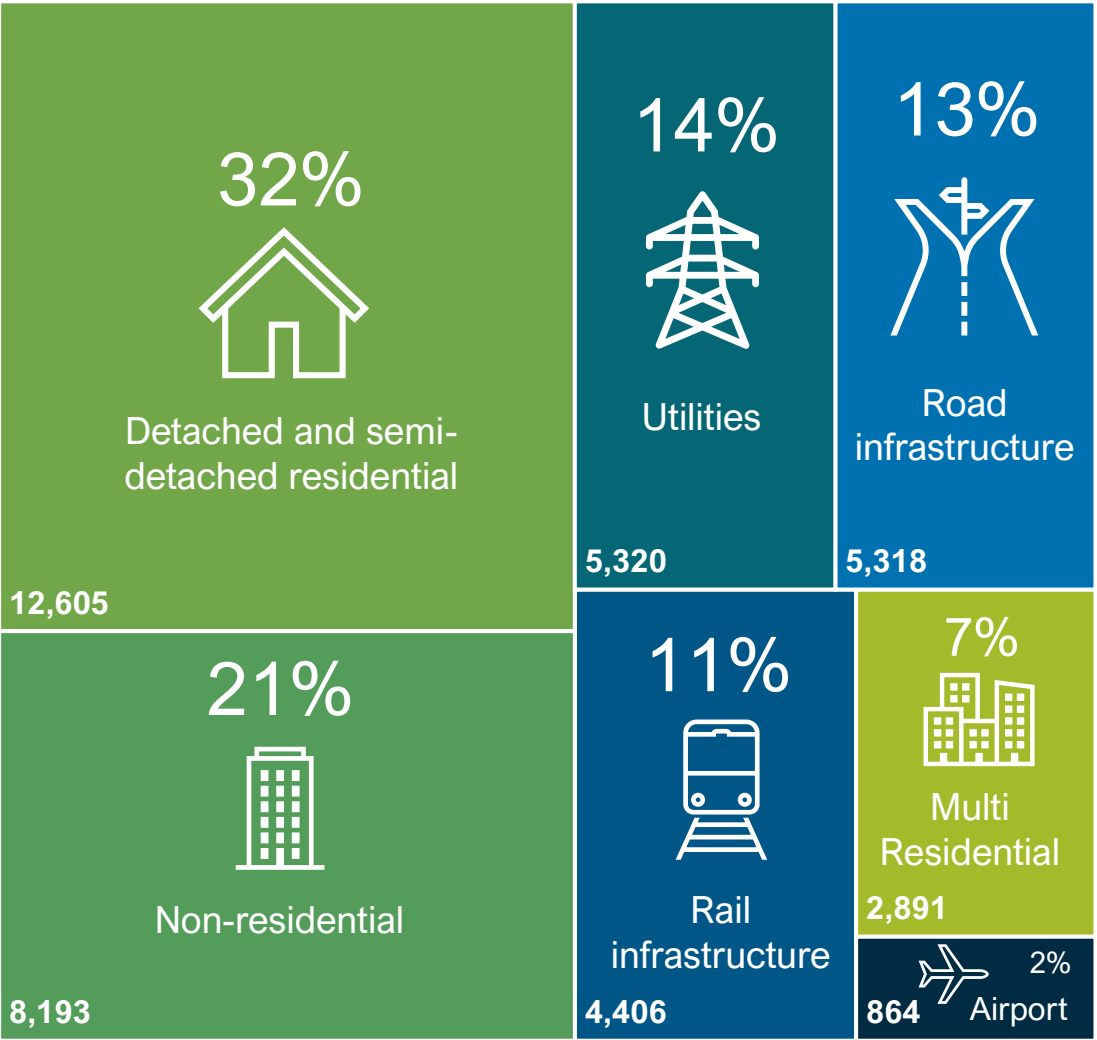


Figure 2: Embodied carbon (kt CO₂e) per typecast for Baseline Scenario by life cycle module in baseline year FY 2023 (Hybrid Analysis)*

*Source: *Embodied Carbon Projections for Australian Infrastructure and Buildings*, Infrastructure Australia, 2024. Note that these quantities are based on a hybrid analysis and gross emissions, not the official net emissions. This data also does not include building fit-outs, which can be significant in terms of emissions over a building’s life.

THE DECARBONISATION HIERARCHY CAN HELP US MAKE BETTER DECISIONS

The decarbonisation hierarchy is a framework for reducing carbon, shown in the figure below and featured in ASBEC's Issues Paper. It demonstrates that the opportunity to reduce carbon is greatest in the early stages of a project. This is similar to the "Avoid/Switch/Improve" methodology being recommended in Infrastructure NSW's "[Decarbonising Infrastructure Delivery Policy](#)" adapted from PAS 2080:2023.

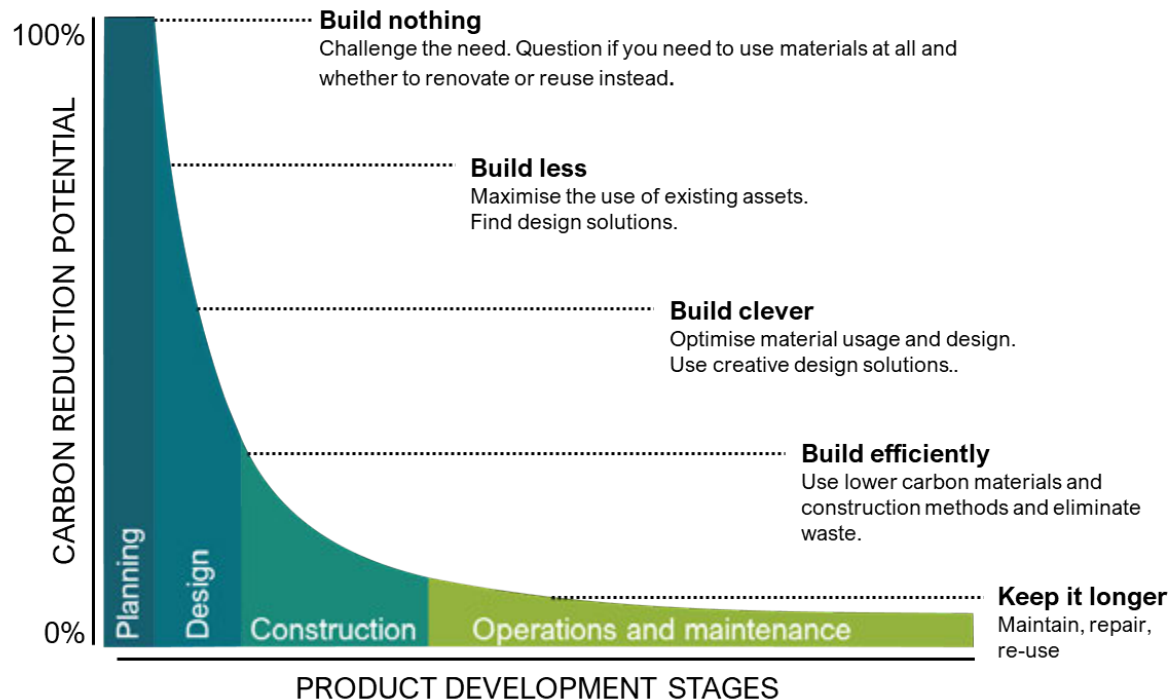


Figure 3: Opportunities to reduce embodied carbon from stages in project cycle
Adapted from source: HM Treasury Infrastructure Carbon Review, 2013

WE HAVE ALREADY STARTED OUR EMBODIED CARBON JOURNEY IN AUSTRALIA

- ✓ We have adopted a credible national methodology for measuring embodied carbon (NABERS), which is aligned across buildings and infrastructure.
- ✓ We are introducing embodied carbon ratings as a voluntary pathway in the National Construction Code from NCC 2025. Building Ministers will consider how to incorporate a minimum standard for embodied carbon in NCC 2028.
- ✓ The Infrastructure and Transport Ministers' Meeting (ITMM) agreed to a [nationally consistent approach for valuing embodied carbon for use in transport infrastructure project decision making](#).
- ✓ ITMM has also agreed to a nationally consistent approach for [measuring embodied carbon for use in transport infrastructure projects](#).
- ✓ All infrastructure proposals submitted to Infrastructure Australia must consider their impact on GHG emissions, and there is in principle agreement that jurisdictions should consider upfront and enabled emissions as part of the cost benefit analysis for transport infrastructure projects receiving over \$100 million in state/territory government funding.
- ✓ Many governments have established embodied carbon reduction requirements for government projects (e.g. Australian Government's [Environmentally Sustainable Procurement Policy and Reporting Framework](#)).
- ✓ Voluntary tools such as Green Star have also adopted upfront embodied carbon targets and are working to align with the NABERS embodied carbon tool in the next version update.
- ✓ Australia's mandatory climate reporting regime requires annual disclosures on scope 3 emissions (which can include upfront embodied carbon) from the second reporting year onwards.
- ✓ Industry-led initiatives like the Materials and Embodied Carbon Leaders' Alliance (MECLA) have produced a range of resources and case studies to help inform and encourage innovation.

TARGETS



THE BUILT ENVIRONMENT NEEDS TO REACH 60-75% UPFRONT EMBODIED CARBON REDUCTION BY 2035

Figure 3 presents a decarbonisation trajectory for upfront embodied carbon emissions in the built environment, taking into account global carbon budgets and Australia's projected construction growth. The year 2020 was chosen as a baseline year because it reflects upfront carbon footprint values close to those expected for the Australian market (Infrastructure Australia, 2024, Table 56; Slattery, 2023).

We then compared this trajectory to the Climate Change Authority's projections which include state-based commitments. Their target matches our calculation – a reduction of around 60-75% embodied carbon from 2020 levels. By 2050, upfront carbon emissions need to reduce by effectively 100%.

THE LAG BETWEEN REGULATION, PLANNING, DESIGN AND CONSTRUCTION

Because built environment assets are typically planned, procured, and designed several years before construction commences, future targets must be pulled forwards. A gap or "lag" of 3 years between design and construction is assumed, though in practice there will be significant variation between different categories of buildings and infrastructure.

This means that to meet our 2035 reduction targets, we need policy in place as soon as possible, noting the three-year National Construction Code revision cycle.

TRAJECTORY

Australian Sustainable Built Environment Council | ASBEC

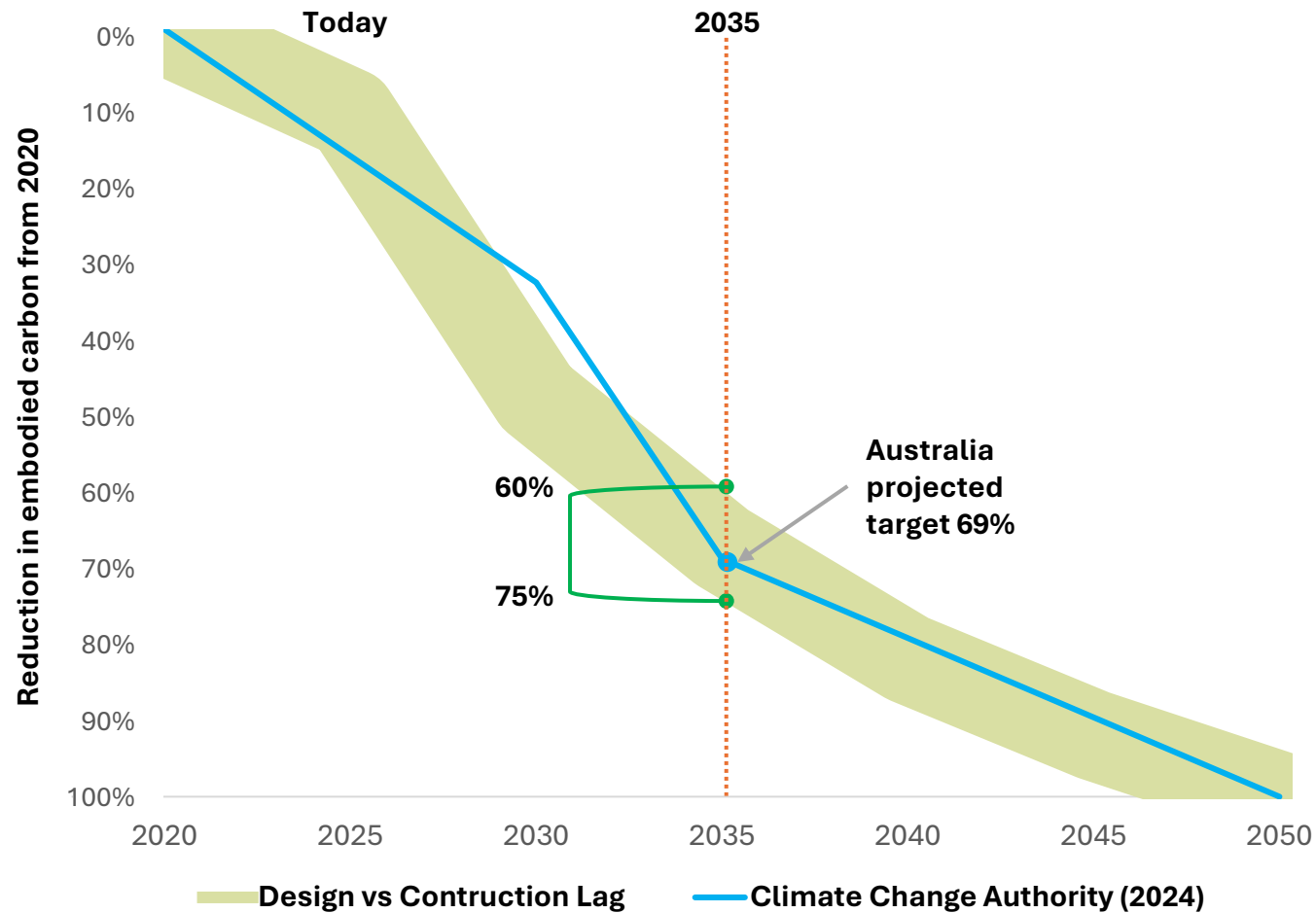


Figure 3: Upfront embodied carbon reductions trajectory for the built environment

MORE THAN MATERIALS



EACH BUILDING MATERIAL SECTOR IS ON ITS OWN DECARBONISATION JOURNEY...

...and they need to be supported by government to achieve their individual decarbonisation trajectories.

Some sectors that are able to electrify will be able to decarbonise as Australia's electricity grid becomes decarbonised; others will need to find technology solutions to replace emissions-intensive manufacturing process heat or chemical processes.

Infrastructure Australia's report, "Embodied Carbon Projections for Australian Infrastructure and Buildings" found that 23% of upfront embodied carbon in the built environment could be cost effectively abated by 2026-27 using direct like-for-like substitution of lower carbon materials.

However, harder-to-abate materials need commercial-scale technological change, and this takes time.

THIS MEANS THAT WE CANNOT DEPEND ON MATERIAL SUBSTITUTION WITH LOW EMISSION PRODUCTS OF SIMILAR PERFORMANCE TO MEET OUR MID-TERM REDUCTION TARGETS

We need to invest in decarbonising our supply chain, but this won't be enough to reach our target of 60 to 75% reduction by 2035.

Industry and government will need to work collaboratively and use every lever at our disposal.

The good news is that all the policy levers are available today, and we can set a policy pathway to maximise their impact.

MATERIAL DECARBONISATION TRAJECTORIES

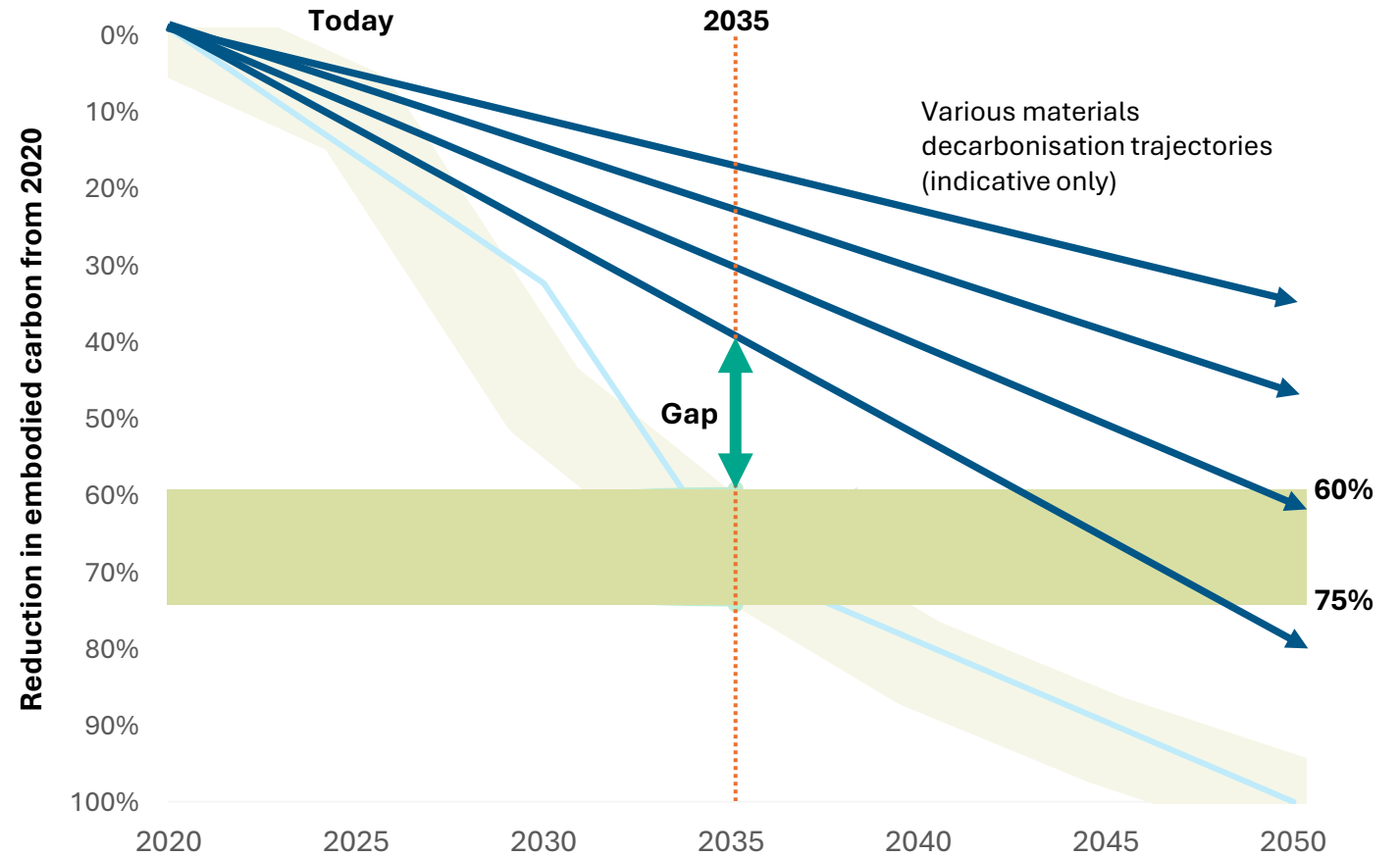


Figure 4: Material decarbonisation alone won't help us meet our 2035 emissions reduction targets

**POLICY LEVERS –
ACTIONS TO HELP
US ON THE WAY**



IT IS CRITICAL TO ACT NOW.

Decarbonising upfront carbon emissions is not an event, but a long-term process. The strategies put in place need to be transparent, clear, and communicated in advance. This will allow industry to make progress now as well as investing in longer-term strategies, rather than being overwhelmed with solving every problem at once.

With a large pipeline of infrastructure and building investment ahead, government and industry need to act now before early emissions are 'locked in' through decisions made when assets are planned, designed, procured, delivered and maintained.

Reducing upfront carbon emissions generates significant and immediate abatement.

We know that kicking off action to reduce the emissions of building materials and construction products (i.e. supporting manufacturing supply chains to decarbonise) needs to happen now because the trajectories for change are long.

We also know that some actions to design out upfront embodied carbon emissions provide important co-benefits, such as minimising construction costs (from using less materials), resilience to materials supply chain shocks, supporting modern methods of construction and adaptive re-use potential to contribute to national efforts to supply more affordable housing.

THE COMPOSITION OF OUR SOLUTIONS WILL CHANGE OVER TIME

While it seems like we have an enormous task ahead of us, we need to understand that much of the initial progress has the potential to be fast, effective, cheap and not disruptive to the supply chain.

We need to go hard in the early years to reduce emissions through better building design, material efficiency and planning mechanisms, but set in motion incentives to help building material supply chains fully decarbonise.

After 2035, we expect that our decarbonised construction products and materials supply chains will generate more substantial emissions reduction.

TO ACHIEVE A REDUCTION OF 60 TO 75% IN EMBODIED CARBON BY 2035, WE HAVE TO FOCUS ON ALL OUR POSSIBLE LEVERS.

These are the levers:



Reform **planning and procurement** to encourage low carbon projects



Reduce demand for carbon-intensive materials by **improving building design and material efficiency**



Scale up **supply chain decarbonisation** to increase the supply of low embodied carbon materials



Transition to **fossil fuel free transport and construction**

Some levers are easier to employ than others, which is why our roadmap recommends actions across all of them. In some cases, such as with supply chain decarbonisation, we need to start now so that we can reap the significantly large benefits much later. In others, like making better design decisions, we can start now and see benefits sooner. Both short- and longer-term action puts us on a better trajectory to meet our overall emissions reduction commitments.

The approach that we need is more complex than the formula for reducing operational carbon. We require action across planning policy, building codes, procurement strategies, industrial policy, fiscal policy, and energy policy.

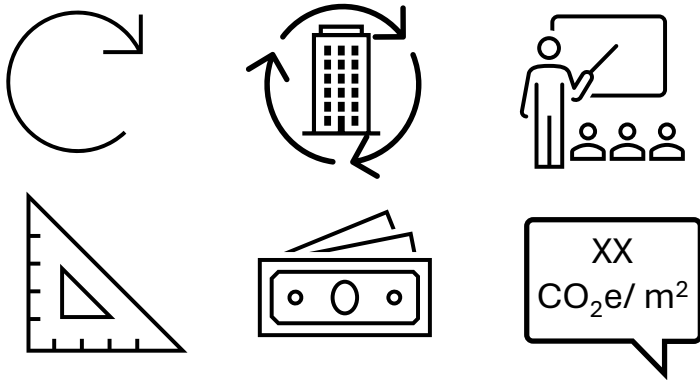
The following recommendations and actions have been chosen for their impact and feasibility, based on feedback from ASBEC's Issues Paper consultation.

REFORM PLANNING AND PROCUREMENT TO ENCOURAGE LOW CARBON PROJECTS



WHAT WE NEED TO START RIGHT NOW AND CONTINUE THE MOMENTUM OVER THE NEXT FEW YEARS:

Refer Key Recommendations 1, 2, 4, 5, 6, 7



Decarbonised design and construction is currently not an expectation in Australia. Government and industry need to show how to deliver low-carbon assets, including by making the best use of existing structures and making the economy more circular.

ACTIONS TOWARDS 2028

- > Industry and government to continue to share learnings and approaches to state/territory and local planning policies across the country that encourage retrofit-first or reuse considerations for buildings and infrastructure.
- > Industry and government to use planning and procurement policies to drive upfront embodied carbon reduction and circular design/construction practices, verified through a NABERS Embodied Carbon rating or similar.
- > Develop and promote standards for assessing and accepting reused structures and materials.
- > Transition from “knockdown-rebuild because new is better” to “make old into new again” as the most attractive option. That will take knowledge of how to do it to make it attractive to the market.
- > Government design and procurement policies should encourage (alongside all other expectations of quality, safety, energy performance, durability, etc.):
 - 20%-40% reduction in upfront carbon emissions (both via design choices and selection of lower emission products with equivalent performance and durability)
 - Measured and verified emissions (e.g. EPD) for structural components
 - Transition to fossil-fuel free construction equipment on an ‘if not, why not’ principle.
- > Government to accelerate programs to reduce supply side emissions and further embed low-carbon materials in standards, business cases and procurement.
- > Industry and government work together to explore how to benchmark avoidance into embodied carbon policy.
- > Government and industry strive to reduce unnecessary fit-outs in their assets, e.g. avoid if possible, if not then reuse as much as possible, and where new material is required make sure it's low carbon (comparing products of equivalent performance and durability).

ACTIONS TOWARDS 2031

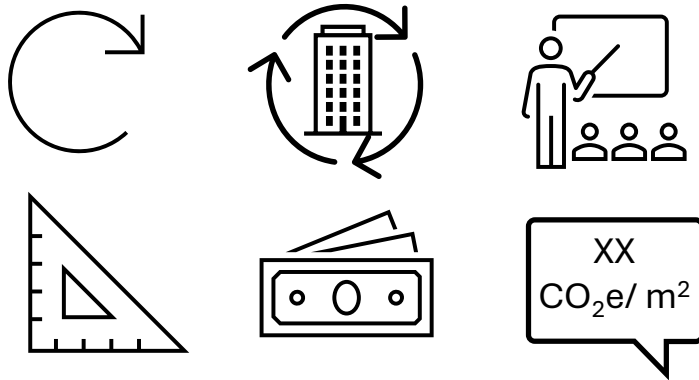
- > Planning mechanisms like floor space concessions (calibrated properly), density bonuses, accelerated approvals, and extending Clean Building concessions to encourage low-carbon and circular practices.
- > Government design and procurement policies encourage:
 - 40%-60% reduction in upfront carbon emissions
 - Measured and verified emissions (e.g. EPD) for structural components, façade, fit-outs and equipment
 - Fossil-fuel free construction equipment on an ‘if not, why not’ principle.

REDUCE DEMAND FOR CARBON-INTENSIVE MATERIALS BY IMPROVING BUILDING DESIGN AND MATERIAL EFFICIENCY



WHAT WE NEED TO START RIGHT NOW AND CONTINUE THE MOMENTUM OVER THE NEXT FEW YEARS:

Refer Key Recommendations 1, 2, 4, 5, 6, 7



Feedback from ASBEC's Issues Paper consultation emphasised the importance of designing out carbon at the project level rather than depending on low-carbon materials. This involves optimising design for carbon reduction, supporting the use of durable and efficient materials, and including considerations like “whole-life carbon assessments” and circularity in construction.

ACTIONS TOWARDS 2028

- > Fund, resource and adapt NatHERS and BASIX to align with NABERS emissions factors, and include an adjustment factor to ensure that small house sizes are encouraged (i.e. using less overall embodied carbon rather than per m²). This will help to collect data on carbon intensity of housing typologies.
- > Australian Government to adapt consumer facing material (such as “Your Home”) to align with embodied carbon objectives and circularity principles.
- > Industry to work collaboratively with government to create a simplified calculator to estimate and compare embodied carbon in houses.
- > Construction clients to incentivise focussing on design solutions first prior to selecting materials and products, to gain every advantage for low-carbon construction.
- > Establish and maintain a pattern book of low-carbon designs across common building and infrastructure typologies.
- > The Australian Building Codes Board, in collaboration with governments and industry, to publish guidance on Modern Methods of Construction.

ACTIONS TOWARDS 2031

- > Using available data, NCC Volume 1 sets progressively more stringent carbon budgets or % reduction targets for new construction using NABERS pathway for verification.
- > Use data collected via residential upfront embodied carbon calculators to understand more about the carbon impact of different housing typologies.
- > Industry and government to collaborate on creating and incentivising volume builders' catalogues to be full of more efficient and smaller sized homes, which cost less for consumers as they are using less material.
- > Fund and support NABERS to continue collecting data on embodied carbon emissions of all building and infrastructure products and projects, so that an embodied carbon reduction trajectory for projects can be developed to 2050.

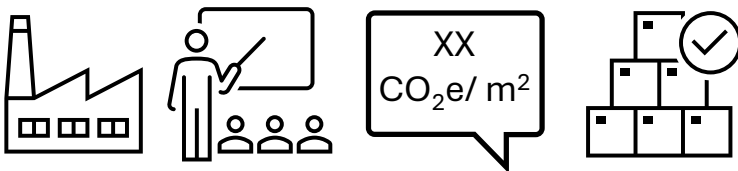
SCALE UP SUPPLY CHAIN DECARBONISATION TO INCREASE THE SUPPLY OF LOW EMBODIED CARBON MATERIALS



A1-A3 as described in EN 15978:2011 *Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method*

WHAT WE NEED TO START RIGHT NOW AND CONTINUE THE MOMENTUM OVER THE NEXT FEW YEARS:

Refer Key Recommendations 3, 6, 7 , 8



Without deliberate intervention to decarbonise the supply chain, embodied carbon will become the dominant source of carbon emissions for the built environment unless effective action occurs at the national scale.

Strong signalling from the built environment can support the supply chain to deliver better products and services.

ACTIONS TOWARDS 2028

- > Government incentivises and supports:
 - Australian manufacturers to understand and disclose the embodied carbon of their materials and products through trusted and verified processes such as Environmental Product Declarations (EPDs).
 - Industry associations to develop common EPD models, tools and reporting structures for members with very similar processes.
 - Innovation in low carbon materials through government market signals, procurement and business cases.
- > Governments to work with industry to:
 - develop specification guidelines on procuring low carbon materials.
 - investigate how carbon content can be included in a national building product information transparency framework or registration scheme.
- > Government and industry to fund flagship projects to test and validate new product options or explore 'low carbon complex structural systems', along with publishing case studies on the findings will accelerate their market acceptance and wider adoption – e.g. through MECLA.
- > The built environment industry to work collaboratively with the life cycle analysis (LCA) sector to encourage professional industry standards and consistency in the delivery of LCA assessments.

ACTIONS TOWARDS 2031

- > For all major construction products in structure, façade, fit-outs and equipment, accelerate data capture of emission factor data for the specific construction materials, derived from a third party-verified process life cycle assessments.
- > Industry to explore developing voluntary customer-centric information on carbon content for some construction materials (based on verified carbon emissions information), to compare like-for-like (e.g. similar to MEPS and energy efficiency).
- > Industry to streamline standards and performance metrics to address approval challenges and facilitate quicker adoption of low-emission construction materials.

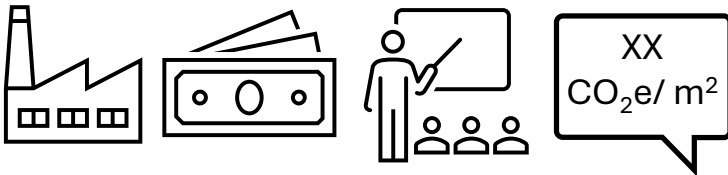
TRANSITION TOWARDS FOSSIL FUEL FREE TRANSPORT AND CONSTRUCTION



A4-A5 as described in EN 15978:2011 *Sustainability of construction works*
- Assessment of environmental performance of buildings - Calculation method

WHAT WE NEED TO START RIGHT NOW AND CONTINUE THE MOMENTUM OVER THE NEXT FEW YEARS:

Refer Key Recommendations 3, 5, 6, 7



Our industry needs to incentivise fossil free construction activities, rewarding projects that utilise renewable energy sources, fossil fuel free energy, and the electrification of construction plant and equipment. Transitioning to fossil fuel free construction is important not only for reducing carbon emissions, but can also provide a range of co-benefits including reduced local air and noise pollution, lower operating and maintenance costs, increased energy efficiency, reduced reliance on foreign fuel, and utilisation of locally produced renewable energy.

ACTIONS TOWARDS 2028

- > Government to:
 - Increase rate of development of new renewable electricity sources.
 - Require transition to fossil-fuel free construction equipment on an 'if not, why not' principle.
 - Increase research and development into low carbon liquid fuels (LCLF).
- > Government and industry to collect and share data on construction emissions.
- > Government to collaborate with industry to develop and implement cost-effective fossil-fuel free options for heavy transport.
- > Industry and government to prioritise, share case studies and signal the importance of fossil fuel free construction equipment and machinery.
- > Government and industry to improve energy efficiency during construction by:
 - Optimising testing and commissioning processes.
 - Using renewable or LCLF fuels to power existing construction equipment.
- > Transition construction sites to renewable energy sources and electrified methods with technical guidance.
- > Explore "mode shift", i.e. the shift from one mode of transport to another. For example, from road freight to lower emissions modes such as rail.

ACTIONS TOWARDS 2031

- > Industry and government to electrify all construction energy uses where possible.
- > Develop and implement roadmaps to fossil-fuel free construction sites, including cleaner fuels, energy efficiency, electrification and industry collaboration.



PROJECT JOURNEY



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BUILT ENVIRONMENT COUNCIL

ASBEC’S PROJECT AIM WAS TO CONTINUE THE GREAT WORK THAT HAD ALREADY STARTED, AND MAP OUT A POLICY ECOSYSTEM THAT COULD SUPPORT THE CONSISTENT MEASUREMENT METHODOLOGY DEVELOPED BY NABERS.

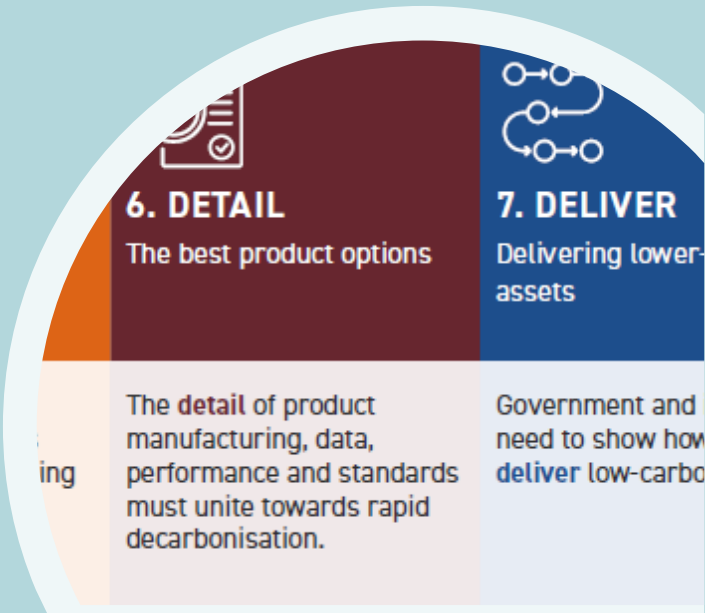
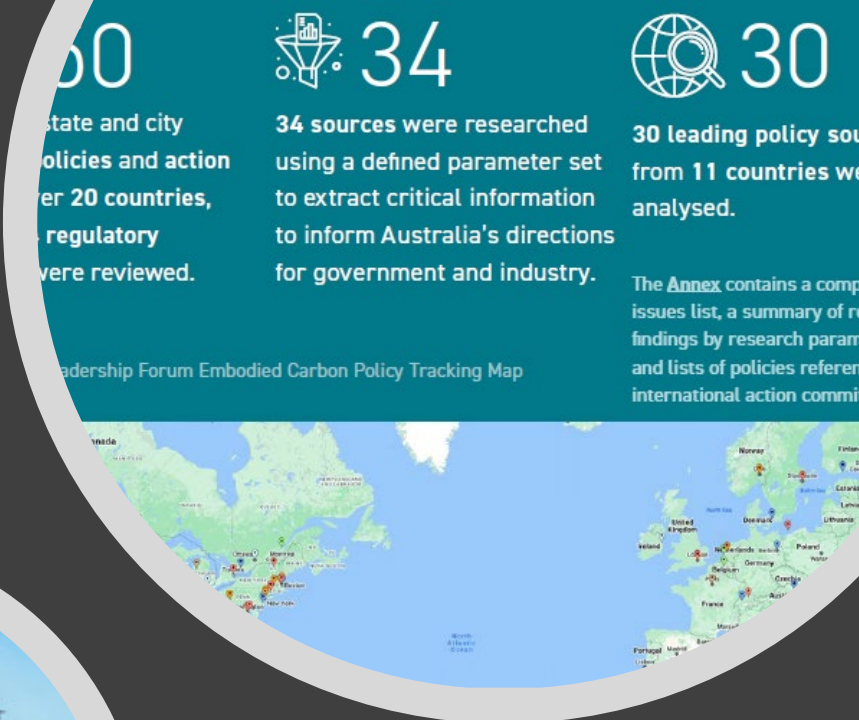
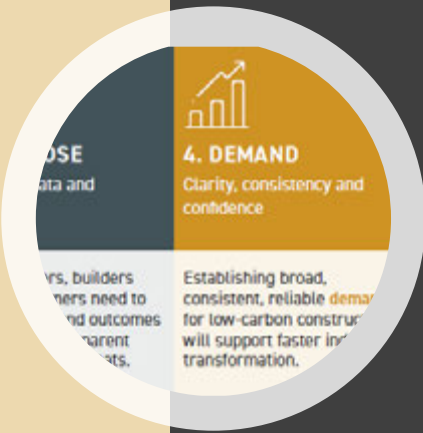
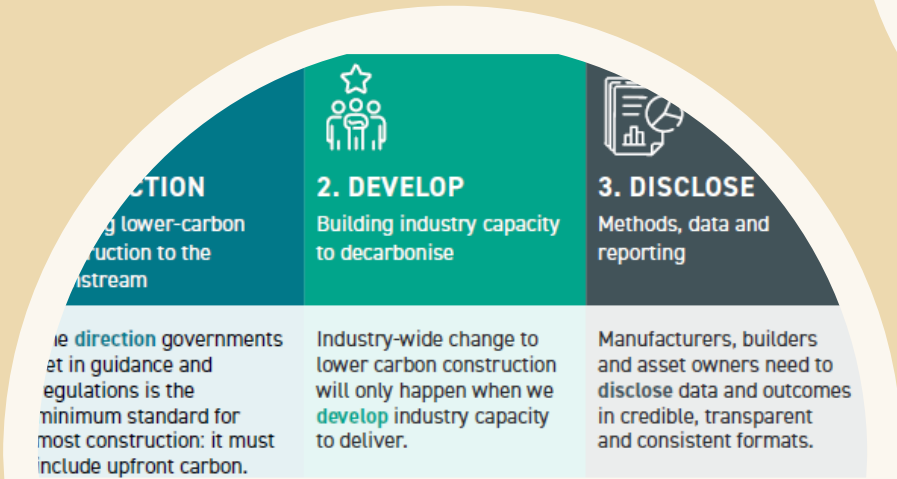
ASBEC’s Issues Paper, *Embodied Carbon Emissions in Australia’s Built Environment*, was released for feedback in June 2024. The purpose was to gather key stakeholder insights on upfront embodied carbon policy options for Australia’s built environment.

The Issues Paper laid out how the built environment contributes to Australia’s carbon emissions and why we need to focus on upfront embodied carbon now. Based on research findings from Australia and abroad, it highlighted the issues that need to be addressed to successfully tackle embodied carbon and to achieve Australia’s commitment to net zero carbon emissions by 2050.

Rather than addressing every industry issue, we aim to identify high-priority actions that will inspire rapid and significant progress. This will create an environment (policy and industry) of change that will enable the other issues to be resolved in time.

Details on the research and consultation component of this project are included in a separate Annex.

<https://www.asbec.asn.au/research-items/issues-paper-embodied-carbon-emissions-in-australias-built-environment/>



ASBEC’s embodied carbon [Issues Paper](#) highlighted the size of the challenge

While today’s embodied carbon emissions (10%) are less significant than operating emissions (21%), they are different. Operating emissions will reduce as the grid decarbonises and we make our buildings more efficient.

Embodied carbon (the embodied carbon emissions that occur upfront during construction from materials and site activities, in-use emissions from maintenance works, and end-of-life emissions) is forecast to rise without deliberate intervention to decarbonise the supply chain. This is because the emissions from the sector come from the amount of material we use as well as manufacturing and chemical processes – not just from energy emissions – and because we are increasing our rate of construction.

To address the built environment’s impacts on climate change, we need to reduce all carbon emissions across the whole life of an asset. Addressing upfront embodied carbon is the first step in a journey towards a circular economy. Tackling upfront carbon first gets the industry moving.

Upfront embodied carbon emissions are persistent, difficult to decarbonise, and “locked in” when the asset is built. This is why we are focusing on upfront now. Decarbonisation of upfront carbon emissions is not an event, but a long-term process. The strategies put in place need to be transparent, clear, and communicated in advance. This will allow industry to make progress now, rather than being overwhelmed with solving every problem at once.

Improvements to upfront embodied carbon will contribute to a more circular economy. However, the circular economy is a much broader concept, and embodied carbon is just the beginning.

The built environment sector can do more, now. We can tackle emissions under our control (design choices, procurement practices, construction methods) and consistently signal to our supply chain that carbon reduction is both necessary and urgent.



*Embodied Carbon Projections for Australian Infrastructure and Buildings, Infrastructure Australia, 2024. Note that this quantity is based on a hybrid analysis and gross emissions of 529,100kt CO₂e, not the official net figure





INFRASTRUCTURE NET ZERO REPORT

A solid foundation: A common definition for net zero infrastructure and how to get there

Achieving net zero in infrastructure requires a shared understanding of what net zero means and the infrastructure sector's role in managing and reducing carbon emissions.

Various standards, such as *The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard* (GHG Protocol Corporate Standard) and *PAS 2080:2023 Carbon Management in Buildings and Infrastructure* (PAS 2080), provide essential guidance. However, confusion often arises due to a lack of clarity on how these standards apply in practice.

Australia already has made inroads on the components of a common definition. The Infrastructure Net Zero (INZ) initiative sought to identify a common definition for net zero in infrastructure and how to get there.

INZ's first consultation paper revealed that most of infrastructure is using a common framework. It also revealed broad-based agreement on the need for a common definition.

INZ's final report:

- outlines the need for the infrastructure sector to transition to net zero.
- presents **key terminology and definitions** to understand in the context of net zero and infrastructure (e.g. "GHG emissions", "Upfront carbon emissions").
- provides a **common definition for net zero**.
- summarises best practice carbon measurement and management standards.
- provides guidance on when to adopt relevant best practice carbon measurement and management standards.
- discusses the benefits of adopting consistent standards and approaches to carbon measurement and reporting.

WHAT INFRASTRUCTURE NET ZERO HAS AGREED ON:

A common definition (as per PAS 2080)

"Reduction of anthropogenic greenhouse gas emissions to zero or to a residual level that is consistent with reaching net zero emissions in eligible 1.5 °C pathways (hence time-bound) and neutralising the impact of residual emissions (if any) by removing an equivalent volume of carbon."

The following frameworks provide guidance for managing GHG emissions:

- GHG protocol standards, relevant for organisational or entity emissions.
- PAS 2080:2023, relevant for managing carbon across the lifecycle of a project. It is supported by RICS Whole life carbon standard, EN 15978, and EN17472.

Rating tools like Green Star, NABERS, and IS can help projects report and reduce their emissions.

There is a significant overlap in policy across all states supporting the reduction of carbon in the sector.

THANK YOU

This project was made possible with funding support from the National Australian Built Environment Rating System (NABERS). ASBEC expresses sincere appreciation for this support, and notes that this Comprehensive Policy Framework does not represent the policy position of the Australian or NSW Governments.

ASBEC would also like to acknowledge the support of:

- Chair of ASBEC's embodied carbon working group, Jorge Chapa, Green Building Council of Australia
- ASBEC Project Manager, Jeremy Mansfield OAM, Mansfield Advisory
- Project consultants, Thinkstep-anz
- ASBEC's embodied carbon working group
- ASBEC and MECLA members, contributing experts and stakeholder reference groups

ASBEC acknowledges First Nations people as the Traditional Owners and Custodians of Australia.

We pay our respects to Elders past and present and recognise their ongoing connection to culture and Country.

Cover sheet: Supporting document #3

NEWS | AUSTRALIA

Upgrading Australia's worst-performing homes could save enough energy to power 4.5 million EVs

Upgrading the nation's lowest-performing homes could massively reduce Australians' energy use and electricity bills, Climateworks Centre analysis shows.

26.03.25

Authors

Joshua Danahay
Mia Dewar

Category

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New Climateworks Centre analysis reveals that each Australian state and territory could dramatically reduce household energy consumption by upgrading its worst-performing homes.

The energy saved would be enough to power 4.5 million EVs per year.

The analysis builds on our Enabling Australia's home renovation wave report, which modelled the costs and benefits of improving low-performing homes' energy performance through three upgrade packages – 'quick-fix', 'modest' and 'climate-ready' (more details on these packages below) – and recommended one of these packages for dwellings in each state and territory.

Residential buildings account for around 10 per cent of Australia's emissions and 24 per cent of its electricity use.

Many of Australia's existing homes are inefficient, resulting in high energy bills and contributing to householders experiencing indoor temperatures outside WHO health recommendations.

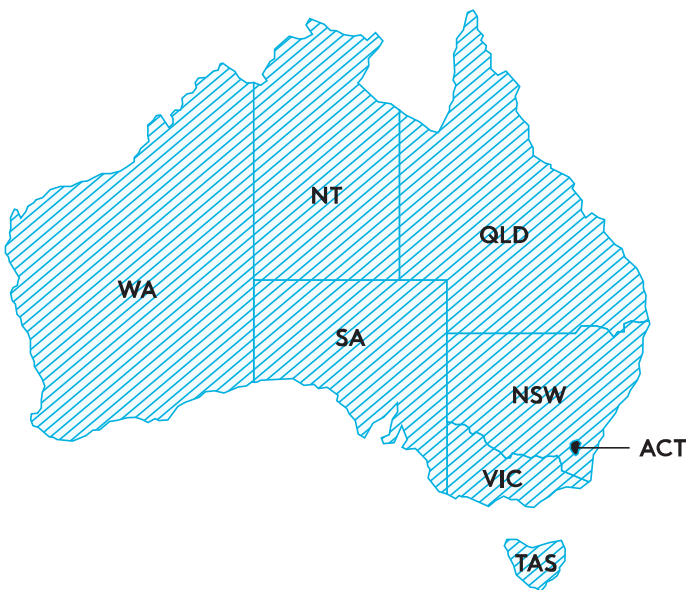
Upgrading 10 per cent of Australia's housing stock, or just over 1 million homes, (a conservative estimate of Australia's 'low-performing' homes) with the recommended package could lower household energy consumption by up to 9,136 gigawatt hours per year.

efficiency standards were introduced in 2003.

Across Australia, upgrades to low-performing homes could help their residents collectively save more than \$2.01 billion per year on energy bills.

The measures would also result in Australia reducing annual emissions by 2.3 MtCO₂e, the equivalent of removing 480,000 petrol cars from the road for a year.

The map below outlines the benefits of upgrading the worst-performing 10 per cent of homes in each state and territory:



National

Recommended upgrade level:
Various

Annual energy savings:
9.14 TWh

Annual emissions reduction:*
2.3 million tCO₂e

Homes upgraded:
1.07 million

Click on the map to view data for each state and territory (desktop only)

*Includes electrification of cooktops and hot water in addition to thermal upgrades where indicated.

In 2023, Climateworks collaborated with research partners CSIRO and Strategy. Policy. Research., using CSIRO's national housing data portal to measure the costs and benefits of improving low-performing homes' energy performance through three upgrade packages.

stars (out of 10), while low-performing apartments have NatHERS ratings between 2.7 and 4.2 stars.

Homes with ratings towards the lower end of the NatHERS rating system can feel too cold in winter and too hot in summer and are expensive to keep at a comfortable temperature.

Homes at the higher end can stay comfortable without much energy needed for heating or cooling.

We applied the following upgrade packages to low-performing homes in our model:

- 'Quick-fix': ceiling insulation, draught sealing, heavy drapes and roller shutters combined with an efficient electric heat pump
- 'Modest': 'Quick-fix' plus floor insulation and an additional layer of glass or film on windows
- 'Climate-ready': 'Quick-fix' plus floor and wall insulation, high levels of draught sealing, double-glazed windows and a heat recovery ventilation system.

We found that households in states and territories with colder climates benefit the most from more comprehensive upgrades through greater bill savings and reduced emissions.

Those in hotter and more tropical climates would find 'quick-fix' upgrades cost-effective over the lifetime of those upgrades, alongside electrifying appliances used for hot water and cooking.

'Quick-fix' upgrades raised the NatHERS rating of previously low-performing detached houses and townhouses to between 3.4 and 5.1 stars, 'modest' to between 3.6 and 5.4 stars and 'climate-ready' to between 6.3 and 8.7 stars.

Policy can enable renovation wave in low-performing homes

On average, 'quick-fix' upgrades are estimated to cost around \$13,700 per dwelling. 'Modest' upgrades cost around \$19,000, and 'climate-ready' around \$37,100 per dwelling.

Our research shows that, alongside the savings to householders already noted, home energy performance upgrades at the recommended level in each state and territory can provide an overall benefit to society.

Despite the benefits, the upfront costs mean that many sections of the population cannot take advantage without government action.

There is an opportunity for policy support to reduce the costs of improvements such as double-glazing or insulation.

For example, the Australian Capital Territory offers rebates to support homeowners in purchasing ceiling insulation, which can be combined with low-interest loans for purchasing hot water heat pumps and electric cooktops.



Policies supporting home energy performance upgrades can provide an overall benefit to society, Climateworks research shows. (Unsplash: Tom Rumble)

In the case of community housing, states and territories can lead by example by directly upgrading their housing portfolio to the recommended level.

For example, the Australian Government's Social Housing Energy Performance Initiative provides co-funding with states and territories towards energy efficiency upgrades for over 60,000 properties, and has also committed an extra \$500 million to retrofit a further 50,000 homes.

energy ratings disclosure and an expansion of NatHERS to include existing homes.

The Victorian Government is also progressing measures to electrify residential buildings as part of its Gas Substitution Roadmap.

Climateworks' Renovation Pathways research has consistently shown that policies to support a wave of energy efficiency upgrades are a win-win-win solution.

Such policies simultaneously deliver on governments' social, economic and environmental commitments, enhancing liveability for Australians.

More about our analysis

All data is based on upgrading homes from a base ('low-performing') scenario (as detailed in the Renovation Pathways Technical Report).

Data presented is a weighted average across detached houses, townhouses and apartments.

It is assumed at least 10 per cent of total dwellings (detached houses, townhouses and apartments) are 'low-performing'. As noted above, we consider this to be a conservative estimate and a good place to start.

The number of total dwellings is based on ABS 2021 Census data.

National results in **Table 1** and **Table 2** below are the sum of upgrades for all states and territories.

homes in each state and territory

State/ Territory	Number of homes	Recommended upgrade level	Total peak demand reduction (MW)	Annual energy consumption savings (GWh)	Annual energy bill savings* (\$)	Ann GHG emi: savi (tCO ₂ e)
New South Wales	331,722	Modest	428.6	2,425.4	\$517.44 million	658,1
Victoria	278,512	Climate-ready	1,524.4	3969.9	\$666.18 million	879,2
ACT	18,631	Climate-ready	171.0	440.9	\$75.64 million	93,86
Queensland	214,356	Quick-fix	119.8	465.3	\$311.40 million	182,0
South Australia	79,759	Climate-ready	340.2	897.4	\$203.33 million	236,4
Northern Territory	8596	Quick-fix	12.8	7.5	\$6.88 million	6184
Western Australia	112,222	Modest	141.8	556.4	\$149.33 million	185,8
Tasmania	25,505	Climate-ready	147.6	373.2	\$78.72 million	96,78
National	1,069,509	Various	2,886.1	9135.9	\$2.01 billion	2,338

*Includes electrification of cooktops and hot water in addition to thermal upgrades where indicated.

homes in each state and territory

State/ Territory	Number of homes	Total peak demand reduction (MW)	Annual energy consumption savings (GWh)	Annual energy bill savings*	Annual GHG emissions savings* (tCO ₂ e)
New South Wales	331,722	358.8	2425.4	\$507.07 million	651,033
Victoria	278,512	616.2	3519.4	\$538.23 million	767,382
Australian Capital Territory	18,631	54.8	383.1	\$61.02 million	83,601
Queensland	214,356	119.8	465.2	\$311.40 million	182,007
South Australia	79,759	134.5	785.5	\$168.40 million	233,067
Northern Territory	8596	12.8	7.5	\$6.88 million	6184
Western Australia	112,222	127.6	547.6	\$146.75 million	184,762
Tasmania	25,505	47.5	325.7	\$67.12 million	96,523

*Includes electrification of cooktops and hot water in addition to thermal upgrades where indicated.



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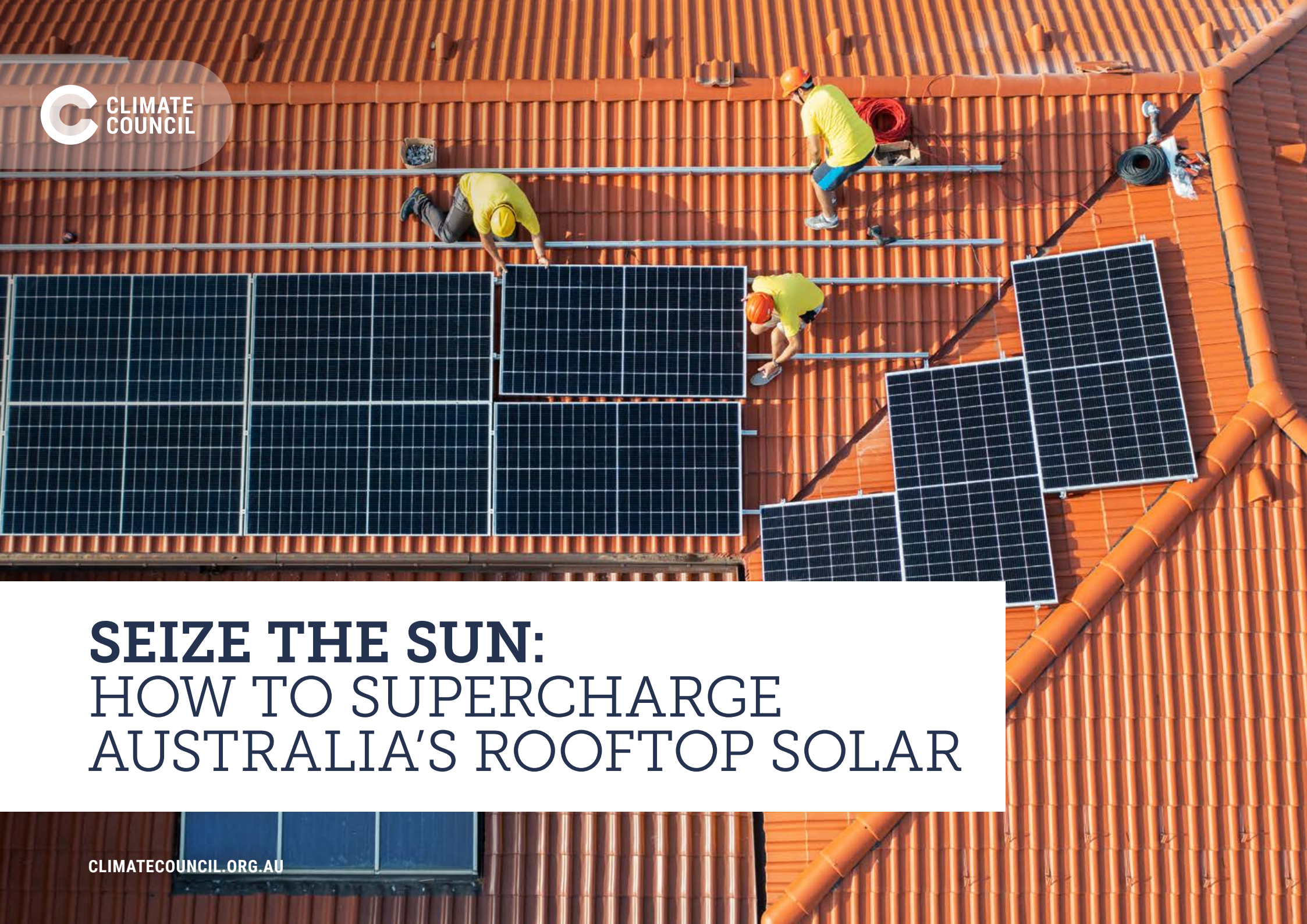
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Cover sheet: Supporting document #4



SEIZE THE SUN: HOW TO SUPERCHARGE AUSTRALIA'S ROOFTOP SOLAR

Thank you for making an impact.

The Climate Council is 100% independent and community-funded. We rely on word-of-mouth and donations from the general public to provide reliable and quality research, socialise it and then campaign for the solutions we need. If you'd like to support more reports like this go to: www.climatecouncil.org.au/donate

Published by the Climate Council of Australia Limited.

ISBN: 978-1-923329-01-0 (print)
978-1-923329-00-3 (ebook)

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Acknowledgments:

Climate Council acknowledges the contributions of other specialist advisers who provided advice and feedback on this report.

The Climate Council acknowledges the Traditional Owners of the lands on which we live, meet and work. We wish to pay our respects to Elders, past and present, and recognise the continuous connection of Aboriginal and Torres Strait Islander peoples to land, sea and sky. We acknowledge the ongoing leadership of First Nations people here and worldwide in protecting Country, and securing a safe and liveable climate for us all.



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Key findings

1 Australia is the world leader in rooftop solar, with more than 3.6 million households cutting their power bills and our climate pollution. That's more rooftop solar panels per person than anywhere else in the world.

- › Over the past decade, Australia's solar industry has grown from strength to strength. More than 300,000 systems are installed each year, and some of the largest businesses in Australia have gone solar including Woolworths, IKEA, Bunnings and ALDI.
- › Together, this rooftop solar adds up to 23 gigawatts of affordable renewable energy capacity to Australia's electricity system – about a quarter of all electricity capacity nationally.
- › Cost-of-living relief is a key reason to invest in rooftop solar, with the average household saving more than \$1,500 a year. Collectively, Australian households with rooftop solar are saving nearly \$3 billion a year on their power bills.
- › Households with solar are more insulated from power price increases, and those with a battery are even better off. From 2022 to 2023, households without solar or storage were hit with a \$500 average increase in power bills, compared to \$300 for those with rooftop solar and only \$100 for those with solar and a battery.

2 To cement our place as the world's solar champions, Australia can more than double our rooftop solar this decade by driving uptake across more family homes, social housing and businesses.

- › Australia has the potential to add four million more rooftop solar systems (or 26.4 gigawatts) this decade – by making better use of available rooftop space on owner-occupied homes, social housing and businesses.
- › Slightly more than half of all owner-occupied houses already have solar installed, but there's still another 2.8 million households like them that haven't yet taken it up.
- › Two-thirds of new houses are being built without a solar system. We can unlock solar savings for 537,000 new homeowners this decade by ensuring all new homes have solar from day one.
- › People living in social housing could benefit the most from solar, with tenants saving up to \$270 million a year in power bills and governments saving up to \$84 million in annual bill relief.
- › Nine in 10 small businesses are missing out on the benefits of rooftop solar. An office with 40 workers could halve its electricity bill by installing 24 kilowatts of rooftop solar (equivalent to about four household solar systems).

3 As we ramp up rooftop solar, we need to adapt our grid to soak up all the clean, cheap energy that will be created and help more Australians cash in. That means rolling out more batteries and smart appliances that can tap into reliable solar power around the clock.

- › To maximise the benefits of millions more solar systems, we need to roll out 25 gigawatts of battery storage – to unlock the cost savings of solar power around the clock.
- › We can install two million more batteries in homes and businesses to help Aussie families and business owners store excess solar power during the day, use it at night and drastically cut their energy bills.
- › We can roll out 5,000 community-scale batteries to share the cheap solar power generated by nearby homes and businesses within their neighbourhood.
- › We can encourage households to use more of their solar electricity during the middle of the day when sunshine is most abundant.
- › Collectively, these simple changes will help reduce demand on the grid and build a more affordable and reliable energy system for all Australians.

4 To seize the sun this decade – reaching and improving on our national renewable energy target of 82 percent by 2030 – the Australian Government needs to put rooftop solar and storage at the heart of our national energy plans.

- › Rooftop solar and storage have a critical role to play in Australia's shift to clean, reliable energy as our coal-fired power stations continue to close. By the end of 2024, Australia's rooftop solar capacity is set to overtake coal – meaning that at the sunniest times of day, rooftop solar can feed more electricity into our main national grid than coal.
- › The *Aussie Solar Drive* can double the number of solar systems on Australian rooftops by bringing solar and storage to social housing, rolling out more community-scale batteries, helping more businesses go solar, and making sure all new rooftops have solar panels.
- › The *Australian Energy Corps* can skill up a new wave of clean energy workers by providing free, high-quality vocational training for apprentices and experienced energy workers.

INTRODUCTION

By getting more solar onto Australian rooftops, we can unlock the benefits for more Aussies

Australians love solar power and it's not hard to see why. As one of the sunniest countries in the world, harnessing our endless sunshine to power our homes and businesses with clean, affordable energy just makes sense. It's no wonder we're the world leader in rooftop solar.

Already, more than 3.6 million Aussie households have taken control of their power bills by putting solar panels on their rooftops. That's one in three households, and on average each of them are saving

more than \$1,500 per year. As many families struggle with increasing costs of living, rooftop solar is a clear opportunity to help Australians cut their power bills and our climate pollution at the same time.

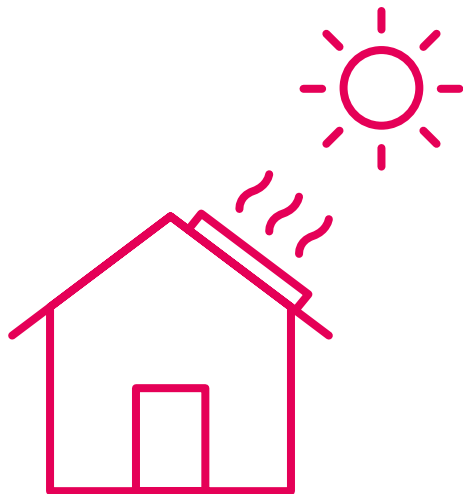
By better using the available space on top of our homes, social housing and businesses, we can double our rooftop solar capacity this decade – and deliver the bill-busting benefits to millions more Australians. But we're missing a trick if we focus on solar panels alone. By ramping up battery storage as well, we can soak up excess solar energy while the sun is shining, and provide reliable, affordable and clean power around the clock.

Supercharging our rooftop solar and storage can also help us build a more equitable energy system. By installing solar on social housing, we can ease the burden of bills on some of the most vulnerable people in our community. By rolling out more community batteries, we can share the benefits of affordable solar power with people who can't install their own panels, like renters and apartment dwellers. And by easing overall demand on our electricity grid, we can make our energy system more affordable and reliable for everyone.

There's huge benefits for our climate, too. Rolling out more rooftop solar and storage will help Australia ramp up our renewable energy capacity as our coal-fired power stations continue to close over the coming years. Cutting climate pollution further and faster this decade will help us stem the rapid rise of dangerous global warming and secure a safer future for our kids.

So what are we waiting for? To seize the sun this decade, the Australian Government needs to put rooftop solar and storage at the heart of our national energy plans, alongside large-scale renewables and transmission infrastructure. State and territory governments can step up too – and many of them already are. It's a win-win situation across the country: easing cost of living pressures for more Australians, and ramping up renewables so we can cut climate pollution.

We have huge potential to keep growing rooftop solar and storage in Australia, and so much to gain when we do: lower bills, less climate pollution and a more reliable grid. It's time to cement our place as the world's solar champions by going even bigger on solar now.



What is rooftop solar?

In this report, 'rooftop solar' refers to solar photovoltaic systems installed on homes, commercial buildings and industrial facilities to directly power their energy needs. More than 95 percent of these solar systems are installed on rooftops, but they can also be attached to the walls or built on the ground where land is available, such as at a mine or industrial facility.

Small-scale household panels often come to mind when talking about 'rooftop solar', as this is the most common kind of installation in Australia today. But there is major potential to expand rooftop solar to commercial and industrial uses as well, to meet the needs of small businesses in our suburbs, office blocks in our cities and industrial facilities like manufacturing plants. In this report, we use the term 'rooftop solar' to capture all of these opportunities.

Some other important definitions

Capacity: The potential output of a solar system under optimal conditions. Capacity is measured in watts (W) or a related unit (like kilowatts, megawatts or gigawatts – see below). Capacity is often used in this report to refer to the size of a solar system. For example, a typical household solar system is about 6.6 kW.

Watt (W): A unit used to measure the amount of electricity produced or consumed in a given moment. For example, a toaster uses about 750 watts of power while it is working. In this report, we also refer to kilowatts (kW, equal to 1 thousand watts), megawatts (MW, equal to 1 million watts) and gigawatts (GW, equal to 1 billion watts).

Kilowatt-hour (kWh): A measure of electricity used or generated over a period of time. If you use one kilowatt of power for 1 hour, you will use 1 kilowatt-hour of energy. For example, a 1 kW solar system in Sydney produces an average of 4 kWh per day. Kilowatt-hours are also commonly used to describe how much energy a battery can store.



1.

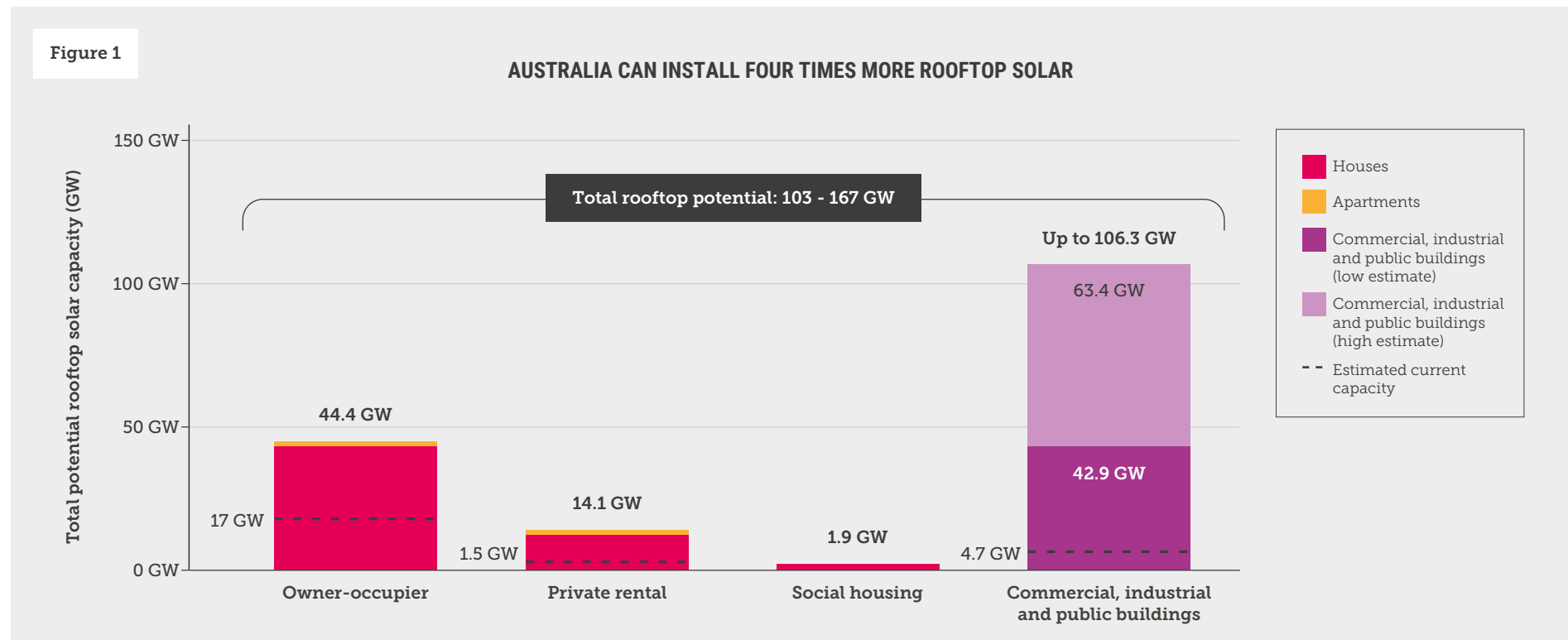
We're just getting started in seizing Australia's rooftop solar potential



Australia is the world leader in rooftop solar. Over 3.6 million homes already have solar panels on the roof (APVI 2024a), saving Aussie families nearly \$3 billion in electricity bills each year (Dehghanimadvar et al. 2024). This rooftop solar adds up to 23 gigawatts (GW) of clean, affordable renewable energy capacity – about a quarter of all electricity generation capacity nationally (APVI 2024b; Climate Council 2024). The amount of installed rooftop solar capacity looks set to overtake the total amount of coal generation capacity around Australia by the end of 2024.

This impressive uptake of rooftop solar is only scratching the surface of Australia’s bright opportunities. Millions more Australian households could be generating electricity on their roofs, using it in their homes and sending it into the grid where others can also benefit. There is also huge untapped potential for Australian businesses, with uptake of rooftop solar much lower for commercial and industrial facilities than households. Figure 1 highlights how much more room there is to grow across these different segments.

Based on total available and appropriate roof space, Australia has the potential to install around 103 GW of rooftop solar – about four times more than is on our rooftops today. This is 1.5 times the capacity of the utility-scale electricity generators in Australia’s National Electricity Market, the grid which powers the entire east coast, South Australia and Tasmania (AEMO 2024). With more homes, businesses and warehouses being built every day, our potential for rooftop solar is only growing.

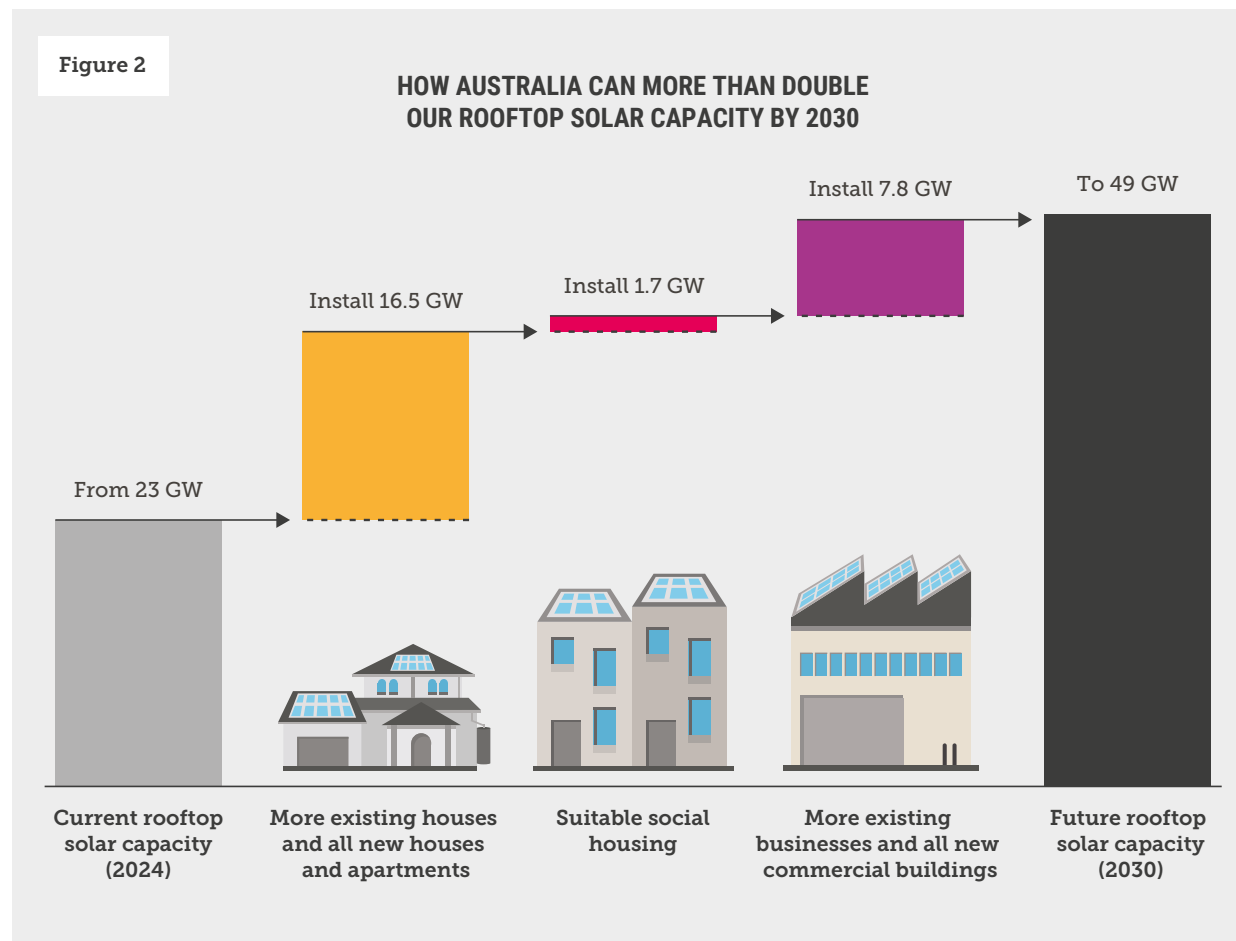


Source: Total potential capacity for residential dwellings is based on average solar potential per dwelling from Dehghanimadvar et al. (2024), applied to 2021 Census Data. Commercial, industrial and public buildings potential from Roberts et al. (2019). The potential for solar installations on vacant land at industrial facilities is not included, but is likely to add even more capacity.

In the Climate Council's *Seize the Decade* plan to cut climate pollution further and faster this decade, we identified that Australia should aim to roughly double our rooftop solar capacity by 2030, to 49 GW of solar backed up by 25 GW of household and community batteries (Climate Council 2024). We have the roof space and abundant sunshine to do this, as well as huge community support for solar and great industry know-how.

Australia's solar industry has built massive momentum, installing an average of 300,000 household solar systems every year for the last five years APVI (2024a). Figure 2 highlights that keeping up this momentum will go a long way towards the goal of having 49 GW of solar installed on rooftops by 2030.

We can then close the gap on installations by switching on the benefits of solar for those who are currently missing out. This includes people living in social housing, those living in new apartment buildings, and Aussie businesses. Targeting the roll-out of more rooftop solar and storage this way will mean lower energy bills, less climate pollution, and greater energy independence for Aussie households and businesses. The following chapter unpacks how we can bring these benefits to millions more Australians in the years ahead.



Source: Climate Council estimates. See the Methodology Notes chapter for full assumptions.



We can switch on the benefits of solar for those who are currently missing out: people living in social housing, those living in new apartment buildings, and more Aussie homes and businesses.

2.

Key opportunities to
supercharge rooftop
solar across our
homes and businesses





Australians have installed a lot of rooftop solar over the past decade, because it makes sense. It cuts energy bills, slashes climate pollution, and puts households in control of their energy bills. We can accelerate this momentum to reach 49 gigawatts of rooftop solar this decade by focusing on a few specific opportunities. These are:

- › continuing to expand uptake by the owners of freestanding homes;
- › ensuring all new homes and commercial buildings are built with solar;
- › bringing the benefits of solar to people living in social housing; and
- › supporting businesses to take it up at much greater rates.

This can add significant renewable electricity capacity quickly, while we continue the important work of rolling out transmission, large-scale renewables and grid-level storage to slash climate pollution from our electricity sector. It can also ease cost of living pressures for more Australians by unlocking the bill-busting benefits of solar power.

OPPORTUNITY #1

Get more owner-occupied houses to take up solar



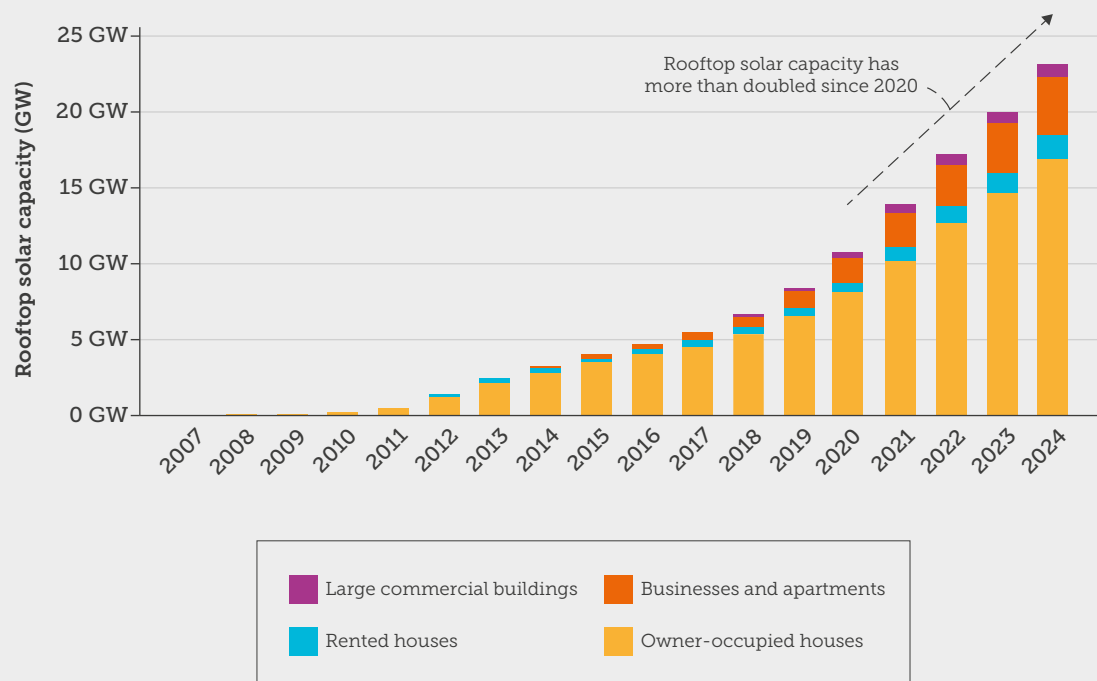
Owner-occupied, freestanding homes have been the backbone of Australia's rooftop solar surge to date. Over four-fifths of residential solar can be found on the rooftops of owner-occupied houses (Energy Consumers Australia 2023).¹ This uptake has been driven by low practical barriers to installation, generous government incentives and a significant drop in upfront costs over time.

Despite high take-up of rooftop solar in this segment, only slightly more than half of all owner-occupied houses have solar installed today. The vast majority of households with solar are yet to add any type of storage to this. There is a clear opportunity to get even more solar and storage onto these rooftops, which means understanding what will motivate and enable homeowners to take these up.

Half of Australia's owner-occupied houses are missing out on the benefits of rooftop solar.

Figure 3

ROOFTOP SOLAR CAPACITY HAS INCREASED SIX-FOLD OVER THE PAST DECADE



Source: Climate Council analysis of APVI (2024b). Historic solar capacity of rented houses is implied only, based on 2023 survey data (Energy Consumers Australia 2023). **Note:** Years refer to financial years.

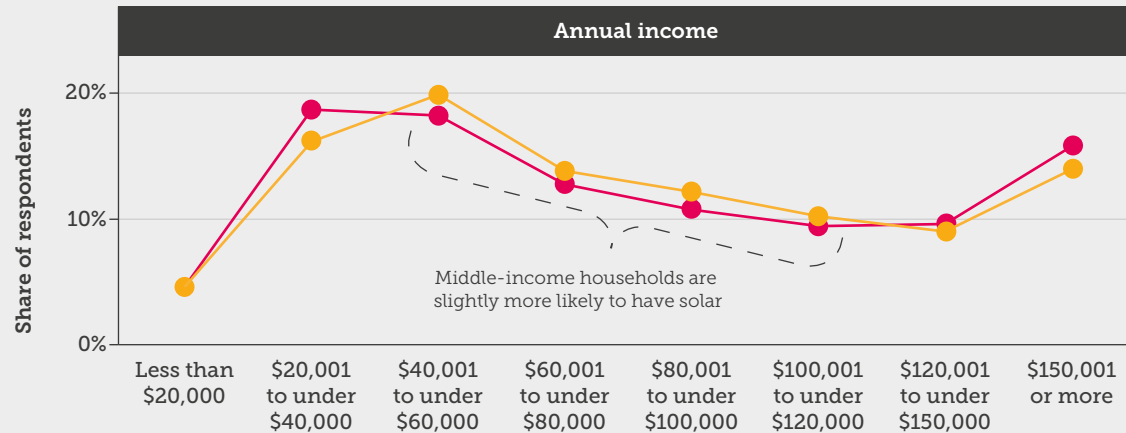
¹ 86 percent of households with rooftop solar live in an owner-occupied detached or semi-detached dwelling, with the majority of remaining solar systems on tenanted detached and semi-detached dwellings.

Cost-of-living relief is a key reason to invest in rooftop solar, and people who care about reducing their energy bills are more likely to install solar. Climate Council analysis of the latest *Energy Consumer Behaviour Survey* shows that middle-income households are the most likely to install solar, compared to low-income households (who may not be able to afford the upfront costs) and high-income households (who may have more disposable income and less interest in reducing their energy bills) (see Figure 4, top). People who are interested in new technology to help manage their energy bills are also more likely to install solar. Likewise, people who are *not* interested in technology to cut energy bills are *much less likely* to install solar (see Figure 4, bottom).

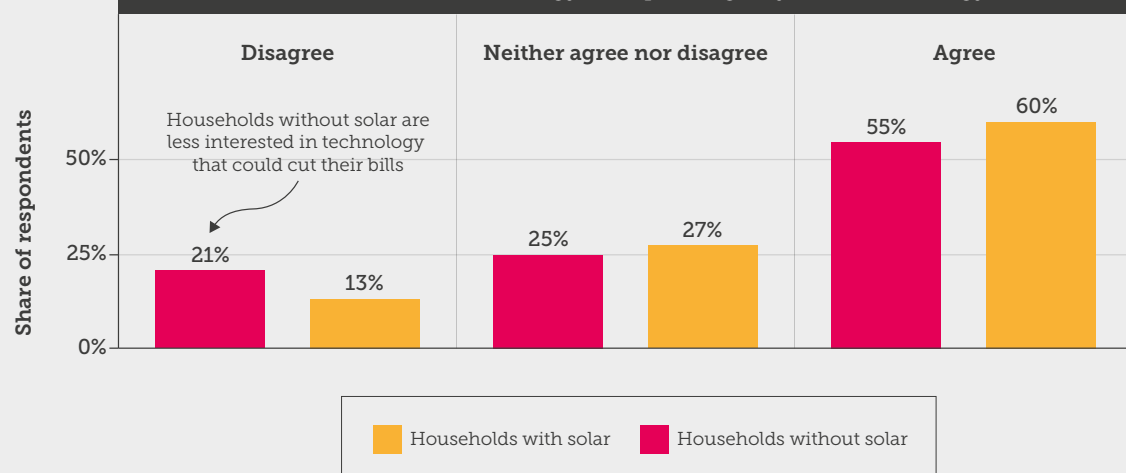
Because rooftop solar can reduce energy bills by 40 to 60 percent and save the average household more than \$1,500 a year, an investment in solar pays for itself over time (Vorrath 2023; Dehghanimadvar et al. 2024). However, the upfront costs of solar and batteries are still a barrier for many households. With half of Australians having less than \$1,000 in savings and three-quarters struggling with cost of living (Blackburn 2024), households need help to spread the costs of solar out over time. Zero and low-interest finance is one way to achieve this, by allowing households to install rooftop solar and batteries at a minimal upfront cost to be paid off over time with their bill savings. Zero-interest loans are already available in the ACT (as discussed in Box 1) and Tasmania.

Figure 4

MIDDLE-INCOME HOUSEHOLDS ARE THE MOST LIKELY TO INSTALL SOLAR



I am interested in new technology to help manage my household energy bills



Source: Climate Council analysis of Energy Consumers Australia (2023); counting owner-occupied detached and semi-detached dwellings only.

These programs need to be continued and rolled out in other jurisdictions, providing zero-interest financing to those who need it most, like households on low incomes. Other households can access low-interest finance from commercial providers. Some low-interest options are already available, like [CommBank's Green Loan](#), which provides a low interest rate and fees for purchases of solar, batteries and other clean energy upgrades. More commercial providers need to make these options available for their customers. It's a win-win for banks and homeowners: homeowners are able to save money on energy bills, and banks clean up their lending.

The Australian Government's Home Energy Upgrade Fund (HEUF), while similar, has not yet been implemented appropriately to accelerate the rollout of rooftop solar and batteries. The \$1.3 billion HEUF is designed to provide green loans to help Aussie households make upgrades to their homes allowing the more efficient and clean use of energy. However, the only concessional finance option currently made available through the HEUF has an interest rate of 7.3 percent (Plenti 2024), which is significantly higher than most mortgages or business loans (Reserve Bank of Australia 2024). Despite attracting taxpayer support, this loan is unlikely to be a cost-effective option for most homeowners. There is a significant opportunity for this fund to be reconfigured to provide much lower-interest finance, supporting more households to install rooftop solar and batteries.

BOX 1: ZERO-INTEREST LOANS FOR ROOFTOP SOLAR AND BATTERIES: THE ACT SUSTAINABLE HOUSEHOLD SCHEME

Since July 2021, the ACT's Sustainable Household Scheme has funded over 11,760 rooftop solar systems and 2,676 household batteries for Canberran homeowners, in addition to electric vehicles, water heaters, air conditioning and heating (ACT Government 2023). Overall, the scheme has provided more than \$212 million in finance, through a commercial lending partner.

The lending partner can refer homeowners to their network of tradies. After a homeowner organises the installation and it is completed, the lending partner pays the solar installer (or other tradie) directly, reducing friction for all parties.

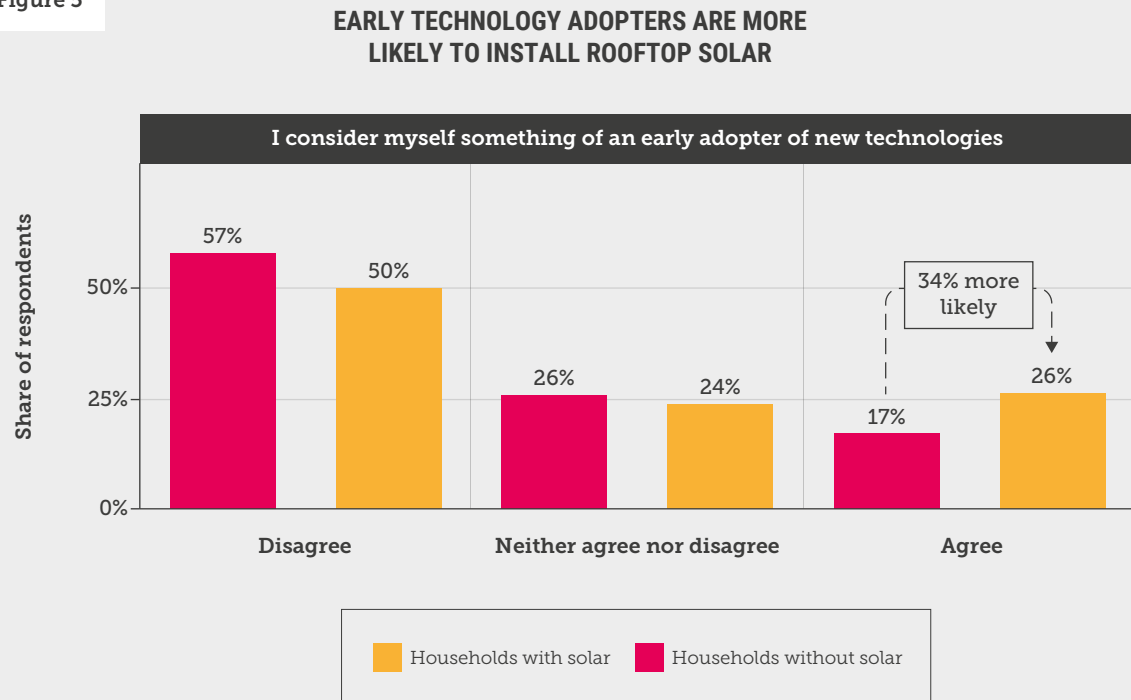


Aside from a desire to ease cost-of-living pressures, one of the strongest predictors of solar uptake is attitudes to technology. People who consider themselves early adopters of new technologies are 34 percent more likely to have solar panels than those who do not (Figure 5).

Rooftop solar is a proven technology, with more than two decades of deployment in Australia demonstrating its reliability, practicality and benefits. A high-quality public information campaign can help boost awareness of these facts, with a focus on reaching owner-occupiers of freestanding homes who don't consider themselves to be early adopters of new technologies.

Together, access to low- and zero-cost finance for the upfront costs of solar and storage, a public information campaign about the proven benefits of rooftop solar, and improvements to how solar households interact with the grid (discussed in chapter 3) can help drive further uptake among the approximately 2.8 million owner-occupied freestanding homes that don't yet have panels on the roof.² This segment has some of the greatest potential to roll out even more solar and storage quickly and efficiently, building on the strong uptake already seen to date.

Figure 5



Source: Climate Council analysis of Energy Consumers Australia (2023); counting owner-occupied detached and semi-detached dwellings only.

Cost-of-living relief is a key reason to invest in rooftop solar, however the upfront costs are still a barrier and households need help to spread the costs out over time.

² Climate Council estimate, derived from Energy Consumers Australia (2023) and ABS (2021a).

OPPORTUNITY #2

Ensure all new homes have solar from day one



The best time to install rooftop solar and batteries is when building a house. Ensuring solar is considered during construction can lower installation costs while maximising benefits – because solar can be factored into a property’s original design, electrical plans and construction. Solar panel prices are also plummeting as manufacturing capacity ramps up in China, the USA and India (International Energy Agency 2023), making rooftop solar an increasingly cost effective addition to new homes.

Despite these advantages, two-thirds of new houses are being built without a solar system (ACIL Allen 2022). While about 50 percent of existing houses have rooftop solar, only about 30 per cent of new houses do – meaning many new homeowners are missing out (Energy Consumers Australia 2023; ACIL Allen 2022).

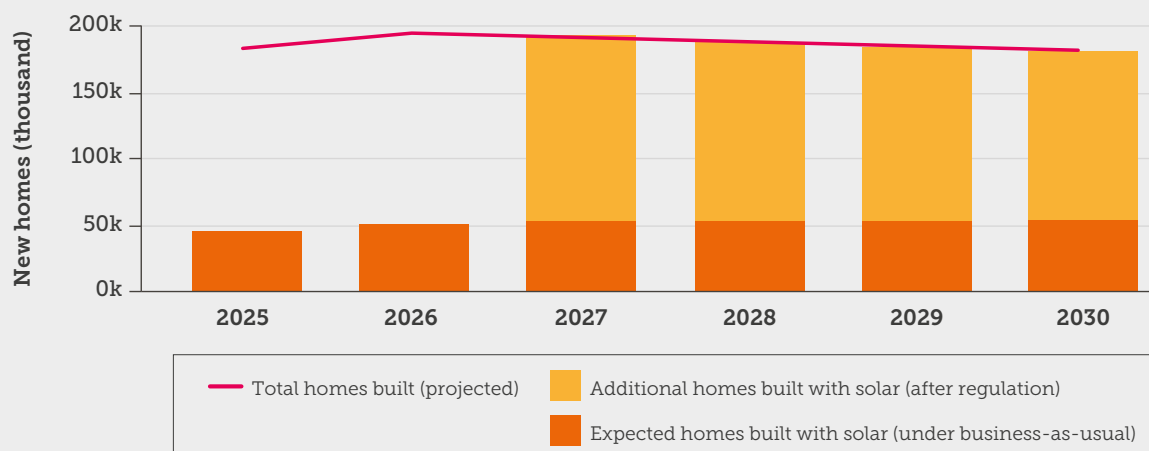
There is a significant opportunity to bring the benefits of solar to more people simply by ensuring panels are added as a standard feature to all new and substantially rebuilt properties. This core energy infrastructure can be delivered along with space to install a battery and charge an electric vehicle – making it as easy as possible for households to take up one or both of these technologies if it suits their needs.

Climate Council modelling indicates making rooftop solar standard for all new and substantially rebuilt homes – both houses and apartments – could see panels added to an additional 537,000 homes by 2030, beyond business-as-usual installations (as shown in Figure 6). This would unlock a further 2.7 gigawatts (GW) of clean electricity generation capacity, equivalent to more than half of Victoria’s coal-fired power plants (AEMO 2024).

Putting rooftop solar on new apartment buildings is an especially important opportunity, because there are additional physical, financial and governance challenges to retrofitting solar in these buildings. These barriers are further discussed in Opportunity #5.

Figure 6

REQUIRING ROOFTOP SOLAR ON ALL NEW HOMES CAN MORE THAN DOUBLE UPTAKE



Source: Climate Council Analysis, based on ACIL Allen (2022). Assumes all new attached and detached homes are built with a 6.6 kw solar system. In practice some houses could not accommodate a solar system, while many houses will opt to install a larger system, averaging out the expected additional capacity.

OPPORTUNITY #3

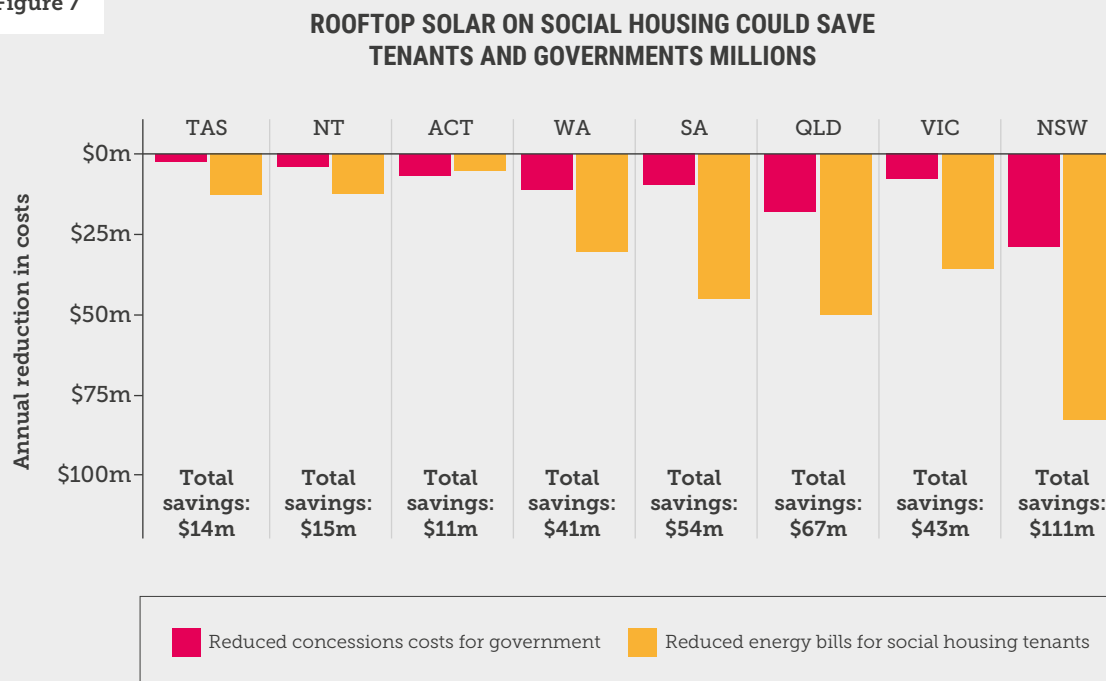
Put solar on most social housing to unlock cost savings for tenants and governments



There are over 260,000 detached and semi-detached social housing dwellings in Australia, representing about 3 percent of all houses (ABS 2021). Social housing is made up of public housing provided by governments, and community housing provided by not-for-profit organisations. People living in social housing are some of the most economically vulnerable Australians, including people who cannot work because of illness and disability, single parents on very low incomes, and others experiencing major disadvantages. Their disposable income is typically half of the national average, and nine of out ten households receive most of their income from a government payment (ABS 2022a).

People living in social housing would therefore benefit the most from the bill savings and cost-of-living relief provided by rooftop solar. Households that receive most of their income from government payments spend 1.5 times more of their income on electricity bills than households that receive their income from employment (ABS 2024b). Being unable to access the benefits of rooftop solar represents a 'poverty premium' for social housing tenants, potentially increasing their energy costs by 20 percent (Anglicare Australia 2023). Climate Council analysis suggests rooftop solar could save these households \$600 to \$1,200 per year, easing the burden of bills on some of the most vulnerable people in our community.

Figure 7



Source: Climate Council estimates, based on average energy cost savings estimated by Dehghanimadvar et al. (2024), social housing dwelling counts from ABS (2021a) and the value of concessions from state and territory government sources. Government savings are presented in gross terms, excluding the cost of rooftop solar systems. See Methodology Notes for full assumptions.

Governments can save money too, with lower energy bills meaning less spending on power bill relief. Federal, state and territory governments spend billions each year on one-off and ongoing energy bill rebates. The Federal Government alone will spend \$5 billion on one-off energy bill rebates between 2022 and 2025 (Chalmers et al. 2024). This is an expensive band-aid solution to an ongoing problem: electricity costs are sometimes too high and volatile for vulnerable, low-income households to manage.

Redirecting the costs of electricity concessions and rebates to installing rooftop solar on social housing is a smarter, long-term way to reduce energy bills and ease cost of living pressures. Plus, it creates more jobs in the solar industry and cuts climate pollution – which energy rebates never will. As shown in Figure 7, Climate Council analysis suggests that installing rooftop solar on all detached social housing properties could save governments up to \$84 million a year, while leaving no household worse off.³ Collectively, households could save up to \$270 million a year, after accounting for the substitution of energy concessions.

To unlock these cost savings, federal and state governments can partner on installing rooftop solar on all 260,000 detached and semi-detached social housing properties, backed up by storage. This would be done as direct capital upgrades to homes, delivered by state housing agencies and jointly funded by the federal government. This kind of collaboration is already happening at a small scale through the \$300 million [Household](#)

[Energy Upgrades Fund](#) (Chalmers et al. 2023). For more information on how governments can scale this up for broader partnerships on the deployment of solar and storage, see chapter 4.

In addition to these community and publicly owned houses, there are approximately 19,000 further indigenous community housing properties which could benefit from solar (AIHW 2024). These properties could also receive solar panels directly, or where concentrated in remote areas, a tailored, centralised solution incorporating larger solar and storage equipment. For example, the Marlinja community is now powered by a central solar and storage system, which efficiently meets their energy needs (Original Power 2024).

Installing rooftop solar and storage on social housing can also benefit our grid. Properties owned by a single entity, like a state government or major housing provider, can be more easily networked together into 'virtual power plants'. Virtual power plants (VPPs) combine many smaller batteries into a single, big, on-demand energy source that is visible to grid operators and can be called upon to manage supply and demand throughout the day.



BOX 2: SOUTH AUSTRALIA'S VIRTUAL POWER PLANT

The South Australian Government has partnered with Tesla to install solar and batteries on over 5,500 public housing properties, saving the typical tenant up to \$562 per year. These solar and storage systems are working together to form a virtual power plant, the largest one in Australia. It has already firmed up power supply to the grid when problems have occurred with transmission infrastructure or power stations.

While initial grant funding from the state government set up the South Australia Virtual Power Plant, it is now operating commercially with Tesla bearing the costs of solar and battery installations.

Source: Department of Energy & Mining, South Australia (2022).

Installing rooftop solar on social housing would share solar savings with those most vulnerable to cost of living pressures.

³ Analysis is based on the average social housing dwelling. Average energy bill savings from solar are generally several times the value of energy concessions. Where a rooftop solar system does not provide the expected savings to households, energy concessions should still be available.

This means excess solar generated from social housing properties would be stored for use by residents when the sun goes down, or to be fed back into the grid when it is needed most.

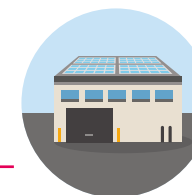
This opportunity is already a reality for over 5,500 public housing tenants in South Australia, who have rooftop solar and a battery working together to cut their energy bills, and provide more clean energy for all South Australians (see Box 2).

Rolling out rooftop solar and storage to social housing is a huge opportunity to keep boosting clean energy generation and make our grid more stable. Installing a solar system on every suitable detached and semi-detached social housing property in Australia could unlock up to 1.7 gigawatts in generation capacity by 2030, equivalent to a medium-sized coal-fired generator. Importantly, it will also make our renewable energy system fairer by sharing the benefits of cheap and reliable solar right across the Australian community, including with those most vulnerable to cost of living pressures.



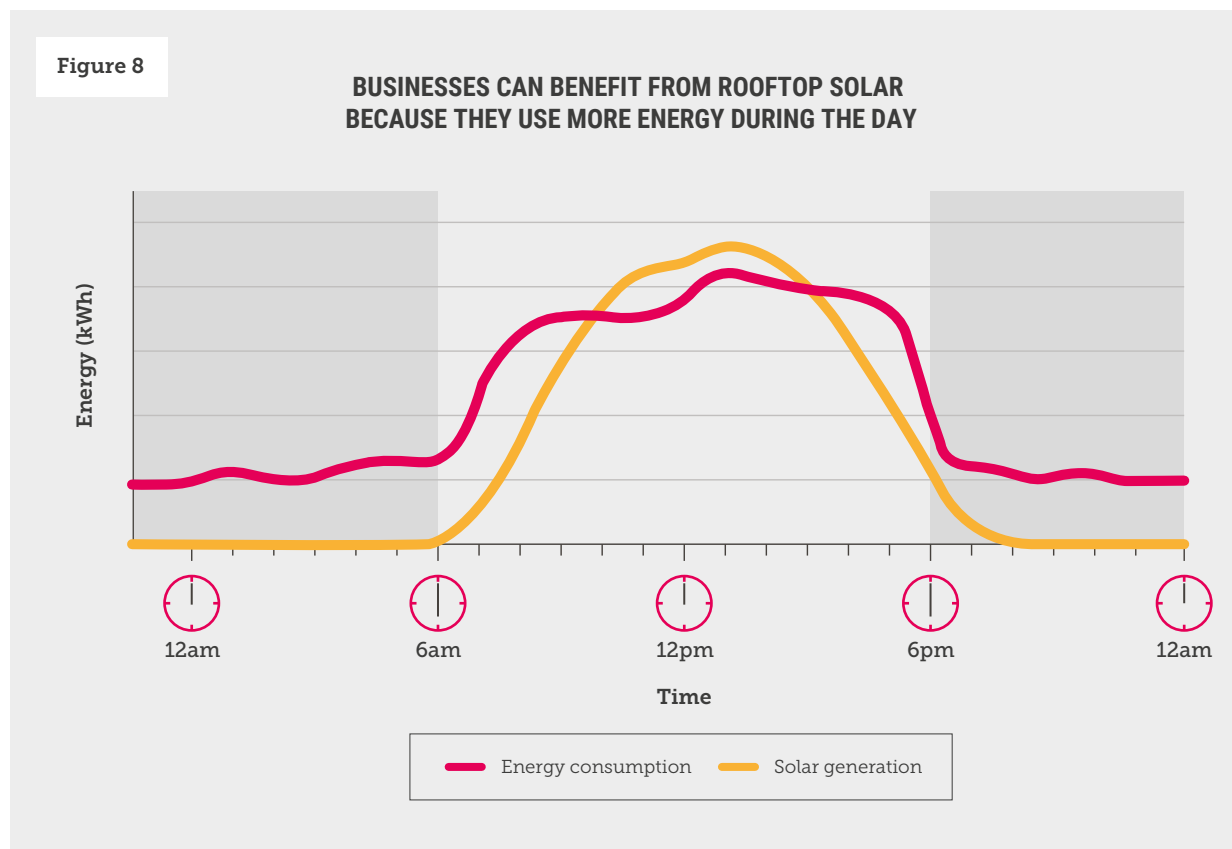
OPPORTUNITY #4

Accelerate rooftop solar and storage for businesses where there is untapped potential



Historically, households have led Australia's solar spree. However, many Australian businesses can actually benefit from rooftop solar even more than households. This is because more of their energy use is centred on the middle of the day – during business hours – when solar generation is also highest. As shown in Figure 8, this daytime energy use is well-suited to rooftop solar.

Given the overlap of business hours and sunshine hours, businesses stand to save significantly on energy costs. For example, an office accommodating 40 people could halve its electricity bill by installing 24 kilowatts of rooftop solar – equivalent to about four household solar systems (Clean Energy Council 2016). Despite these bill-busting benefits, most businesses haven't taken up this opportunity. To date, about 3.8 gigawatts (GW) of commercial-scale rooftop solar has been installed nationally. This represents only about 4-10 percent of available commercial rooftop space, and about one-fifth of currently installed household solar capacity (Roberts et al. 2019, APVI 2024b).

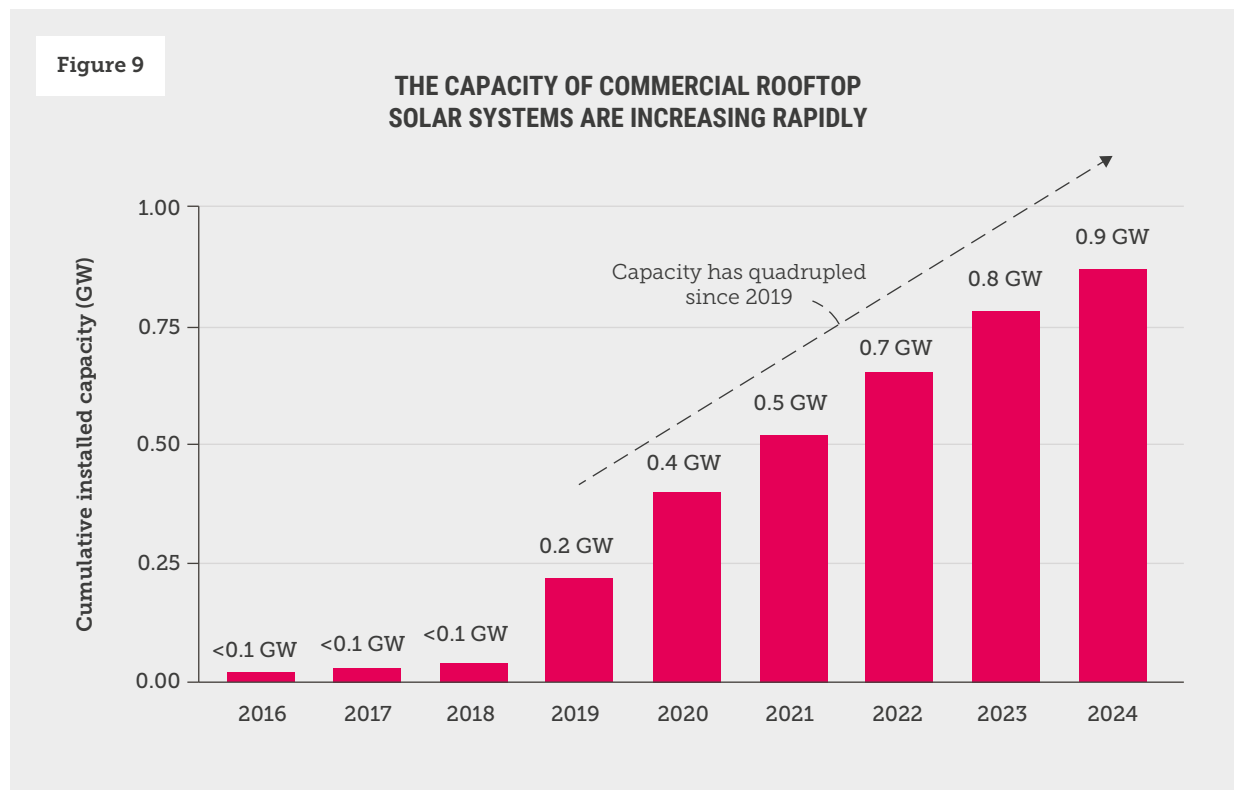


Source: Illustrative example, based on Clean Energy Council (2016).

While there are some challenges in accurately assessing the commercial-scale solar capacity installed to date,⁵ survey data suggests only one in 10 small businesses have rooftop solar installed (Energy Consumers Australia 2023).

In recent years there has also been an increase in the number of very large rooftop solar installations on warehouses and factories, and sometimes mounted directly on the ground at mines and other industrial facilities (APVI 2024b, 2024c). As shown in Figure 9, though this type of rooftop solar is relatively new, it has grown rapidly to just under one gigawatt (GW) of capacity in about six years.

This growth has been driven by some of Australia's largest businesses. Collectively, retailers like Woolworths, IKEA, Bunnings and ALDI have installed rooftop solar capacity equivalent to tens of thousands of homes. As explained in Box 3, these investments can help businesses reach their renewable energy targets and cut their power bills.



Note: Includes solar systems with a capacity of at least 100kW; equivalent is based on a household solar system of 6kW.

Source: Climate Council estimates, based on APVI (2024b, 2024c). Only solar systems developed for behind the meter use are included.

Nine in 10 small businesses are missing out on the benefits of rooftop solar – but large commercial systems are rapidly increasing.

⁵ For the purpose of this report, and consistent with APVI (2024b), rooftop solar systems with a capacity of 15-100 kilowatts are defined as 'commercial-scale'. However many small businesses may only have space or the need for a small, <15 kilowatt system. Conversely, households – especially apartment complexes – may install large, commercial-scale rooftop solar. As a result, the capacity of business and household solar in this report is an estimate only.

BOX 3: ROOFTOP SOLAR SUPPORTS WOOLWORTHS' GOAL OF 100% RENEWABLES BY 2025

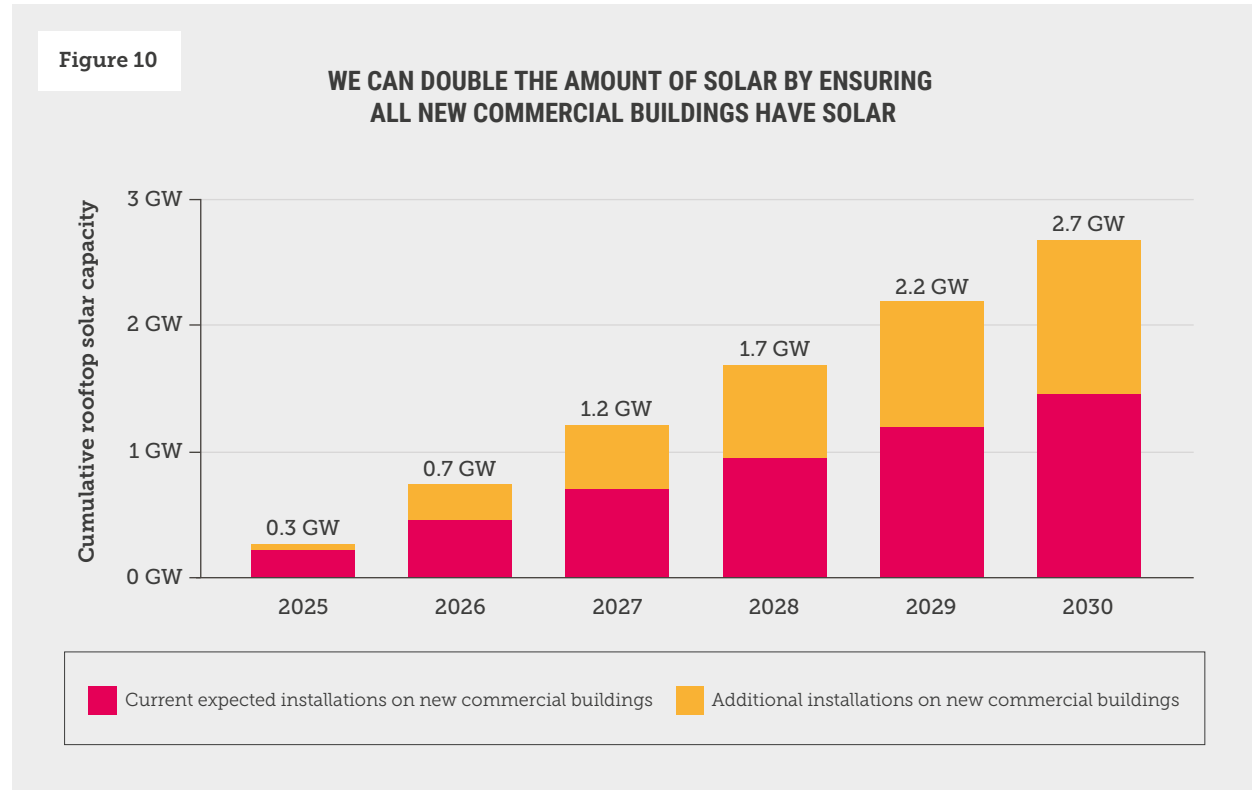
The Woolworths Group is a major energy user, accounting for about 1 percent of Australia's total electricity use (Woolworths Group 2021). In order to support the company's goals of 100% renewable electricity by 2025, 215 rooftop solar systems have been installed on its stores and distribution centres, of which 112 are 'large' systems greater than 100 kilowatts (The Guardian Labs 2023).

This represents over 100,000 solar panels, and typically offsets each supermarket's energy use by 10 to 30 percent (Clean Energy Regulator 2024).



Because large businesses have high energy needs – like heating and cooling, lighting and refrigeration – more of the power generated by rooftop solar is used on-site. This benefits everyone, because businesses have lower energy needs from the grid, which puts downward pressure on electricity prices. When big businesses use less electricity from the grid, this also cuts climate pollution and puts less strain on power distribution networks, reducing the need to invest in upgrades.

New commercial buildings can also put solar on the roof as a standard part of the build, together with storage. As shown in Figure 10, Climate Council analysis indicates that making rooftop solar standard on all new commercial buildings from May 2025 can unlock an additional 1.2 gigawatts (GW) of rooftop solar by 2030, almost doubling the capacity expected at current rates.



Source: Climate Council estimates, see Methodology Notes for details.

When big businesses use less electricity from the grid, this benefits everyone by putting downward pressure on power prices and cutting climate pollution.

OPPORTUNITY #5

Unlock the benefits of solar for more renters and apartment dwellers



Historically, few renters and people living in apartments have had access to the benefits of rooftop solar. There are physical, economic and social challenges which make it difficult or unappealing to retrofit rooftop solar. For these reasons, the Climate Council's plan does not assume any solar retrofitting for rental properties or apartment buildings.

Renters and apartment residents still can – and should – benefit from increasing Australia's solar capacity. If we ensure that all new buildings have rooftop solar, more renters and owners of new apartments and houses will gain access to solar over time. Those who can't install solar on their roof can still access the bill-busting benefits of solar too, thanks to innovations like solar sharing schemes.

Apartment buildings

Rooftop solar on apartment buildings is rare. That's because there are a number of challenges associated with apartment building installations:

- › **Physical challenges:** Roof space on apartment buildings is limited, and may be required for other uses, ranging from swimming pools to heating and cooling equipment. Older buildings may also lack internal space for cabling, inverters, or solar sharing technology. However, as the price of solar panels continues to reduce, mounting solar panels on apartment walls may become viable in some cases.
- › **Governance challenges:** Because roof spaces are usually common property, a special resolution must be passed to install solar. In most states and territories, this requires a 75 percent majority of owners, which can be difficult to achieve in buildings where many apartments are rented, leaving owners without the incentive of bill savings.

- › **Financial challenges:** Whereas individual homeowners can often finance a solar installation through their mortgage, owners corporations have more complicated borrowing conditions. Because owners corporations can only access unsecured finance, interest rates can be twice that of a typical mortgage. Finally, apartment owners generally cannot use the government rebates available for house owners to install shared solar systems, despite these being more efficient.

Not all apartment buildings are suitable for solar. High-rise buildings with more than four storeys generally do not have enough roof space to justify retrofitting solar, because the cost savings are split between so many people. But half of Australian apartment residents live in buildings with less than four storeys (ABS 2021). These apartment buildings can install rooftop solar and reap the benefits of lower energy bills – including for common property uses like elevators.

If we ensure that all new buildings have rooftop solar, more renters and apartment residents will gain access to solar over time.

Shared solar systems can provide efficient power generation for apartment buildings. Relative to a typical installation on a house, a single apartment building can benefit from a larger solar installation using high capacity inverters. For example, a single apartment building with 40 units could install a 70kW solar system, equivalent to the solar capacity of about 10 houses – using resources and labour efficiently (Yarra Energy Foundation 2022).

These shared solar installations are increasingly being supported by smart technology, such as the Australian SolShare, which shares solar generation amongst apartments fairly (Alume Energy 2024). This technology can result in up to 55 percent more solar being consumed on site, increasing energy bill savings, and reducing the load on the distribution network when surplus electricity is exported (Alume Energy 2024).

This greater efficiency helps to overcome the typically higher costs of solar for apartment buildings.

The challenges described above have historically reduced the uptake of rooftop solar by apartment residents, but this is changing. The Federal Government has worked with the ACT and Victorian governments to provide rebates and zero-interest loans directly to apartment owners corporations (ACT Government 2022; Solar Victoria 2024a). These programs level the playing field for apartment owners, ensuring they are able to access comparable rebates to owners of houses. The Victorian program goes further, providing rebates of up to \$2,800 per apartment – twice that available to owners of houses – acknowledging the additional challenges associated with installing solar in apartments (Solar Victoria 2024a).

State and territory governments should review the success of these initial programs to assess the cost-effectiveness of solar for apartments. In the meantime, solar should be required on all new apartment buildings, as proposed for commercial buildings in the 2025 update to the *National Construction Code* (NCC). People living in apartment buildings that don't have solar could also benefit from models for community solar, like WA's "Sunshine Saver", discussed in Box 4 on the following page.



Renters

Australians who rent are three times less likely to have access to solar than people living in owner-occupied homes (Energy Consumers Australia 2023). While saving money on energy bills encourages owner occupiers to install solar, this benefit is not relevant to landlords, because their tenants are responsible for paying electricity bills. And while tenants may wish to reduce their electricity bills with a rooftop solar system, they do not have the right to install this equipment.

Some state and territory governments have already stepped in to help address this issue. For example, the Victorian Government offers up to \$2,800 in rebates and zero-interest loans to encourage landlords to install rooftop solar (Solar Victoria 2024b). However, uptake has been low, with only 306 applications approved in the first five months of 2024, compared to nearly 18,000 applications for owner-occupied properties (Solar Victoria 2024c).

Ensuring Australian renters can share in the benefits of rooftop solar is important for ensuring our clean energy system is also a fair one. Over time, more landlords may choose to install solar to take advantage of increases in property values, government rebates, and reductions in the cost of solar. But bringing the benefits of solar directly to more rental properties is likely to take time. The split in incentives for renters and landlords makes it harder to increase solar installations for renters, while there are other, more straightforward opportunities to get more rooftop solar into our grid this decade.

The mandatory inclusion of solar on new and substantially renovated houses and new apartment buildings will ensure that over time, more of the properties available in the rental market come with solar as a standard feature. In the meantime, there are other ways to bring the benefits of solar power to Australians who rent, like community solar banks and solar gardens. For renters, our focus should be on ensuring they can access the benefits of cheap, reliable solar in lower bills, but this does not necessarily need to be on their own rooftops in the near term.

BOX 4: COMMUNITY SOLAR BANKS

Community solar banks allow households who can't install solar on their roofs to benefit from a solar farm located elsewhere. Members of community solar banks can either pay a subscription fee, or make an upfront investment. They then receive credits on their energy bills, which are based on how much revenue the community solar farm earns.

The Australian and West Australian Governments are operating "Sunshine Saver", a community solar bank model for low-income households and renters.

The program is available in Esperance and a selection of other small towns serviced by large solar farms. Eligible households subscribe for \$1 per day, and receive an automatic daily bill credit of \$1.5, plus 10 percent off the cost of power used between 6am and 6pm. This saves households about \$40 on their energy bill. The program is structured so that no household is worse off, but the time-of-use savings are an additional incentive to use power at times when electricity is available from cleaner and more affordable solar farms.

Source: Horizon Power (2024).

Community solar banks allow renters to benefit from a solar farm located elsewhere.

Everyone has a role to play on the journey to double our rooftop solar. People living in a house they own will continue to lead the way, while Aussie businesses increasingly reap the benefits of rooftop solar and storage. Governments have a role to play too, by putting rooftop solar on social housing, and supporting households and businesses to install solar with policies, investment, and high-quality, trusted information.

As we build this new rooftop solar capacity, we also need to make sure our grid is ready to accommodate it. This doesn't just mean poles and wires: it means new, smarter ways to store and use electricity which will benefit Australian families and businesses – as discussed in the next chapter.



3.

Key opportunities
to deliver a grid that
soaks up more solar





As we expand the rollout of rooftop solar, we need to adapt our electricity grid to ensure Aussie homes and businesses get the full benefit of all the clean, cheap energy that will be created.

To make the most of the electricity generated by millions more solar systems on household and business rooftops by 2030, we need a grid that can:

- › Maintain stability and resilience so that power is always available when it's needed;
- › Provide benefits and returns to households and businesses that invest in solar and batteries;
- › Share the benefits of abundant, affordable solar power with the whole community, including people who don't have solar;
- › Be safely, efficiently and affordably managed by energy system operators.

As a world leader in rooftop solar, Australia is dealing with challenges that most other countries have not yet had to face. Improving how our grid works is essential for maintaining and accelerating our momentum in installing even more rooftop solar and delivering an affordable, reliable energy system that works for all Australians. In the process, we can show the world how it's done to help other countries with high rooftop solar uptake keep building on their own momentum.

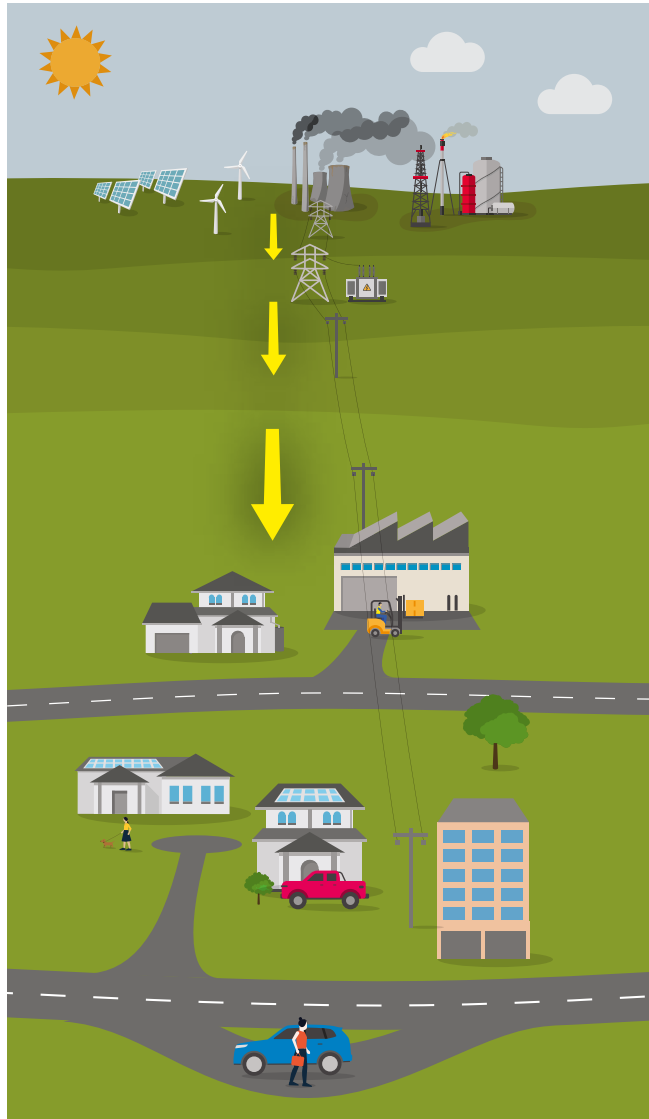
Three priority areas will help us build the grid that we need to maximise rooftop solar potential in Australia. There is a significant body of policy work underway across all levels of government and with energy system regulators to advance the many practical actions needed to deliver on these. The priorities identified here are the end goals that governments, regulators, industry and communities should be striving towards together.

		OPPORTUNITIES		
		Shift electricity use to when we generate the most solar power	Use household batteries to store extra solar power for use later	Use community-scale batteries to expand the benefits to the local network
OUTCOMES	Maintain stability and resilience so that power is always available when it's needed	✓	✓✓	✓✓✓
	Provide benefits and returns to households and businesses that invest in solar and batteries	✓✓	✓✓✓	✓✓
	Share the benefits of abundant, affordable solar power with the whole community, including people who don't have solar		✓	✓✓
	Be safely, efficiently and affordably managed by energy system operators.		✓	✓

Improving how our grid works is essential for supercharging rooftop solar and delivering an affordable, reliable energy system for all Australians.

THE SHIFT IN OUR ENERGY SYSTEM

→ Flow of electricity



GENERATION

From:
Inflexible coal-dominated utility-scale power generation

To:
Renewable energy-dominated utility-scale power generation, backed up by utility-scale storage

TRANSMISSION

From:
Many large power lines delivering power in one direction

To:
Optimised number of large power lines delivering utility-scale power to distribution networks and across regions

DISTRIBUTION

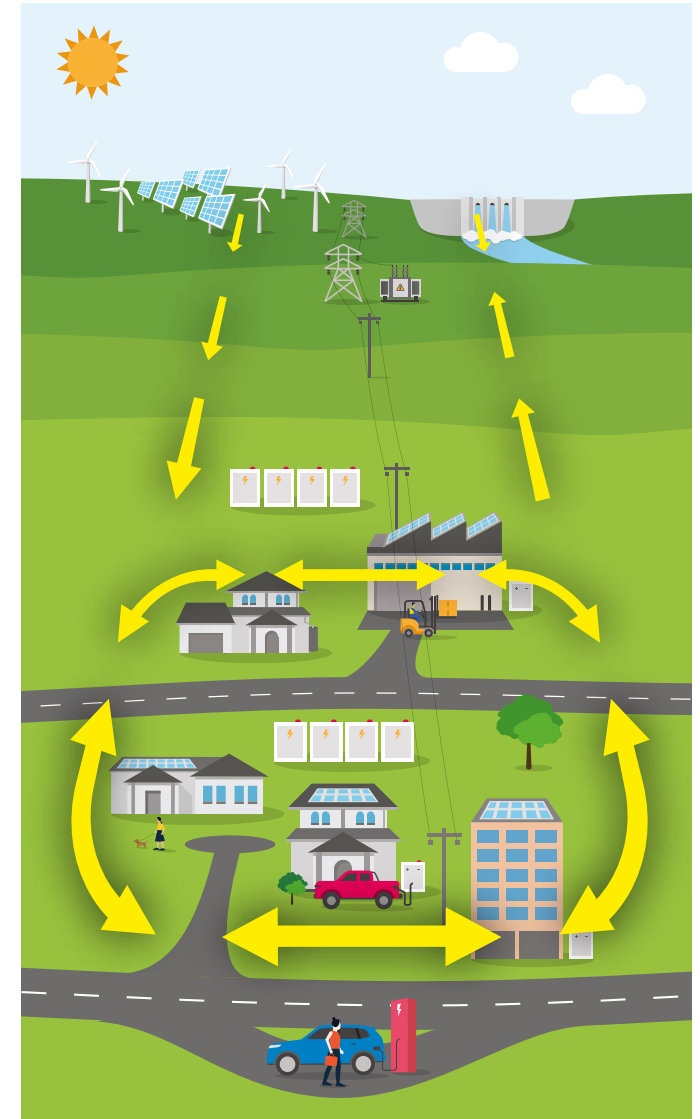
From:
Many smaller power lines built out for peak demand delivering power in one direction

To:
Optimised number of smaller power lines to match utilisation and support two-way power delivery across distribution networks

COMMUNITY

From:
Households, businesses and industry only consume electricity passively

To:
Households, communities, businesses and industry with solar and batteries consume, generate, store and supply cheap, locally-generated electricity to their local community



OPPORTUNITY #6

Shift electricity use to when we generate the most solar power

Shifting electricity use to align with peak rooftop solar generation can help maximise our uptake of this clean, cheap and abundant power and reduce strain on the electricity grid. Smart strategies like daytime water heating, pre-cooling buildings, and charging electric vehicles while the sun is shining can help to boost cost savings for households and businesses, by better balancing supply and demand to avoid cheap rooftop solar being curtailed.

TO DO THIS, WE CAN

-  Electrify household and commercial building appliances, particularly for water heating.
-  Shift water heating to peak solar generation hours between 11am and 3pm.
-  Shift household cooling during summer to between 3pm and 5pm, to pre-cool our homes for the evening.
-  Charge electric vehicles during the day between 10am and 4pm.
-  Continue rolling out smart meters and time of use tariffs across Australia to intelligently detect and reward the use of electricity during times of low prices.
-  Provide mobile apps and digital tools for households and businesses to better understand their solar power generation, energy use and pricing throughout the day, to encourage other behaviour shifts where possible.

THIS WOULD

-  Shift electricity demand from nighttime to daytime when sunshine is abundant, to use more solar power and avoid homes and businesses having their solar systems shut down by networks to avoid oversupply.
-  Increase the value of solar power generated during the day, which would increase the reward for energy exported to the grid from homes and businesses.
-  Cut energy bills of households without solar by shifting more of their use to times of the day when energy is most abundant and cheaper.
-  Slash bills even further for those with solar, who can meet most or all of their energy needs entirely from their own rooftop generation.

HOW IT WORKS

David and Angie

David and Angie* live in a house without solar panels or batteries, but they do have smart household appliances that switch on during the day. This allows them to:

- › Heat water in the late morning and store it in insulated tanks;
- › Charge their electric vehicle throughout the day (either at a community charger near their work or at home);
- › Pre-heat or cool their home just before the sun sets.

This allows them to shift as much as 20 kilowatt hours (kWh) of electricity use from nighttime to daytime when electricity prices are lower.

If David and Angie got a 5 kilowatt (kW) rooftop solar system, they'd be able to generate the energy needed to cover most of their home energy needs. By using most of their electricity when their solar panels are generating, they'd maximise their energy bill savings.

If they got a solar panel that was even larger, they could make further savings by exporting excess solar generation to the grid to offset their electricity bills.



*These scenarios are included for illustrative purposes and are not based on real people.

HOW DOES THIS HELP US MAKE THE MOST OF ROOFTOP SOLAR?

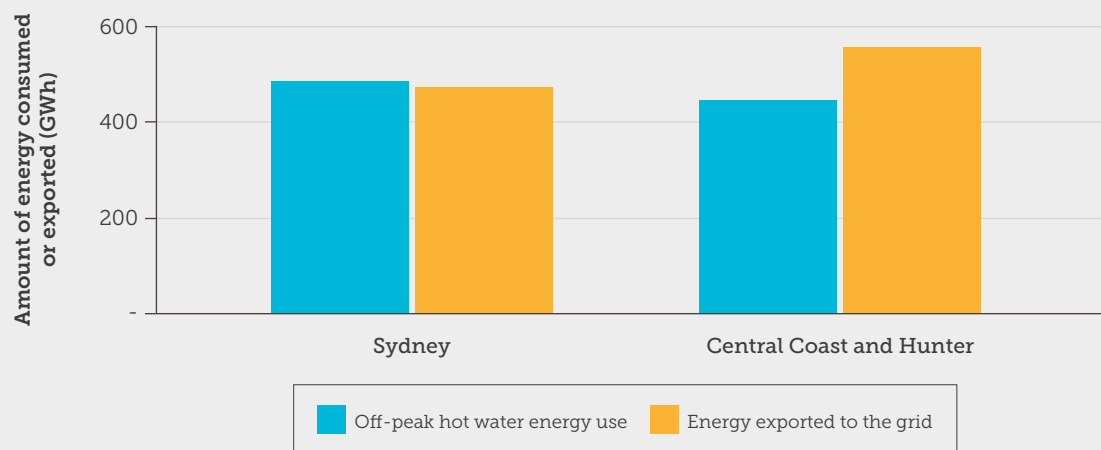
Shifting electricity demand to when solar power is generated, allows us to use cheap and abundant daytime electricity.

As even more rooftop solar and storage comes online, households and businesses should be finding every opportunity to take advantage of cheap, abundant solar energy in the daytime. Three big opportunities to do this in our homes are through daytime water heating, pre-cooling spaces, and electric vehicle charging.

At the moment, many electric water heating systems operate overnight, which misses the opportunity to use abundant daytime solar generation. Figure 12 shows the overnight electricity consumption for hot water and the exports of distributed solar in Sydney and the Central Coast of NSW. It shows that in the Central Coast, more solar is being exported to the grid in the middle of the day than the amount of electricity that is being used overnight for heating water. This is almost the case in Sydney as well. If water heating happened during the day, that rooftop solar energy could instead be used immediately – cutting demand at night and saving households money by using energy when it is cheapest and most abundant. That's almost 930 gigawatt hours (GWh) of energy shifted in just these two regions in one year.

Figure 12

**WATER HEATING COULD BE SHIFTED TO DAYTIME,
WHEN CHEAP SOLAR POWER IS MOST ABUNDANT**



Source: Average electricity consumption by Local Government Area in the Ausgrid distribution network 2022-2023, (Ausgrid 2023).

The ability for the electricity system to intelligently detect and reward the use of electricity during times of low prices is enabled by smart meters and time of use tariffs. These mechanisms are being rolled out across Australia. The Australian Energy Market Commission (AEMC) is aiming for 100 percent smart meter uptake by 2030 (up from 30 percent in 2020) (Australian Energy Market Commission, 2023). Time of use tariffs are also increasingly common

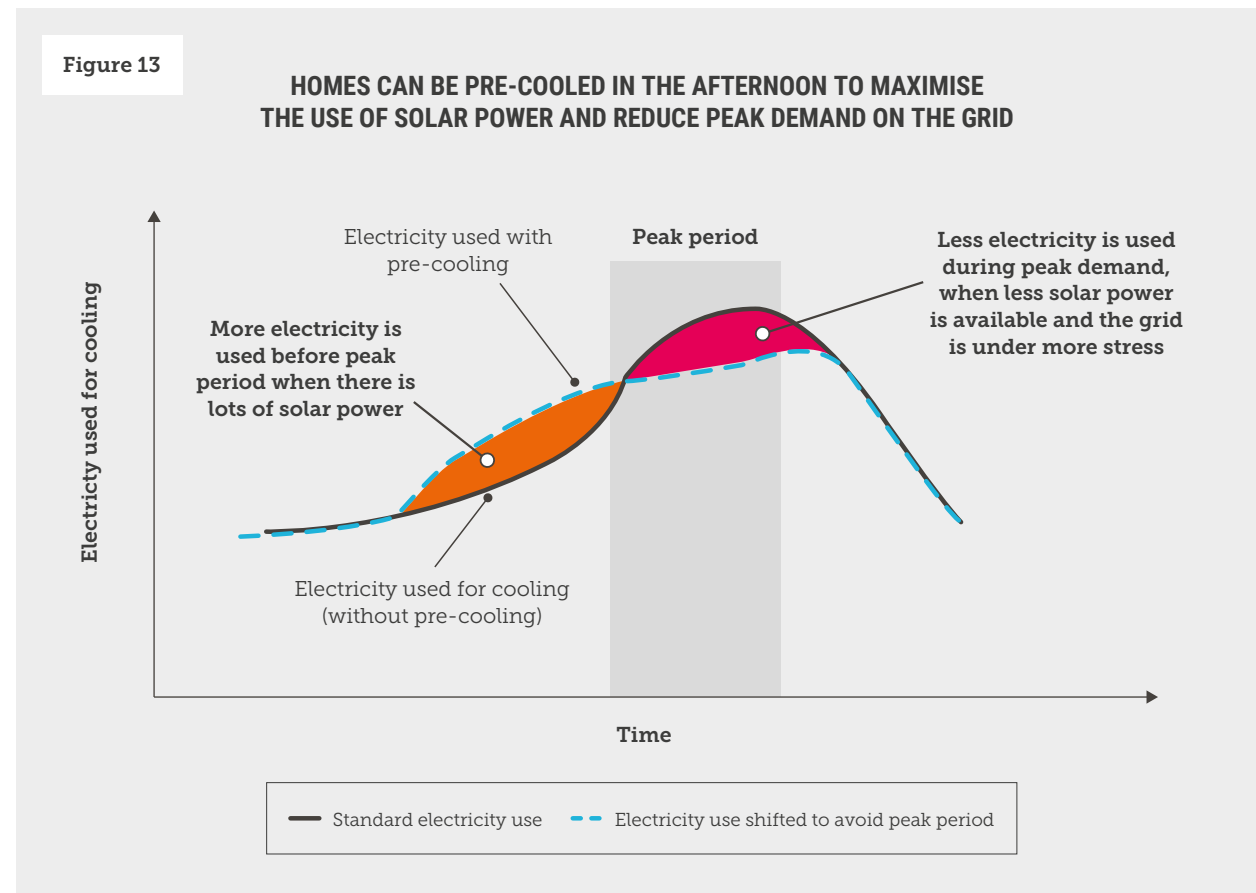
throughout the National Electricity Market (our main national grid). About 30 percent of electricity customers are on time of use tariffs in June 2023, which was a 5 percent increase from 2022 (Australian Energy Regulator, 2023). Energy system regulators and retailers need to ensure that smart meters and time of use tariffs are carefully implemented with consumer protections in place to prevent negative impacts on households and businesses.

Pre-cooling is another way to shift electricity consumption to off-peak hours, particularly in hot climates. This involves cooling a building or space more than usual during periods of high solar generation, and allowing the building walls, floors and furnishings to absorb and store this coolness. The stored coolness is gradually released after the air conditioning system gets turned off before peak electricity demand periods. This allows us to shift energy use away from high-demand, high-cost periods to times when electricity is cheaper. Figure 13 shows how energy demand can be shifted through the use of pre-cooling. The blue dashed line shows a flattening of demand throughout the day.

When water heating and air conditioning units can be coordinated across many different households, network operators can efficiently allocate the amount of energy used to manage any potential strain on the grid during times of peak demand. As of 2022, Energy Queensland had direct control of the air-conditioning units of more than 136,000 homes or small businesses through the PeakSmart scheme, providing up to 150 megawatts (MW) of flexible load that could be shifted by implementing pre-cooling (Kuiper 2023).

Charging electric vehicles during periods of peak solar generation is the third important way to make the best use of cheap and abundant solar energy. Electric vehicles can have battery capacity ranging from 40 to 100 kilowatt hours (kWh), which can comfortably absorb any excess energy generated from solar panels during the day. Even if electric vehicles are not being charged at home and are instead charged in a

public charging station, they can help to absorb the abundant electricity from nearby commercial and industrial facilities with solar. Since electric vehicles are essentially batteries on wheels, they provide further benefits, especially with the introduction of vehicle-to-home (V2H) or vehicle-to-grid (V2G) capabilities, which are discussed in the following chapter.



Source: Adapted from Naderi et al. (2022).

OPPORTUNITY #7

Use household batteries to store extra solar power for use later

Storing excess rooftop solar power in batteries is increasingly important as more electricity is generated from rooftop solar.

Solar households and businesses with batteries can capture their own clean energy and then use it when the sun isn't shining, reducing their reliance on grid power during peak evening hours when electricity is most expensive. This 'behind the meter' electricity use provides the cheapest power for households and businesses as it bypasses network charges, wholesale costs and retailer profits. Household batteries maximise the cost-of-living relief provided by rooftop solar while reducing evening peaks and contributing to a more resilient energy system.

If rooftop solar and battery owners agree to connect their systems into a virtual power plant, network operators will be able to more accurately control energy generation, storage and use to maintain grid stability and help households and businesses save more in their power bills.

TO DO THIS, WE CAN



Install batteries in households and businesses – initially aiming for two million additional units by 2030.



Charge batteries with excess solar power before it is exported to the grid as a default.



Charge batteries from the grid during peak solar generation hours between 10am and 4pm.



Supply homes and businesses with electricity from 'behind the meter' batteries before drawing from the grid.

THIS WOULD



Allow households and businesses to generate free electricity in the daytime, store it and then use it in the evenings.



Drastically cut energy bills of households because they purchase less power during the evening, and even more so for those that can meet their needs entirely from their own generation and storage.



Reduce evening peak demand, which helps with grid stability and enables energy independence for communities who can generate, store and then discharge their own local energy.



Increase the value of solar power generated by solar owners, which would increase the return on their investment.



Enable more efficient allocation of network capacity without breaching safe operating limits – enabling solar owners to continue using their systems.

HOW IT WORKS

Jessica and Liz

Jessica and Liz* live in a house with solar panels and a battery. This allows them to:

- › Generate free solar power for daytime energy use;
- › Store excess daytime solar power in their battery;
- › Once their battery is full, export excess daytime solar power to the grid, to offset their power bills;
- › Use the energy stored in their battery in the evening to power their home's needs, then export any remaining energy back to the grid while electricity demand is high, further offsetting their bills.



Justin

Justin* doesn't have a battery in his home, but he does have an electric vehicle with vehicle-to-home capabilities. This allows him to:

- › Use his vehicle as a battery for storing excess rooftop solar power;
- › Drive his car to work and charge his car at a charging station that is drawing energy from rooftop solar on commercial buildings nearby;
- › Drive home with a fully-charged battery that can provide electricity for his household evening activities.



*These scenarios are included for illustrative purposes and are not based on real people.

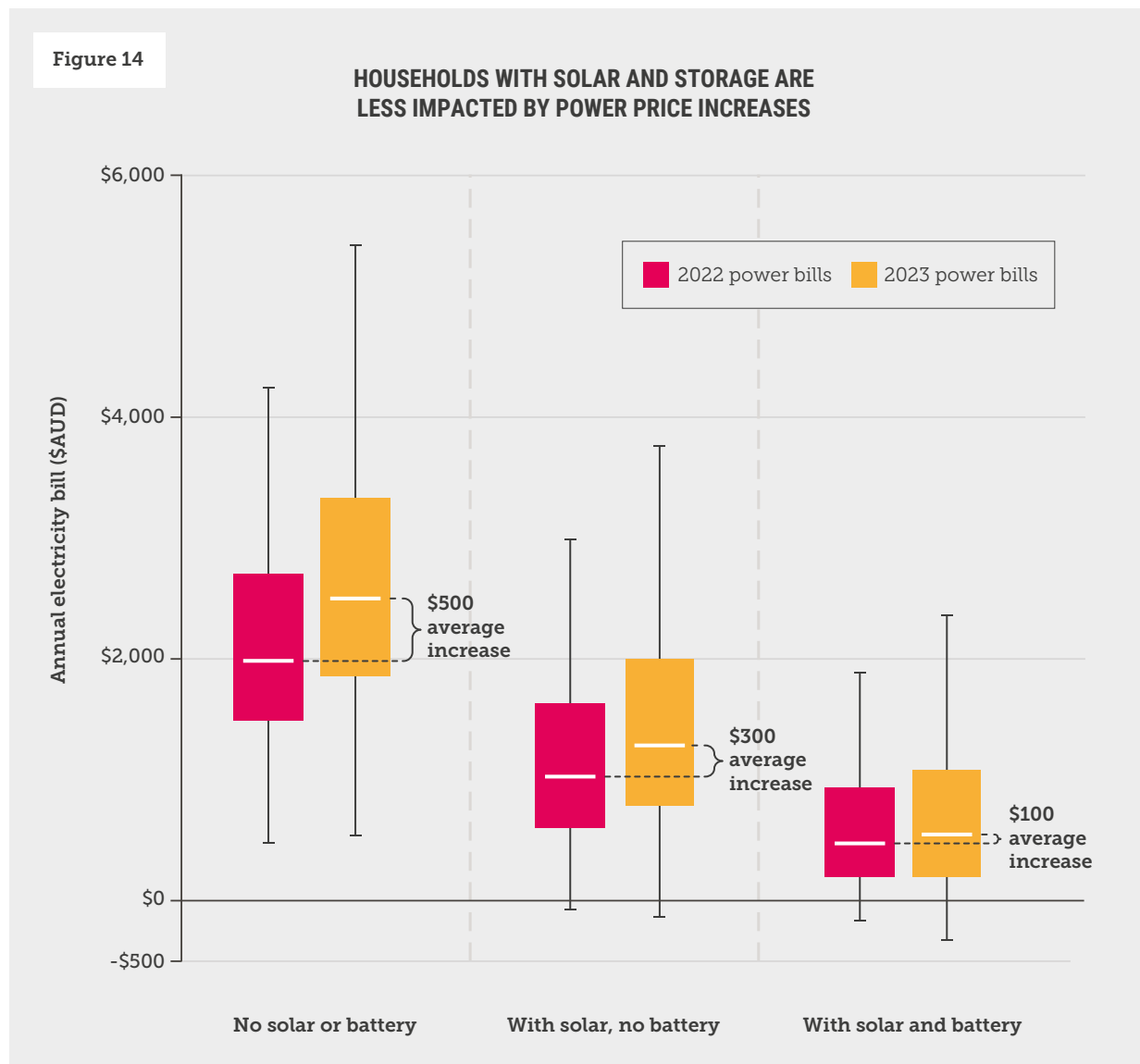
HOW DOES THIS HELP US MAKE THE MOST OF ROOFTOP SOLAR?

Household batteries maximise the benefits of solar panels for households and businesses.

Rooftop solar panels and storage work together to minimise how much power households and businesses need to draw from the grid. This not only insulates them from high and variable power prices, but also reduces network and retail costs which are part of every energy bill.

Modelling of electricity price changes over 2022 to 2023 by UNSW showed that households without solar or battery systems in their homes were the most vulnerable to electricity price changes. Shown in Figure 14, these households experienced a \$500 increase in their power bills on average, compared to the \$300 or \$100 average increase experienced by those with solar panels, or solar panels and batteries respectively (Ashby et al. 2023).

Households with solar are more insulated from power price increases, and those with a battery are even better off.



Source: Adapted from Ashby et al. (2023). **Note:** The lines around each box represent the range of reported bill values, while the box represents the range of the middle 50% of values.

Enabling a smarter, more coordinated rooftop solar and storage system helps to ensure households and businesses maximise their investment in solar.

Investing in smart solar and storage systems can help network operators ensure voltage in the grid stays within technically safe ranges. Currently, network operators can readily instruct power companies to dispatch electricity from large-scale generators. But they do not have direct control over rooftop solar generation, which can lead to challenges in balancing the grid.

To manage this problem, network operators would historically disconnect rooftop solar systems from the system when voltage got too high, which also disabled them for generating power for household appliances and batteries. This also caused network providers to put limits on new installations, capping them to smaller systems than properties could otherwise accommodate. For example, Western Power in WA limits new solar installations to 1.5 kilowatt (kW) systems in some areas. Both of these technical fixes disadvantage households and businesses who could be benefiting more from investing in rooftop solar and battery systems.

Thankfully, more sophisticated solutions are now being rolled out. 'Dynamic operating envelopes' allow flexible, real-time adjustment to the amount of energy rooftop solar owners can export to the grid when it is necessary to maintain grid security, without shutting systems down altogether. This can also avoid the need to restrict the size of new solar installations, so that homeowners and businesses can install larger systems that maximise their investment in rooftop solar. Installing batteries alongside implementing dynamic operating envelopes can ensure household and business rooftop solar systems can generate to their full capacity, and the energy can be used efficiently.



OPPORTUNITY #8

Deploy more community-scale batteries to expand the benefits of rooftop solar

Community-scale batteries act as a bridge between households, businesses and our grid. These large batteries can store excess rooftop solar energy generated by nearby homes and businesses which don't have their own storage. This stored energy can then be accessed by all households and businesses connected to the local network, including those without their own solar panels.

These systems can have a capacity ranging from 100 to 1000 kilowatt-hours (kWh) and are designed to support a few hundred homes and businesses. They can be located in convenient areas like local government depots and community facilities, or alongside existing grid infrastructure like transformer stations which are already located throughout our cities and suburbs. Community batteries are a key way to share the bill saving benefits and cost-of-living relief provided by local solar power with more of the community.

TO DO THIS, WE CAN



Install 5,000 community-scale batteries in locations that maximise value for the community and provide stabilising services for the grid.



Provide a reduced local use of service price when local homes and businesses use electricity from community-scale batteries.



Allow local energy exchange between households and businesses, facilitated through a local community-scale battery.

THIS WOULD



Provide households and businesses that don't have rooftop solar with access to locally-generated solar power, resulting in cheaper bills and avoided distribution costs.



Enable household rooftop solar power to be sold to nearby businesses or community scale batteries that can either use the electricity in real time, or soak it up for later use. This ensures greater use and value of solar power generated by the household.



Store 5000 kilowatt hours (kWh) on average of locally-generated solar energy in each neighbourhood, and provide that energy to around 250 households at night.



Soak up peak solar generation and manage evening peak demand in the community.

HOW IT WORKS

Dan and Priv

Dan and Priv* are renting a townhouse that doesn't have rooftop solar or batteries. However, the house is connected to their local community-scale battery, which means they can:



- › Access electricity generated by their neighbours;
- › Pay reduced prices for the electricity they use from the local community battery that avoids the additional transmission and distribution fees that would normally be included from purchasing electricity generated from far away.

This way, even though Dan and Priv don't have their own rooftop solar, they can still benefit from the expansion of rooftop solar in their neighbourhood.



Michael and Felipe

Michael and Felipe* have a rooftop solar system, but no battery. However, since their house is connected to their local community battery, they can:



- › Generate solar energy in the day and export excess power to the local community-scale battery. Even if there is low demand during the day, this energy is still valuable as it can be stored and discharged later when demand is high. The electricity they export helps to offset their power bills;
- › Draw electricity from the local community-scale battery at a reduced price in the evening. Like Dan and Priv, their electricity costs would be lower than if they needed to draw electricity from beyond their local network.



*These scenarios are included for illustrative purposes and are not based on real people.

HOW DOES THIS HELP US MAKE THE MOST OF ROOFTOP SOLAR?

Community-scale batteries can help to match energy supply and demand directly within local communities, so more power gets stored and used close to where it is produced in the first place. By installing more community batteries, we can soak up abundant rooftop solar power without every solar home or business needing to have their own battery.

Each neighbourhood has a mix of residential, commercial and sometimes industrial buildings, each with their own energy generation, storage and use profiles. Connecting all the local rooftop generation to a community-scale battery can efficiently supply solar energy to households and businesses when they need it.

For example, households with solar panels may generate far more solar power during the day than they need. Their excess generation can be absorbed by the community-scale battery. The stored energy can then be discharged back to households in the evening when solar energy generation is low and demand is high. This means community-scale batteries can act as an energy 'buffer' by providing energy locally during times when demand spikes.

Community-scale battery pilots around the country are testing different business models to see which can deliver the best value and benefits for the community. This is why the regulatory environment governing the operation of community-scale batteries has been changing over the past several years (Zsuzsanna et al. 2024). As we learn more about using community-scale batteries, regulators need to ensure community benefits are at the centre of their policy and market design criteria.

Community-scale batteries can share the cheap solar power generated by nearby homes and businesses with their neighbourhood.



Image: Totally Renewable Yackandandah is a community-led initiative that aims to power the Victorian town of Yackandandah with 100% renewable energy. Locals who don't have their own solar panels can still buy affordable, locally-generated solar power from the community-scale battery via a local retailer.

4.

Policies to help Australia shine bright





Aussie Solar Drive

We have huge potential to keep growing rooftop solar and storage in Australia, and so much to gain when we do: lower cost of living, less climate pollution and a more flexible, resilient grid. That's why it's time for a bold national push to double solar capacity on Australian rooftops and deliver more community and household storage by the end of the decade – reaching almost 50 gigawatts (GW) of reliable, affordable clean energy and 25 GW of supporting storage.

This big national push, the *Aussie Solar Drive*, can support the next big wave of rooftop solar and storage on homes and businesses around the country. This will cement our place as the world's solar champions and bring the benefits to even more Australians. A major new training initiative, the *Australian Energy Corps*, can roll out alongside the *Aussie Solar Drive* to boost the number of skilled energy workers in Australia. Training more workers for great energy careers will help to deliver this big step-up in rooftop solar and storage, while also enabling the ongoing and essential rollout of transmission infrastructure and large-scale wind, solar and storage projects.

Roll out rooftop solar and storage for all social housing

As mentioned in Opportunity #3, Australians living in social housing will benefit the most from the bill savings provided by rooftop solar, because they are facing some of the toughest cost-of-living challenges. The Australian Government is already partnering with state and territory governments to provide energy efficiency upgrades for up to 30,000 social housing properties through the [Household Energy Upgrades Fund](#). While these upgrades will help to make properties cheaper, safer and more comfortable to live in, providing tenants with access to rooftop solar and storage would slash bills and climate pollution even further.

Governments can finance some of this investment by rethinking how energy bill support is provided to social housing tenants. Australian Government or state government green bonds can be used to finance the upfront cost of installing rooftop solar and storage. This model has been demonstrated by Singapore's Housing and Development Board in delivering sustainability upgrades and energy-efficient new builds across its property portfolio (Housing and

Development Board 2022). With rooftop solar and storage slashing their energy bills, social housing tenants will then have less need for ongoing energy bill rebates which currently cost governments hundreds of millions of dollars each year. The savings on these rebates (see Opportunity #3) can be used to meet the returns on the green bonds, reducing the total cost of delivering this new rooftop solar and storage.

A similar approach was briefly piloted in recent years in New South Wales through the *Solar for Low-Income Households* scheme. Eligible households who were receiving the \$285 a year energy bill rebate could opt to swap this for a fully-installed 3 kilowatt (kW) solar system, which the NSW Government estimated could deliver bill savings of up to \$600 a year. Participating residents agreed to trade off the energy bill rebates for 10 years to reflect the cost of the system. While this pilot has now ended, it provides an important real-world example of how rooftop solar and storage could be rolled out to many more Australians living in social homes.

Alongside helping financially disadvantaged Australians cut their energy bills, rolling out rooftop solar and storage on social housing also has the potential to support several other national energy priorities. For example, the Australian and state governments could partner with local manufacturers of solar panels and batteries to purchase the necessary equipment, helping to kick-start domestic manufacturing through the *Solar Sunshot* and *Future Made in Australia* policies.

Because a large number of these homes will be owned by a single state government agency or community housing provider, there is also significant potential to network many solar systems together to form a virtual power plant. A pilot of this approach, delivered in partnership between the South Australian Government and Tesla (see Box 2, p. 16), demonstrates the potential of innovative models like this to help deliver a resilient and reliable grid powered by far more rooftop solar.

There is significant potential to network the rooftop solar systems from social housing into a virtual power plant, to help deliver a more resilient and reliable power grid for everyone.

Accelerate 'solar soaker' community batteries

Ensuring households continue to experience genuine benefits in lower power bills is essential to maintaining and accelerating solar uptake rates. Australian Government investment in community batteries can help households and businesses maximise the benefits of installing rooftop solar, as well as sharing lower power bills and cost-of-living relief with the wider community.

The Australian Government has made an initial \$200 million investment in 420 community batteries around the country from 2022 to 2024. The *Community Batteries for Household Solar* program has been significantly oversubscribed, demonstrating appetite and capacity to incorporate many more community-scale batteries into our grid. The Climate Council's [Seize the Decade](#) plan identified a need for approximately 5,000 community batteries around the country by 2030, to firm up rooftop solar generation alongside household batteries. As part of the *Aussie Solar Drive*, the Australian Government can deliver more co-investment with local governments, businesses and utility networks to keep growing the number of community batteries in our grid.

This investment is an affordable alternative to more significant network upgrades, which may otherwise be needed to ensure Australians who already have rooftop solar – and those who install it in future – can get the most out of their panels. It can also be rolled out quickly and efficiently because the Australian Government has already

built the necessary grant and delivery systems through the first round of the *Community Batteries for Household Solar* program. A second stage of the program could focus on partnering with local governments to deliver community batteries in areas with significant potential to expand solar uptake. In Queensland, the Noosa Council's community battery provides a practical example of how local governments can get involved in the

delivery of this important infrastructure.

The council owns the battery, which is operated by a specialist energy firm to buy and sell power into the National Electricity Market. As well as supporting local homes and businesses to make the most of their solar in one of Australia's sunniest regions, the council uses any profits to invest in other projects that cut climate pollution in their community (Noosa Council 2023).



Refocus the Small-scale Renewable Energy Scheme to support commercial solar and storage

Australian businesses have plenty to gain from rooftop solar and storage, but at the moment uptake lags behind households. The Australian Government can drive a big expansion of commercial solar and storage by refocusing the *Small-scale Renewable Energy Scheme* to specifically support business uptake – particularly among the small and medium businesses that create good local jobs.

The first wave of the *Small-scale Renewable Energy Scheme* established a requirement for energy retailers to purchase clean energy generation certificates, which were created through rooftop solar installed on Aussie homes. The scheme has played an important role in driving uptake of household rooftop solar during the early development of this technology, and is a proven market-based model.

A refocused *Small-scale Renewable Energy Scheme* could require large corporations operating in Australia to meet legislated renewable energy targets. Many big companies – like major banks, supermarkets and airlines – have already set their own voluntary renewable energy targets as part of corporate sustainability commitments. These companies would be required to meet a legislated share of their energy needs with renewables, which could be achieved either by installing rooftop solar and storage on their own facilities, or by purchasing renewable generation certificates. Small and medium businesses could produce these renewable generation certificates and sell them to

reduce the cost of installing solar, in the same way as the first wave of the scheme has – primarily for households. Big businesses which have already set voluntary renewable energy targets would also benefit from a clear and consistent framework for demonstrating their progress, and a level playing field with the same requirements applying to all major corporations. Administration of this scheme could leverage the existing energy reporting mechanisms of the National Greenhouse and Energy Reporting Scheme, which large corporations are already part of.

With the *Small-scale Renewable Energy Scheme* now winding down towards the policy's 2030 end date, there is an opportunity to update this proven market-based model to seize the potential of rooftop solar for Australian businesses. This could incentivise far more uptake of solar across Australia's warehouses, workshops and commercial buildings, adding more gigawatts of clean generation to our energy mix.



Ensure rooftop solar is added to all new and substantially renovated homes, apartments and commercial buildings

Around 170,000 new homes are built in Australia each year – including both freestanding properties and apartments (ABS 2024a). Governments are working to accelerate this build rate to around 250,000 new homes a year, as part of tackling the nation's housing affordability and availability challenges.

There is a significant opportunity to bring the benefits of solar to more people simply by ensuring panels are added as a standard feature to all new and substantially rebuilt properties.

The National Construction Code sets out the minimum requirements for how new homes and apartments must be built. After extensive negotiations between the Australian states and industry, the latest update in 2022 set new 'whole of home' energy efficiency requirements which aim to ensure new properties are comfortable to live in and affordable to run (Australian Building Codes Board 2022). This update has seen some progress on making rooftop solar a more frequent inclusion for newly-built homes and apartments, but does not go far enough. Australia already has a big retrofit job ahead of us to extend the benefits of rooftop solar and energy efficiency to existing buildings. Every new and rebuilt home delivered now without solar panels and capacity for storage is simply adding to this challenge. Federal and state governments should work together to set a new bar in the National Construction Code, making rooftop solar a standard feature of all new housing delivered in Australia, wherever this is practically possible.

For commercial buildings, energy efficiency rules in the National Construction Code are encouraging an increasing number of newly-built offices, warehouses and factories to install rooftop solar (Strategy.Policy.Research 2022). The Australian Building Codes Board has proposed that these rules be strengthened to make installing a rooftop solar system a standard requirement for all new commercial buildings by 2025 (Australian Building Codes Board 2024). This would slash climate pollution and reduce energy bills for all kinds of businesses, from healthcare centres to shops and warehouses. Over the period 2025 to 2035, this improvement has been estimated to deliver \$4 billion worth of benefits in reduced energy costs, network costs and emissions (Centre for International Economics 2024).

Australian governments have been making incremental improvements to building standards for years, slowly edging towards homes and businesses which are cheaper to run and produce less climate pollution. It's time to go all the way by making rooftop solar and capacity for storage a standard feature of all new and substantially renovated properties.

Deliver a national information campaign about the benefits of proven, reliable rooftop solar

Because Australia's rooftop solar revolution has happened so quickly and often seamlessly, many people aren't aware of how rooftop solar has become increasingly efficient, affordable and reliable. A national information campaign about rooftop solar can help more Australians understand the proven benefits and tackle common questions about how to get the right solar and storage for their needs.

There is a lot of content out there about rooftop solar, but Australians need clear and reliable information from a reputable source they can trust. The Australian Government's *Solar Consumer Guide* is a good initial model of collating trusted information, but needs to be better promoted to consumers. Together with a range of more direct government actions through the Aussie Solar Drive, a national information campaign can help break down barriers of knowledge or perception that may be standing in the way of more households and businesses taking up rooftop solar and storage.



Australian Energy Corps

Doubling the amount of solar on Aussie rooftops by 2030 is a big job, particularly alongside the ongoing delivery of large-scale transmission, renewable generation and storage projects around Australia. That's why we need a major new national investment in energy skills alongside the *Aussie Solar Drive*.

Clean energy jobs can offer great, long-term careers for people starting out in the workforce, and for those who are already working in other parts of the energy sector. The *Australian Energy Corps* can skill a new wave of clean energy workers to power up Australia, including helping to roll out more rooftop solar and storage. The Climate Council recommends Australian governments work together to deliver this major boost to energy skills as an essential enabler of our move to clean, reliable and affordable renewables.



Provide free vocational training and upskilling for workers in electrical, plumbing, gasfitting, large-scale renewable energy and relevant building trades

Free vocational training is a key way to attract more workers to the clean energy sector, and help them find the right specialisation for their skills and interests. Whether that's installing rooftop solar and storage, working on large-scale generation projects or doing building retrofits to make homes all-electric and efficient, there are going to be tens of thousands of great new jobs available for energy workers in the years ahead.

The Australian Government has already started down this path with direct financial payments for an initial 10,000 New Energy Apprentices. Now we can scale this up and give aspiring and experienced energy workers access to fully-funded vocational courses so they can gain the classroom knowledge needed to start building or diversifying their careers.

Invest in capital upgrades for energy training facilities at public TAFEs and not-for-profit training providers

Today's energy workers need to train with the latest equipment and technologies they'll be working with on the job. A dedicated capital upgrades fund supporting the *Australian Energy Corps* can ensure training facilities around the country have the right gear to provide quality, up-to-date training, including on assessing and installing rooftop solar and storage to meet a range of household and business needs.

Ensure safe, supervised and high quality on-the-job placements for workers

Apprentice and upskilling workers can contribute to Australia's energy workforce as they learn. The *Australian Energy Corps* can be set up as a dedicated apprenticeship support network for energy workers, connecting them to union- and industry-led Group Training Organisations (GTOs) as their primary employer. Quality GTOs give workers a stable and reliable employer throughout their apprenticeship, while supporting them to gain experience on a range of work sites and types of projects through diverse placements.

Companies that need energy workers – like those delivering our next big wave of rooftop solar installations – can then easily engage with the *Australian Energy Corps* to find workers with the right level of experience and skills for their job. Mandatory apprentice ratios on publicly-funded energy infrastructure projects, like the roll-out of rooftop solar on social housing properties, can also help ensure there are plenty of interesting and diverse jobs for training workers, so they gain the hands-on experience essential for becoming a fully qualified tradesperson.

Provide dedicated streams for new apprentices and upskilling or reskilling workers

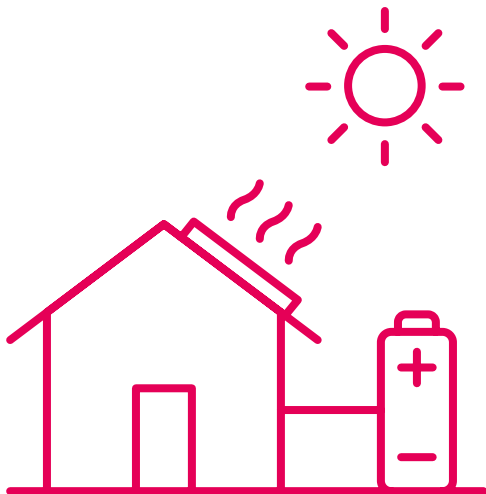
The *Australian Energy Corps* can connect workers with great training opportunities no matter where they are up to in their careers. Australia's existing energy workforce is a huge resource with relevant skills and experience for renewable energy jobs. The *Australian Energy Corps* could support the upskilling and reskilling of existing trade-qualified energy workers from related industries like fossil fuel energy generation, through tailored training programs and supervised work placements, as well as providing full apprenticeships for workers at the start of their energy careers.



CONCLUSION

As one of the sunniest places on earth, it's time to seize the sun.

Australia has already come a long way in rolling out rooftop solar, with around 3.6 million households and thousands of businesses — big and small — already sharing the benefits. As one of the sunniest places on earth, we have so much more potential and there's plenty we can still do to bring these benefits to more Australians.



Together, the *Aussie Solar Drive* and the *Australian Energy Corps* can be the catalysts for Australia's next big wave of rooftop solar and storage on households, businesses and in communities. Rooftop solar is popular around the country because families and communities understand its huge potential to cut electricity bills, give households more control over their energy needs, and slash climate pollution. A renewed push to share these benefits with more households and businesses can directly respond to the cost-of-living and energy pressures Australians are feeling now.

Beyond its benefits for households and businesses, rooftop solar has a central role to play in the clean energy system we're building to replace Australia's ageing and unreliable coal-fired power generators. All three levels of government have major investment and action underway to build the large-scale transmission, generation and storage we need to power past the end of fossil fuel energy. Big plans are also in train to grow new clean industries which can underpin the next era of Australian prosperity through the Future Made in Australia agenda.

A bold national drive to deliver and enable more rooftop solar and storage is the missing piece of the policy puzzle to bring more renewable energy capacity online quickly, cleaning up our grid and meeting our growing electricity needs this decade.

Our shared goal must be to ensure everyone has access to clean, reliable and affordable electricity. If we get the policies right, for two in three Australian homes and many more businesses, this can be delivered directly from their own roofs. For millions more, this clean and affordable power can come from a grid boosted by abundant electricity made cheaply during our sunny days, captured and stored in communities close to where it will be used. This is the bright future that rooftop solar and storage offers, that we can seize with the *Aussie Solar Drive* today.

Methodology notes

Rooftop solar capacity

This report uses solar installation data collated by the Australian Photovoltaic Institute (APVI) to estimate the capacity of three types of rooftop solar. The capacity of household rooftop solar (systems 15 kW or smaller) and commercial rooftop solar (systems sized 16 to 100 kW) is sourced from APVI (2024b).

Some large solar systems greater than 100 kW are also included as rooftop solar, where it is designed for use behind the meter (rather than as a power plant, generating energy primarily for export into the grid). As noted in Opportunity #4, businesses including supermarkets and hardware stores are installing these very large rooftop solar systems to meet their on-site energy needs.

Large solar systems of 100 kW are registered with the Clean Energy Regulator individually by name, and so can be individually filtered. To isolate behind the meter installations the list of registered systems was filtered to exclude registrations with names including 'station', 'farm', 'solar', or 'energy'. A subset of the list was then manually reviewed to validate this filtering. After filtering, the remaining eligible large, behind the meter solar systems represent 7 percent of total capacity.

Cost savings for social housing tenants and government

Annual savings for social housing tenants and governments are based on total typical bill savings from Dehghanimadvar (2024). It is assumed that governments reduce energy bill concessions available to households in line with energy bill savings, up to the total annual concession value. Any bill savings after the value of concessions is then retained by tenants. As shown in Table 1, potential energy bill savings are greater than annual concessions in all states and territories.

Total cost savings for tenants and governments are based on multiplying the value of concessions and tenants' remaining energy bill savings by the count of detached and semi-detached social housing dwellings from the 2021 Census (ABS 2021). Given it is assumed that all concessions would no longer be paid and that all dwellings could accommodate solar, this estimate should be considered as the total potential savings from solar installations.

Table 1: Cost saving analysis assumptions.

Jurisdiction	Estimated annual electricity bill saving	Annual energy bill concession value	Concession characteristics	Source
ACT	\$1,372	\$800.00	Lump sum	ACT Revenue Office
NSW	\$1,372	\$350.00	Lump sum	Service NSW
NT	\$1,755	\$422.67	Lump sum, fixed component only	Northern Territory Government
QLD	\$1,459	\$372.20	Lump sum	Queensland Government
SA	\$1,623	\$274.85	Lump sum	Government of South Australia
TAS	\$1,394	\$173.30	Lump sum	Tasmanian Government
VIC	\$978	\$171.15	17.5% of bill value, does not apply to first \$171.60	Department of Families, Fairness and Housing
WA	\$1,292	\$334.49	Lump sum	Government of Western Australia

Increase in capacity from installing solar on all new social housing:

The total increase in rooftop solar capacity is based on installing an 8 kW system on each detached social housing dwelling, and a 4 kW system on each semi-detached dwelling, with system sizes based on Dehghanimadvar (2024), and dwelling counts based on the 2021 Census (ABS 2021).

Increase in capacity from installing solar on all new commercial buildings:

Currently commercial buildings are incentivised to install rooftop solar due to energy efficiency requirements, but not required to do so. However, the proposed NCC 2025 makes solar installation mandatory for all commercial buildings, covering 100 percent of available roof space, or meeting a minimum capacity per m2 of conditioned floor area.

Projected construction of new commercial building stock by climate zone and building type was sourced from Strategy.Policy.Research. (2022a). New commercial stock is measured as m2 of conditioned floor area, in line with the proposed requirements of NCC 2025. Under the current state, solar systems are installed on 47 to 69 percent of new commercial buildings, with specific survey data from Strategy.Policy.Research. (2022b) used where available for a given building type, and 50 percent used as a default assumption otherwise.

Under both current regulations and the proposed NCC 2025, new buildings with solar are assumed to install solar capacity equivalent to the watts per m2 parameter from Australian Building Codes Board (2024). These parameters are based on achieving a 50 percent level of on-site consumption to maximise energy cost savings (DeltaQ 2024). In practice, some high-rise buildings will not have enough roof space available to support this level of solar, while other buildings, such as warehouses and aged care facilities, are likely to install more solar than required given abundant roof space and high energy use. As a result, the amount of solar per m2 is considered an average response.

In the absence of regulation, only the current rate of solar installations is expected to occur. All new commercial buildings are assumed to install rooftop solar from May 1 2025.

Increase in capacity from installing solar on all new residential buildings:

Currently, only about one-in-three new houses are built with solar. While data is not collected for apartments, anecdotally very few are built with solar. While the 2022 reforms to the *National Construction Code* (NCC) will incentivise rooftop solar installation, the impact of these regulations is not yet clear.

For the purpose of this report, the increase in rooftop solar has been modelled based on the current base case, which has not yet seen the impacts of NCC 2022. Current rates of rooftop solar installation and projections for new dwelling construction were sourced from ACIL Allen (2022). Solar is assumed to be installed on all new properties from July 1 2027.

Houses were assumed to install 6.6 kW of rooftop solar, based on the industry standard system size for houses on single phase power, but it should be considered an average. Homeowners may choose a larger or smaller system to suit their property and energy needs.

Given the range in apartment buildings, from low-rise two storey buildings to high rises, there is a large variation in the amount of rooftop solar capacity available. The apartment solar capacity of 2.5 kW per dwelling is based on a middle value of the range of potential capacities for apartments of different size, as estimated by Dehghanimadvar (2024).

References

ACIL Allen (2022). *NCC 2022 Residential Energy Efficiency - Final Decision RIS*. Accessed: <https://www.abcb.gov.au/ncc-2022-residential-energy-efficiency-final-decision-ris>.

ACT Government (2022). *Solar for Apartments Program*. Accessed: <https://www.climatechoices.act.gov.au/policy-programs/solar-for-apartments-program>.

ACT Government (2023). *Sustainable Household Scheme Dashboard*. Accessed: <https://www.climatechoices.act.gov.au/policy-programs/sustainable-household-scheme-dashboard>.

Allume Energy (2024). *How SolShare works - Technical*. Accessed: <https://allumeenergy.com.au/how-solshare-works-technical/>.

Anglicare Australia (2023). *The High Cost of Poverty in Australia*. Accessed: <https://www.anglicare.asn.au/wp-content/uploads/2023/09/Australia-Fair-The-Poverty-Premium.pdf>.

Ashby, L., Bruce, A., Roberts, M., Kallmier, E. and Dehghanimadvar, M. (2023). Impact of 2023 tariff changes on outcomes for households with and without solar and battery storage. In: *Australian PV Institute*. Accessed: <https://apvi.org.au/solar-research-conference/wp-content/uploads/2023/12/Ashby-L-Impact-of-2023-Tariff-Changes-on-Outcomes-for-Households-with-and-without-Solar-and-Battery-Storage.pdf>.

Ausgrid (2023). *Ausgrid average electricity consumption by LGA FY2023*. Accessed: <https://www.ausgrid.com.au/Industry/Our-Research/Data-to-share/Average-electricity-use>.

Australian Building Codes Board (2022). *New whole-of-home energy efficiency - what's it all about?* Accessed: <https://ncc.abcb.gov.au/news/2022/new-whole-home-energy-efficiency-whats-it-all-about>.

Australian Building Codes Board (2024). *NCC 2025 Public Comment Draft: Volume One, J9D5 Facilities for solar photovoltaic and battery systems*. [online] pp.191–192. Accessed: https://consultation.abcb.gov.au/++preview++/engagement/ncc-2025-public-comment-draft/supporting_documents/NCC%202025%20PCD%20%20Volume%20One.pdf.

Australian Bureau of Statistics (2021). *Dwellings (place of enumeration) by Dwelling Structure (STRD) and Tenure and Landlord Type (TENLLD)* [Census TableBuilder].

Australian Bureau of Statistics (2022a). *Household Income and Wealth, Australia, 2019–20 financial year. Table 8.1 and 8.3*. Accessed: <https://www.abs.gov.au/statistics/economy/finance/household-income-and-wealth-australia/2019-20>.

Australian Bureau of Statistics (2022b). *Household Income and Wealth, Australia, 2019–20 financial year. Table 10.1 and 10.2*. Accessed: <https://www.abs.gov.au/statistics/economy/finance/household-income-and-wealth-australia/2019-20>.

Australian Bureau of Statistics (2024a). *Building Activity, Australia, March 2023. Table 37: Number of Dwelling Unit Completions by Sector, Australia*. Accessed: <https://www.abs.gov.au/statistics/industry/building-and-construction/building-activity-australia/mar-2023>.

Australian Bureau of Statistics (2024b). *Selected Living Cost Indexes - 2024 Weighting Pattern*. Accessed: <https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/annual-weight-update-cpi-and-living-cost-indexes/dec-2023#cite-window1>.

Australian Energy Market Commission (2023). *AEMC on smart meters: 100% by 2030*. Accessed: <https://www.aemc.gov.au/news-centre/media-releases/aemc-smart-meters-100-2030-new-customer-information-real-time-data-and-protections>.

Australian Energy Market Operator (2024). *2024 Integrated System Plan*. Accessed: <https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp>.

Australian Energy Regulator (2023). *Network tariff reform*. Accessed: <https://www.aer.gov.au/about/strategic-initiatives/network-tariff-reform>.

Australian Institute of Health and Welfare (2022). *Housing assistance in Australia, Social housing dwellings*. Accessed: <https://www.aihw.gov.au/reports/housing-assistance/housing-assistance-in-australia/contents/social-housing-dwellings>.

Australian Photovoltaic Institute (2024a). *Monthly installations by size category, Australia*. Accessed: <https://pv-map.apvi.org.au/analyses>.

Australian Photovoltaic Institute (2024b). *Timeseries data by installation size, Australia*. Accessed: <https://pv-map.apvi.org.au/postcode>.

Australian Photovoltaic Institute (2024c). *Large-Scale PV Systems*. Accessed: <https://pv-map.apvi.org.au/power-stations>.

Best, R., Burke, P.J., Nepal, R. and Reynolds, Z. (2021). Effects of rooftop solar on housing prices in Australia, Working Paper 2105, Apr 2021, Centre for Climate and Energy Policy, Crawford School of Public Policy, The Australian National University.

Blackburn, T. (2024). *Skint: More than 9 million Aussies have less than \$1,000 in savings*. Accessed: <https://www.finder.com.au/news/millions-of-aussies-have-less-than-a-grand-in-savings>.

Centre for International Economics (2024). *Increasing the stringency of the commercial building energy efficiency provisions in the 2025 National Construction Code Consultation Regulation Impact Statement Prepared for Australian Building Codes Board*. Accessed: <https://www.abcb.gov.au/sites/default/files/resources/2024/CRIS-Commercial-Energy-Efficiency-.pdf>.

Chalmers, J., Bowen, C. and McAllister, J. (2023). *Helping Australians save energy, save on energy bills*. Accessed: <https://ministers.treasury.gov.au/ministers/jim-chalmers-2022/media-releases/helping-australians-save-energy-save-energy-bills>.

Chalmers, J., Bowen, C. and McAllister, J. (2024). *New power bill relief*. Accessed: <https://ministers.treasury.gov.au/ministers/jim-chalmers-2022/media-releases/new-power-bill-relief>.

Clean Energy Council (2016). *Guide To Improving Electricity Use In Your Business*. Accessed: <https://assets.cleanenergycouncil.org.au/documents/consumers/guide-to-improving-electricity-use-in-your-business.pdf>.

Clean Energy Regulator (2024). *Australia's largest retailer serving fresh, green power*. Accessed: <https://cer.gov.au/news-and-media/case-studies/australias-largest-retailer-serving-fresh-green-power>.

Climate Council (2024). *Seize the Decade: How we empower Australian communities and cut climate pollution 75% by 2030*. Accessed: https://www.climatecouncil.org.au/wp-content/uploads/2024/03/CC_MVSA0394-CC-Report-Next-Wave_V8-FA-Screen-Single.pdf.

Dehghanimadvar M, Roberts M, Bruce A, Egan R, (2024). *Rooftop solar potential of Australian housing stock by tenure and dwelling type*. Solar Citizens / APVI. Accessed: <https://apvi.org.au/wp-content/uploads/2024/04/Solar-potential-of-Australian-housing-stock-published-16-4-24.pdf>.

DeltaQ (2024). *NCC 2025 Energy Efficiency - Advice on the technical basis - Final Stringency Analysis*. Accessed: <https://www.abcb.gov.au/sites/default/files/resources/2024/REP01080-B-009-Whole-Building-Stringency-Analysis-Report-Extended10-April-2024.pdf>.

Department of Energy & Mining (2022). *South Australia's Virtual Power Plant*. Accessed: <https://www.energymining.sa.gov.au/consumers/solar-and-batteries/south-australias-virtual-power-plant>.

Energy Consumers Australia (2023). *Energy Consumer Behaviour Survey - October 2023*. Accessed: <https://energyconsumersaustralia.com.au/publications/surveys-energy-consumer-sentiment-behaviour>.

Geelong Sustainability (n.d.). *Geelong Community Solar Program*. Accessed: <https://www.geelongsustainability.org.au/project/geelong-community-solar-program/>.

Horizon Power (2024). *A new energy solution making it easier for more households to save on their energy bills*. Accessed: <https://www.horizonpower.com.au/for-home/home-electricity-solutions/sunshine-saver/>.

Housing and Development Board (2022). *HDB Raises S\$1 Billion Through Inaugural Green Bond Issuance*. Accessed: www.hdb.gov.sg/cs/infoweb/about-us/news-and-publications/press-releases/16032022-Green-bond-green-finance-framework.

International Energy Agency (2023). *Renewables 2023: Analysis and forecast to 2028*. Accessed: www.iea.org/reports/renewables-2023.

Kuiper, G. (2023). *Growing the sharing energy economy 2*. [online] *Institute for Energy Economics and Financial Analysis*, IEEFA, pp.1–53. Accessed: https://ieefa.org/sites/default/files/2023-10/Growing%20the%20sharing%20energy%20economy_Oct23_2.pdf.

Naderi, S., Pignatta, G., Heslop, S., MacGill, I. and Chen, D. (2022). *Demand response via pre-cooling and solar pre-cooling: A review*. *Energy and Buildings*, <https://doi.org/10.1016/j.enbuild.2022.112340>.

Noosa Council (2023). *Community Battery Project*. Accessed: www.noosa.qld.gov.au/community-battery-project.

Plenti (2024). *Green Loans*. Accessed: <https://www.plenti.com.au/green-loans/>.

Reserve Bank of Australia (2024). *Lenders' Interest Rates*. Accessed: <https://www.rba.gov.au/statistics/interest-rates/>.

Roberts, M., Nagrath, K. Briggs, C., Copper, J., Bruce, A., and McKibben, J (2019). *How much Rooftop Solar can be Installed in Australia? Report for the Clean Energy Finance Corporation and the Property Council of Australia*. Sydney.

Rutovitz, J., Langdon, R, Mey, F., Briggs, C. (2022). *The Australian Electricity Workforce for the 2022 Integrated System Plan: Projections to 2050*. Accessed: https://www.uts.edu.au/sites/default/files/2022-11/ISP2022_Workforce_v1.pdf.

Solar Choice (2024). *Solar Panel Costs: Solar Choice Price Index*. Accessed: <https://www.solarchoice.net.au/solar-panels/solar-power-system-prices>.

Solar Victoria (2024a). *Solar for Apartments*. Accessed: <https://www.solar.vic.gov.au/apartments>.

Solar Victoria (2024b). *Solar Homes program reporting*. Accessed: <https://www.solar.vic.gov.au/solar-homes-program-reporting>.

Solar Victoria (2024c). *Solar rebates for rental properties*. Accessed: <https://www.solar.vic.gov.au/solar-rebates-rental-properties>.

Strategy. Policy. Research. (2022a). *Commercial Building Baseline Study 2022: Final Report*. Accessed: <https://www.dccew.gov.au/sites/default/files/documents/commercial-buildings-energy-consumption-baseline-study-2022.pdf>.

Strategy. Policy. Research. (2022b). *Research report: use of renewable energy to trade-off energy efficiency requirements in Section J of the National Construction Code*. Accessed: <https://www.dccew.gov.au/sites/default/files/documents/use-%20renewable-energy-%20trade-off-ee-requirements-section-j-national-construction-code.pdf>.

The Guardian Labs (2023). *Woolworths Group accounts for 1% of electricity used in Australia - what is it doing about it? The Guardian*. Accessed: <https://www.theguardian.com/woolworths-group-scale-for-good/2023/jun/05/woolworths-group-accounts-for-1-of-electricity-used-in-australia-what-is-it-doing-about-it>.

Vorrath, S. (2023). *Rooftop solar saves money, and batteries can wipe out bills: Labor pushes household savings*. Accessed: <https://reneweconomy.com.au/rooftop-solar-saves-money-and-batteries-can-wipe-out-bills-labor-pushes-household-savings/>.

Yarra Energy Foundation (2022). *Guide to Solar for Apartments*. Accessed: <https://www.yef.org.au/app/uploads/2022/10/Guide-to-Solar-for-Apartments-2022.pdf>.

Zsuzsanna, C., Dwyer, S., Kallies, A. and Economou, D. (2024). *The role of community-scale batteries in the energy transition: Case studies from Australia's National Electricity Market*. *Journal of energy storage*, <https://doi.org/10.1016/j.est.2024.112277>.

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The Climate Council acknowledges the Traditional Owners of the lands on which we live, meet and work. We wish to pay our respects to Elders past and present, and recognise the continuous connection of Aboriginal and Torres Strait Islander peoples to Country.

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