Australian Government

Department of Infrastructure and Transport

State of
Australian
Cities 2013

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2013

Department of Infrastructure and Transport
Major Cities Unit

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Director — Publishing and Communications Section
Department of Infrastructure and Transport
GPO Box 594, Canberra ACT 2601 Australia

Email:　　publishing@infrastructure.gov.au
Website:　www.infrastructure.gov.au

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Foreword

Like the three that have come before it, this year's State of Australian Cities report provides not just a snapshot of our 18 major cities, but a rich picture of their changing patterns and the effect that these changes have on the lives of the three out of every four Australians that live within them.

Since 2010, these annual reports have provided vital insight into the productivity, sustainability and liveability of our cities. No other document brings together so much up-to-date information about what is happening in our cities and the evolving story of how we live and work.

Not only does this report contain the most recent data on our cities, it also provides a much richer picture than ever before of *where* change is occurring in our cities. Yes, our cities rank well globally. But it is important that we look further to the vastly different landscapes within and between our cities. Access to jobs, commuting times, proximity to public transport, use of renewable compared to traditional forms of energy for our homes and workplaces, and protecting ourselves from the damaging effects of climate change are just some of the public policy issues explored and sometimes explained in these pages. For public policy decision makers and the curious public, there is no better compendium to explain what is going on in our cities today.

This year, the on-line version contains valuable additional data with hundreds of links to maps and more detailed information available from supplementary online map application.

Also this year, each chapter includes case studies which offer the reader insight into how universities, agencies, governments and individuals are helping us manage the myriad of challenges we face every day in our urban areas. My heartfelt thanks to all those who have agreed for their research findings and experiences to be part of this report. It is a privilege to include them in these pages. Finally, thank you to the staff of my department who have produced the State of Australian Cities 2013. I hope interest in it will equal and indeed exceed the editions that have come before it which have been seen now by nearly three million readers.

A body of evidence such as this is the foundation for building more productive, sustainable and liveable Australian cities. I commend it to you.

Anthony Albanese
Deputy Prime Minister
Minister for Infrastructure and Transport
Minister for Broadband, Communications and the Digital Economy
July 2013

Executive summary

State of Australian Cities 2013 is the fourth in a series of annual Australian Government publications bringing together current research and data to present a comprehensive picture of how our major cities are evolving, and to strengthen the knowledge base used to develop policy. The purpose of *State of Australian Cities 2013* is to provide an evidence base for policy and investment decisions in our major cities, to explore trends in urban development and to inform people about the factors that are shaping our cities and the lives of their communities.

The second tranche of the Australian Bureau of Statistics' (ABS) *2011 Census of Population and Housing* was available to this year's report. Consequently, there is an emphasis on migration, industry structure and human capital.

A major change for 2013 is the introduction of maps. These are available at different functionalities according to the report's format (hard copy, PDF or soft copy). The interactive web-based maps allow readers to explore particular aspects of cities according to their interests. The report looks at examples of these, and much of the commentary is about the stratification of cities and what this means for productivity, liveability and sustainability.

The main theme of the report is how the change in Australia's industrial structure (described in some detail in the 2012 report) is affecting its major cities. Given an increasing concentration of high paying jobs in their centres, while at the same time most of the population growth is happening on the edges, the report focuses on what this may mean for productivity and equity.

Key findings Chapter 2: Population and settlement

- Australia has one of the highest population growth rates in the OECD. Around half this comes from net overseas migration. Since the average growth of major cities is slightly above the national rate, this indicates many Australian cities have some of the highest growth rates in the developed world.

- In the 2011–12 year, the larger capitals grew almost 50 per cent faster than the rest of the country. Over the last five years, the previously high population growth rates in regional Queensland's major cities have moderated. Growth rates in Darwin and Perth remained particularly strong.

- There are large differences in the age and gender of those moving to and from individual capital cities. Canberra, Darwin, Perth and to a lesser extent Brisbane are attracting high numbers of mainly male 15–24 year olds. Sydney is losing significant numbers of residents across all age groups but overseas migrants are taking their place at a rate that keeps Sydney growing, albeit below the national average.

- High growth areas are also mostly high churn areas (high numbers of people moving in and out). In this situation, a change of just a fraction of a per cent can make the difference between high population growth and low population growth. Regional major cities in Queensland and the outer suburbs of the larger capitals are in this situation.

Student tourism

- Australia is the third most popular market for international students in the world. This market generates more than $15 billion for the nation every year.

- One in every 16 persons living in the City of Sydney is an international student while for the City of Melbourne it is one in five. Large numbers also commute into these areas for study.

- China is the largest source country of international students, particularly for higher education followed by India, South Korea, Vietnam and Malaysia.

- The rapid increase in international student numbers since 2000 has created accommodation and transport stresses particularly for Melbourne and Sydney. While there has been some progress in building more student accommodation, most international students rely on the private rental market.

- There has been a fall in the numbers of international students since 2010, particularly in the Vocational Education and Training (VET) sector traditionally dominated by Indian students.

International migration

International migrants are dividing into two types:

- The first are from the skilled migrant scheme (about half of Net Overseas Migration) and are part of the international gateway function of the global cities of Sydney and Melbourne. This stream is characterised by temporary and visitor migrants who mostly live in or near city centres.

- The second stream is made up mainly of citizen migrants who usually reside at a distance from city centres. This group increasingly leads transnational lives and are critical to the international connectedness of cities.

- Ninety-six per cent of the 29 million border crossings annually are short term movements. On any day, there are more than a million temporary visa holders in Australia (this figure does not include New Zealanders).

- The rise in the proportion of international 'sojourners' in the Australian population especially in the larger capital cities is challenging traditional definitions of what is meant by 'migrant'. For a significant proportion, Australia will be a point on the journey rather than a place to settle permanently.

- The current patterns of international migration seem closely aligned with the increasing role of knowledge intensive transactional industries in Australia.

- Eighty-five per cent of 457 Visa holders live in capital cities and half live in the inner city and mainly work in the transaction industries.

- Skilled migrants outside the city centres are often working in industries that do not fully utilise their skills.

Key findings Chapter 3: Productivity

- Major cities have experienced a large increase in their number of knowledge-intensive jobs – high-skill jobs that significant expertise, intellectual effort and innovation. This increase has tended to be concentrated in central areas.

- While knowledge-intensive jobs account for only a small proportion of all jobs in major cities, they are increasingly important to their productivity and they increase employment opportunities and salaries.

- The manufacturing and retail sectors, which once drove jobs growth, are now employing a smaller proportion of Australians.

- An increasing number of people are living further away from city centres in major cities while higher-skill, higher-paying jobs, are becoming concentrated in central areas.

- There are three ways that the connection between work and homes in major cities could be improved: firstly, by bringing workplaces closer to homes; secondly, by increasing the number of dwellings in areas that have the greatest number of jobs so that people can live closer to work; and thirdly by improving transport links between work and home (Kelly et al. 2013).

- Australia's cities tend to have higher of private car use than public transport use when compared with overseas cities.

- Average incomes appear to influence the type of transport used for journeys to work. Those who use public transport tend to have higher average weekly individual incomes than those who use other means of transport.

- Private vehicles provide easier access to a higher number of jobs than mass transit in Australia's major cities.

- Industry structure differs widely between major cities. Each city plays a unique role in the nation's economic system. The participation of males compared with females in particular types of industry also differs widely.

- The mining sector and associated fly in, fly out and drive in, drive out practices influence the economies of some major cities, particularly Perth and Brisbane as well as demand for office space and the aviation service.

- Major ports and airports are important to the productivity of major cities and they influence the urban structure of cities.

- Labour force participation rates and the participation rates of male versus females differ between and within major cities. The proportion of employed persons working full-time and part-time and the proportion of males and females working in these categories also differ between and within major cities.

Key findings Chapter 4: Sustainability

Heat

- Based on current trends, heat-related deaths in Australian cities, especially Perth and Brisbane, are predicted to increase.

- Policy responses to previous heat events were tested during the record-breaking summer of 2012–13, when Australia registered the hottest September to March period on record, the hottest summer on record, the hottest month on record, the hottest day on record and the longest national-scale heatwave. It was also the hottest summer on record for Australian sea-surface temperatures.

- Despite these records, most Australian cities did not exceed their long term average highest monthly maximum and minimum temperatures during the summer months of 2012–13. There were also significant differences in rainfall, particularly between Queensland coastal cities (many of which received record rainfall), and southern cities, some of which received hardly any rain during this period.

- The Bureau of Meteorology has developed an improved method of recording and predicting heat events. These are now able to be compared and mapped using a measure known as the 'excess heat factor' (EHF) measure.

- The liveability of Australia's cities will be affected by how their sustainability is managed. Many cities are making significant progress in introducing of vegetative (including plants, trees, open green spaces and even forests) at various scales across cities – from buildings to districts and metropolitan regions – to reduce the UHI effect and thereby increase liveability and reduce energy use.

Household energy

- Since 2008, residential energy use has accounted for 12 per cent of the nation's total consumption.

- Energy demand for space heating and cooling is projected to increase in the coming decades. Factors influencing increased demand include houses with the largest average floor areas in the world, the decreasing occupancy rate of dwellings and the increasing use of whole-house heating and cooling systems.

- Airconditioner use in the residential sector has increased significantly, with possession almost doubling between 1994 and 2004, rising from an average of 0.395 units to 0.762 units per household. This is projected to increase even further. The rapid growth in air conditioner possession has effectively overshadowed any energy consumption reductions gained by improved efficiency over the same period.

- Appliances account for 23 per cent of Australia's residential sector energy consumption, with electricity being the predominant power source used. Attempts to reduce appliance-related energy consumption by the residential sector have focused on achieving greater product efficiency. The overall gains achieved by these efficiency initiatives have, however, been offset by the increased number and variety of appliances in homes.

Transport energy

- Nearly 40 per cent of total national energy use is expended in moving people and freight. The transport sector uses 73 per cent of Australia's total liquid fuel, with over half of that being used by road transport.

- The transport sector also contributes the largest proportion of average household carbon dioxide (CO_2) emissions at almost 42 per cent. Light passenger vehicle use alone accounts for 35 per cent of Australia's average household emissions, by far the largest overall component of the transport sector's emissions.

- Energy use in light passenger vehicles is relatively well documented, but there is more limited publicly available information for mass transit systems making comparison of energy use between modes in Australia difficult. The potential energy efficiency savings of urban mass transit systems are considerable; however, further information in this area will be needed to inform public policy decisions.

Waste

- Australia generated 54 million tonnes of waste in 2009–10. Forty seven per cent of this was recovered domestically, 46 per cent went to landfill and the remaining seven per cent was exported.

- Waste worth $2.4 billion formed one per cent of Australia's exports in 2011–12. Eighty two per cent of this was ferrous metals, gold, copper and aluminium.

- Australia's waste management industry has been valued at $9.5 billion with income from waste products valued at $4.5 billion annually.

Key findings Chapter 5: Liveability

- Liveability indexes are an attempt to measure the broader aspects of cities beyond the traditional economic indexes.

- The UN-Habitat City Prosperity Index is an important contribution to objectively measuring cities on an internationally comparable basis. Melbourne ranks highly on prosperity and quality of life.

- The Australian Property Council's Liveability Index is a subjective index of 11 of Australia's major cities. The Council's 2012 rankings were unchanged from 2011 with Adelaide ranked as the nation's most liveable city.

- The median incomes of households in Australia have risen substantially in real terms, with particular strong growth between 2003–04 and 2009–10. Growth was particularly strong for households at the top and bottom end of the scale. Income growth was widespread in a geographic sense across Perth, while more strongly concentrated on the inner parts of Melbourne and other cities.

- Unemployment in Australia has halved since the 1990s and this has been an important factor in the increase in comes at the lower end of the scale. The fall in unemployment has been particularly marked in those areas of cities where it was previously very high.

- In the larger major cities, unemployment rises with distance from the city centre. There is also a decrease in skill levels with distance – this may be contributing to unemployment.

- Part time employment and underemployment have also increased in the major cities, particularly amongst women in the retailing and the hospitality sectors.

- In Australia's larger cities, home renters predominate in the centre while outright homeowners are generally found in the middle suburbs. In the outer suburbs new homes are being purchased – this is the so-called 'mortgage belt'. On the fringes of cities there is an outer belt of home renters. This outer belt of renters appears to be little studied.

- Cities are becoming increasingly stratified by age as well as income, skills and employment. There was been a pronounced shift of persons aged over 65 away from the inner and middle parts of cities towards the outer areas between 2001 and 2011.

- Rates of walking and cycling fell throughout the 1990s before recovering in the first decade of the century. The proportion of journeys to work made by bicycle is now the highest it has been in 40 years.

Key findings Chapter 6: Governance

- A Transport and Infrastructure Senior Officials Committee Cities Group has been established to progress intergovernmental collaboration on cities through the Standing Council on Transport and Infrastructure.

- In response to the Australian Government's *Walking, Riding and Access to Public Transport—Draft Report for discussion*, nearly 200 public submissions were received.

- The 2013–14 Commonwealth Budget included funding for the second phase of the National Building Program (NB2) of $24 billion across 5 years to 2017–18. Thirty five NB2 projects across Australia's major cities have subsequently been announced.

- Following the release in April 2012 of a discussion paper by the Business Council of Australia, the Australian Government has requested that the Productivity Commission undertake a study to benchmark Australia's major project development assessment processes against international best practice.

The world continues to urbanise. In 2008, for the first time in history more than half of the world population lived in cities. The most populous 600 cities in the world are home to 25 per cent of the world's population and produce around 60 per cent of global GDP (Dobbs et al. 2011). The top 100 generate more than half of this (UNHABITAT 2011). By 2030, only 17 years from now, it is estimated that five billion people or 80 per cent of humanity will be urbanised (UNHABITAT 2011). It is little wonder then that the current era has been called the 'Triumph of the City' (Glaeser 2011).

For highly urbanised countries, a wrong step in urban policy can have national implications, especially when around 40 per cent of the national population live in just two cities (as is the case for New Zealand, Chile and Australia). Aside from city states like Singapore and Monaco, Australia is the most urbanised nation on earth (Figure 1-1). Few other countries have as much need to understand how their cities work as Australia.

Figure 1-1   Urbanisation rate of selected countries
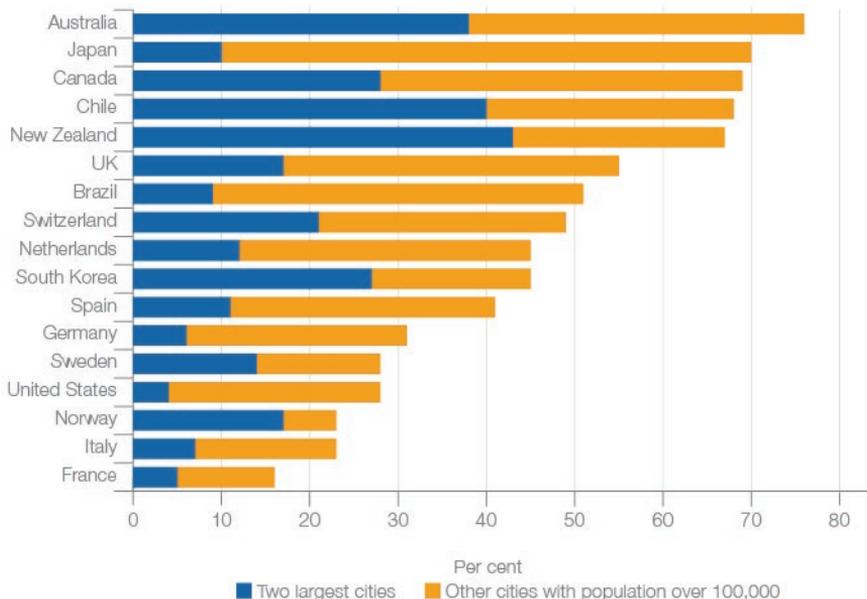
Source: Ellis 2013

To the fulfil the need for an informed discussion on the nation's cities, the Australian Government committed to publishing annual reports on the progress of Australian cities towards the national aspirations described in *Our Cities, Our Future – A National Urban Policy for a*

productive, sustainable and liveable future (Department of Infrastructure and Transport 2011). *State of Australian Cities 2010* was the first comprehensive snapshot of Australian cities, bringing together data and research to inform development of the National Urban Policy. *State of Australian Cities 2013* is the fourth in the series.

Each State of Australian Cities report follows the same basic structure as the National Urban Policy but differs in exploring a particular facet of the chapter theme. For example, in 2011 the focus of the Population and Settlement chapter was demographic structure and migration flows and in 2012, population growth and housing.

The first section of this chapter signposts the main findings and some of the policy implications flowing from them. The second section discusses the definitions and the way in which data is used.

Overview of main themes

The Sustainability chapter of this year's report focuses on two issues: heat and energy. Heatwaves are the leading cause of fatalities from natural disasters in major cities and the risk may increase with further global warming. Using the severe heatwave in January 2013 as its starting point, the chapter looks at how heat affects cities and the potential role of vegetation or 'green infrastructure' in ameliorating temperature extremes in urban environments.

The energy discussion is in two halves: trends in household energy use and an examination of the evidence for transport energy efficiency across modes.

The Liveability chapter spatialises some of the results of changing economic and social conditions in major cities in the 21st Century. In particular it shows how the parts of cities are becoming defined by income, employment, housing and age.

This first part of the report discusses cities in terms of population and productivity. The main focus of Population and Settlement in 2013 is settlement patterns and migration. It shows how population growth is still being accommodated on the fringes of cities and how migration is increasing in its scale and complexity.

The Productivity chapter is in two sections. The first deals with industry structure, in particular the changes occurring in post-industrial cities. The second deals with human capital and shows continuity at the city scale but large changes occurring within cities.

Cities can enable significant increases in productivity. Thick labour markets with many employers and potential employees, as well as many different types of jobs and diverse skills, allow greater division of labour. In a similar way, thick consumer markets allow more specialised production. Complex and interwoven economies are also more stable. Indeed, it has been argued that the increasing stability and resilience of the Australian economy, evident through the course of the 20th century (Lim et al. 2011), is related to the rise of urban economies within the nation and its major trading partners.

While the major changes taking place in Australia's industrial structure have been subject to extensive commentary by economists and policy makers, it seems the spatial implications are less well appreciated.

For three decades from the 1970s, Australia's largest cities saw a decreasing reliance on the CBD as the location of jobs. For example the City of Melbourne, between 1971 and

2001, went from having 31 per cent of Melbourne's total employment to 19 per cent. This was due in part to the creation of jobs as outer areas urbanised, but also due to employers in businesses such as manufacturing relocating from the city centre to cheaper locations, or larger sites, in the middle and outer suburbs (Department of Sustainability and Environment 1970).

This spatial economic expansion appear to have stopped, and may even be reversing. Census data suggests that from 2001 to 2011, the City of Melbourne's share of Melbourne's total employment went from 19 per cent to 20 per cent.

As described in *State of Australian Cities 2012,* economic value and by extension high-paying jobs are increasingly concentrating in city centres as part of the change from labour intensive industrial production to knowledge intensive transaction industries which rely on high job densities for their productivity. This is not a particularly Australian phenomenon; it is happening in the cities of developed nations all over the world (Moretti 2012).

Chapter 3 of this report discusses this in some detail. It shows that while the contribution of manufacturing to the economy is still growing, employment is falling as the industry is becomes more capital intensive to remain competitive in an increasingly globalised trading environment (Figure 1-2).

Figure 1-2   Manufacturing employment and change in Gross Value Added, 1985–2012
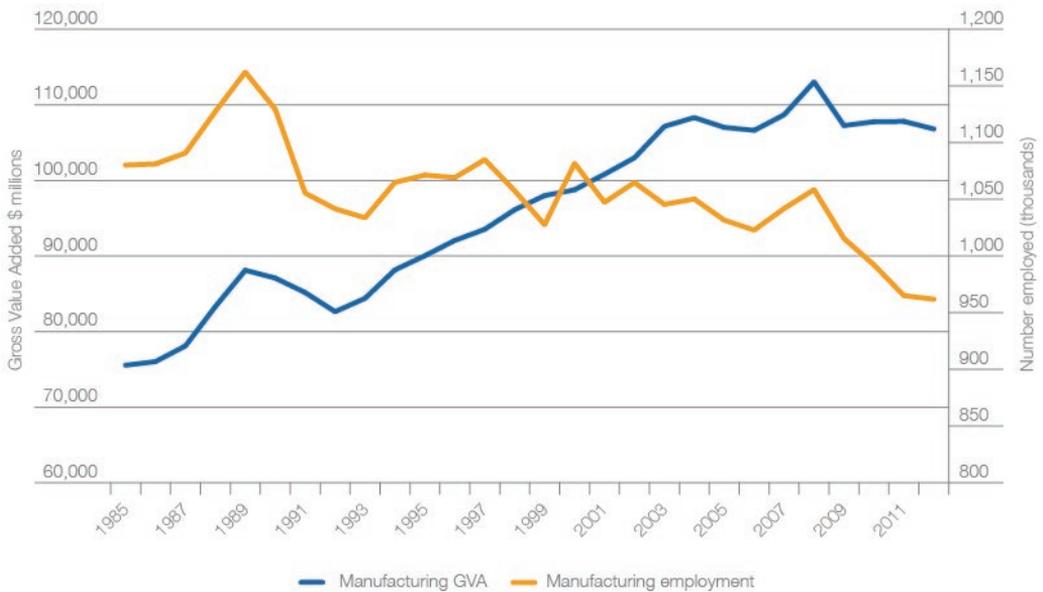
Source: ABS 2013a, 2013b

The spatial aspects of this are critical. The jobs which moved over time to the middle and outer suburbs meant that manufacturing became a key employer in outer suburbs (many of which over time became 'middle' suburbs as cities spread). Indeed, manufacturing remains the largest employer in the outer suburbs of many major cities in south eastern Australia.

As a result, the middle and outer suburbs are where the loss of manufacturing jobs is felt most acutely. One of the clearest examples of this is in Melbourne as shown in Map 1-1.

Map 1-1   Change in persons working in the manufacturing sector in Melbourne, 2001–11
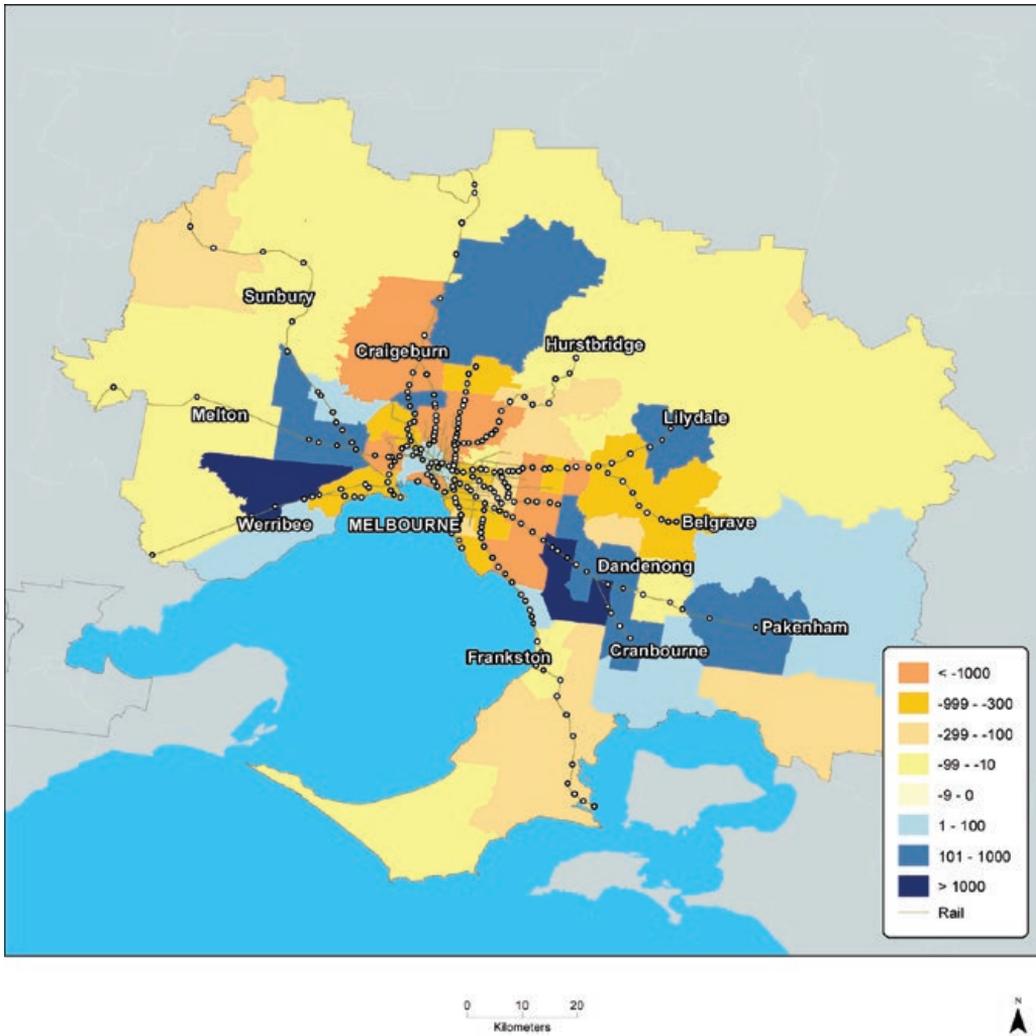
Falling manufacturing employment would not be such a challenge if the other kinds of jobs traditionally located in outer suburbs – retail, construction and transport and logistics – were producing replacement jobs, both in number, hours of work, and in remuneration levels. They are not. For example, as discussed in Chapter 2, between 2006 and 2011 the net growth in private sector employment in Western Sydney (an area containing middle and outer suburbs, including the employment centre of Parramatta) was virtually zero. Jobs growth was almost exclusively in the public sector and mostly in the health and community services industry (O'Neill 2013). This is an additional problem because this industry, like most personal service industries, has had low productivity growth for some decades and cannot drive a rise in living standards in the same way as manufacturing (Moretti 2012).

The changed trend in terms of jobs in middle and outer suburbs has not been accompanied by a change in the trend of settlement patterns in Australian major cities. As described in Chapter 2 of this report, significant population growth in most of our major cities is happening on the edge, just as has been the case since the Second World War. This can be seen in the example of Melbourne in Map 1-2.

Map 1-2   Population change in Melbourne, 2001–11
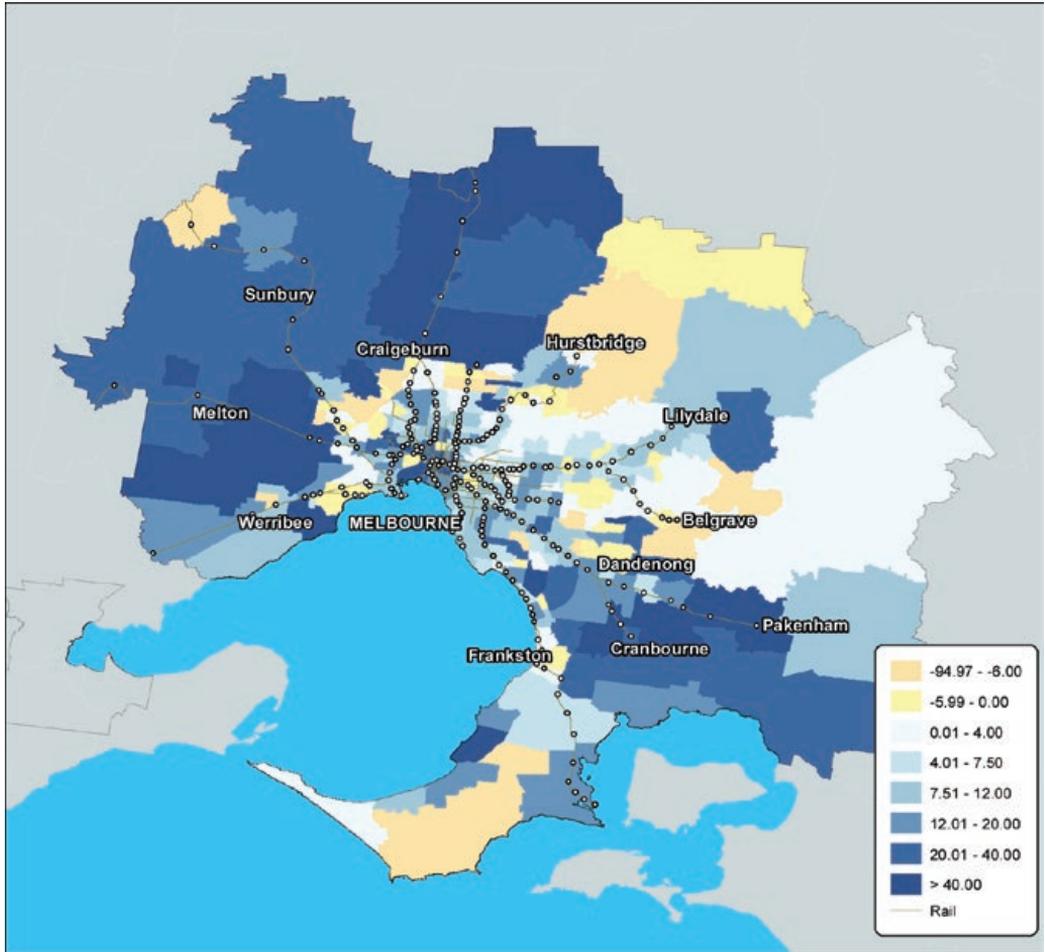
Figure 1-3 shows that, during the decade to 2011, the self-sufficiency of the outer sector of Australia's three largest cities increased slightly, then decreased, particularly in Melbourne.

What Figure 1-3 cannot show is, for example, if high paying, high productivity jobs are being replaced by low paying, low productivity jobs as shown in the example above for Western Sydney. It does not show how documented broader trends for full time work to be replaced by casual and part time work are playing out in such areas.

Figure 1-3   Employment self-sufficiency ratios in outer Sydney, Melbourne, Brisbane and Perth, 2001, 2006 and 2011
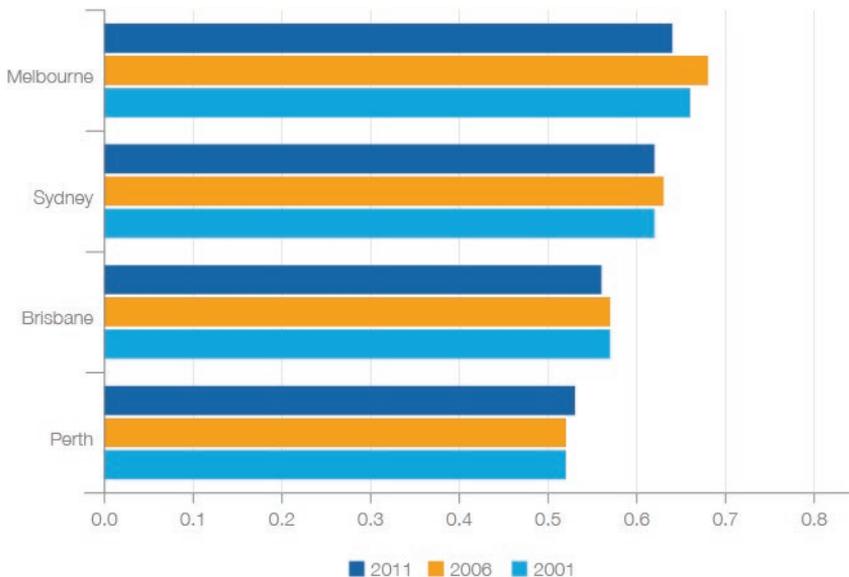
Note: Self-sufficiency is the ratio of the number of people who work in the region to the number of employed people who live in the region.

Source: BITRE data

What is giving added urgency to the challenge is that Australia has one of the highest rates of population growth in the developed world (Chapter 2) which is forecast to see four million extra people settled in the capital cities by 2035. If large numbers of these new residents are accommodated on the edges of capital cities as happens now, in the absence of changes to the nature of employment in middle and outer suburbs, there is a real likelihood of much greater demand for transport infrastructure to connect them with better paid jobs located further in. This is likely to exceed not only the capacity of current infrastructure but of future Governments to provide sufficient infrastructure.

The alternative seems even more unpalatable; a significant proportion of the urban population at risk of being "locked out" of their city's prosperity by a steepening inner-city house price gradient and congested road and rail systems.

In the recently published book, *Australia's unintended cities: The impact of housing on urban development*, Rawnsley and Spiller described the essence of the situation.

> Metropolitan Melbourne may be drifting towards a seriously divided city which cannot credibly claim sustainability or superior liveability. Just as importantly, this urban structure is doing nothing to improve human capital and labour productivity at a time when the nation is in pressing need of a boost in this area.

> This disadvantageous pattern of urban development may not be planned and its consequences not intended. But it is certainly not accidental. Successive generations of plans for metropolitan Melbourne have promoted a poly-nucleated structure… The reality, however, is that the metropolis is afflicted with relentless pressure for low density urban expansion into districts that are increasingly distant from the main concentrations of employment.

> This pressure is fuelled by a compelling bipartisan agenda to improve housing affordability for ordinary households. Regrettably, trying to solve the affordability problem by cutting up more land on the urban fringe may be like trying to fix a flagging economy by printing more money. Ultimately, this approach may devalue the whole metropolis and compromise its capacity for sustainable prosperity (2012).

Chapter 5 gives a sense of how this situation is playing out on the ground. It paints a picture of cities increasingly stratified by income, skills, age, workforce participation and housing (some examples are shown in Maps 1-3, 1-4 and 1-5).

Adelaide.
Image courtesy of Sam Noonan for Integrated Design Commission SA

Map 1-3   Proportion of persons unemployed in Melbourne, 2011
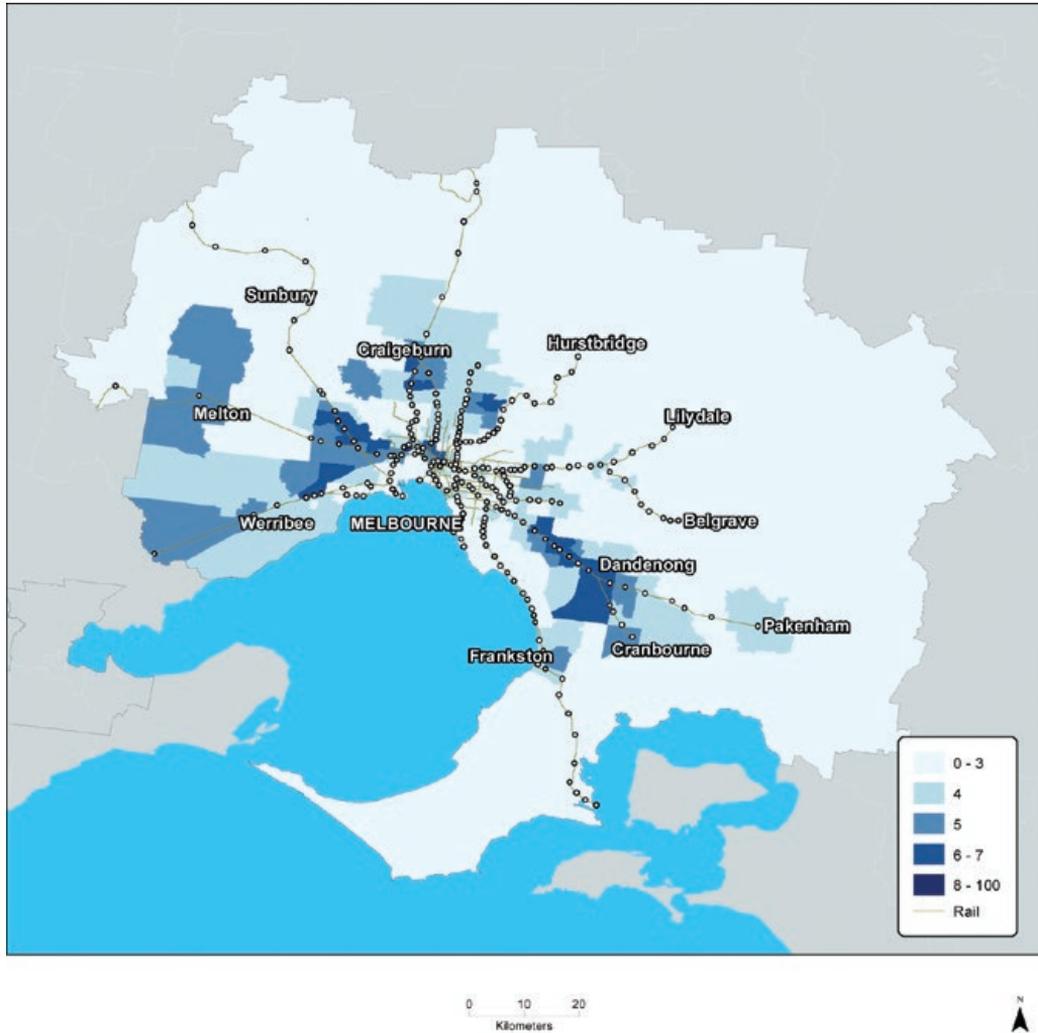
Map 1-4   Proportion of people with no post school qualifications in
                 Melbourne, 2011
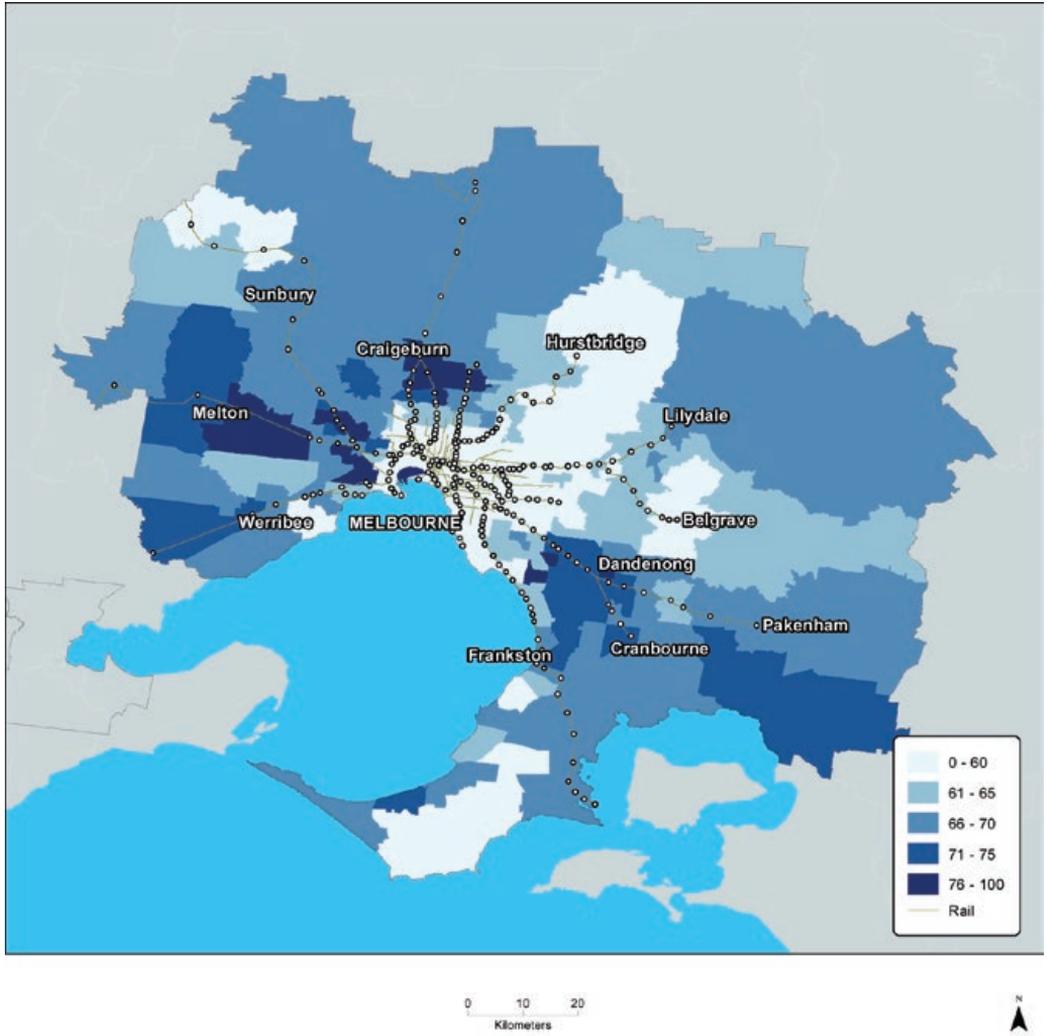
Map 1-5   Proportion of persons with Bachelor degree or higher in Melbourne, 2011
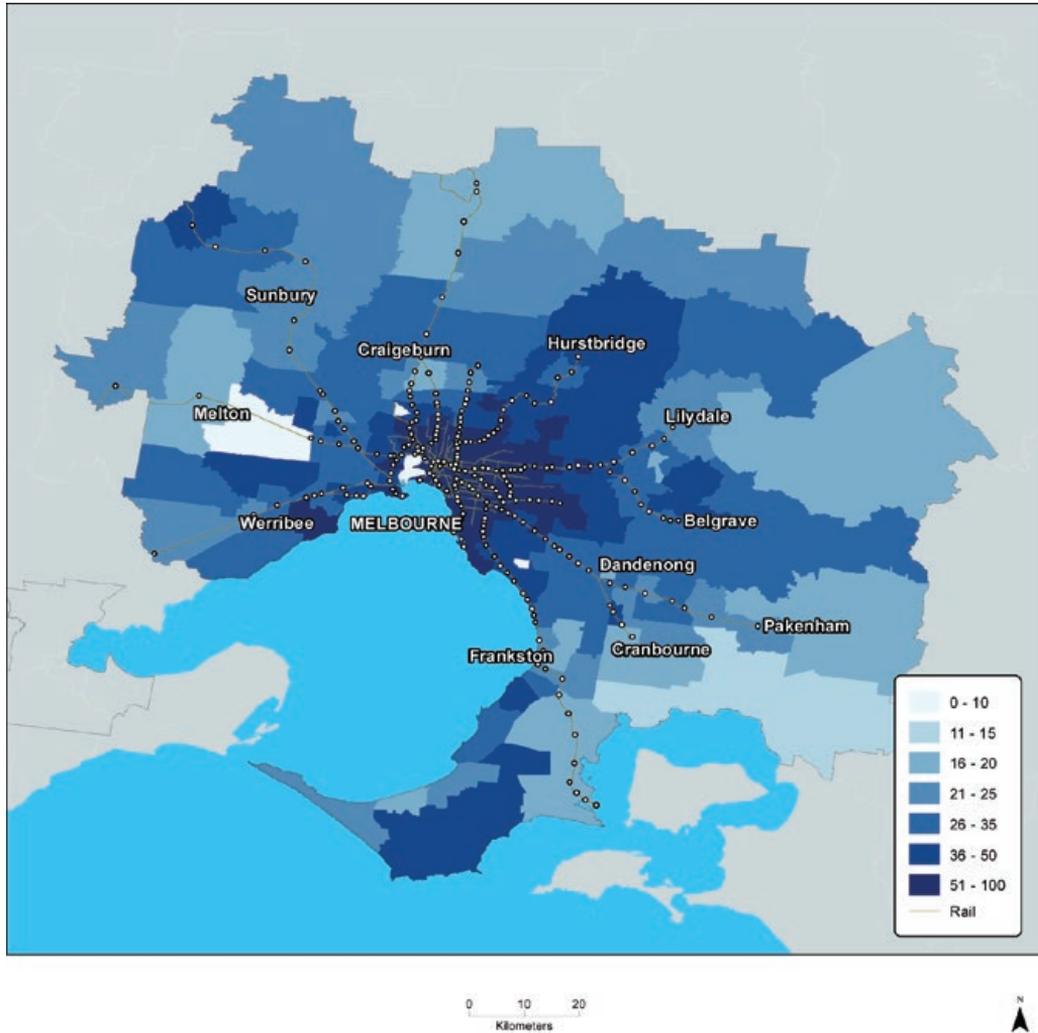
This spatial stratification was highlighted in a recent report by the Grattan Institute (Kelly and Mares 2013) which outlined three basic policy options:

Job creation in outer suburban areas. A feature article by the National Growth Areas Alliance explores this in Chapter 3.

Moving people closer to jobs. This has been a key objective of most capital city plans for more than two decades. Chapter 2 shows that successes have been limited and the most population growth is still occurring on the urban fringe.

Improvements to transport systems, particularly high density links into city centres. Projects like the M5 East and the North-West Rail in Sydney and the CityLink and Western Ring Road in Melbourne show just how expensive such solutions can be, while the projected costs of projects such as WestConnex and East-West Link illustrate some of the implications of continuing with current approaches.

A range of additional policy options may be available. Whichever policy approach is pursued – jobs to people, people to jobs, changed or improved transport connections between, or doing nothing and accepting a number of productivity and social consequences – there will be impacts on liveability and sustainability, not just on productivity. These trade-offs need to be considered, debated, and understood by the community.

It is not the place of State of Australian Cities reports to propose or prioritise policy responses to the challenges of 21st Century urbanism. Their purpose is to describe the arc of the social, economic and environmental aspects of the nation's major cities so that discussions on options and trade-offs are better informed.

Reading State of Australian Cities 2013

What's new in 2013

The Australian Bureau of Statistics (ABS) released the data from the 2011 Census in two tranches. The first was released in July 2012 and contained the Basic Community Profiles which focus on population and housing. This data formed the basis of much of *State of Australian Cities 2012*. The second tranche, released after *State of Australian Cities 2012* was published, contains data on skills, migration and industry structure. This information is the basis for discussions of human capital, changing industry structure and Australia's population movement In this report.

This report is the first to incorporate a large number of maps. The online version includes links to an application that enables interactivity with the maps.

Using the maps

The maps in *State of Australian Cities 2013* are in three formats. The hard copy reports use a small sample of the maps to illustrate part of the discussion. The USB drive versions of the report use a PDF format for the maps, which are at medium resolution and can be panned and zoomed. The maps are also separately available in high resolution on the Major Cities Unit website, www.majorcities.gov.au. They allow the reader to turn layers on and off and visualise different aspects of our cities at different scales. Maps use the ABS Statistical Area 2 (SA2). Those maps showing longer time series only use Statistical Local Area (SLA).

Definition of major cities

The State of Australian Cities reports define major cities as those with a population of more than 100,000 residents. This follows the ABS definition (2011b) and the convention in Australian urban studies literature (Forster and Hamnett 2007). Applying this definition, there are 18 major cities in Australia (Map 1-6). In 2011, 77.3 per cent of the population lived in these cities, up from 75.9 per cent in 2001. Between 2011 and 2012 the population of Australia's capital cities grew by 1.8 per cent, faster than the remainder of Australia (1.2 per cent). Perth had the fastest growth of all capital cities at 3.6 per cent, ahead of Darwin and Brisbane (both 2.0 per cent). The slowest growth was in Greater Hobart (ABS 2013c).

Map 1-6   Major cities of Australia
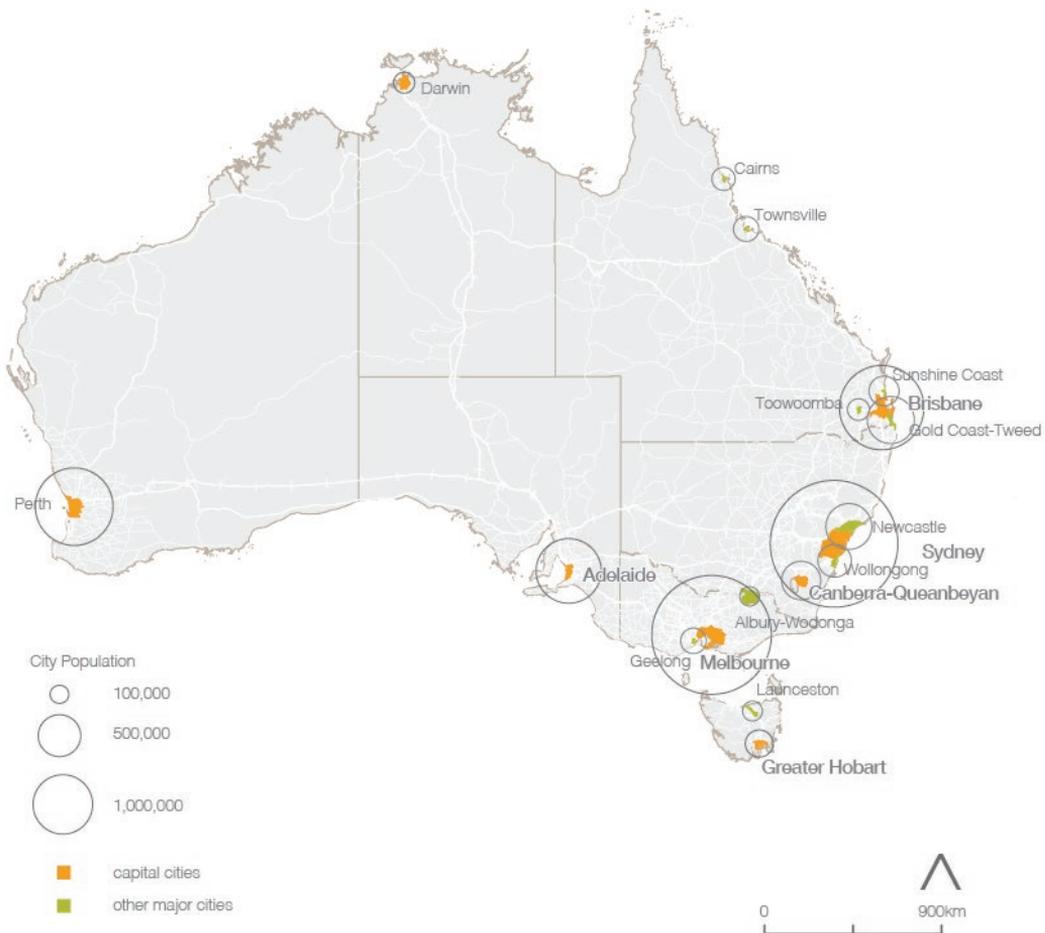
Geographic Boundaries

To make valid comparisons, the State of Australian Cities reports use the ABS boundaries that most closely relate to the built urban areas.

The 2011 Census marked the first major change to the ABS geography for nearly 50 years. Previously, ABS units were based on Collection Districts – a Collection District being the area a Census collector could reasonably cover when distributing and collecting Census forms (about 200 households). These were then built up into Statistical Local Areas and Local Government Areas. One of the main problems with the system was that every time Local Government Areas changed, the ABS geography changed. Given this happened in most years, constructing a data time series was difficult and became progressively more inaccurate the longer the time period sought.

To address this, a new geographic unit called a 'mesh block' was adopted for the 2011 Census. In an urban context, mesh blocks are areas that contain between 30 and 60 dwellings. Mesh blocks have two main advantages:

1. They essentially function like small Lego bricks and can be built up into a variety of geographies according to requirements.

2. The area of mesh blocks will remain stable through time, which means that those wishing to construct a time series will not have to deal with continual changes in geographic areas and long and accurate time series will eventually be possible.

As part of the changeover, much of the Census geography used in previous State of Australian Cities reports is no longer supported by the ABS. The Statistical Divisions used for capital cities in earlier reports have been replaced by Greater Capital City Statistical Areas. Unlike the old Statistical Divisions these new boundaries cross local government boundaries, allowing the ABS to more closely approximate the settled area of cities to changing urban boundaries. The differences between the old and new geographies are shown in Appendix 1 and are outlined below:

- *Sydney*. Little has changed, with some extension in the Blue Mountains.

- *Melbourne*. The boundary of Melbourne has been greatly extended northwards and now takes in Macedon, Lancefield and the Murrindindi shire.

- *Brisbane*. This city has the largest boundary changes of all and nearly doubles in area. The new areas are mainly to the west and include the rapidly suburbanising Beaudesert, the former dairying areas of Boonah and the Eastern Downs around Esk stretching nearly as far north as Nanango.

- *Adelaide.* This city has two areas added to it. The northern boundary now takes in the former agricultural areas of Roseworthy and Two Wells while to the east, Adelaide now includes Hahndorf and Mt Barker and extends out as far as Mt Torrens.

- *Perth.* Much of the former Peel area has been added to Perth which now includes Mandurah and Pinjarra.

- *Hobart.* There are only minor changes to this city – the boundary moves a little further to the east to take in the fishing village of Dunalley.

- *Canberra.* The boundary now takes in the whole of the ACT, but the effect on its population is minimal.

- *Darwin.* Unchanged.

In previous State of Australian Cities reports, ABS units called Statistical Districts were used to define the non-capital major cities. This is no longer used by the ABS but have been manually reconstructed using Statistical Local Areas. It has therefore been possible to construct a time series back to 1996 for the non-capitals.

Inevitably with such a major change, there has been a period of adjustment and this report does contain some data on the old boundaries, particularly in the longer time series.

Residence

In the 2006 Census, the ABS introduced a major change that also affects the time series used in this report. All previous Censuses were based on place of enumeration i.e. a person was counted where they were on Census night. In order to improve the accuracy of the Census, 2006 and 2011 data was also based on place of usual residence. In most cases, the difference between the two methods is slight – often a fraction of a per cent – but it presents a dilemma to those constructing a time series. The choice is between continuing to use the less accurate place of enumeration data or changing to place of usual residence and having a very slight discrepancy between the pre- and post-2001 Census data. The approach taken in this report is to use place of enumeration data pre 2001 and place of usual residence post 2001 as a default because the value of long time series usually outweighs a slight loss in short-term accuracy. The exception is where the time series involves very small changes over the years. In these cases, only place of usual residence data is used.

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Brisbane-Kurilpa Bridge-Arup.
Image courtesy of David Sanderson

Population and settlement

Introduction

Cities have two core roles. The first is the agglomeration of production and consumption, which will be discussed in Chapter 3 (Productivity). The second is receiving people and goods and distributing them to where they need to go. Freight centres, for example, receive goods from outside the city, distribute them and send goods produced in the city to other cities. The *State of Australian Cities 2012* discussed this function in some detail. City size is not necessarily a guide to the extent of this function. For example, billions of dollars worth of freight passes annually through the relatively small city of Geraldton in Western Australia.

People also flow through cities and this movement will be examined in this chapter. The first section looks at the role cities play in internal or residential migration in Australia. It shows that major cities in Australia have markedly different patterns of internal migration, suggesting the migration patterns are very sensitive at the margins at least to shifting economic fortunes. This chapter also in a feature article examines an important but seldom discussed section of urban populations – foreign students.

Cities also act as distribution points for people flowing across national borders. In Australia, two cities – Sydney and Melbourne – dominate the international flow of people. These are the so-called 'global cities'. The *2011 State of Australian Cities* showed that a key part of the population structure of these cities is international migrants arriving and internal migrants leaving at a slightly slower rate. In the second section of this chapter what is meant by migration is explored in more detail. It shows that international population movement within and between global cities is changing rapidly in both extent and complexity.

For the first time, maps have been used in State of Australian Cities reporting to reveal the geography of population change. Some of these have been used in the text as examples, while the full range can be accessed online using the supplementary online map application.

Key findings

Internal migration

- Australia has one of the highest population growth rates in the OECD. Around half this comes from net overseas migration. Since the average growth of major cities is slightly above the national rate, this suggests many Australian cities have some of the highest growth rates in the developed world.

- In the 2011–12 year, the larger capitals grew almost 50 per cent faster than the rest of the country. Over the last five years, the previously high population growth rates in regional Queensland's major cities have moderated. Growth rates in Darwin and Perth remained particularly strong.

- There are large differences in the age and gender moving to and from individual capital cities. Canberra, Darwin, Perth and to a lesser extent Brisbane are attracting high numbers of male 15–24 year olds. Sydney is losing significant numbers of residents across all age groups but overseas migrants are taking their place at a rate that keeps Sydney growing, albeit below the national average.

Student tourism

- Australia is the third most popular market for international students in the world. Australia's international student market generates more than $15 billion for the nation every year.

- One in every 16 persons living in the City of Sydney is an international student while for the City of Melbourne it is one in five. Large numbers of international students also commute into these areas for study.

- China is the largest source country of international students for Australia, particularly for higher education, followed by India, South Korea, Vietnam and Malaysia.

- The rapid increase in international student numbers since 2000 has created accommodation and transport stresses, particularly for Melbourne and Sydney. While there has been some progress in building more student accommodation, most international students rely on the private rental market.

- There has been a fall in the numbers of international students since 2010, particularly in the Vocational Education and Training (VET) sector, which has been traditionally dominated by Indian students.

International migration

- International migrants are dividing into two types:
  - The first are from the skilled migrant scheme (about half of net overseas migration) and are part of the international gateway function of the global cities of Sydney and Melbourne. This stream is characterised by temporary and visitor migrants who mostly live in or near city centres.
  - The second stream is made up mainly of citizen migrants who usually reside at a distance from city centres. This group increasingly leads transnational lives and are critical to the international connectedness of cities.

- Ninety-six per cent of Australia's 29 million annual border crossings are short term movements. On any day, there are more than a million temporary visa holders in Australia (this figure does not include New Zealanders).

- The rise in the proportion of international 'sojourners' in the Australian population especially in the larger capital cities is challenging traditional definitions of what is meant by 'migrant'. A significant proportion will not settle permanently in Australia.

- Current patterns of international migration seem closely aligned with the increasing role of knowledge-intensive transactional industries in Australia. Eighty-five per cent of 457 Visa holders live in capital cities and half of these live in the inner city mainly working in transaction industries.

- Skilled migrants living outside city centres often work in industries that do not fully utilise their skills.

Population overview

International context

As shown in Figure 2-1, between 2000–2010 (the last complete period for which figures are available) Australia's population growth rate was one of the highest in the Organisation for Economic Cooperation and Development (OECD). The Net Overseas Migration (NOM) component of Australia's population growth averaged 55 per cent during this decade (ABS 2012a). Without it, Australia's growth would be around the OECD average of 0.7 per cent. Since this is below replacement rate, without international immigration Australia would quickly move to a position of structural ageing and the total population would begin to fall.

Many European countries and some Asian ones (Japan and China) are entering a period of structural ageing that on current trends will become more severe over the next three decades. This is expected to have a significant impact on their Gross Domestic Product (GDP) growth (McDonald 2012). The number of migrants seeking to come to Australia has created the fortunate position of being able to largely determine population growth, NOM has been used to balance to some degree the ageing of its population as the so-called 'Baby Boomer' cohort enters the retirement phase. This is expected to cushion the fall in living standards that may have occurred as the working age component of the population shrinks (McDonald 2012).

Figure 2-1   Population growth rates of OECD countries, 2000–10

Country	Per cent
Israel	1.8
Ireland	1.5
Luxembourg	1.5
Australia	1.5
Spain	1.3
Mexico	1.3
New Zealand	1.2
Turkey	1.2
Iceland	1.2
Canada	1.0
Chile	1.0
Norway	0.9
United States	0.8
Switzerland	0.8
Italy	0.6
Belgium	0.6
Sweden	0.6
France	0.6
Austria	0.4
Korea	0.4
United Kingdom	0.4
Denmark	0.4
Finland	0.3
Greece	0.3
Netherlands	0.3
Czech Republic	0.3
Slovenia	0.3
Portugal	0.3
Slovak Republic	0.1
Japan	0.1
Poland	0.0
Germany	-0.1
Estonia	-0.2
Hungary	-0.2

Source: OECD 2012

National context

As shown in Figure 2-2, there has been a wide variation in the population growth of major cities during the 2001–11 decade. Taken as whole, growth was particularly strong for cities in northern and western Australia, with Toowoomba a notable exception. Aside from Melbourne, growth was subdued in the south-eastern parts of the country.

Figure 2-2   Population growth by major city, July 2001–June 2006 and July 2006–June 2011
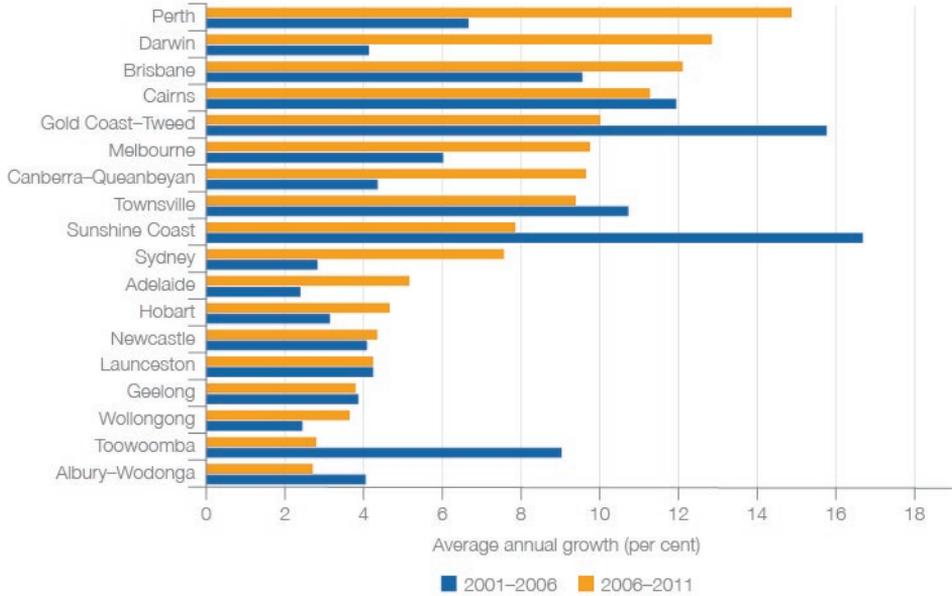
Source: ABS 2012b

Figure 2-3 shows the difference in growth between the first and second halves of the 2001–2011 decade. In general, cities with high growth rates often displayed high variability. Perth and Darwin's growth, for example, accelerated during the second half of the decade while on the Gold and Sunshine Coasts, the strong growth they experienced in the first half of the decade moderated significantly. Toowoomba is an exception. Examination of inter censual population estimates by the ABS (2012b) suggest that this city's population growth may have been severely affected by major floods in early 2010.

Figure 2-3   Difference in population growth rates by major city, July 2001–June 2006 and July 2006–June 2011
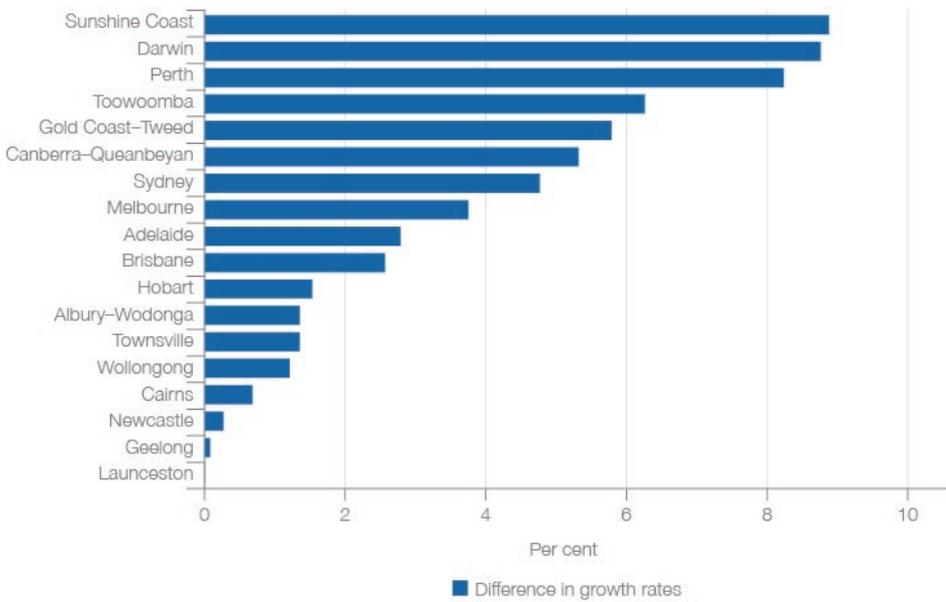
Source: ABS 2012b

Population growth within cities

Map 2-1 uses Melbourne as a case study to show population change within a major city between 2001 and 2011. Immediately noticeable is the fall in the population of peri-urban areas. In terms of the numbers of people involved however, the dark blue areas are more significant. The areas of strongest growth in Melbourne in the first ten years of the century were on the fringe or in the centre. The middle ring suburbs registered either modest growth or in some cases, declines.

Map 2-1   Population change in Melbourne, 2001–11
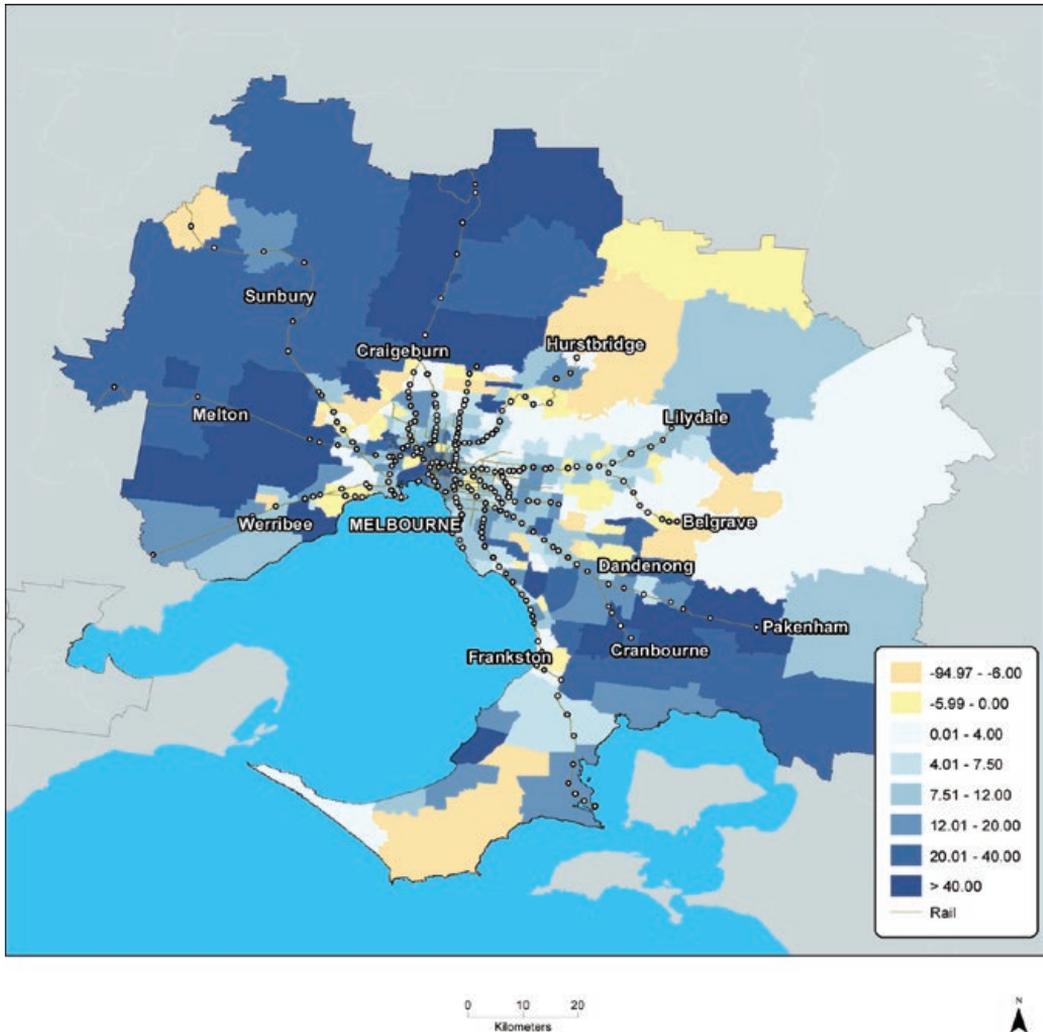
Map 2-2 represents the population pattern of 40 years ago. While the pattern of outward expansion is evident, population loss is particularly intense in the inner city suburbs. Forty years later, the population trend has been reversed in the inner areas of Melbourne and the red areas in Map 2-2 are the areas now showing modest or even negative population growth.

Map 2-2   Annual population change in Melbourne, 1971–76
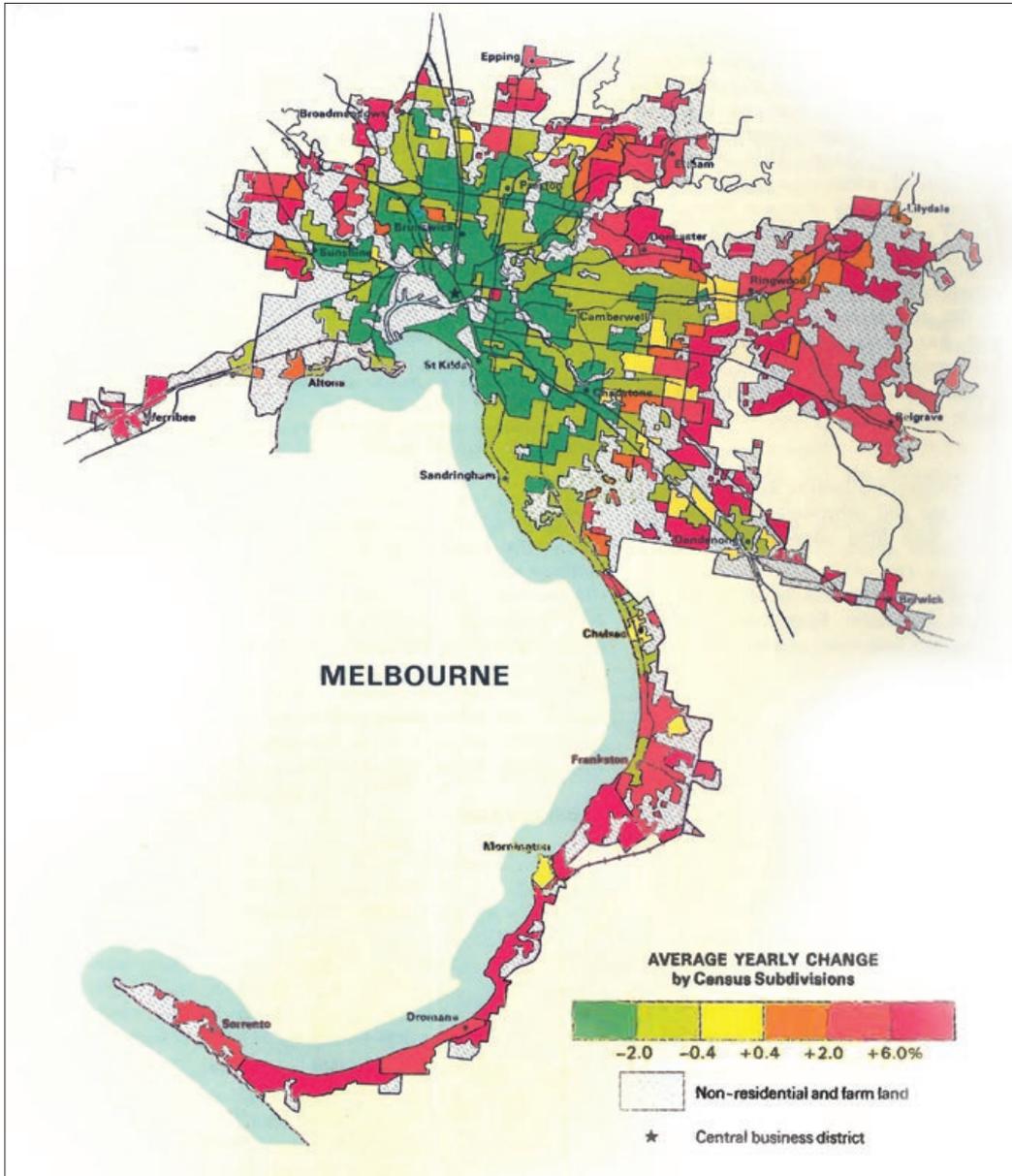
Source: Nat MAP 1980

Australia's fastest growing capital city – Perth, shows the same pattern of population change in an even more pronounced way, as shown in Map 2-3. Perth's CBD is growing rapidly, but there is also a distinct outer-ring of growth particularly to the north and south. Conversely mid-ring suburbs mostly registered either modest growth or population reduction.

Map 2-3   Population change in Perth, 2001–2011
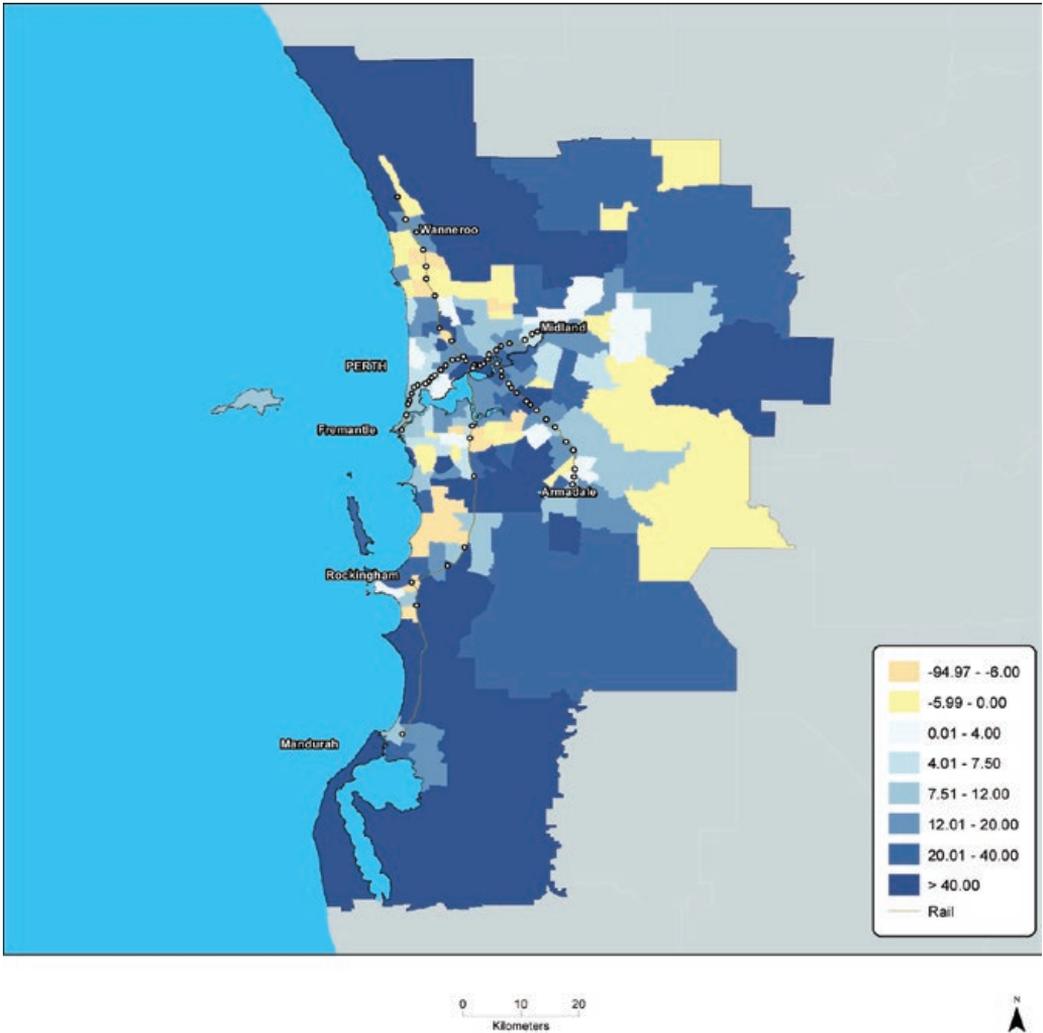
Neither of these maps (or their on line counterparts for other cities) shows evidence of widespread urban consolidation in Australia's major cities. In other words, the outward geographic spread of the major cities shows little sign of abating; indeed it only varies in scale between cities.

Part 1: Internal migration

Australia has one of the most 'residentially mobile populations of any country and this is especially so in Australia's 18 major cities (Hugo and Harris 2011, p. 3). Residential mobility within Australia has two components: domestic movers and domestic migrants. Migration implies moving on a long term or permanent basis within Australia. Moving, is a more fluid population flow and does not necessarily have the permanency that is associated with migrating. Domestic movers and migrants differ from overseas migrants who are not able to move as freely due to visa approvals and qualifying restrictions.

Domestic migration and population change

The 1996 Census introduced two questions; 'place of residence one year ago' and 'place of residence 5 years ago'. This made it possible to better understand both movement and migration patterns in Australia. More recently, movement data for inter-Census years have been improved using Medicare change of address data in conjunction with Census projections and Defence Force data (ABS 2009). This information system is experimental and is still being revised to account for issues such as people who move more than once during the given time and the lag in registering change of address with Medicare (ABS 2009). The patterns identified in the data are however, consistent with a detailed analysis of the 1996, 2001 and 2006 ABS migration matrices conducted by the Department of Infrastructure and Transport.

Population change is measured by the number of births and deaths and the number of movers and migrants, taking into account both net overseas migration (NOM) and net internal migration (NIM) for a given city or area (ABS 2012e). NIM is the net population change for an area due to individuals arriving and departing from an area over a given period of time.

Understanding why people move is complex. In 2005, Hugo led a team that attached a survey to Australia Post redirection forms asking for the reasons that people moved (Hugo et al. 2005). This showed a complex range of factors were behind the decision to migrate. The Department also explored this issue by analysing the characteristics of where people were moving from and those of where they move to. It found that, while economic conditions were an important influence, there were also a host of other factors at work. The ABS has also indicated that there are a wide range of factors behind migration patterns (ABS 2012d). While there seems to be no clear cut reason *why* people move domestically, it is possible to know *where* they are moving to and from.

Migration between cities

In 2010–11, cities which experienced NIM losses did not necessarily experience population decline. Likewise, cities which experienced NIM gains did not necessarily experience growth. This is because the loss or gain of NIM interacted with the other determinants of population change – births, deaths and NOM – to determine the actual population of each city. Figure 2-4 shows the natural population change, births and deaths, along with the NIM of Australia's 18 major cities for the year 2010–11.

Figure 2-4   Residential population change in major cities, 2010–11
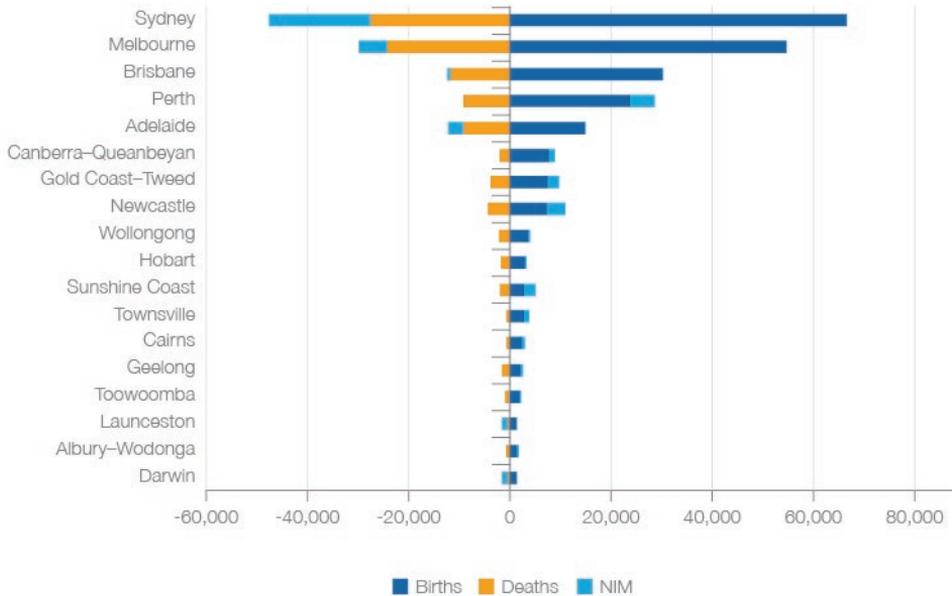
Source: ABS 2012a, 2012d and 2012e

Of Australia's 18 major cities, six had net losses of domestic migrants, while 12 had net gains. Australia's three largest cities – Sydney, Melbourne, and Brisbane – were all net losers of domestic migrants despite high overall population growth rates. Sydney has increased its population by 6.6 per cent since 2006; however, it saw net loss of 20,249 domestic migrants – almost four times greater than the next highest net loser of domestic migrants – Melbourne. Overall, Melbourne has increased its population by 9.7 per cent; however, it lost 5,540 domestic migrants to other parts of Australia. Perth gained more domestic migrants than any other city, with 4,977 more people moving there than departing during the 2010–11 period. The next highest net gainers of domestic migrants were the regional cities of Newcastle, Gold Coast – Tweed and the Sunshine Coast.

Emerging characteristics of net internal migration in Australian cities

The impact of NIM on population change is being experienced differently by each of Australia's 18 major cities. Figures 2-5 and 2-6 show the net number of domestic migrants as a percentage of the estimated population for each of Australia's major cities at one-year intervals between 2006 and 2011. Over this period some cities have shown little to no change year to year, while others have been in varying states of decline or growth.

As shown in Figures 2-5 and 2-6, cities that have experienced declines in NIM rates have followed different trajectories. Darwin displays one of the most rapid turnarounds, moving from being a net gainer in 2006 to a net loser in 2011. This extreme is not entirely unexpected as Darwin has always had a large fluctuation in population (State of Australian Cities 2012, Golebiowska and Carson 2009, p. 40).

Figure 2-5   Capital city net internal migration as a percentage of estimated residential population by year, 2006–07 to 2010–11
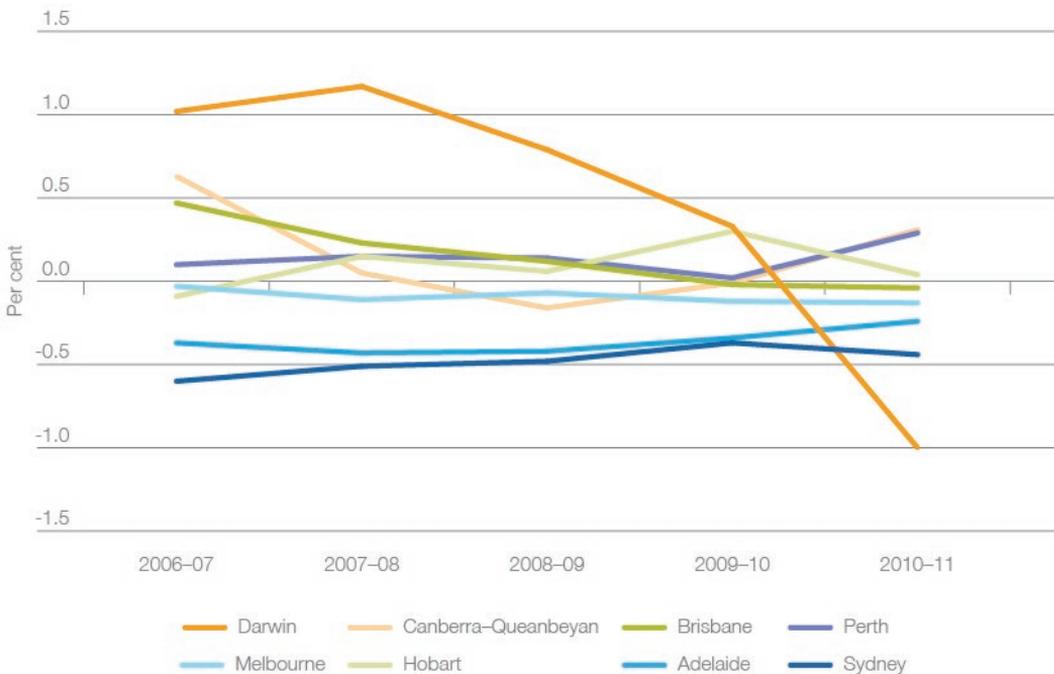
Source: ABS 2012c and 2012e

Figure 2-6   Regional city net internal migration as a percentage of estimated residential population by year, 2006–07 to 2010–11
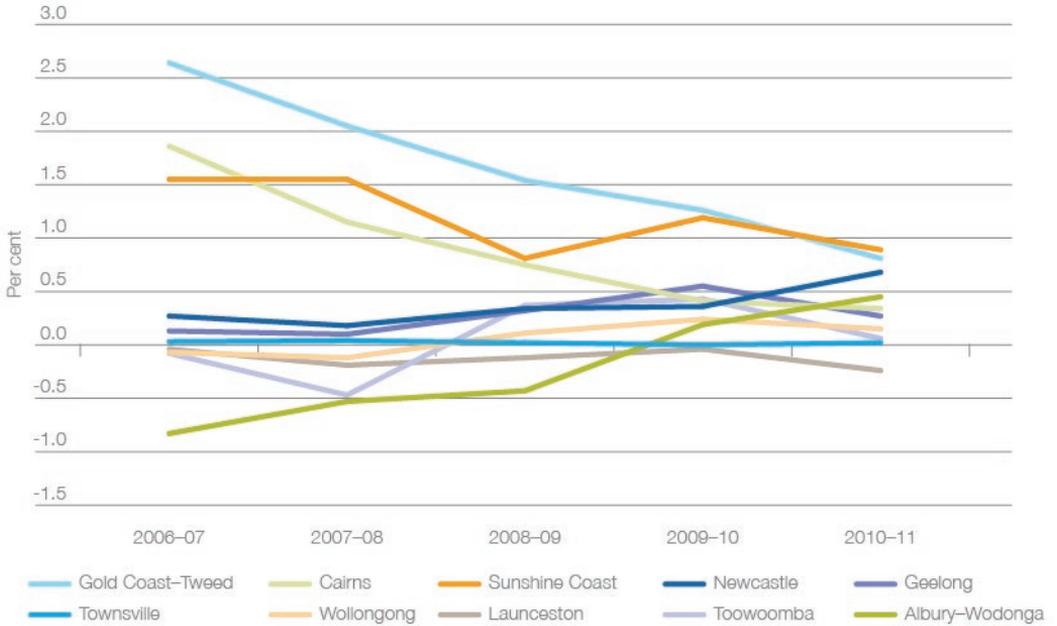
Source: ABS 2012c and 2012e

The Gold Coast – Tweed has also witnessed a consistent decline, losing close to two per cent of its net gains from 2006 to 2011. Unlike Darwin, the decline in Gold Coast – Tweed has not shifted the city from being a net gainer to a net loser of domestic migrants. Cairns and the Sunshine Coast have also experienced declines in the rate of NIM gains between 2006 and 2011. However, the trajectory of both has been different, with the decline in Cairns being consistent year on year, while the Sunshine Coast has been characterised by rapid ups and downs. Canberra-Queanbeyan shows a horseshoe pattern: NIM in 2006 reflected a 0.6 per cent gain before dipping to a 0.16 per cent loss and then growing again to a 0.31 per cent gain.

The experience of cities with increases in NIM rates is also varied. Albury-Wodonga has experienced steady growth in NIM and has gone from being a net loser to net gainer of people. Townsville has also gone from being a net loser to net gainer of domestic immigrants. Unlike Albury-Wodonga, Toowoomba's gains were the result of rapid growth from 2007 to 2009 and, after peaking in 2009–10, its rate is now declining. Perth has experienced overall growth in NIM gains, although there have been years of losses followed by gains. Sydney remains a net loser of NIM; however, the percentage of net losses in Sydney has decreased from 2006 to 2011.

Interestingly, the pattern of difference is counteracted by a convergence towards 2010–11. In the latter part of the study period, all major cities except Darwin and Canberra-Queanbeyan show a convergence towards smaller percentages of NIM gains or losses. Within the convergence, however, there is still a level of difference, with each of the 18 major cities still having their own specific experience of NIM.

For each of the cities with available data, there is a higher prevalence of male net domestic migrants than female net domestic migrants. Figure 2-7 shows the averaged ratio of male and female domestic migrants between 2006 and 2011. Darwin has the highest ratio of males to females, with 99.8 per cent of all net migrants being male and only 0.2 per cent being female. Perth has the next most significant ratio, with 92 per cent of domestic migrants being male and only eight per cent being female. Sydney and Adelaide have the closest ratio, with both having 52 per cent net male migrants and 48 per cent net female migrants.

Figure 2-7   Male and female net internal migration as a percentage of total by major city average, 2006–11
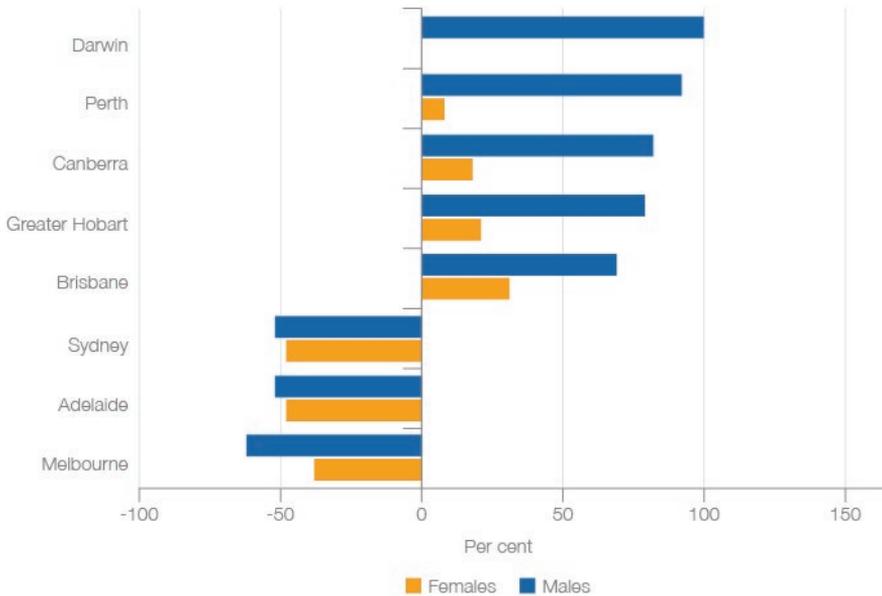
Source: ABS 2012e

Figure 2-8 shows that the age structure of NIM is different for each city. Sydney is losing people from all age groups, with the largest losses being in the 25 to 64 year age group. In contrast, Hobart is losing people in only the 15 to 24 year age group and gaining people of all other ages. Melbourne, Brisbane and Adelaide are losing people aged 0 to 14 and 25 to 64 but gaining people aged between 15 and 24 as well as those over 65 years of age. Canberra is losing people aged 25 to 64 years and people aged over 64, gaining population aged 15 to 24 years and displaying no change in those aged 0 to 14 years. Darwin is a net loser of birth to 14 year olds and those aged 65 plus but a net gainers of 15 to 24 year olds and 25 to 64 year olds, although both to different extents in each city. Perth is a net gainer across all age categories.

Figure 2-8   Age structure for net internal migration by selected major city, averaged, 2006–11
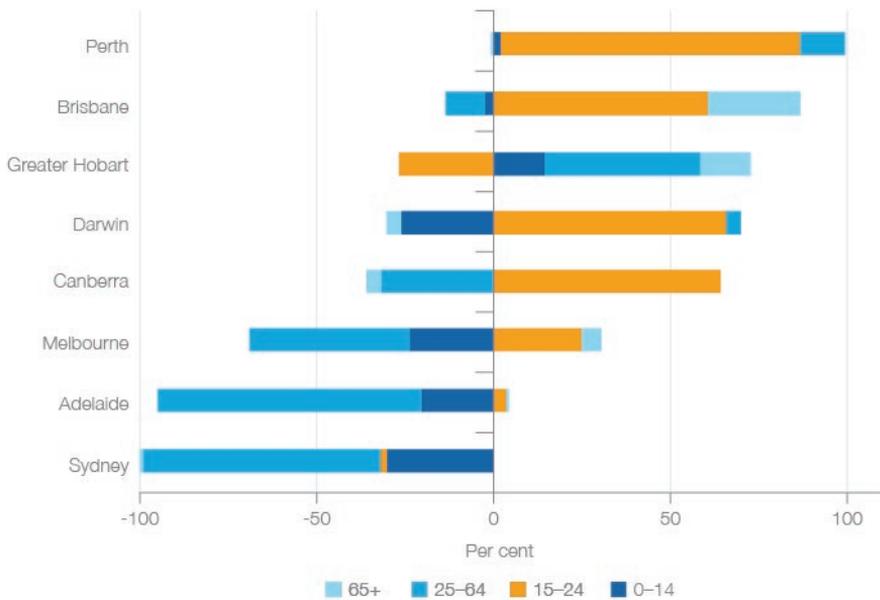
Source: ABS 2012e

Net and gross movements of people

The average net loss or gain from NIM for each of Australia's 18 major cities was less than 0.5 per cent of the averaged estimated resident population between 2006 and 2011, as shown in Figure 2-9. The Sunshine Coast was the highest average net gainer, with domestic migrants accounting for 1.19 per cent of the city's population over the period. Sydney was the highest average net loser, with domestic migrants accounting for -0.48 per cent of the city's population over the period.

Figure 2-9   Net internal migration as a proportion of estimated resident population by major city, averaged, 2006–11
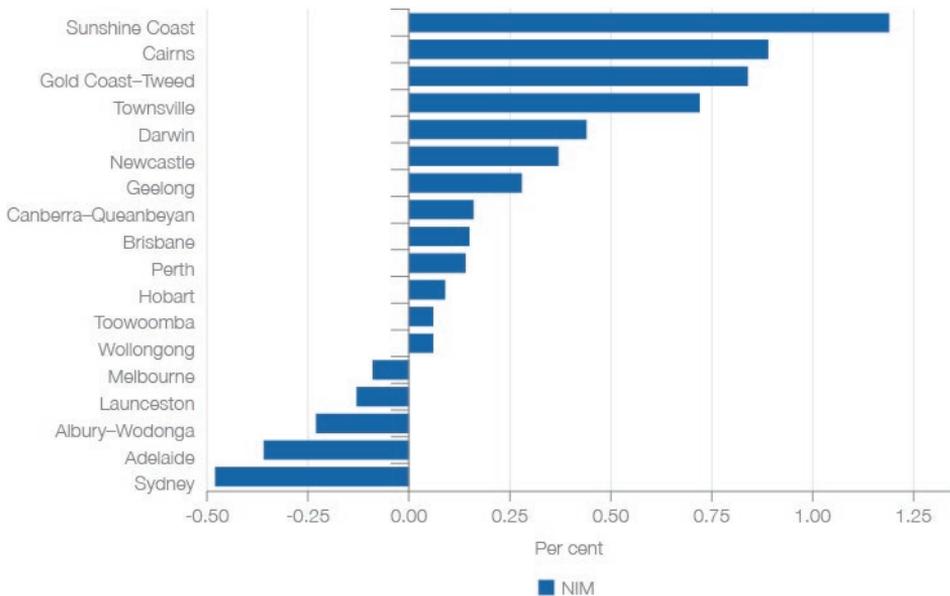
Source: ABS 2012c and 2012e

The flow of domestic migrants between Australian cities is much greater than the net gain or loss, as illustrated in Figure 2-10. While the net gain or loss from domestic migration for the 18 major cities is less than 1.25 per cent of the population, the percentage of people arriving or departing is much higher.

Darwin has the highest average flow of people moving to and from the city as a percentage of the estimated population of all the major cities, as can be seen in Figure 2-10. Between 2006 and 2011 people arriving to Darwin equalled 5.0 per cent of the averaged estimated resident population. During the same period, the average number of people departing Darwin equalled 4.9 per cent of the averaged estimated population. The net gain, however, is 0.44 per cent, highlighting the point that the gross number of domestic movers into and out of our cities (known as 'churn') is significantly higher than indicated by the net gain or loss.

Figure 2-10   Net internal migration, gross departures and gross arrivals as a
percentage of estimated resident population by major city,
averaged, 2006–11
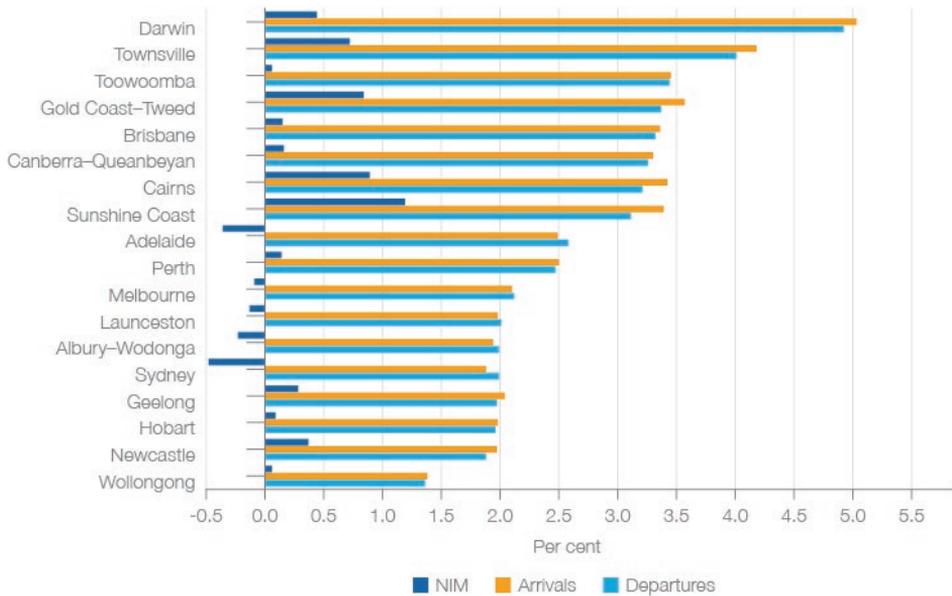
Source: ABS 2012c and 2012e

Migration within cities

Considering the flow of domestic migrants within cities is important to understanding how population distributions change on a micro scale. However, study of the movements of people within our major cities is hindered by the limited data available. Accordingly, the cases presented below are limited to Sydney, Melbourne and Brisbane using geographical classification of inner, middle and outer areas developed by the Bureau of Infrastructure, Transport and Regional Economics (BITRE) in their report series Population Growth, Jobs Growth and Commuting flows which has covered Perth, Sydney, Melbourne and South-East Queensland (BITRE 2010, 2011a, 2012 and 2013).

The largest flows of domestic migrations are occurring within our capital cities. Domestic migrations from one place within Sydney, Melbourne and Brisbane to another place within the same city accounted for 60 per cent to 75 per cent of total migrations of each of the cities – see Figure 2-11. The remainder of migrations for the three cities were made by migrants to or from intrastate or interstate which is explored in the next section.

Figure 2-11   Intracity, intrastate and interstate departure and arrival flows for
               Sydney, Melbourne and Brisbane, averaged, 2006–11
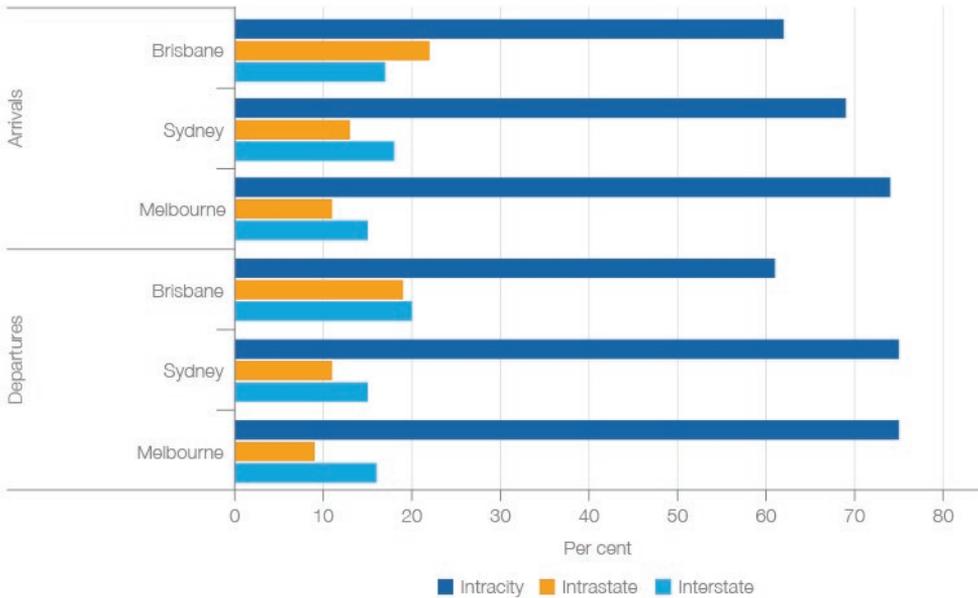
Note: The proportions are based on the total number of people departing or arriving to the city or moving within the
         city. Movements to and from intercity, intrastate and interstate are shown as a proportion of total arrivals and
         departures to the city, excluding people moving to and from the city from outside Australia.

Source: ABS 2012e

The migration flow patterns of movement within each of the three cities display both
similarities and differences, as seen in Figure 2-12. The middle and outer suburbs of Sydney
and Brisbane had relatively similar flows in and out of them. The inner areas of Brisbane
and Sydney had proportionally less flows. In contrast, Melbourne had a significantly larger
proportion of people living in the city moving into and out of its outer areas to other areas of
the city and less people moving into and out of the inner city area.

Figure 2-12   Departures from and arrivals to Sydney, Melbourne and Brisbane as a percentage of estimated resident population by inner, middle and outer area, averaged, 2006–11
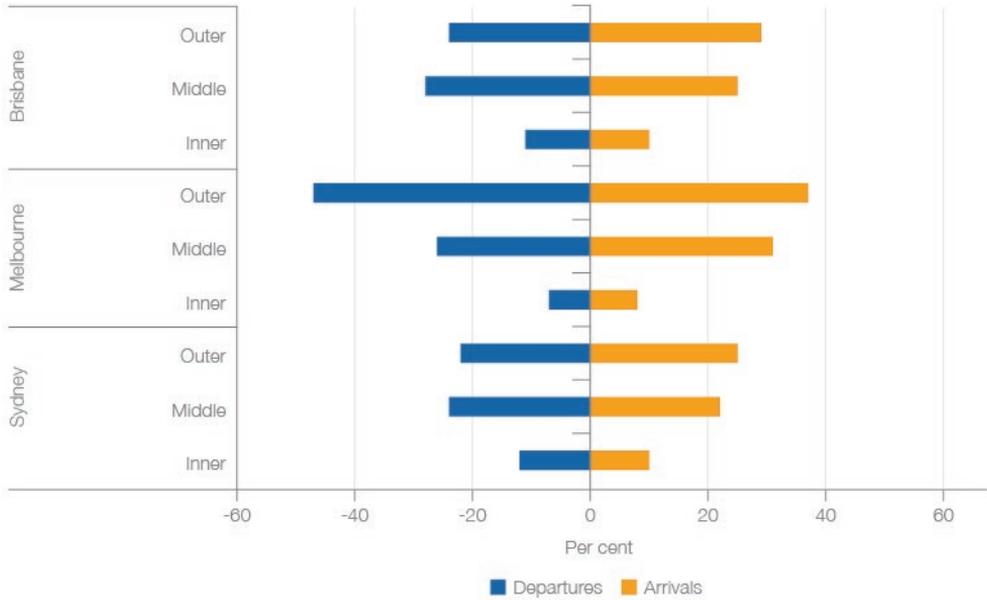
Note: The proportions are based on the total estimated resident population of that particular area of the city arriving or leaving from other parts of Australia. It does not include international movements or movements by non residents. Thus, inner city movements in particular are likely to significantly exceed the proportion shown on the figure.

Source: ABS 2012e

Intrastate and interstate migration

The experience of interstate domestic migration for Sydney, Melbourne and Brisbane is more uniform than the intrastate flows between 2006 and 2011. This is illustrated in Figures 2-13 and 2-14. All three cities had similar percentages of those migrating interstate from the city and those migrating interstate to the city. Brisbane had a higher proportion of intrastate arrivals and departures than Sydney and Melbourne.

Figure 2-13   Intrastate arrivals and departures for Sydney, Melbourne and
                   Brisbane, averaged, 2006–11
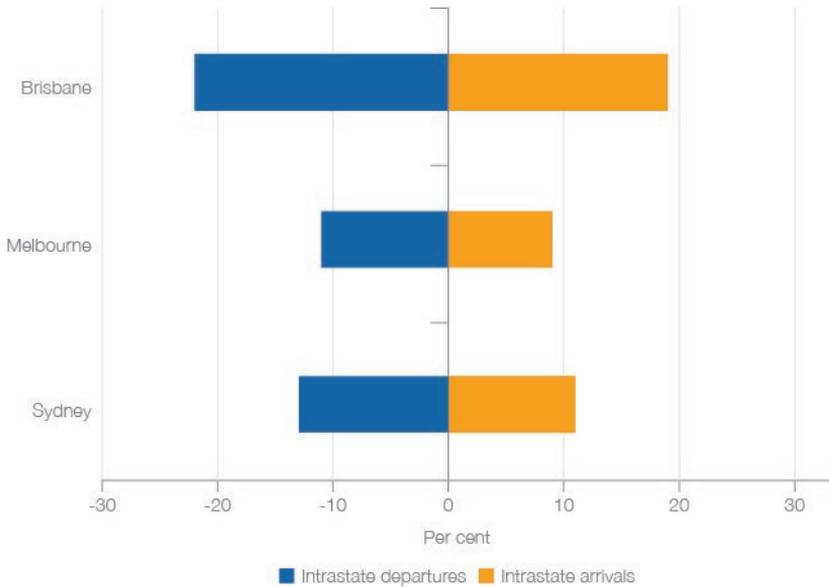
Note: Movements to and from intrastate are shown as a proportion of total arrivals and departures to the city, excluding
           people moving to and from the city from outside Australia. This figure contains information which is included in
           Figure 2-11 but has been included as a separate figure to demonstrate intrastate trends more clearly.

Source: ABS 2012e

Figure 2-14   Interstate arrivals and departures for Sydney, Melbourne and
                   Brisbane, averaged, 2006–11
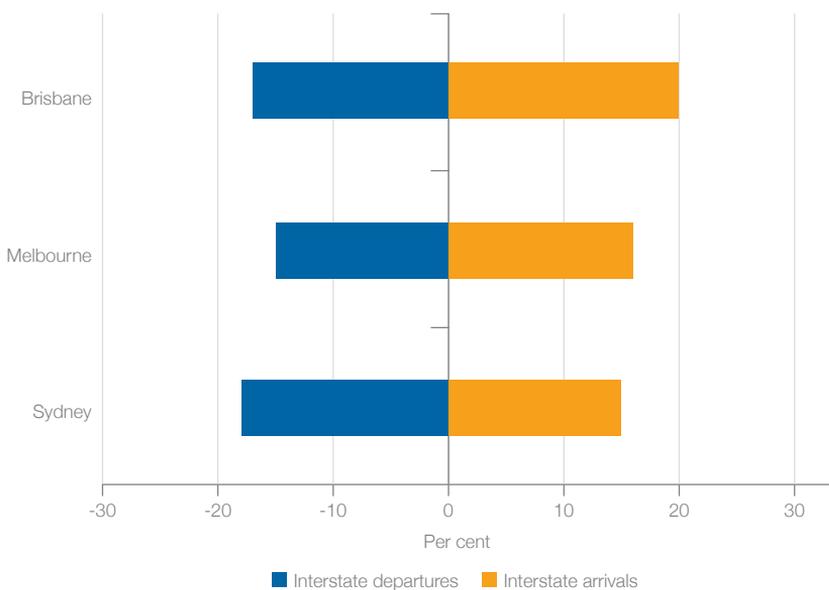
Note: Movements to and from interstate are shown as a proportion of total arrivals and departures to the city, excluding
           people moving to and from the city from outside Australia. This figure contains information which is included in
           Figure 2-11 but has been included as a separate figure to demonstrate interstate trends more clearly.

Source: ABS 2012e

The flow of people migrating intrastate from Sydney, Melbourne and Brisbane is less than the flow of people migrating within different areas of cities. Figure 2-15 shows that the outer areas of Sydney, Melbourne and Brisbane all had the highest intrastate and interstate in and out flows as a percentage of the resident population, followed by the middle and inner areas respectively. All areas of Sydney and Melbourne had relatively even in and out flows as a percentage of the resident population for intrastate and interstate domestic migration. Brisbane, however, lost a significant number of people from the outer suburbs, although it is not clear how many were movements to the adjacent Gold Coast and Sunshine Coast.

Figure 2-15   Intrastate and interstate departures and arrivals for Sydney, Melbourne and Brisbane as a proportion of estimated resident population by inner, middle and outer area, averaged, 2006–11
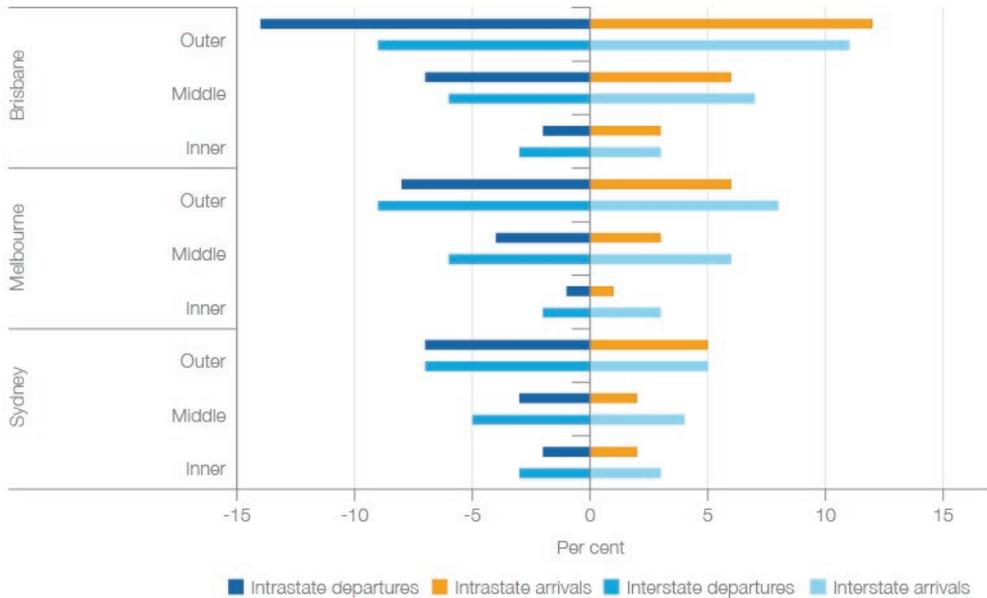
Note: This figure is based on the population of people departing or arriving to the city or moving within the city outside Australia. Movements to and from intercity, intrastate and interstate are shown as a proportion of total arrivals and departures to the city, excluding people moving to and from the city from Australia.

Source: ABS 2012e

Map 2-4 uses Sydney as a case study to show interstate migration within the city. It illustrates that the destination for many interstate migrants into Sydney is the so called 'global arc' from the Kingsford Smith Airport to the northern suburbs. Map 2-5 shows two areas of Sydney are the loci of interstate departures, Parramatta and central Sydney. Both these areas are experiencing high levels of population churn and the balance was in the negative in 2010.

Map 2-4   Interstate migration into Sydney, 2010
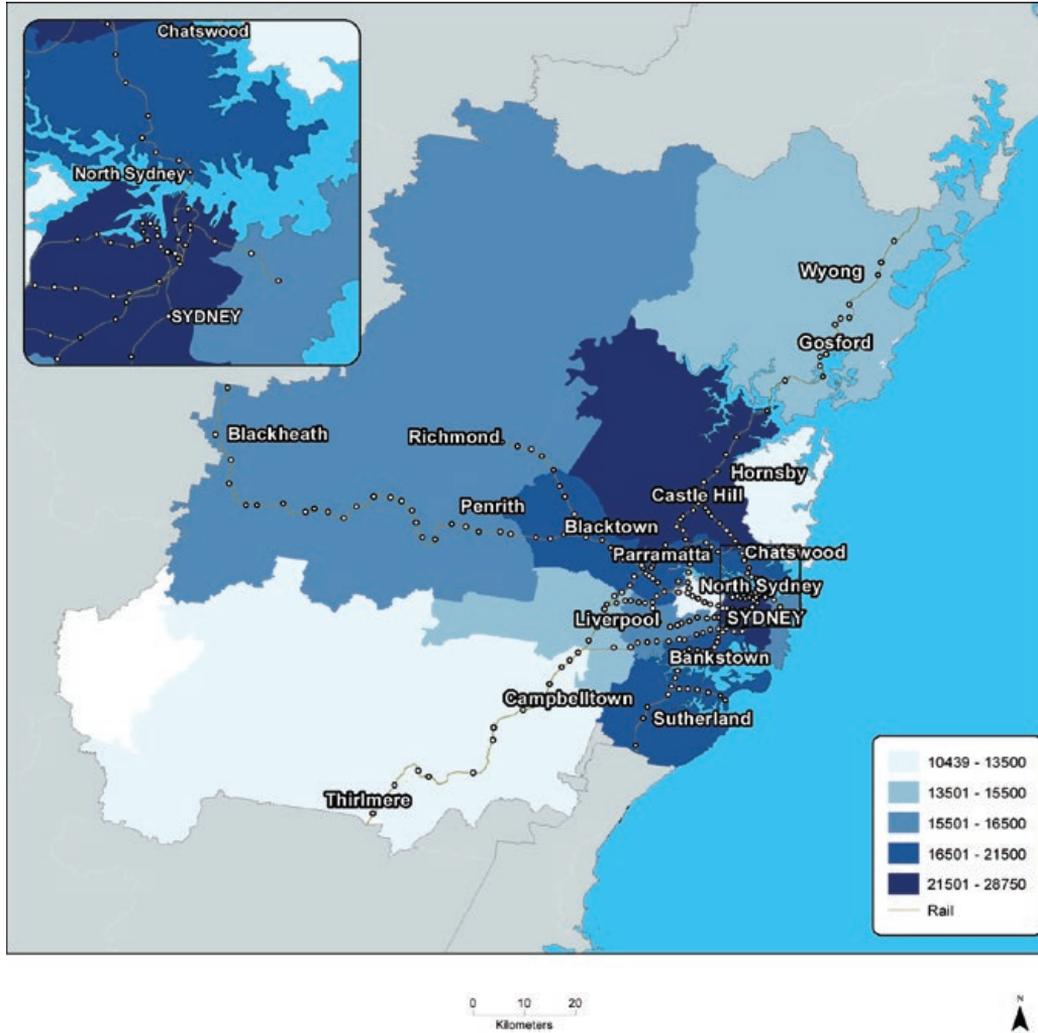
Map 2-5   Origin area for people moving from Sydney to other states, 2010
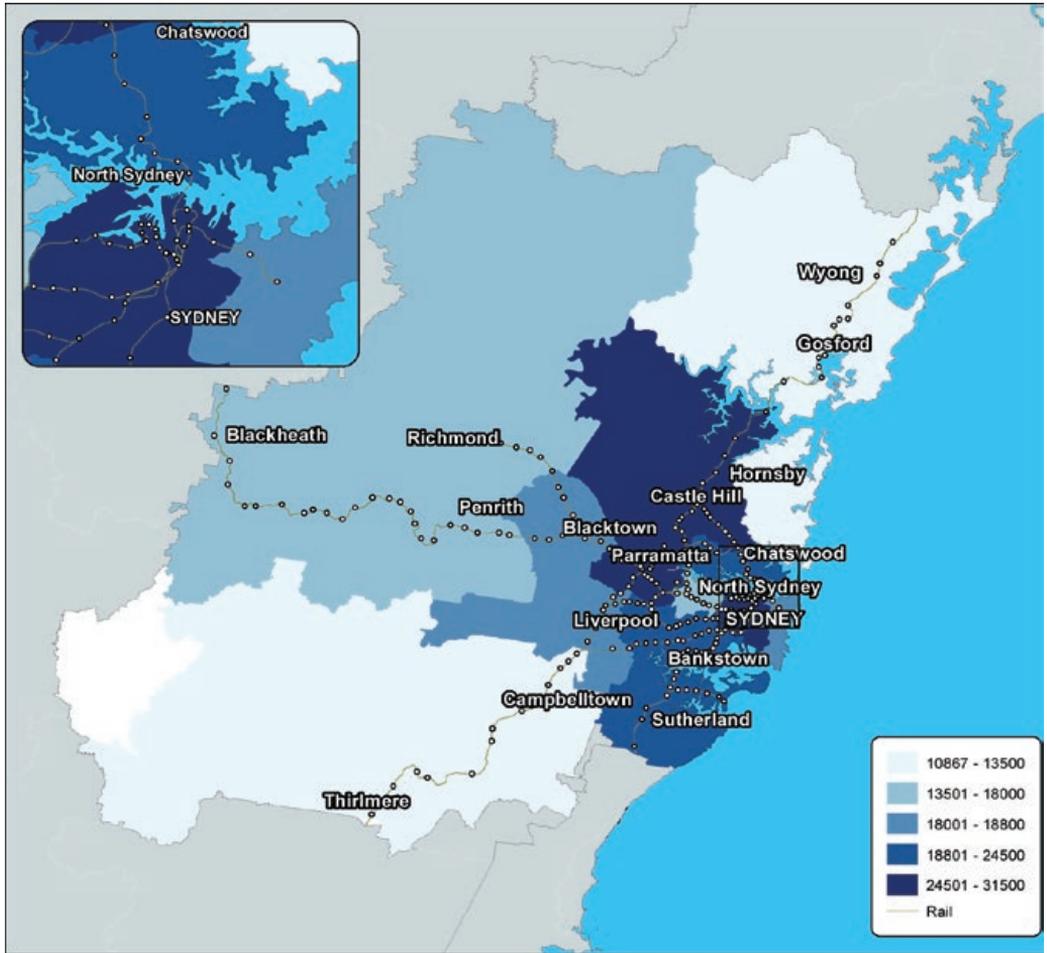
Map 2-6 shows that while Sydney is losing people to other states from all areas of the city, some are more affected than others. The areas experiencing the highest losses interstate are the same areas that have high levels of international migration (described in the next section).

Map 2-6   Net movement in and out of Sydney to other states, 2010
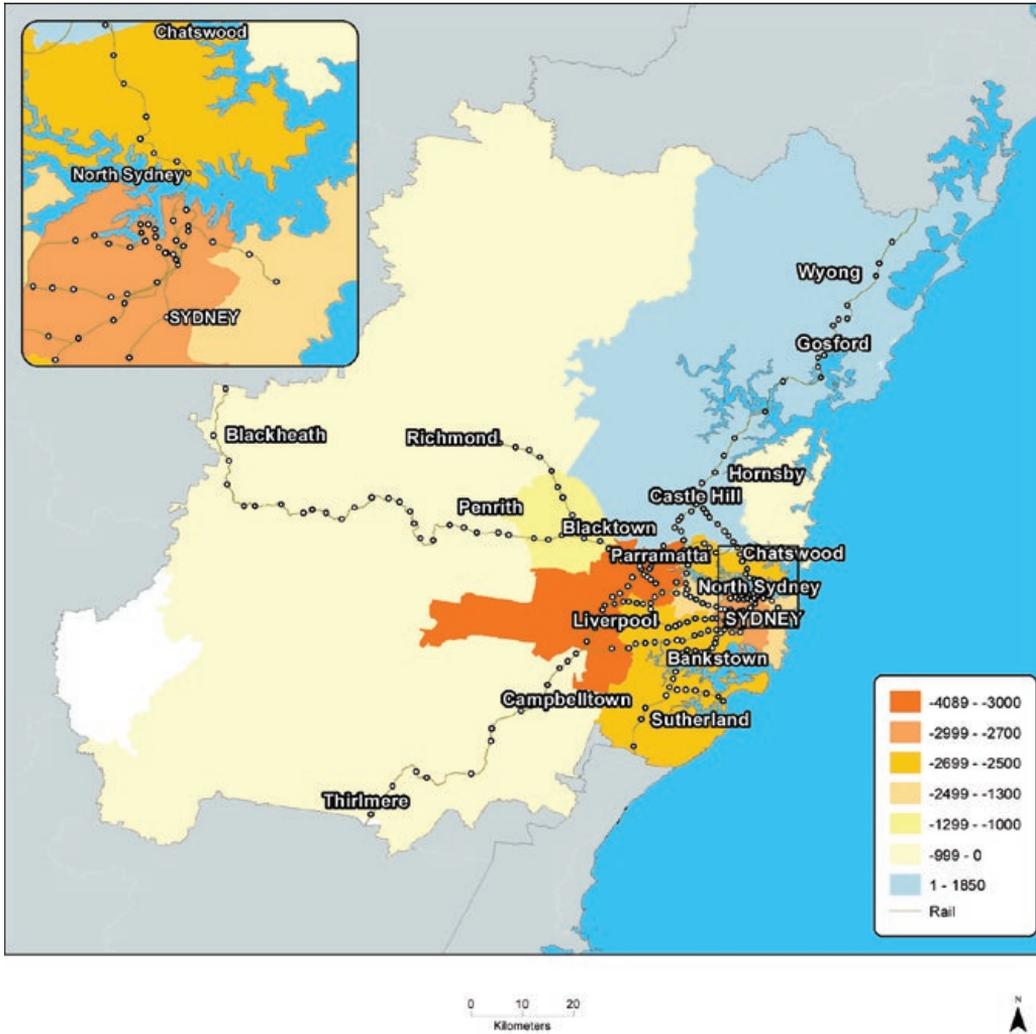
Internal migration conclusion

Much of the discussion about internal migration in Australia focuses on net population gains and losses. This has seen expressions such as 'sea change', 'tree change' and 'the big shift' enter the national lexicon. In reality, these net gains and losses are often a fraction of the number of people moving between places. Rather than internal migration being a mass movement of people from, for example, the 'bush to the coast', a better characterisation would be rivers of people moving around Australia forming social and economic linkages across the nation.

Previous work by the Department of Infrastructure and Transport has shown this movement has been remarkably stable for at least the last 20 years for which data is available. This section has shown that the movement is highly sensitive at the margins to social and economic movements. While the movement to the north and west of the continent is of long standing, it is accompanied by high rates of population churn in those areas growing above the national growth rate. In other words, a lot of people are moving to places like Darwin and the Sunshine Coast but a lot of people are leaving as well. It only takes a slight variation one way or the other to tip a high growth area into a low growth area. This is shown by the difference in population growth in centres in the first five years of the century and their growth rates since then.

This section also shows the crucial role in internal migration played by the outer suburbs of the larger capital cities. They are also experiencing high growth and high churn and like the smaller regional cities of the north and west, would be impacted by small movements in the balance of people moving in or out.

Hobart aerial.
Image courtesy of Sam Rosewarne and the Mercury

Tourism for the purposes of education

Since the 1990s, Australia has become a major destination for international students market (Figure 2-16). International students are generally in one of the following four streams:

- ELICOS: provides English language tuition and prepares overseas students for progressing to further study within Australia. The initial English language or bridging course is often the first point of contact for international students and acts as a pathway to other education institutions.

- Secondary schools: includes government and non-government institutions.

- Vocational education and training (VET): including TAFEs, dual sector universities and private colleges. This provides practical training and education, preparing trainees for jobs at various levels, from trades to professional positions.

- Higher education: enrolment in universities.

International students take courses across many disciplines but over 50 per cent are enrolled in commerce or marketing courses in both the VET and higher education sectors.

International education activities generate over $15 billion of export income annually, making it Australia's fourth largest export industry. This revenue supports about 130,000 full-time equivalent positions (Deloitte Access Economics 2013).

Figure 2-16   International visitors to Australia for the purposes of education by sector, 1994–2012
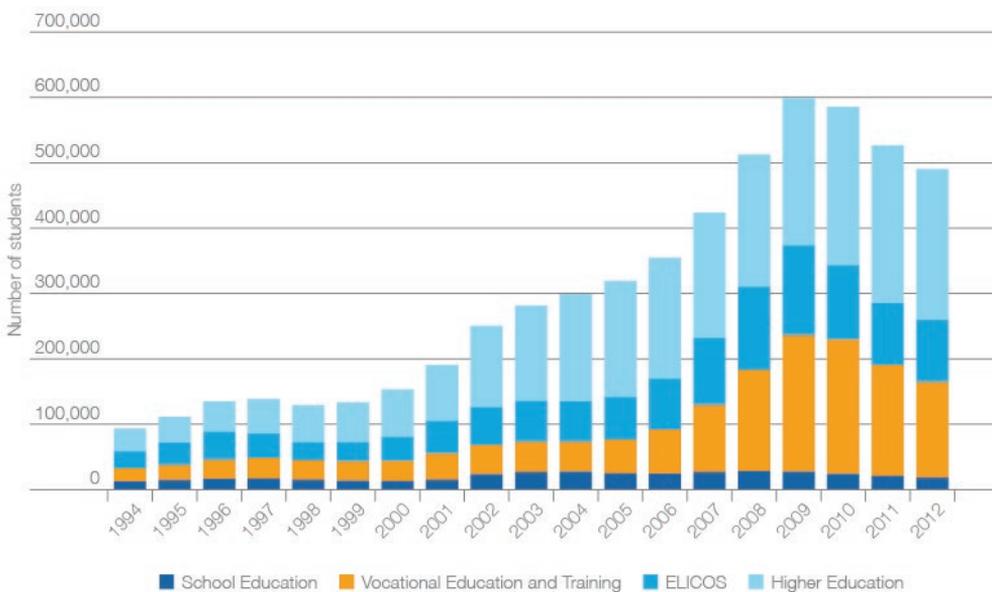
Note: ELICOS is English Language Intensive Courses for Overseas Students.

Source: Australian Education International 2012

According to the OECD *Education at a Glance 2012*, Australia, with 6.6 per cent of the market, was the third most popular destination for international students in the world in 2010, behind the United States (16.6 per cent) and the United Kingdom (13 per cent).

However, Australia has the highest average in the OECD of international students as a proportion of all onshore higher education students (21.3 per cent in 2011).

Of the 5,691,791 tourists to Australia aged 15 years and over during the year ended 31 December 2012, six per cent were visitors for the purposes of education. Visitors for the purposes of education spent, on average, 142 nights in Australia – the longest average duration of all tourist groupings. This represents a total of 51 million nights in Australia or 25 per cent of all international visitor nights. International visitors for the purposes of education are also predominantly based in our major cities and their presence there, like other tourism streams, provides a significant economic boost.

International students across higher education, vocational and English Language Intensive Courses for Overseas Students (ELICOS) spend an annualised average of $42,531 per annum (Davidson et al. 2010) while studying in Australia. Their families contribute most of the money for program fees, living expenses and travel and recreation activities; however, income from working is also important to fund travel and recreation activities (Davidson et al. 2010). Figure 2-17 shows that around 50 per cent of that spending ($15.7 billion in 2011), flows through to local shops and the retail sector, accommodation providers, travel services and other community enterprises. (DIICCSRTE 2013).

Figure 2-17   Export income from education, type of expenditure, 2002–11
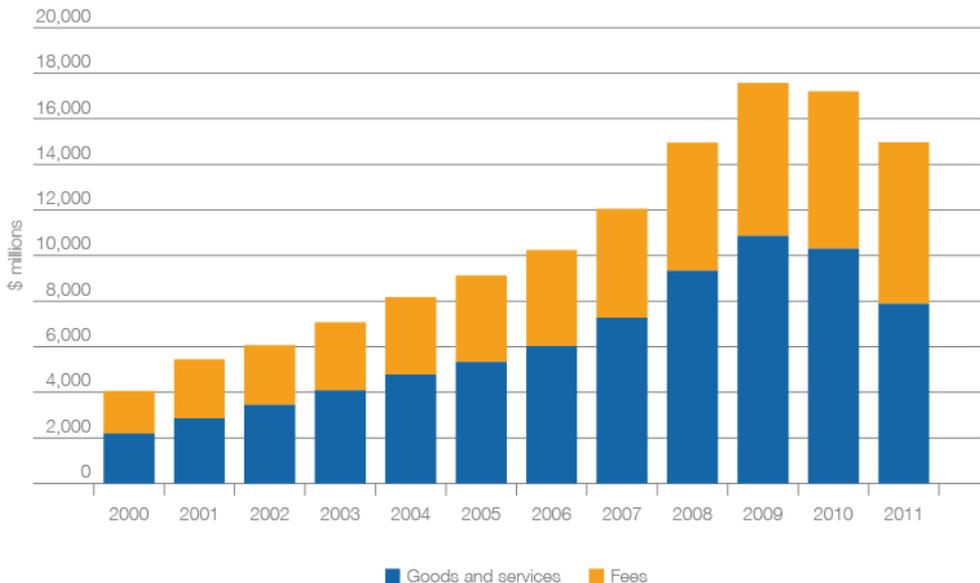
Source: ABS 2013

Figure 2-18 shows the numbers of international students enrolled in vocational and higher education in our major cities. In recognition of the economic contribution that international students make to cities, state and local governments have developed initiatives to promote their respective cities as quality study destinations. Perth Education City, Education Adelaide and Study Melbourne complement the well-established marketing strategies that universities and many other educational providers around Australia have in place to

recruit international students. Local and state governments have also organised events such as Brisbane Welcomes International Students, Perth International Student Festival and the NSW International Student of the Year Awards which highlight the contribution made by individual students in that State.

Figure 2-18   Number of onshore international students enrolled in the vocational education and training and higher education sectors in major cities, 2011
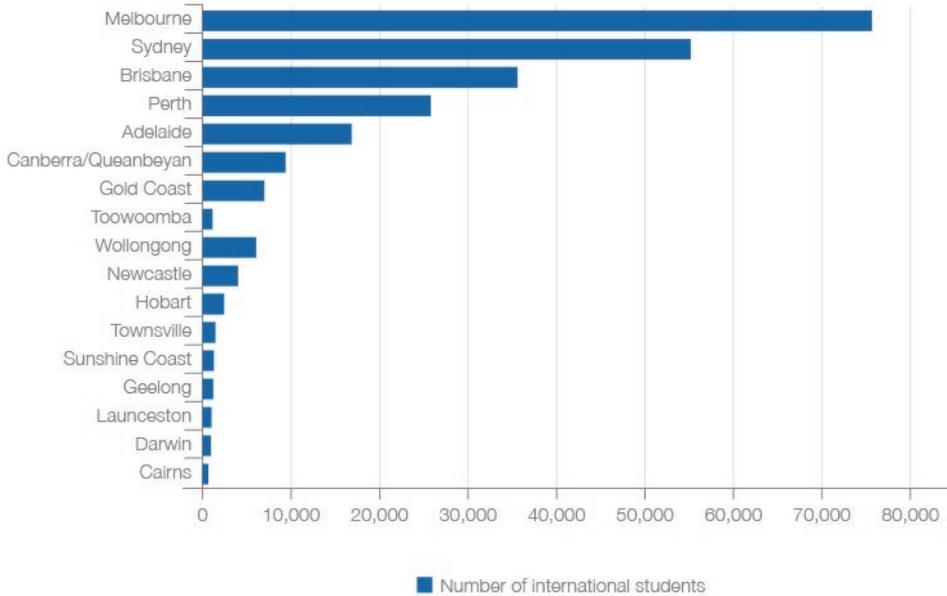
Source: AEI 2012

Figure 2-16 shows a decline in enrolments since 2010, which has been felt most heavily in the VET sector. Reports of violence against international students – particularly Indian students, a large proportion of whom are enrolled in VET (Figure 2-19) – gained widespread media attention in 2009 and has been cited as a reason for the 37 per cent decline in VET enrolments between 2008–09 and 2010–11 (DIICCSRTE, 2013). However, the 2010 report of the Review of the *Education Services for Overseas Students (ESOS) Act 2000* conducted by the Hon. Bruce Baird found that some of the rapid growth in international student numbers from 2005 included people on student visas who were not genuine students. It found that some students undertook an education in order to gain permanent residence without any intention of finding a job related to their course of study. This expansion of non-genuine student numbers was helped by some agents and institutions whose business practices were dubious and sometimes illegal. In 2010, changes to skilled migration requirements effectively severed the connection between studying certain courses and a near guaranteed path to permanent residency. This led to a dramatic reduction in the numbers of non-genuine students taking certain VET courses, including hospitality management, hairdressing and cookery (Australian Government, 2011).

Figure 2-19   International student enrolments for the top five source countries, 2011
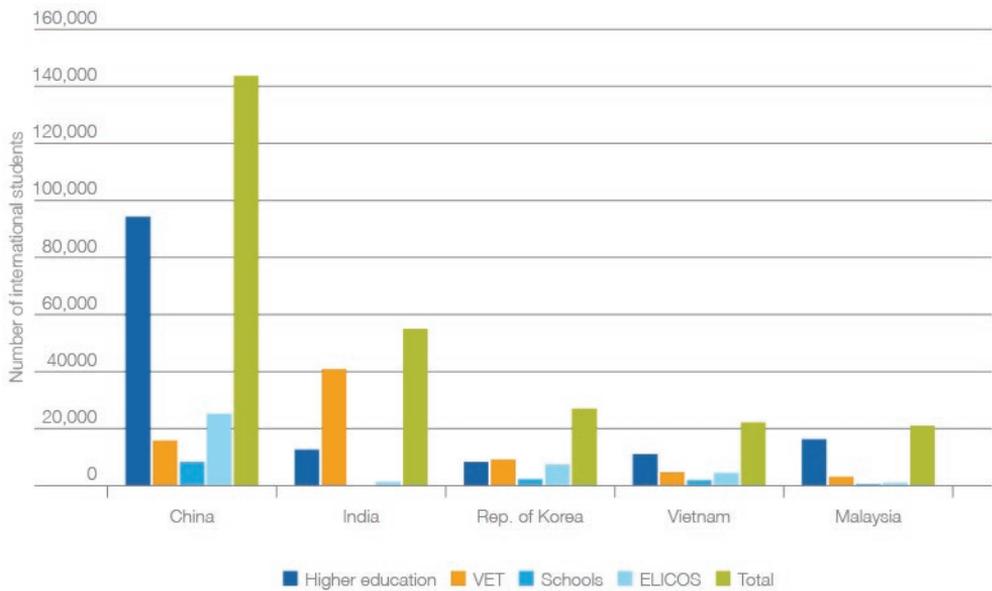
Source: AEI 2012

Other challenges, including the global financial crisis and rising costs, including the high value of the Australian dollar, have also affected international student enrolments. Despite this, higher education enrolments, which account for the majority of enrolments and in excess of 65 per cent of the fee revenue, have only declined slightly and are expected to begin growing again by 2014 (Australian Government 2011).

Maintaining the high quality of teaching and research at Australian universities is critical if they are to continue to attract international students. However, other factors also affect decisions on where to study, such as the level of integration with Australian nationals, access to student support services and appropriate and affordable health facilities, accommodation and transport.

Access to accommodation

The 2012 International Student Survey (ISS) showed that 88 per cent of international respondents across all sectors were satisfied or very satisfied with living in Australia, an increase of two per cent on the 2010 survey (AEI 2013). However, the 2012 ISS showed a satisfaction rating of just 51 per cent for both living and accommodation costs compared to 61 per cent in 2010 and 60 per cent in 2011. These levels are consistent with other surveys that have found the majority of international students are satisfied with their accommodation. However, as the author of a report commissioned by a local council in Sydney noted, 'being satisfied does not equate with living in optimal conditions for study and lifestyle' (Judd 2012, GML Social Research 2011, p. 13).

In the United States and the United Kingdom students regularly move from their home to a geographically separate area to study and reside in purpose-built accommodation but Australian domestic students have traditionally studied at their local university or TAFE and often live at home. The prevailing model in Australia has therefore been a commuter student model. Before 2000, those students requiring student accommodation represented a relatively small minority of the overall student population on most Australian campuses. The large increase in demand from international students for accommodation over the last decade has therefore posed particular difficulties.

This demand is demonstrated by Figure 2-20 which shows that even if all on-campus beds in Melbourne and Sydney were quarantined for international students, this would still only provide accommodation for less than 19 per cent of them. The increased demand for accommodation due to the growing numbers of international students has seen a growth in purpose-built student housing on and off campus, including an additional 6,211 properties built with the support of the Australian Government's National Rental Affordability Scheme. However, evidence suggests the majority of international students are renters in the private housing market.

Figure 2-20   International students and beds in university on campus accommodation in selected cities, 2011
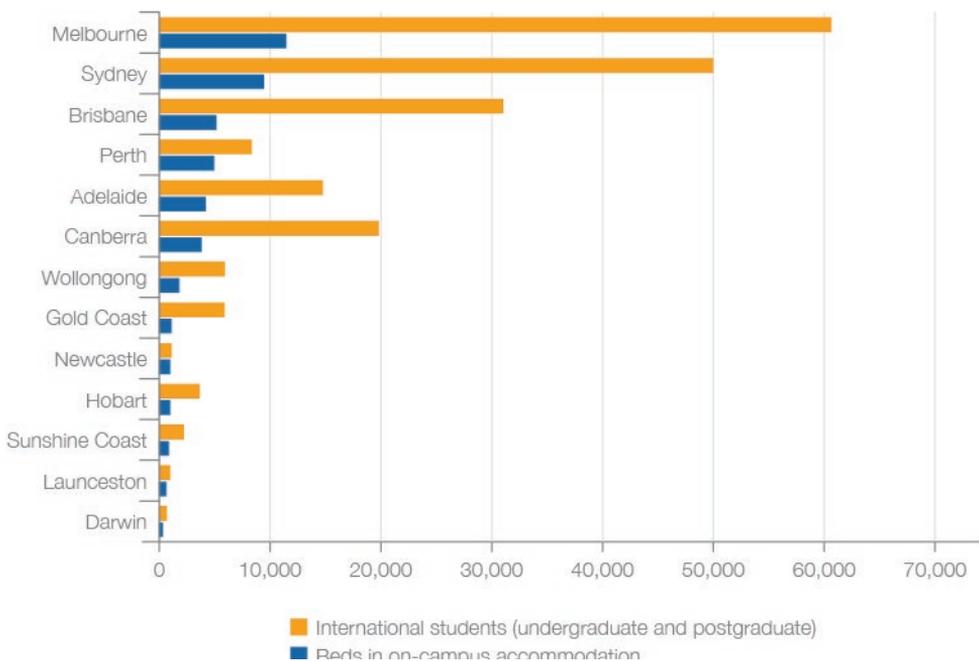
Source: Adapted from AEI's *Onshore higher education international students as a proportion of all onshore students by university 2011*

Generally, these private renters sought to live close to the institutions where they are studying at because of the lower transport costs and increased study and social opportunities. With many institutions located in the inner suburbs of our major cities, many students also seek to live in these centres. In the City of Melbourne, 18,353 international

students reside in the Local Government Area (LGA), equating to approximately one in five of all residents and a further 15,147 international students travelling into the city to study (City of Melbourne 2012). The City of Sydney (2013a, 2013b) estimates that 10,714 international students live in that LGA alone, representing one in 16 residents.

With many international students reliant on part-time work, inner cities are also attractive due to their higher job densities. Students are required to work more hours to support their study than ever before. The Group of Eight, a committee of Australia's foremost universities, indicates that students now work three times the hours of their counterparts in 1984 (Ong and Ramia 2009). International students are allowed to work up to 40 hours per fortnight during the semester and unlimited hours during semester breaks (Department of Immigration and Citizenship 2011).

In 2011, the Inquiry into International Student Accommodation in New South Wales, by the NSW Legislative Assembly, was told that due to rising rents in Sydney's inner city international students were competing with other groups seeking low-cost housing and were often outbid by those groups. The inquiry also noted that the shortage of accommodation meant that international students were often forced into living arrangements outside the mainstream rental sector, including share housing, boarding houses and lodgements in private housing. When coupled with a lack of local knowledge about tenancy arrangements, international students sometimes faced unfair practices by landlords, including arbitrary evictions and overcrowding.

Other cities have experienced similar issues to Sydney. The ABS (2011a) estimates that 27 per cent of full-time international students in Australia live in an overcrowded property, compared to 11 per cent for domestic full-time students. Brisbane City Council released a report in 2008 with similar findings to the NSW Legislative Assembly. In response, the Council which had already increased house inspections in suburbs with high concentrations of international student residents, passed amendments to its House Code, reducing the number of *unrelated* people allowed to reside in one household from six to five in an effort to combat overcrowding.

Figure 2-20 shows that Canberra has the highest proportion of on-campus accommodation for international students. This is mainly due to the Australian National University (ANU), which has an innovative policy of guaranteeing accommodation for all undergraduates originating from outside the local area in their first year, including international students. Since 2008, the ANU has built four lodges which are operated by a specialist student accommodation manager. The lodges house 2,303 undergraduate and postgraduate students who support the creation of 29 new commercial opportunities on the edge of Canberra's CBD, which borders the ANU campus.

Access to transport

A key determinant for international students when deciding where to live is transport costs. Universities Australia (2010) has recommended that government travel concessions for full-time students be extended to all full-time international undergraduates.

Before October 2012, transport concessions for international tertiary students were available in all States and Territories except New South Wales and Victoria which account for almost 60 per cent of the overall international student population. These states argued that such concessions would be an unreasonable impost on their budgets and that international students should be self-sufficient in terms of meeting living costs.

In October 2012 the New South Wales Government announced that it would trial a scheme that offered concession rates to international students. The new program provides discounts on MyMulti2 and MyMulti3 tickets, which allow travellers to use multiple transport options in the greater Sydney area. However, three universities popular with international students – the University of Technology Sydney, the University of Sydney and the University of New South Wales are not included in the greater Sydney area.

International student contribution to domestic tourism

Beyond their obvious contribution to Australia's education sector, international students represent an opportunity for the broader tourism industry. Research in 2010 showed that while study is the key reason for being in Australia, international students are undertaking travel activities before, during and on completion of their studies (Davidson et al 2010). Of the 6,000 students surveyed, 85 per cent had undertaken holiday travel while studying in Australia. Most of these trips were one to three days (38 per cent) and day trips (24 per cent). For the majority of students (84 per cent), the average Australian holiday spend was less than $1,000 per trip. However, with most students (64.5 per cent) travelling in groups, this represents a significant tourism contribution. The research also indicates that over 70 per cent of international students expected at least two or more friends and two or more family members to visit them in Australia during their studying periods. The majority of these visitors (40 per cent) stay for one to two weeks. Only 36 per cent of these international visitors will stay in commercial accommodation. Nearly half will stay with other international students.

Yarra Trams Light Rail.
Image courtesy of Brendan Finn, Hyder Consulting

Part 2: International migrant settlement patterns – Migration and Australia's global cities

Contributed by the Department of Immigration and Citizenship

Introduction

The long history of forming connections through migration has now reached new thresholds as a result of the expanding scope and penetration of information and computer technologies and cheaper, faster and more frequent international transport. As a result, the social and economic networks linking locations, institutions and people have unprecedented depth and density. The 'networked society' is stretching social, economic, political and cultural spaces across national borders and is at the centre of the globalisation processes integrating Australia into the Asia-Pacific region and the globe. One of the biggest policy challenges confronting Australian global cities is that of developing integrated approaches that are able to capitalise on the transnational character of migration.

Currently the urban geography of immigrants is of two types. The first, overtly linked to the global dimension of the city, is centred on its core business districts. It is defined in terms of the dynamism of knowledge-based and transaction industries such as finance, accounting and management services and characterised by large temporary resident and visitor populations.

The second not only has temporary resident populations but also citizen migrant communities groups that increasingly live transnational lives. These areas, generally at some distance from city centres and once thought of as ethnic enclaves, are now potential hubs connecting Australia to other countries through the daily lives of migrants. To a large extent, these areas are as much a part of the story of a city's globalisation as the city centres.

Global cities function not only as hubs and gateways of human diversity and mobility and as important nodes for innovation, economic growth and social change, but they are potentially also sites for the production of new inequalities and social divisions. The splintering of city governance into rich and poor suburbs and the lack of administrative capacity to distribute the benefits that accrue at the city's centre are both difficult policy challenges.

This section looks at the different ways in which migration—and people movement more broadly—is fundamental to Australia's global cities, such as Sydney. It feeds off and feeds into their development, at once contributing to their local character and also defining them as global.

Temporary resident population

The scale of temporary migration in Australia is large and growing. It is particularly important to examine temporary migration, complementing the traditional focus on permanent migration, to understand the changing human mobility structure of major cities.

On any given day, there are around one million temporary visa holders resident in Australia (not including New Zealanders), a stock of people that is steadily churning as visas expire, their places taken by new arrivals (Table 2-1, Figure 2-21).

Table 2-1   Temporary entrants in Australia, 31 December 2012

Visa holder component	31/12/2011	31/12/2012	% change	% of total
Temporary visa holders				
Visitor visa holders	368,050	401,940	9.2%	23.0%
Student visa holders	254,700	242,210	-4.9%	13.8%
Working holiday maker visa holder	134,840	162,480	20.5%	9.3%
Temporary skilled (subclass 457) visa holders	128,690	157,110	22.1%	9.0%
Bridging visa holders	110,890	102,010	-8.0%	5.8%
Skilled graduate (subclass 457) visa holders	21,910	38,210	74.4%	2.2%
Other temporary visa holders	25,040	26,340	5.2%	1.5%
Total Temporary visa holders	1,044,130	1,130,290	8.3%	64.6%
New Zealand (subclass 444) visa holders	587,100	618,570	5.4%	35.4%
Total Temporary entrants in Australia	1,631,230	1,748,870	7.2%	100.0%

Source: Department of Immigration and Citizenship

Figure 2-21   Temporary entrants in Australia, 2007–12
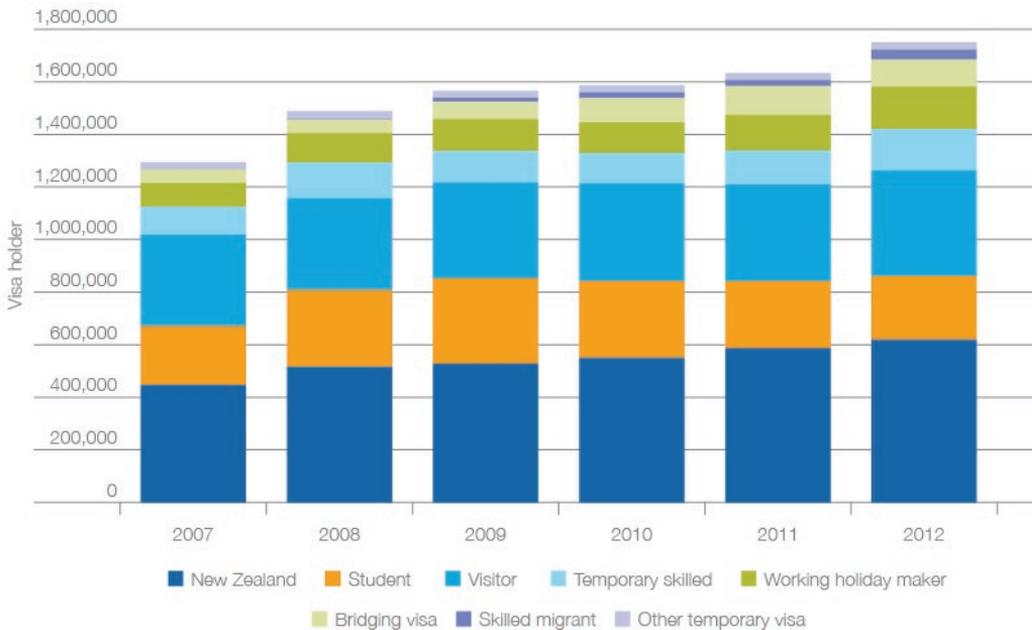
Source: Department of Immigration and Citizenship

Australia's resident population is defined by the ABS using the 12/16 rule (anyone in Australia for 12 out of the previous 16 months). As shown in Figure 2-22, the temporary migration component of the resident population grew strongly from 2004–05 until 2008–09, largely due to the contribution of international tertiary students, working holiday makers and to a lesser extent 457 visa holders. In recent years this growth has moderated due mainly to a fall in the number of international students. In the year ending December 2012 temporary migration contributed a total of 113,200 to the count of Australia's resident population. The forecast for the year ending December 2013 is that this figure will rise to 122,900.

Figure 2-22   Temporary migrant contribution to Australian resident population, 2004–05 and forecast to 2016–17
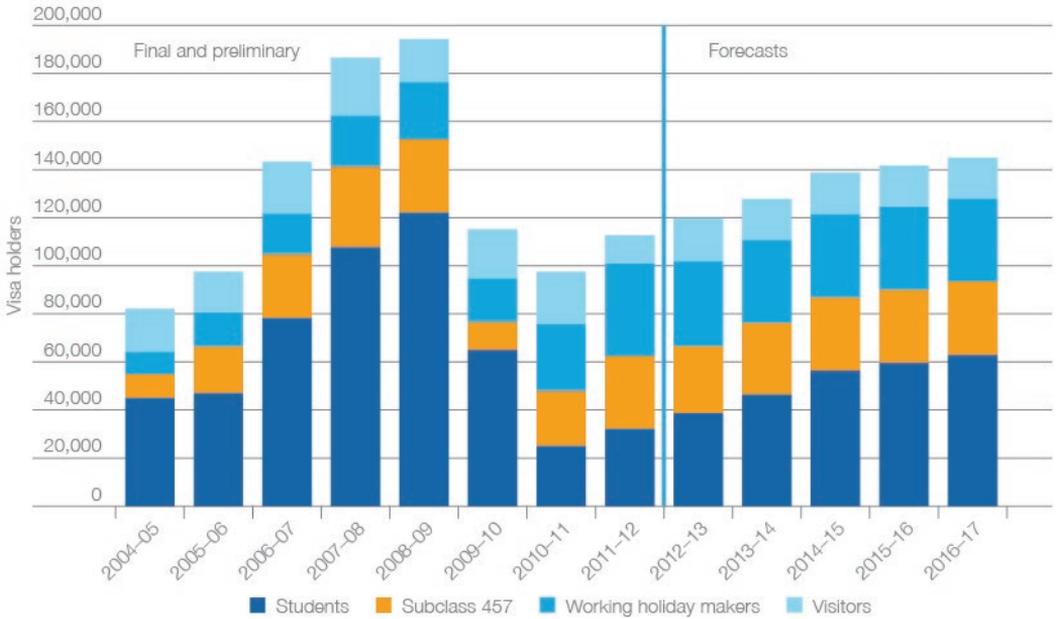
Source: Australian Bureau of Statistics, Department of Immigration and Citizenship

The 12-in-16 month rule means the vast bulk of the almost 30 million international border crossings per year have no bearing on overall population numbers. It also means that people who are not permanent residents of Australia can be counted as additions to the population, so long as they satisfy the residency rule. The wide application of this definition reflects how much transnational mobility is now accepted as characterising Australia's residential population. It has useful applications, such as for understanding occupancy rates, rental demand, dwelling composition and house prices in the urban areas most affected by high levels of mobility. It also raises the question about even more open definitions that factor in additional mobile population groups.

The changing composition of population growth in favour of the temporary component is particularly noticeable in areas of higher education. As discussed earlier significant proportions of those residing in inner Melbourne and Sydney are international students (Hill, 2013).

In addition to the international student component of the temporary resident population, the inner city statistical subdivisions of Sydney and Melbourne are the nominated job location for approximately 15 per cent and 11 per cent, respectively, of the national total of 15,800 (2013) 457 visa holders. In the case of Sydney, the lower Northern Sydney statistical subdivision is the nominated position location for about seven per cent (Figure 2-23).

It is difficult to know whether this means that a similar proportion of 457 visa holders work and/or live in the inner city areas, since the place of residence or work may not coincide with the company's official address, it nevertheless indicates the contribution of skilled temporary international workers to the inner city.

Figure 2-23   Geographical distribution of 457 visa holders by nominated place of work, 2013
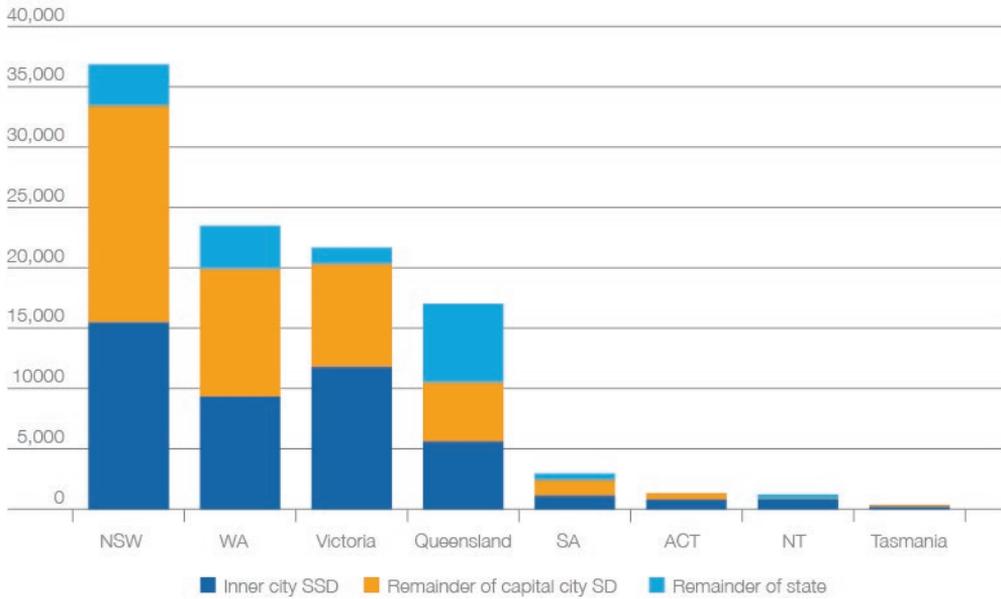
Source: Department of Immigration and Citizenship

Analysis of the industry divisions of 457 visa holders suggests that skilled workers are drawn to industries that agglomerate in inner city areas. For example, the majority of 457 applications lodged for Sydney tend to concentrate in financial and insurance services and information media and telecommunications firms (Figure 2-24).

Figure 2-24   Industry participation of 457 visa holders in NSW, 2013
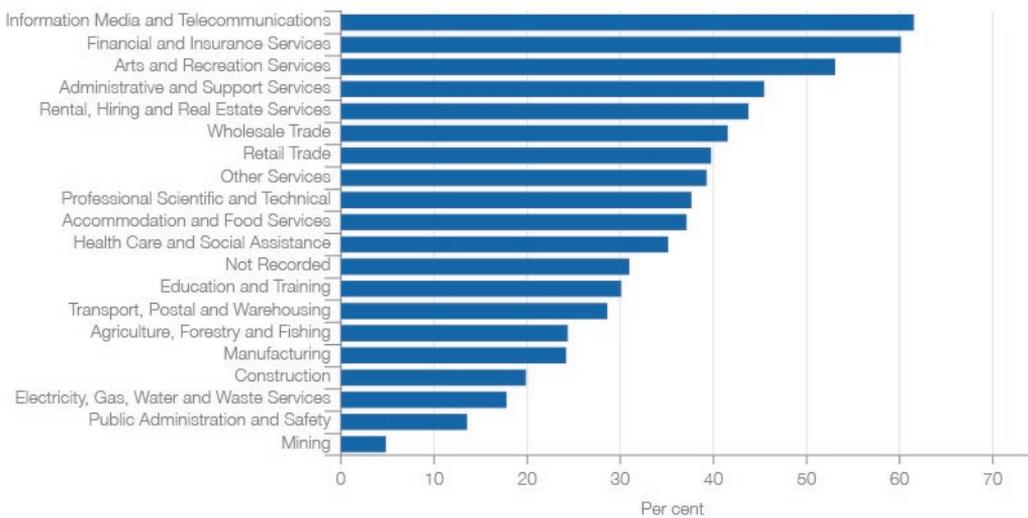
Source: Department of Immigration and Citizenship

International visitor population

One of the major impacts on people movement patterns as a result of faster and more frequent international transport is the massive growth in short-term international visitors. On the global scale, while the overall levels of international migration have remained remarkably constant between two and a half and three per cent of the global population (de Haas 2011), international tourist arrivals have shown virtually uninterrupted growth with the total international arrivals reaching, for the first time, one billion in 2012 (UNWTO 2013).

In Australia, the short-term movement category now constitutes 96 per cent of the 29 million crossings annually of Australia's international borders (ABS 2013a). Short-term visitor arrivals and departures and short-term resident departures and returns represent 1,292 crossings for every 1,000 people of the Australian population. In 2001–02 there were 16.9 million border crossings, representing 865 crossings per 1,000 Australians.

Figure 2-25 provides a measure of the overall increase in short-term visitor arrivals and resident departures. Contrary to the prevailing view held of the Australian resident population, short-term resident departures have continued to exceed short-term visitor arrivals since the year ended June 2008.

In general, the increase in flows of short-term international visitors has been described as an increase in 'people movement intensity' (Andersen and Dalgaard 2011). People movement intensity is defined not only in terms of the volume of in-flows associated with a visa category, but more importantly, the frequency and regularity of movement both in and out of a city, state or nation. Migrants, whether permanent or long-term (e.g. more than 12 months and less than five years) can become part of the short-term departures and arrivals population, adding to movement intensity.

In this regard, increases in people movement intensity is an indicator of both the globalisation and transnationalism of a place (Caselli 2012) and a marker of the relative level of exposure that a society has to foreign influence through temporary in- and outflows of travellers. The societies which are most exposed to the flows of people obtain useful cross-border technologies, ideas, and organisational strategies and gain the transformative edge (Andersen and Dalgaard 2011).

Figure 2-25   Short-term visitor arrivals and resident departures in Australia, 2002–12
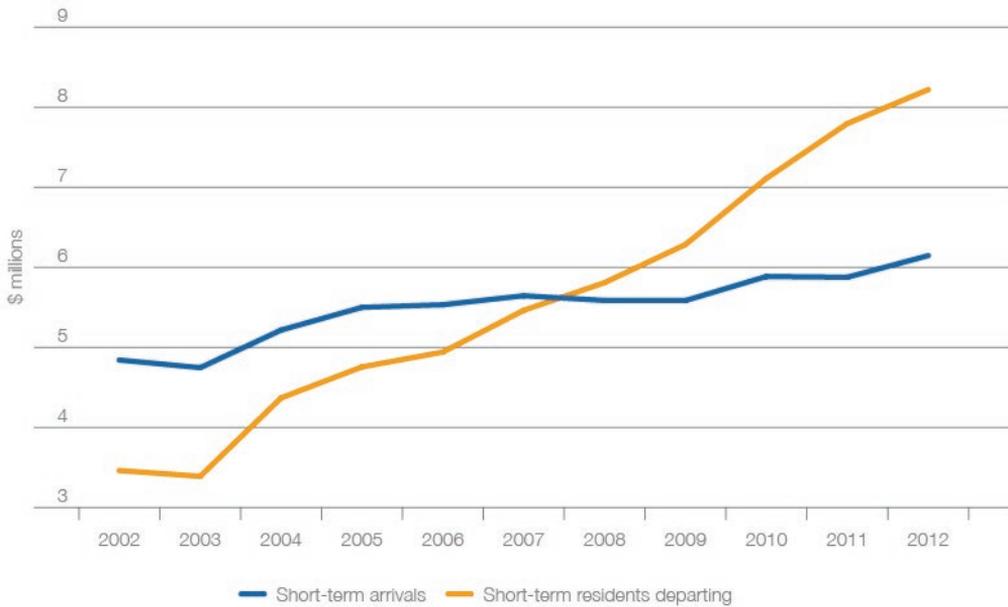
Note: Original series.

Source: Australian Bureau of Statistics and Department of Immigration and Citizenship

One of the key characteristics of a global city is that it is a hub not merely for a high volume of finance, information and knowledge flows but the flows of a large international visitor population. The areas of the city most affected by the constant flow of people are sometimes better understood in terms of the nature of flows, rather than stocks of residents. For this reason it has been suggested that in the areas most affected by high levels of people movement intensity a different concept of what constitutes the population should be used (Hugo 2004).

For example, in the City of Sydney, while there are only a little more than 180,000 residents, over two million international visitors come to the city each year (City of Sydney 2013a). In addition, it is estimated that a further 483,000 people travel to the city on any day to shop, be educated, conduct business or simply to be entertained. This is in addition to the 385,000 people who arrive every day to work in the local area (City of Sydney 2013a). The resident population of the City of Melbourne is a little over 100,000. Over 1.3 million international visitors come to the city each year, and a further 282,000 people travel to the city on any day to shop, study, conduct business or be entertained. In addition, it is estimated that a further 384,000 people arrive every day to work. (City of Melbourne 2013).

Importantly, a major component of the visitor population, across all the categories (holiday, family education, business, work), is return visitors or migrants (Figure 2-26). This circularity perhaps best captures the transnational character of today's visitor flows and provides a useful insight into specific migration corridors.

Figure 2-26   Visitor flows in Australia by purpose of visit, 2011
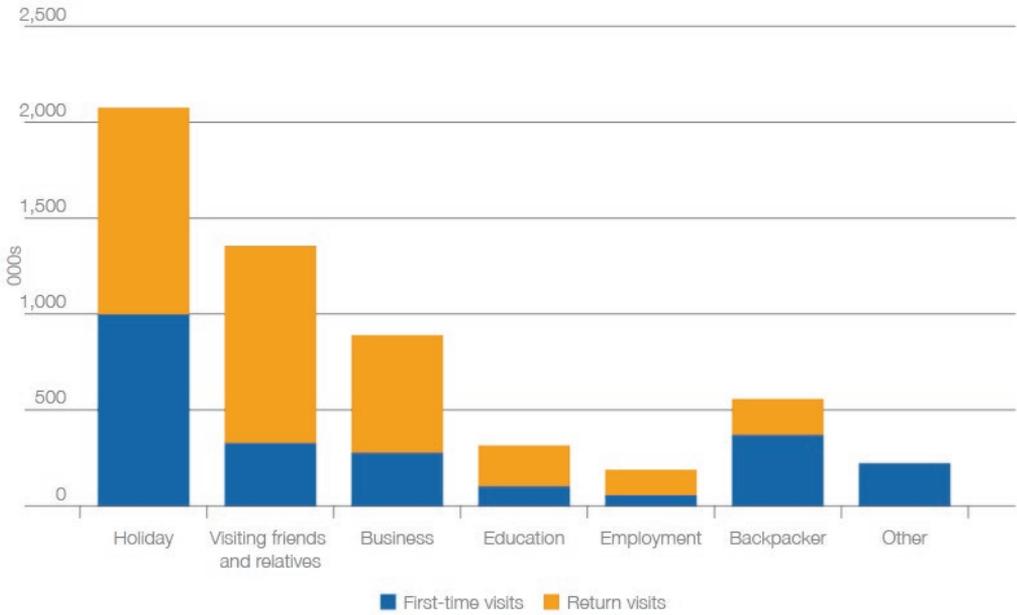
Source: Tourism Australia 2013

The transnational character of the visitor population suggests the formation and stretching of a social and economic space across national borders. As seen in Figure 2-27, approximately 90 per cent of the visitor population in the trans-Tasman migration corridor are circular migrants. This is indicative of the degree of economic and social integration of Australia and New Zealand. The full character of the geography of a transnational space is best understood by looking at the migration corridors that currently connect Australia's gateway cities to the rest of the world.

Figure 2-27   Visitor flows to Australia by country of residence, 2011
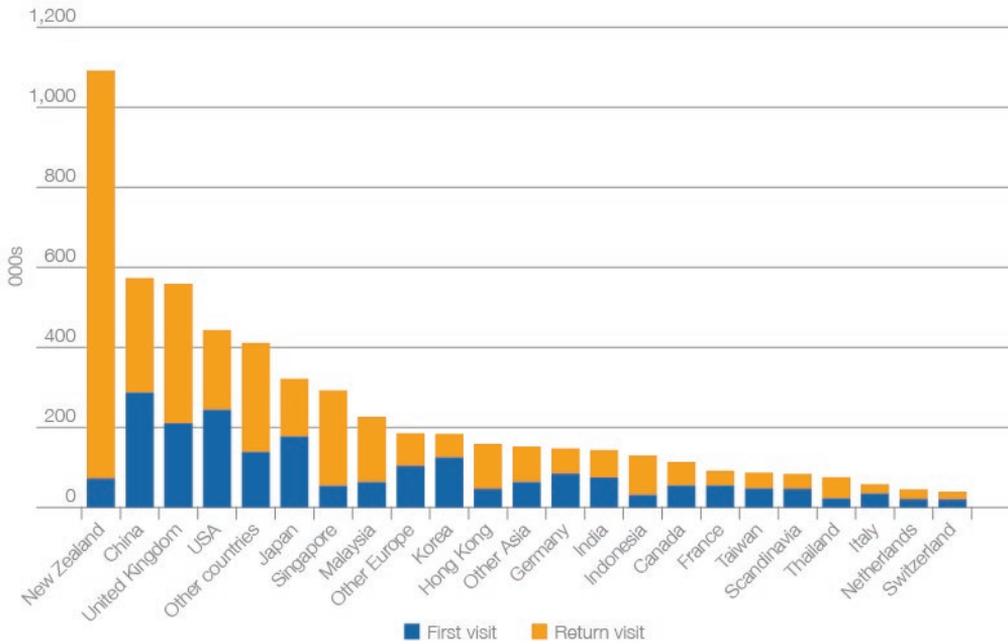
Source: Tourism Australia 2012

For example, a study by Richard Hu (2013c) has found that the number of people moving between Sydney and Shanghai has more than tripled between 2002 and 2011, from around 100,000 to 350,000. There was a large increase in the proportion of work and business related travellers (such as employment, business and conference) while the proportion of people travelling for personal reasons (such as holidays and visiting friends or family) has decreased. Employment was the main stated reason for travel between Sydney and Shanghai in both 2002 and 2011 followed by business. As the migration corridor between Sydney and Shanghai becomes even more established, return visits and circular migration are likely to become the dominant form of people movement within the visitor population.

Intra-company transfers in the banking, finance and professional services, aerospace, pharmaceuticals, electronic engineering, consulting and mining industries also shape cities. They include long-term, short-term and commuting assignments, rotations, extended business travel (30 to 90 days), business travel (up to 30 days) and virtual mobility. These patterns of mobility stretch across all long and short-term visa categories. In some cases there may be important incentives for seeking permanent residency and citizenship in a particular country when this status provides greater opportunities of transnational mobility (Beaverstock 2012). The standard rationale for acquiring citizenship is that it consolidates settlement in the destination country. However, in a more mobile and transnational setting, citizenship acquisition in Australia and another country can just as easily facilitate mobility – a form of mobility capital – giving greater freedom of movement between Australia and the other country.

Benefits of visitor movement intensity

Visitor population and related services are among the biggest contributors to Australia's services exports. In particular, with the number of business travellers to Australia rising 5.1 per cent to 1.1 million in 2011–12, the business travel services exports rose 19 per cent to $3.9 billion. Education-related and recreational travel services remain Australia's largest services exports ($15.1 billion and $11.8 billion respectively). Passenger and other transport services (including cargo and baggage handling, agents' fees associated with freight transportation and airport and port charges) were also among the top six contributors – $2.6 billion and $2.2 billion respectively (Department of Foreign Affairs and Trade 2013a, 2013b).

There may also be a strong relationship between the intensity of visitor movement and the diffusion of knowledge and technology (Andersen and Dalgaard 2011) with beneficial productivity and trade outcomes. On the basis of recent work that builds on Frankel and Romer's influential article 'Does Trade Cause Growth'(1999) there is at least a question raised concerning the linkage between increases in travel intensity and increases in the level of TFP (total factor productivity) and GDP per worker. A basic point made by Frankel and Romer (1999) is that 'trade' has to be taken as a proxy for a whole host of interactions between countries, including 'the exchange of ideas, communication and travel'. Building on this understanding, economists Andersen and Delgaard (2011) argues that there is a causal nexus between cross-border people movement and increases in a country's GDP.

Short-term temporary in and out flows of people have been identified as not only feeding directly into productivity and trade in services exports, but also encouraging the urban transnational flow of technology, ideas and knowledge. These are central to the intra-city agglomeration processes that speed up the exchange of ideas within growth industries (Taylor 2012).This model of international diffusion is probably also affected by long-term and permanent moves and resident departures. Recent literature on transnationalism and global migration questions the traditional distinction between short and long-term and permanent flows as a way of understanding cross-border and cultural interactions. This has implications for any model of international diffusion (de Haas 2010) and the economic benefit that connection to the global economy entails. More importantly it raises questions as to whether urban areas with low levels of international people movements are being excluded from such benefits.

Migration and global cities

Australia has long been seen as an 'immigration country'. This image is now being challenged by new patterns of mobility and settlement.

In the case of refugees and to lesser extent family migrants, Australia is viewed as a place to settle, to become citizens with a view to building a future in Australia. However, in the case of many of the highly mobile professionals Australia, or indeed anywhere, is not viewed as a place to settle permanently. It is just as readily an origin country for emigration as a destination country for immigration and just as readily a place to visit and temporarily reside as it is a place to settle.

International people movement tends to be seen as movement from country to country. However, this really only applies to the refugee component which is often driven by political conflict internal to a nation. The highly skilled, talented and wealthy component

of cross-border people movement is better described as 'transnational' as it corresponds primarily to the formation of common economic, social and cultural spaces among a network of cities—*across* rather than *between* countries. Within this pattern of mobility and settlement, cities such as Sydney and Melbourne are fast becoming hubs for high levels of transnational people movement. They are defined just as much by the level of people *mobility* as their *settlement* patterns.

This dual nature sees high levels of transnational mobility linked to an educated and affluent cosmopolitanism, counterpoised with high levels of localism often linked to disadvantage. On the one hand, there is the overt branding of a city as global and on the other hand there is the historical understanding of a city as national. On the one hand, there is the opening up of the city's prime real estate to a global market and increasing volumes of short and long-term temporary flows of people. On the other there is a segment of the citizen population without easy access to the opportunities and vibrancy that define a city's direction and growth.

Defining a city as national or global is also a definition of the very meaning of the term global. This struggle extends to the classification and ranking of a city as a 'global city' (Robinson 2002). The term global is typically linked to a purely economic process defined by global flows of information, knowledge, finance, services and goods (Taylor 2012). Global cities are usually ranked by the volume of flows between the offices of the high growth advanced producer services industries that agglomerate in a selective number of cities (Taylor 2012). If this image of the *global* includes the movement of people, it usually relates to intra-company transfers and the talented, professional and creative class of people most directly involved in the agglomeration of high growth industries (Beaverstock 2002). In the case of this group of people, the gates of the city are flung wide open (de Haas 2011).

What is often missing is the way that migration systems, corridors and networks function to form a transnational space between origin and destination urban locations (Castles et al. 2012, Samers 2002), where people participate not only economically, but also socially, culturally and politically. Cities like Sydney and Melbourne which rank highly on both economic globalisation (Taylor 2011) and immigration indices (Price and Benton-Short 2007), it is important that the full extent of their diversity and transnational connections is factored into urban planning. Currently, it has been argued that, a lot of planning concerning the global dimension of the city is focused on the business and tourist hubs and not the suburbs where those migrants live and even less important, it seems, are the suburbs outside the business districts and low on a global migration index (Hu 2013a).

Global cities: migration and social polarisation

The global city is home to skilled and unskilled workers, to short and long-term residents, to documented and undocumented migrants and to professionals and refugees. The differences and disparities among the residents of global cities have led some to see the global city as a place of haves and have-nots, where transnational elites are served by a migrant 'servant class' (Hamnett 2012, Sassen 1991) prepared to do the 3D (dirty, dangerous and demeaning) jobs, and commonly linked to irregular or illegal migration.

Much of the focus on the relationship between migration and global cities has looked at the possible link between migration and inequalities, divisions and polarities within global cities (Fainstein 2001, Mollenkopf and Castells 1991, Sassen 1991, Friedmann 1986, Friedmann and Wolff 1982). In this context, the division between high and low-skilled migration streams is thought to duplicate a class division within the global labour pool which is then embedded

in the settlement patterns of a city. In turn, the settlement patterns give rise to the spatial segregation of migrants, social polarisation (Hamnett 2012, Baum 2008, 1997) and ethnic structuring of the city (Burnley 2004, 1999, 1989, Burnley and Murphy 1994).

This focus on migration as a driver of social polarisation in global cities can be traced back to John Friedmann (Friedmann 1986, Friedmann and Wolff 1982). He advanced seven hypotheses based on the role of such cities within the global flows of knowledge, finance and labour. This focus was subsequently developed by Sassen (1991) who argued that social polarisation is an inevitable outcome of the changes in industrial structure and associated changes in occupation and migration to global cities. Mollenkopf and Castells (1991) have also adopted this 'two cities' approach to global cities (see Fainstein et al. 1992, for a critical review of this literature).

Hamnett (2012) on the other hand, has argued that the evidence regarding global city formation and the concentration of the services sector in such locations is more supportive of the claim of income inequality rather than social polarisation. Further, he argues that it does not follow that a growth in the services sector necessarily leads to high skill/high wage and a low skill/low wage labour markets but that middle skill/income service jobs are also produced (clerks, sales and personal service workers). Hamnett's work highlights the fact that where social polarisation does occur, it is more likely to be where labour is being drawn from low paid jobs in the services, manufacturing and construction sectors.

Others, while not denying the inequalities within global cities, emphasise the unique social and cultural activities that take place within them. These are often described as transnational and 'diasporic', referring to the persistent and multiple connections between 'here' and 'elsewhere' enacted by migrant communities (Nagel 2012, Vertovec 2007).

Little attention has been paid to understanding how differing forms of mobility benefit global cities (Samers 2002). More recent global city theory is looking at the different stages of restructuring that global cities undergo, the variation of skills and backgrounds of migrant labour, and the operation of migrant networks and the rights and protections afforded migrant labour. It is now evident that any understanding of global cities must take into account the social, civil and political dimensions of migrant transnationalism (Samers 2002).

Global Sydney: migration and spatial segregation

A distinctive characteristic of Sydney compared with some other global cities is that while there are suburbs with high proportions of foreign-born residents, they are not dominated by a single birthplace group (Hu 2013a, Hugo 2008a). Moreover, more recent immigrant arrivals are more dispersed than earlier generations of arrivals. As Hugo (2008) has noted, there is increasing bifurcation, in both global migration and Australian immigration, between skilled and unskilled migration (Hugo 2008, Hawthorne 2005). The former are both permanent and temporary and the latter arrive largely through the humanitarian program and family-reunion. Since the mid 1990s, the balance in Australia has moved in favour of highly educated, skilled higher income migrants and these cohorts tend to settle in more dispersed patterns rather than reinforce pre-existing ethnic settlement patterns.

Hugo gives the example of two important birthplace groups. The Vietnamese, who arrived in Australia predominantly under the humanitarian and family migration programs, have often experienced difficulties getting jobs. They are the most concentrated ethnic group in Sydney; 35.2 per cent living in the Statistical Local Area of Fairfield, which has 4.6 per cent of the total

Sydney population (ABS 2011b). In comparison, the Chinese, who entered Australia largely under the skilled component of the immigration program, are much less concentrated and live in wealthy and poorer suburbs (Hugo 2008).

Baum (2008) has found Sydney to be the most socially polarised of the Australian capitals, topping a General Deprivation Index in both highest and lowest relative deprivation. As highlighted by Bill Randolph and Darren Holloway (2005) (drawing on the Australian Bureau of Statistics Index of Relative Socio-Economic Disadvantage – SEIFA) the city has witnessed a stark socio-spatial diversification in the past 30 years, with a progressive 'suburbanisation of disadvantage', particularly in the Western and South Western areas.

This has been confirmed in the 'VAMPIRE' Index at Griffith University's Urban Research Program by Jago Dodson and Neil Sipe (2008) which assesses household and suburb vulnerability by examining factors such as mortgage rates, oil prices and inflation risks. The study found that Sydney displayed a more defined spatial patterning of change and increase in vulnerability across the 2001–06 period than less 'globalised' Australian capitals like Brisbane, with a major west-central and south-west region (across Liverpool and Parramatta) registering the greatest vulnerability. The 'two-Sydney's' thesis is seen by some researchers to be enhanced by the trend of higher-end jobs for skilled migrants and low-income service occupations for other types of migrants (Healy and Birrell 2003).

More recent work conducted at the Australian and New Zealand School of Government at the University of Canberra by Hu (2013a, 2013b, 2013d) also describes the impact of migration and people movement on Sydney's development. This study looked at migrant globalism, economic globalism and global mobility as follows:

- The Global Migration Index (GMI) is adopted from a study conducted by Price and Benton-Short (2007a), which ranks cities as global immigrant cities. The GMI is a weighted index that considers four key factors: percentage of foreign born population; total foreign born population; percentage of population born in non-English speaking countries; and whether any one ethnic or national group makes up more than 25 per cent of the foreign born population.

- The Global Competitive Index (GCI) looks at how well Sydney's work force integrates into the global knowledge economy. The GCI is weighted to consider the following indicators based on place of work: workers in knowledge-intensive industries; workers in highly-skilled occupations; workers with a university qualification; and workers' income.

- The Global Mobility Index (GloMo) looks at the mobility of the residential population. The GloMo is also a weighted index that looks at the total movements (international and domestic) into Sydney's LGA's in terms of three indicators: total international movements (not differentiating between Australian citizens or overseas born); total movements by persons without Australian citizenship (international and domestic); and total number of domestic moves (from outside the Sydney region).

The study indicates that in Sydney, migrant globalism (represented by the GMI) does not have the same geography as global Sydney defined in terms of the knowledge economy (GCI). Instead, the mobility dimension of Sydney (GloMo) more closely tracks the geography of Sydney's knowledge economy (see maps 2-7 to 2-9). This provides insight into the economic importance of mobility and challenges the idea that areas of migrant settlement are those of highest mobility.

Map 2-7   Global immigration to Sydney, 2011

**Global Migration Index 2011
Local Government Area**

- -1.613 to -0.719
- -0.692 to 0.111
- 0.214 to 0.731
- 0.732 to 1.725
- Major road
- Major rail
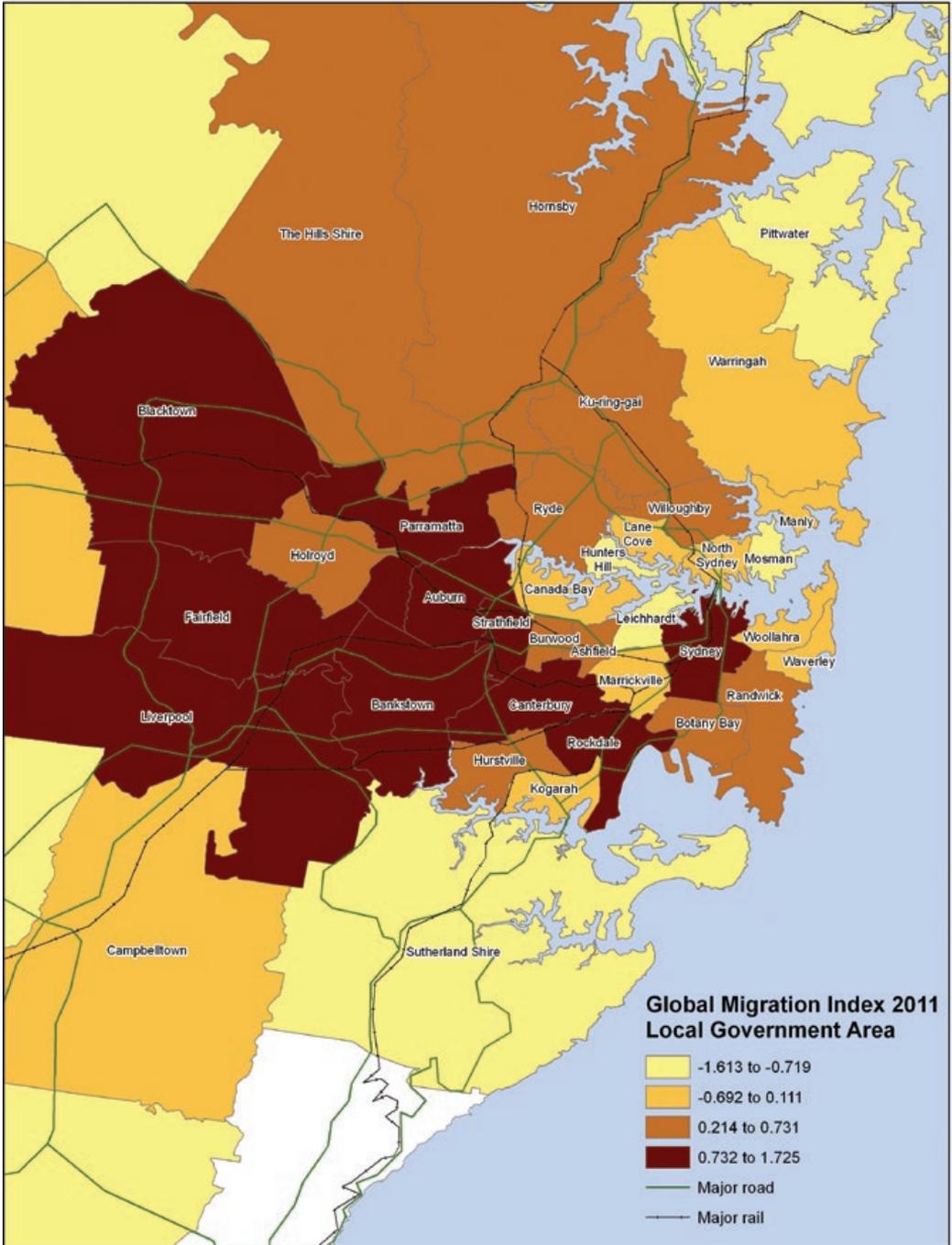
Source: Hu 2013a

Map 2-8   Global Completive Index for Sydney, 2011
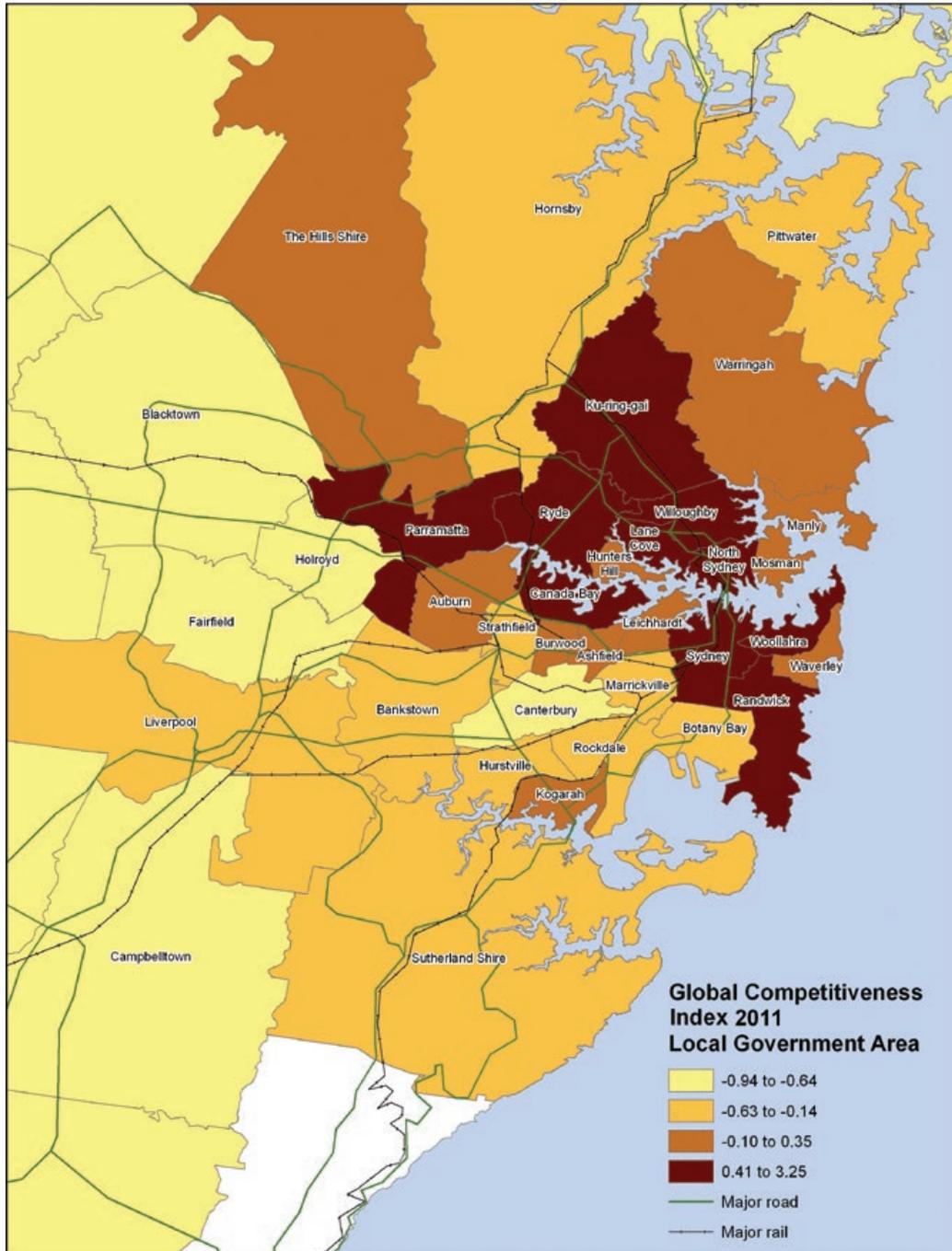
Note: The Global Competitive Index is a weighted index based on proportion of workers in knowledge intensive industries those in highly skilled occupations, workers with a university degree and workers income.

Source: Hu 2013b

Map 2-9   Residential mobility in Sydney, 2011

Global Mobility Index 2011 Local Government Area

- -1.235 to -0.706
- -0.560 to -0.008
- 0.032 to 0.479
- 0.527 to 2.653
- Major road
- Major rail
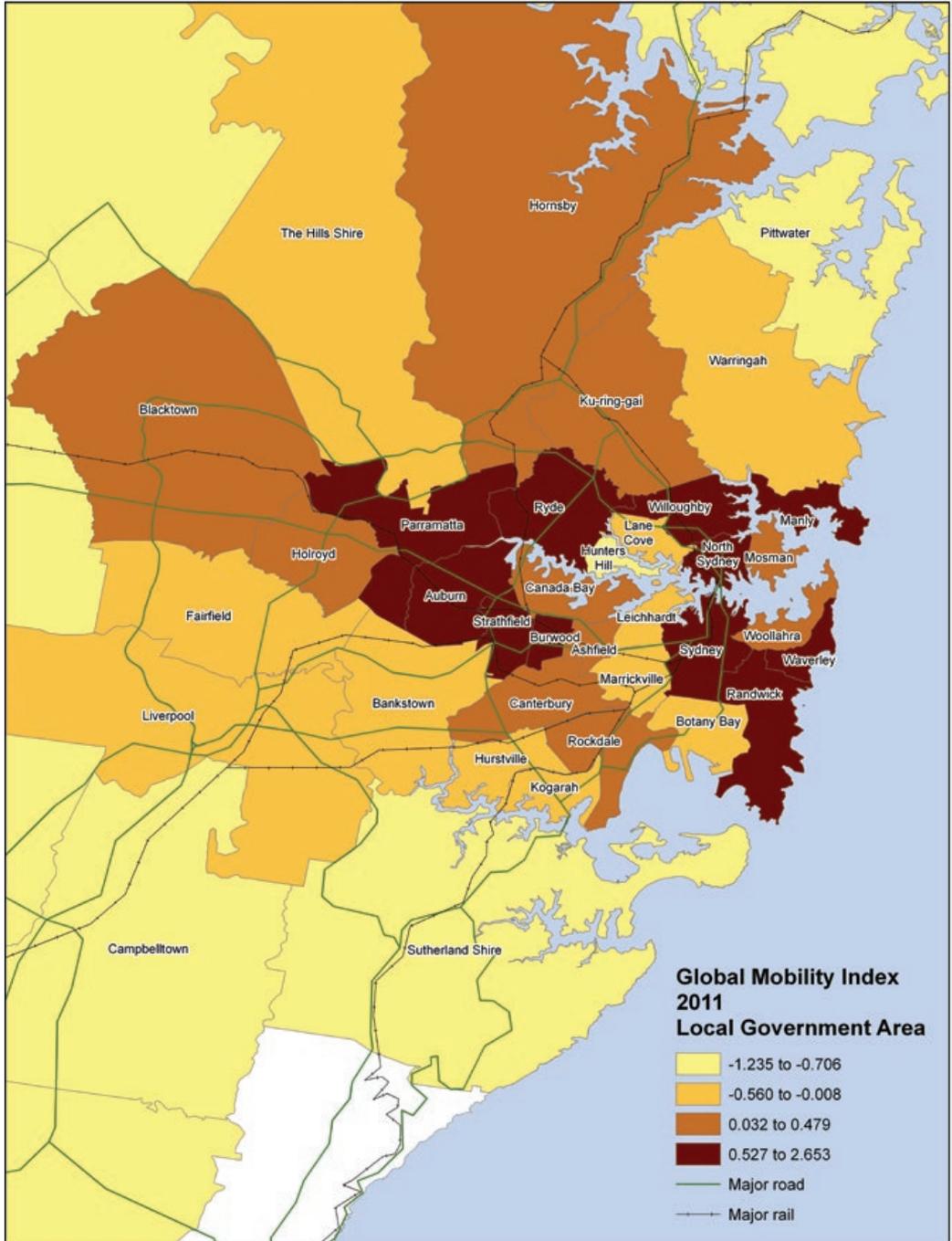
Source: Map supplied by Department of Immigration and Citizenship

One of the findings of Hu's work (2013a, 2013b, 2013d) is the close relationship between the urban planning map of Sydney as a Global City (see the Map in Figure 2-28), and the GCI and GloMo mapping of Sydney, with shared focus on an arc from the west, across the north and down through the CBD. However, their only major overlap with areas of high GMI (reflecting transnational migration concentrations across the south-west) is the cities of Parramatta and Sydney. For example, the planning, GCI and GloMo maps do not reflect the transnational dimension of LGAs that have: large migrant populations (e.g. Blacktown); a high percentage of foreign born population (e.g. Auburn); or a dominant foreign born community (e.g. Burwood, Kogarah and Hurstville in which, despite their overall dispersal, the China-born constitute more than 25 per cent of the total overseas born population) (Hu 2013a). This would suggest that governments may need to focus on migrant led transnational connectivity on areas outside the traditional global arc of Sydney (Vertovev 2007, Appadurai 2000)

Perth, Murray Street Mall.
Image courtesy of Paul Anastas

Map 2-10   Sydney's global economic corridor, 2013

Source: NSW Department of Planning and Infrastructure (DPI) 2013a

Hu's (2013a, 2013b, 2013d), geospatial mapping of Sydney shows three distinct geographies: LGAs associated with migrant globalism integrated into areas identified with economic globalism (for example the cities of Sydney, Parramatta and Ryde); LGAs associated with migrant globalism not integrated into areas identified with economic globalism (for example the cities of Blacktown and Fairfield) and LGAs not integrated into areas associated with either economic or migrant globalism (for example the cities of Wollondilly and Hawkesbury).

The trend between 2001 and 2011 was towards higher levels of dispersal for migrants with high levels of human and/or financial capital. This is demonstrated by the fact that while overseas-born populations as a percentage of total population increased in 40 of Sydney's 43 LGAs, there were fewer LGAs with a high share of migrants from one cultural group in 2011 than 2001.

Fairfield, while dropping slightly on the GMI, remains the prime LGA for humanitarian stream settlement (Vietnamese in the 1970s and now Iraqi refugees). This fact can be partly attributed to the formation of strong transnational migrant networks, but also to the relatively lower costs of housing and rent in Fairfield. It is also one of the lowest ranking areas on Hu's GMI and one of the most disadvantaged in the ABS's Socio-Economic Indexes for Areas (SEIFA) ratings (ABS 2013b) .

Blacktown has the fastest growing resident migrant population in greater Sydney. On current trends it will replace Fairfield at the top of Hu's GMI by 2016. Blacktown is a hub of people with links to urban areas in the Philippines and India. The type of migrants coming to Blacktown are not predominately low-skilled migrants or humanitarian entrants but rather skilled migrants who are more likely to be highly educated, compared to an average person in Blacktown or within the broader community. They are also more likely to fill unskilled (e.g. clerical/admin workers, labourers, drivers) and low skilled industry occupations (e.g. transport, construction and manufacturing sectors) than the average person in Blacktown and Australia. Of the migrants arriving in 2007 and 2010, 28.2 and 27.3 per cent respectively held Bachelor degrees or higher. This is significantly more than the average of all people in Blacktown (13 per cent) and Australia (15.2 per cent). Of the skilled (Bachelor degree or above) migrants arriving in Blacktown from 2010 until Census night 2011, just 48.7 per cent were working in skilled jobs. This is a significantly lower use of their qualifications than for the average of all graduates in Blacktown (65.4 per cent) or Australia (77.7 per cent).

The Blacktown example indicates occupational polarisation associated with migration. Unlike its more usual form with separate flows of low skilled and skilled migration, occupational polarisation in Blacktown results from a skilled migrant cohort filling low skilled positions. This has planning implications for state and territory governments which can locate businesses and transport opportunities to best meet the needs of the area's labour force. For example, those relating to the development of the Western Sydney Employment Area (WSEA) that will locate a range of businesses and provide the transport infrastructure in close proximity to this growing pool of skilled labour (NSW Department of Planning and Infrastructure 2013b).

The City of Sydney, North Sydney and Parramatta also have growing resident migrant populations with large transnational visitor populations. The resident migrant population in these areas are the most integrated into global networks associated with the knowledge economy. Resident overseas students are also a pool of talent for transnational corporations that derive the benefit from agglomeration. Wollondilly and Hawkesbury are the city areas least integrated either into transnational migrant networks or the people to people networks within the knowledge economy.

Hu's mapping of Sydney based on the GCI shows Sydney's global nature in terms of the agglomeration of Advanced Producer Services (APS) firms. In these terms, the City of Sydney is easily the most global LGA in Sydney. Figure 2-28 shows that APS firms are overwhelmingly located in dense parts of Sydney with forty-five per cent of the workers in the APS industry divisions agglomerating in the City of Sydney. Consistent with the state

government's mapping of Global Sydney, North Sydney has the highest concentration of APS workers (51 per cent of the workforce in North Sydney works in this industry division). Furthermore, in line with the mapping of the 'Global Economic Corridor' (Map 2-10) which extends through the Macquarie Park Business District in Ryde, the Ryde LGA experienced the biggest increase on the GCI between 2001–11.

Figure 2-28   Workers in knowledge-intensive industries in Sydney, 2011
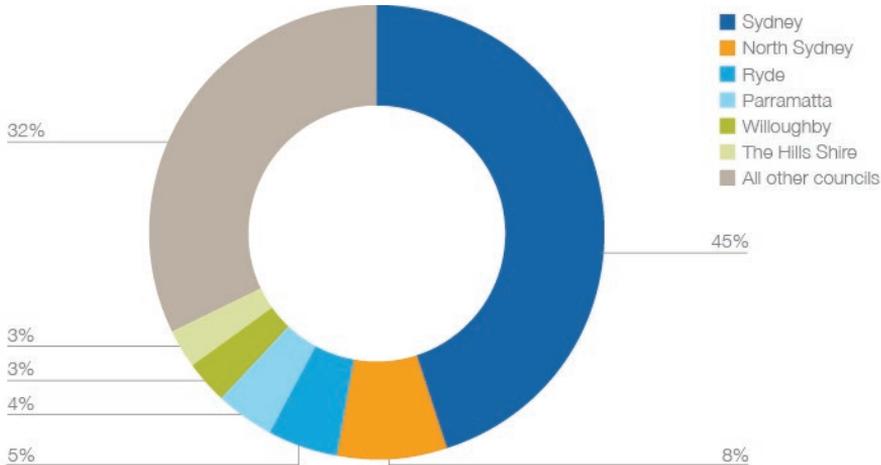
Source: University of Canberra and ABS data

Hu's project (2013a, 2013b, 2013d) emphasises that in a global city like Sydney, one needs to take a wider perspective so as to get the full picture of the interrelation between people movement, the emergence of new social divisions and the formation of a new 'production geography'. It does this by showing that a map of the mobility of Sydney's residential population more closely matches a Sydney that is integrated into the global economy than transnational migration systems.

It is not simply a matter of concluding that potential social divisions in Sydney are internal to a migrant population – although no doubt there is some validity to this claim. Rather, the more troubling divisions are those between a Sydney defined in terms of an economic globalism and those defined by a localism. On the one hand, there are areas of Sydney that attract resources and accumulate opportunities, wealth and power: it is a Sydney defined in terms of transnational mobility and flows rather than settlement. On the other hand, there are areas of Sydney defined in terms of a shared history, identity and attachment to place. Castells (2010) argues that the division between globalism and localism 'is the most fundamental contradiction emerging in our globalised, urbanised, networked world'. This presents opportunities for approaches to social cohesion policy that cut across the typical divisions and issues based on 'old' versus 'new' Australians. Such approaches could bring 21st century opportunities, not just for socially excluded migrants, but also—and perhaps even more so—for many Australian-born.

Knowledge-intensive industries and people movement

The co-incidence between the map of the economic globalism of Sydney (that is, the GCI map, Map 2-8) and the map of the mobility intensity of Sydney's residential population

(the GloMo Map, Map 2-7) suggest that people movement intensity is important to agglomeration of the knowledge-intensive industries. Transaction industry firms agglomerate in the areas that have the highest flows of people. Studies into the interrelation between these two factors are inconclusive. However, a number of possible directions for policy and research are emerging.

People movement, and by extension transnational people movement, is fundamental to the economic modelling of the agglomeration of knowledge-intensive industries (Davis and Dingle 2012). The agglomeration effects associated with these industries depend heavily on the exchange of ideas and knowledge. People movement is central to that exchange. This issue is particularly relevant at a time when there is pressure to raise productivity and when competition is growing amongst OECD countries for a global pool of skill and talent (de Haas 2011).

Traditionally, the focus of urban and regional development policy has been on business climate and measures to attract new businesses and support the growth of existing industry (Asheim 2012). An alternate view is that the attractiveness of cities is based on an above-average level of human capital, the quality of universities and their positions as infrastructural hubs (for example airports with the best international flight connections). The presence of these is said to encourage knowledge intensive business services – the highly value added and/or research based industrial and service activities.

Richard Florida argues in *The Rise of the Creative Class* that 'people climate' (factors that positively affect the location of people) is important to the health of the 'business climate' (factors that positively affect the location of businesses) (2002). Sometimes, says Florida, a 'people climate' can be the most important factor. People, particularly those who work in the growing high-technology and creative industries do not follow jobs; rather, jobs in these industries follow people (Florida 2002).

The creative core has the highest skill levels and accounts for most of the innovation by the creative class. However, even if the Bohemians are relatively few and account for only a modest part of the creative class's contribution to economic growth, they have the most specialised preferences and pioneer the preferences of the creative class in general. The preferences of the Bohemians flow through the rest of the creative class, stimulating its 'bourgeoisie-Bohemian' ('bobo') ethos.

This perspective runs contrary to what has been common wisdom for years – namely, firms that create jobs have to be attracted through fiscal or structural (cluster and innovation) policies to promote regional growth and development (Asheim and Coenen 2005). In contrast, Florida argues that in the knowledge economy, it is crucial to improve people climate by creating and catering to diversity, openness and tolerance in addition to more conventional factors of urban attractiveness, such as a rich cultural scene, interesting architecture and well-developed recreational facilities. The presence of a tolerant environment offers diversity and quasi-anonymity, which are treasured by the creative class and provide space for people who do not fit into the common norms. This again increases the opportunities for innovative thinking and for the further development of new competitive knowledge.

According to Florida (2002) both business and people climate scenarios show how different factors may act as key drivers of skilled people movement intensity within the knowledge economy. Such movement intensity remains central regardless of whether we think it is the business or people climate that constitutes the most important factors for urban agglomeration. In this way, an increase in the urban stocks of a creative class and the urban agglomeration of people associated with creative activities drives the knowledge economy. Figure 2-29 presents a schematic form of the argument.

Figure 2-29   Schematic line of argument of the creative class approach

| People Climate: Tolerance, cultural and sexual diversity | → | Talent: Talented and creative people | → | Business Climate: Knowledge intensive business ensure competiveness | → | Regional growth: Job growth in population etc. |
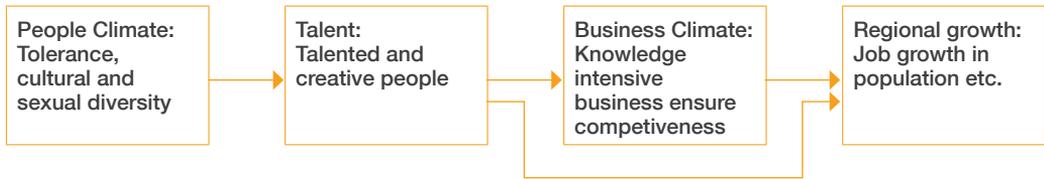
Source: From Asheim 2012

A positive 'people climate' is the basis for the formation of a business climate with human capital and talent attracting new high-technology industries, stimulating urban economies (Jacobs 1969) and consequently fosters the economic growth of cities. In this way, multicultural policy could be seen as part of a feed-back loop where a cosmopolitan 'people climate' influences subsequent flows of people.

In Australia, we are seeing real changes, whereby some parts of Australia are integrated more than others into these processes of social transformation. In this process, the workers in the knowledge economy of central Sydney or Melbourne may have more in common with similar workers in London or San Francisco than they do with others on their own city.

The idea of a two-speed economy is familiar. What is now being suggested is the idea of a two-speed or multi-speed society measured in terms of people-movement intensity and rankings of global connectivity. This is a society undergoing transformations and change at different rates and in different ways. It will also be a society where some sectors of the population have more access than others to the networks, flows of knowledge, capital and innovation that define urban development in the 21st century. This picture of Australia takes us beyond the issues traditionally associated with multiculturalism to concerns about the division between globalism and localism.

International migration conclusion

This picture of Australian global cities as they currently exist takes us beyond familiar frameworks of immigration and settlement. New lines of division are emerging between globalism and localism–that is, between urban spaces within society that derive their meaning and identity from global mobility and connectedness, and those which find them in connection to a local place.

These emerging divisions are embedded in the concept of the 'global' that guides policy directions and decisions concerning which areas and activities are essential to the global integration of the city. To what extent should policy-makers at all levels of government consider the people-to-people transnationalism of migrant geographies in the context of the development of the global city? To what extent should they consider the localism not directly associated with the hubs of economic and migrant globalism and, to what extent do traditional models of locally-defined communities need to adjust to a world characterised increasingly by transnational connections and interests, and high mobility?

Governments will need to carefully consider the relationship between migration strategy and urban development and the management and governance of urban spaces to ensure opportunities and benefits are realised for all Australians by addressing the unevenness of Australia's social and economic integration into the global economy and transnational communities.

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Productivity

Chapter 3

The geographical organisation of Australia's major cities is changing– that is, the way that land uses are arranged within cities is changing. High-growth, knowledge-intensive industries are becoming concentrated in the inner suburbs of major cities, while in outer areas where more people live, employment growth is concentrated in lower productivity, lower paying and increasingly casualised service industry jobs. This is also changing the nature of travel modes and behaviour, and the social fabric of Australia's major cities . Access to a range of jobs, particularly higher-paying jobs, is increasing in central areas, drawing well-educated people to the residential areas in the inner ring.

This chapter examines how the productivity of Australia's major cities is being influenced by these changes and the challenges they present. Industry structure, a key influence on the type and location of jobs in Australia's cities is also studied, with particular consideration of gender. The chapter also looks at human capital in major cities.

For the first time, maps have been used in State of Australian Cities reporting to depict the geography of industry structure, workforce participation and part-time and full-time work rates within major cities. These maps can be found online using the supplementary online map application.

Four feature articles are included in this chapter. The first is on spatial disadvantage in the Western Sydney region and draws on the recent work of Professor Phillip O'Neill. The second, by the National Growth Areas Alliance (NGAA), examines challenges faced by fast-growing areas on the outskirts of Australia's capital cities. The third looks at the importance of night-time activities to the economies of major cities. The fourth examines the impact of the mining sector on major cities, including the effects of fly in, fly out and drive in, drive out practices.

Key findings

- Productivity growth could be increased by improving the urban structure of major cities.
- Major ports and airports are important to the productivity of major cities and they influence the urban structure of cities.
- Major cities have experienced a large increase in the number of knowledge-intensive jobs – jobs that require significant expertise, intellectual effort and innovation. This increase has tended to be concentrated in central areas.
- While knowledge-intensive jobs account for only a small proportion of all jobs in major cities, they are increasingly important to productivity and they increase employment opportunities and salaries.

- The manufacturing and retail sectors, which once drove jobs growth, are now employing a smaller proportion of Australians.

- An increasing number of people are living further away from the centres of major cities while higher-skill, higher-paying jobs are becoming concentrated in central areas. This means that a greater number of people are living further from their work.

- There are three ways that the connection between work and homes in major cities could be improved: firstly, by bringing workplaces closer to homes; secondly, by increasing the number of dwellings in areas that have the greatest number of jobs so that people can live closer to work; and, thirdly, by improving transport links between work and home (Kelly et al. 2013).

- Australia's cities tend to have higher rates of private transport use than public transport use when compared with overseas cities.

- Average income appears to influence the type of transport used for journeys to work. Those who use public transport tend to have higher average weekly individual incomes than those who use other means of transport.

- Private vehicles provide easier access to a higher number of jobs than mass transit in Australia's major cities.

- Industry structure differs widely between the major cities. Each city plays a unique role in the nation's economic system. The participation of males and females in particular types of industry also differs widely.

- The mining sector and associated fly in, fly out and drive in, drive out practices influence the economies of some major cities, particularly Perth and Brisbane, as well as demand for office space and aviation services.

- Major ports and airports are important to the productivity of major cities and they influence the organisation of cities.

- Labour force participation rates and the participation rates of males versus females differ between and within major cities. The proportion of employed persons working full-time and part-time and the proportion of males and females working in these categories also differ between and within major cities.

- A higher proportion of people with bachelor degree level qualifications or higher tend to live in central areas of major cities while those with certificate level qualifications or no post-school qualifications tend to live in outer areas.

Productivity and the geographic organisation of major cities

'Productivity' is defined as the quantity of output that can be produced with a given amount of input. Productivity growth can be achieved by producing more outputs (goods and services) with the same amount of or fewer inputs (workers and capital). Productivity can grow through technological advances, new products; capital intensity and the flexibility and efficiency of the allocation of labour and capital (Australian Government 2010).

Public policy approaches to increasing productivity and workforce participation in Australia in the past have focused on regulatory reform, workplace relations, alterations to tax systems and improving health, education and training. These approaches have typically not had

spatial dimensions (Kelly et al. 2013). While these approaches have been effective to this point, there are concerns that they may not deliver the same levels of productivity growth in the future (Australian Government 2010, Rawnsley and Szafraneic 2010).

Productivity growth could also be increased by changing the spatial organisation of major cities so that labour and capital can be used more efficiently and flexibly (SGS Economics and Planning 2012). However, this could be challenging given the lack of data and lack of understanding about how the various parts of Australia's major cities function spatially (Rawnsley and Szafraneic 2010). For example, it is difficult to determine economic performance at a city or regional level using measures like Gross Domestic Product (GDP) and Gross Value Added (GVA). Micro or business level data would be particularly useful for measuring the economic effects of agglomeration (that is, the clustering in one location of specialised businesses), but this is also lacking.

Some useful literature has begun to emerge – for example, the Grattan Institute report Productive cities (Kelly et al. 2013), reports on population growth, jobs growth and commuting flows in Australia's largest cities (BITRE 2010, 2011, 2012, 2013b) and research on effective job density (SGS Economics and Planning 2012, 2013) – but analytical capacity in this area to date has been limited.

Major ports and airports play a critical role in the productivity of major cities. As Australia's business and trade becomes more internationalised (Infrastructure Australia 2013), it is important that land use around ports and airports and access to supporting infrastructure are planned and managed appropriately so that they can continue to encourage the smooth flow of people, goods and services to and from major cities.

Agglomeration

Agglomeration occurs when businesses perceive that they can benefit from clustering together in one location. For example, businesses that are highly specialised in finance, insurance and business services may cluster together in the central business districts (CBDs) of Australia's largest cities.

Businesses benefit from agglomeration because of greater competition and better job matching in larger labour markets and the spillover or knowledge transfers between businesses (Ahrend 2013). Co-location assists and promotes adaption and innovation (Department of Transport 2012, SGS Economics and Planning 2012).

To a certain point agglomeration benefits increase as cities get larger, possibly because the population size, labour density, the share of services and overall stock of human capital also increases (Ahrend 2013). Larger cities are not just more productive because more highly valued industries are located there; the productivity of individuals actually increases with city size.

Agglomeration also has costs – for example, congestion, environmental degradation, health and social problems. These tend to increase as cities get larger. Up to a certain point, agglomeration benefits grow more rapidly than the costs. However, once a city reaches a certain size, the costs of agglomeration appear to increase at a much faster rate than the benefits (Ahrend 2013). Agglomeration benefits are strongly affected by how well a city's transport systems function. A city with poor transport systems will not maximise its potential agglomeration benefits (SGS Economics and Planning 2012, Ahrend 2013).

The report to the Council of Australian Governments *Productivity and Agglomeration Benefits in Australian Capital Cities* (SGS Economics and Planning 2012) provides a guide for assessing the productivity and human capital benefits and costs of agglomeration in Australia.

The increase in knowledge-intensive jobs

Australia's major cities have experienced significant increases in their knowledge economies, that is, use of knowledge technologies to produce jobs and economic benefits. As a result, there has been a large increase in the number of knowledge-intensive jobs that require significant expertise, intellectual effort and innovation. These types of jobs tend to be concentrated in central areas, largely because of the benefits of agglomeration discussed above (Rawnsley, Finney and Szafraneic 2011).

While knowledge-intensive jobs account for a small proportion of the total number of jobs in major cities, they are important for productivity and national prosperity in that they increase employment and salaries and create additional jobs in areas nearby. Moretti (2012) researched the recent increase of knowledge-intensive jobs in the United States and their effect on cities and many of these findings are relevant to Australia's major cities.

Moretti (2012) estimated that for each new knowledge-intensive job, five more jobs in other sectors are created. In Australian cities such as Perth and Brisbane, jobs in the mining sector have had the effect of creating new jobs in other sectors. Many of these are local services jobs – for example, electricians, police officers, cleaners and baristas. Local services jobs are often described as 'non-tradeable' because they cannot be transferred outside the area where they currently exist. The majority of jobs in major cities are local services jobs.

Moretti (2012) also found that knowledge-intensive jobs also increase wages for those working nearby. Florida (2013) and Mellander conducted research into the wages that workers receive as well as housing costs in United States cities with high proportions of knowledge-intensive jobs. Their findings also may be applicable to Australian cities. They established that the additional financial benefits for high-skilled workers living in these cities remained after allowing for higher housing costs. However, this was not the case for less skilled workers, even though those less skilled workers typically had higher wages compared with other areas. Nonetheless, while these workers might not be financially better off, they may be better off overall because they have access to good opportunities and social and cultural institutions (Ahrend 2013).

Effective job density

Agglomeration cannot simply be measured using the employment density of an area. For example, a firm in an area with relatively low employment might experience agglomeration benefits because it is close to a CBD. Effective job density (EJD) is the best way to measure agglomeration because it includes not only the proximity component of agglomeration but also travel time. EJD uses industry employment data at a micro level to map out the number of jobs accessible within a defined travel time. International research shows that areas with high EJD tend to be the most productive locations within a city because they tend to experience the most agglomeration benefits (SGS Economics and Planning 2012). For example, a doubling of EJD in an area of Melbourne might increase its labour productivity by seven per cent (Rawnsley, Finney and Szafraneic 2011, Trubka 2009).

Map 3-1 and Map 3-2 show changes in EJD between 1996 and 2011 in Melbourne (SGS Economics and Planning 2012). The maps show a steady increase in the number of accessible jobs in the metropolitan area. There was a marked increase in the number of accessible jobs in inner suburbs which contributed to an increase in the number of accessible jobs in the middle ring suburbs. This expansion has been helped by Melbourne's substantial public transport, road and services infrastructure.

The increase in the number and density of highly accessible jobs near Melbourne's city centre is a reflection of the growth of its knowledge economy. The growth experienced in middle ring suburbs in Melbourne has occurred because other job markets have grown to service the knowledge economy in the inner suburbs. Other comparable EJD maps are not available for Australia's other major cities, but it is believed that this phenomenon is also occurring in them as well (SGS Economics and Planning 2012).

Map 3-1   Effective job density in Melbourne, 1996
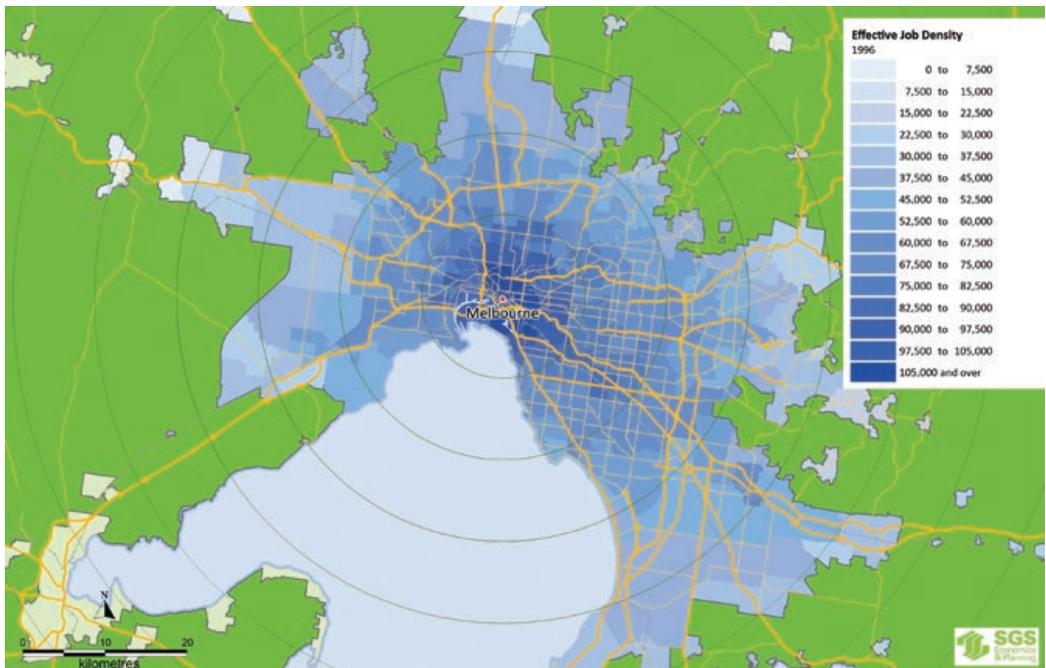
Source: SGS Economics and Planning 2013

Map 3-2   Effective job density in Melbourne, 2011
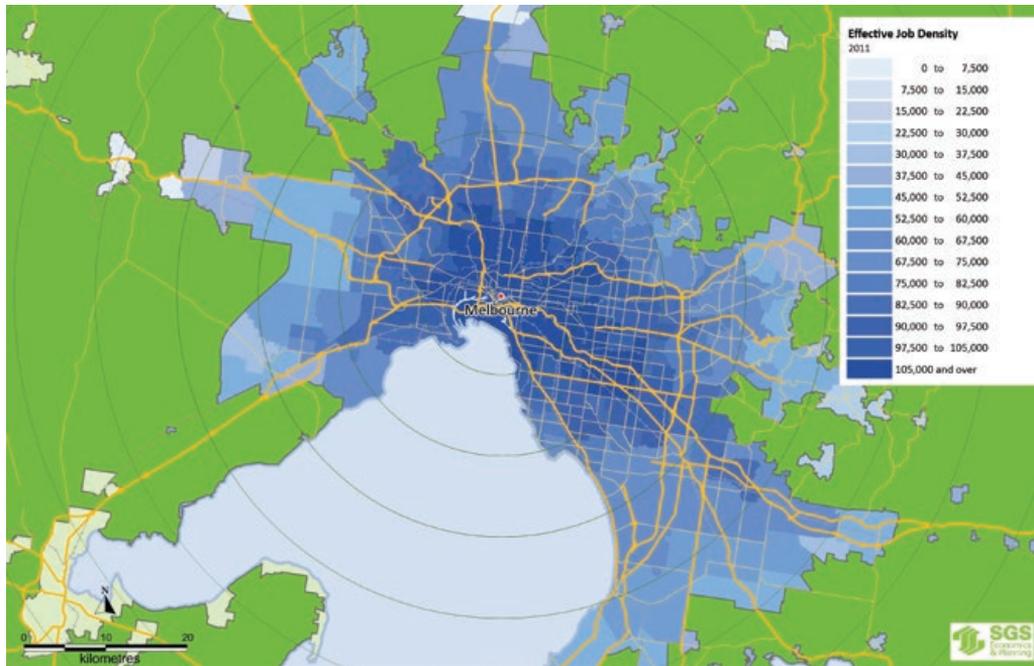
Source: SGS Economics and Planning 2013

The impact on access to job opportunities

Australia's major cities once relied upon our spreading suburb to boost productivity and enrich human capital. After World War II jobs growth moved from the inner city colonial cores to outer suburban growth areas where the population was also growing. Manufacturing, which once drove jobs growth in the middle and outer suburbs, is now employing proportionally fewer Australians while new knowledge-intensive industries are driving jobs growth in the inner suburbs. At the same time, population growth continues to be absorbed and planned for at the metropolitan fringe (Spiller 2012).

The outward spread of major cities, structural economic change and the substantial difference in house prices between inner and outer areas have separated middle and outer suburban communities from the job-rich opportunities in our CBDs. Labour markets are relatively weak in many parts of Australia's major cities, particularly in outer suburbs. Recent research has found that many residents of Australia's largest cities can reach fewer than 10 per cent of all metropolitan jobs within a reasonable commuting time (Kelly et al. 2013). Moreover, the jobs they can reach are less likely to be the higher paying, knowledge-intensive jobs that are clustered in central locations.

The difference in house prices between the inner and outer areas of Australia's capital cities is large and continuing to grow, as reported in *State of Australian Cities 2012*, see Figure 3-1. Because of a lack of affordable housing in the inner and middle suburbs of Australia's major cities, many people do not have equal access to the highly paid and growing job markets in the inner suburbs. This can create spatial polarisation and pockets of social disadvantage.

Figure 3-1   Real house prices by distance from CBD in Australia's largest cities, in 2009–10 dollars
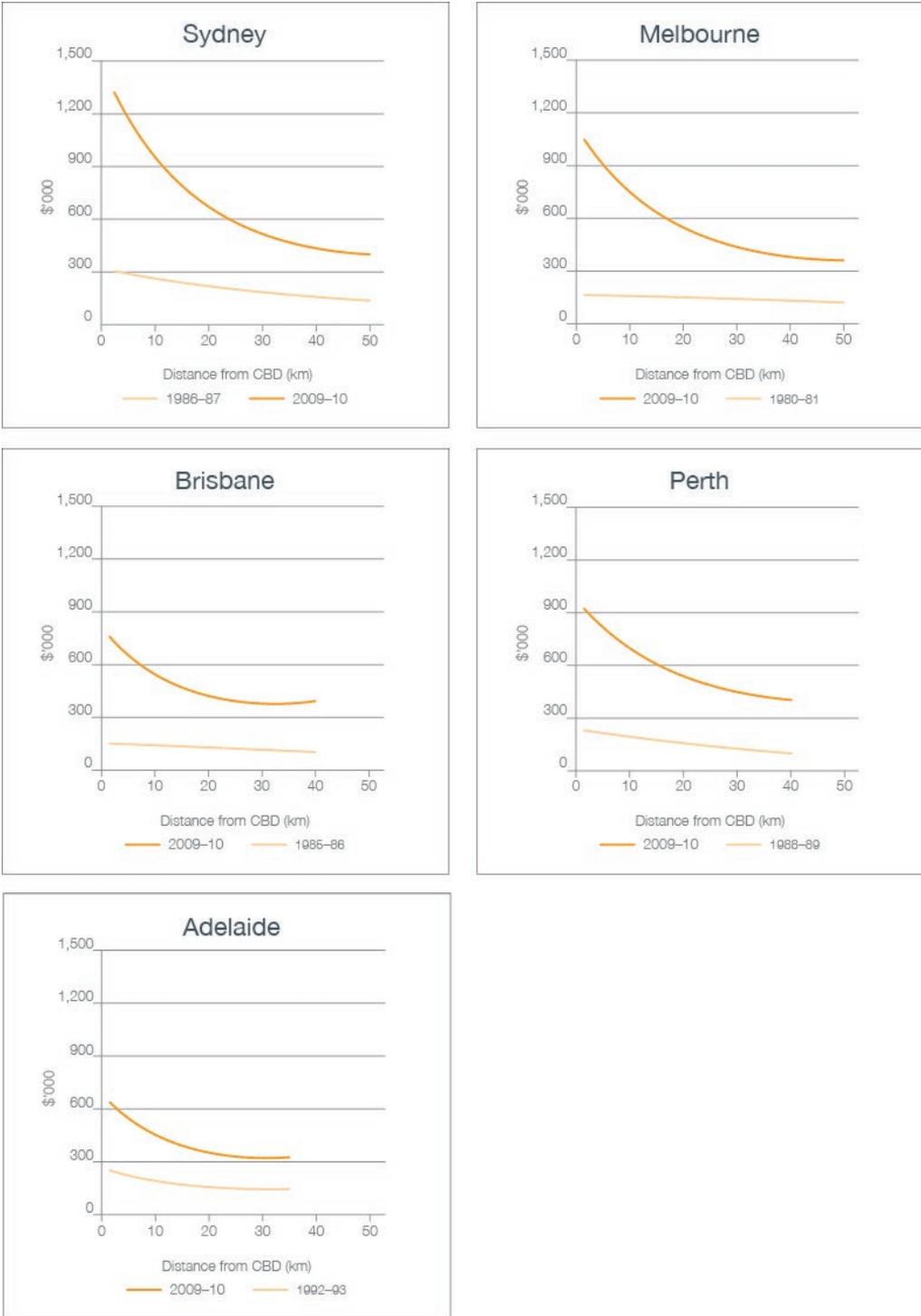
Increasing housing prices generate greater wealth for city homeowners and landlords. But they also exacerbate inequities within cities. Moretti (2012) notes that homeowners in areas with strengthening labour markets, such as the inner suburbs of Australia's capital cities, gain from not only access to jobs with higher wages but also increases in property prices.

Spatial disadvantage in the Western Sydney region

Contributed by Professor Phillip O'Neill

The Western Sydney region covers 8,817.3 square kilometres of greater metropolitan Sydney. It comprises 14 local government areas including Auburn, Bankstown, Baulkham Hills, Blacktown, Penrith, Blue Mountains, Hawkesbury, Holroyd, Fairfield, Liverpool, Campbelltown, Camden and Wollondilly.

Western Sydney has long been a major growth area of Sydney. Its population grew from 1.5 million or 31.7 per cent of Sydney's metropolitan population in 1996 to over 2.0 million or 47.0 per cent of Sydney's population in 2011. In 2010–11, the Western Sydney economy had a Gross Regional Product (GRP) of approximately $95.6 billion, equivalent to nearly one-third of Sydney's Metropolitan GRP (NSW Premier and Cabinet 2013).

Western Sydney's jobs deficit

The Western Sydney region for a long time has had fewer jobs in the region than workers. Approximately 33 per cent of workers living in Western Sydney commute outside Western Sydney to get to work. South-west Sydney in particular has the lowest access to jobs. The New South Wales Government has set employment targets for the region in successive Sydney metropolitan strategies between 2006 and 2011, but there has been little net employment growth in the region over this period.

Western Sydney is Australia's largest manufacturing region and manufacturing represents a substantial amount of Western Sydney's economy. Manufacturing contributed 16 per cent or approximately $13.4 billion of total Western Sydney industry GVA in 2010–11.

However, the decline in manufacturing coupled with the increasing concentration of high-value employment opportunities in Sydney's CBD exacerbated Western Sydney's jobs deficit. In 1996, the number of manufacturing jobs in the region was growing, even coming out of the early 1990s recession (NSW Government 1998). Since then, however, the number of jobs in manufacturing in Western Sydney has fallen, following trends elsewhere in Australia. Between 2006 and 2011, the Western Sydney region experienced a net loss of 6,842 manufacturing jobs.

There has also been a net job loss in the wholesale trade sector in Western Sydney between 2006 and 2011. There has also been limited growth in the number of construction jobs in Western Sydney, linked to the slowing of growth in outer suburban development. Growth in retail trade and private sector transaction industry jobs, including in finance, has also been limited.

Three public sector industries have experienced growth in Western Sydney between 2006 and 2011: health care and social assistance; education and training; and public

administration and safety. Without these sectors there would have been no growth in net additional jobs in Western Sydney between 2006 and 2011. However, productivity growth in these three industry sectors tends to be low and this may have implications for the economic growth prospects for the region.

Figure 3-2 displays the difference between the jobs targets and the net jobs growth/loss between 2006 and 2011 for the 14 local government areas (LGAs) in Western Sydney. It shows that jobs targets have not been met in most of Western Sydney's LGAs, with two notable exceptions: Auburn LGA and the Hills Shire LGA. Auburn's jobs growth probably reflects the fact that the region includes the Sydney Olympic Park precinct and the Parramatta Road corridor. The jobs growth in the Hills Shire extends from the already successful M2 corridor growth.

Figure 3-2   Western Sydney LGAs' deviation from the NSW Government's jobs growth targets, 2006–11
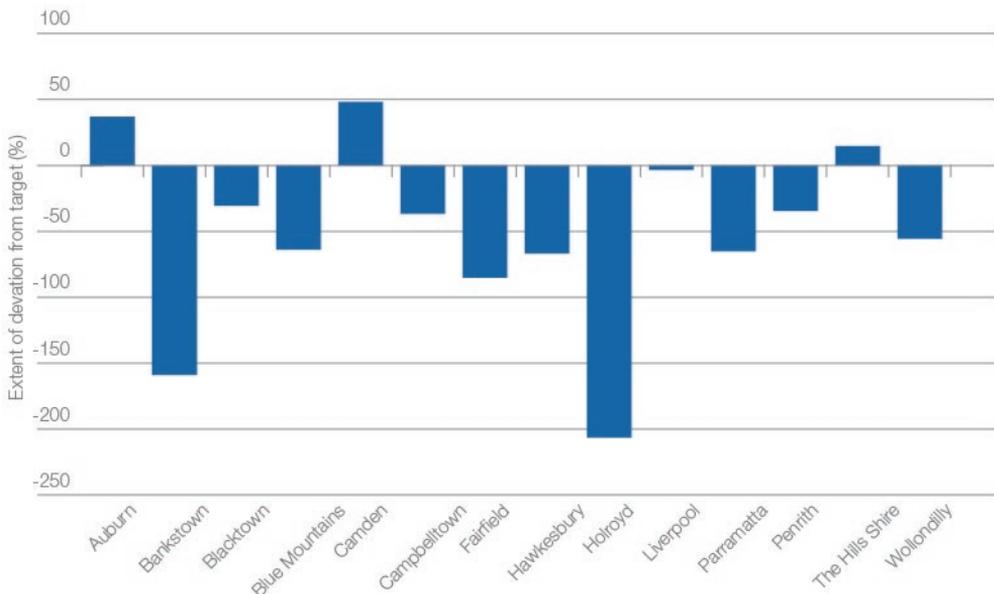
Note: Parramatta reflects the wider Parramatta LGA, not only the relatively more successful Parramatta business centre. The jobs growth shown for Camden LGA is from a limited number of existing jobs so it did not result in the generation of a substantial number of new jobs.

Source: O'Neill 2013 derived from ABS Census data 2006 and 2011

Sydney's income inequality

Map 3-3 below displays average income per capita by postcode in Sydney. It shows that the lowest income receivers in Sydney, with an average income of less than $22,252 per person per annum, are concentrated largely in Western Sydney. The highest income receivers, with average incomes of between $45,488 to $120,122 per capita per annum, are concentrated in Sydney's eastern suburbs, the inner harboursides and the North Shore.

Map 3-3   Distribution of average taxable income per capita by postcode in Sydney, 2011

Base: ESRI World Terrain Base
Esri, USGS, NOAA
Absolute Scale:1:300,000
Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

Cartographer: Frederick Michna
Affiliation: Urban Research Centre,
Universtity of Western Sydney

Taxable Income / Usual Resident ($) by Postcode
- 3915 - 22251
- 22252 - 26497
- 26498 - 33032
- 33033 - 45486
- 45487 - 120122
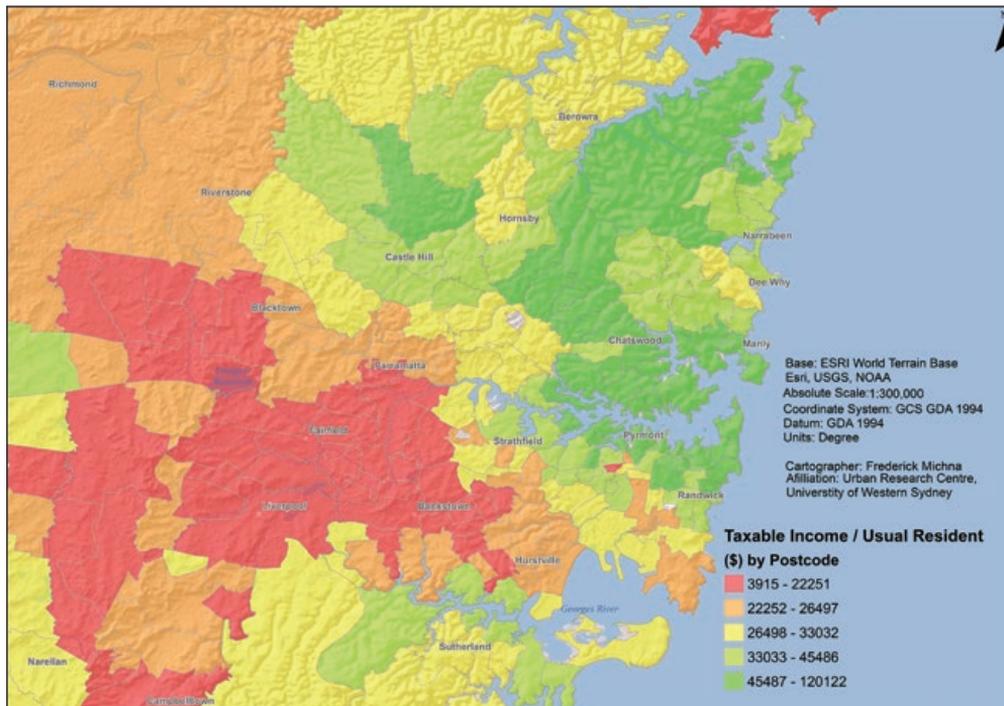
Note: The taxable income per usual resident is calculated by aggregating every taxable income according to its postcode of origin and dividing the result by the population living in that postcode. Taxable income includes income from all sources.

Source: O'Neill 2013 derived from data from Australian Taxation Office and ABS 2012a

The lower average per capita incomes evident in Western Sydney reflect two issues. Firstly, work in Western Sydney is harder to come by. As a consequence, participation rates among young people and women in the region are lower than in other areas of the city, so income is distributed among more people in each area. Secondly, a greater proportion of Western Sydney workers are in jobs in industries that pay less or are not relative to their qualifications.

Opinion piece on the challenges facing fast-growing municipalities in the outer suburbs of capital cities

Contributed by the National Growth Areas Alliance

The NGAA is an organisation which advocates for the interests of communities in outer urban growth area and this article highlights their position in the debate. This article refers to the 25 fast-growing municipalities on the outskirts of the capital cities that are the members of the National Growth Areas Alliance (NGAA). A list of members can be found on NGAA's website at www.ngaa.org.au.

The fast-growing areas on the outskirts of Australia's capital cities face a significant challenge in creating sustainable communities. If current population growth rates are maintained, these areas will double in size over the next 25 years and accommodate almost one in five Australians. Yet fewer than one in 10 jobs are currently located there and each day approximately half a million people commute out of the area for work. NGAA areas also typically have unemployment rates above their state averages. It can be estimated that in total, the areas represented by the NGAA have an additional 20,000 unemployed persons living within them (based on the difference between unemployment rates in NGAA areas when compared with their relevant state average unemployment rates). These factors have considerable social, environmental and economic impacts.

Essential Economics and Geografia (2012) found that the need for large-scale out-commuting and the persistent 'excess' unemployment are a consequence of shortfalls in jobs and/or local skills programs and they result in a significant drain on the national economy. The problems form a complex interaction of cause and effect. For example, according to the experience of local employment coordinators (Essential Economics and Geografia 2012), a shortage of local jobs also reduces the number of workforce entry points for school leavers and that also contributes to local unemployment levels.

An analysis of the flow-on effects of this situation has pointed to the need to:

- create a local system of skilled employment and supporting infrastructure to attract private business investment
- secure a stream of State and Commonwealth funding for community, transport and other major infrastructure to attract private sector investment
- stimulate private sector investment to create more job diversity
- recognise the importance of liveability features in attracting skilled workers and private investment
- improve employment self-sufficiency rates to avoid long-term unemployment growth and deskilling
- raise the local skill base to attract investment.

The current picture

Labour force participation

NGAA municipalities have a low crude labour force participation rate. Table 3-1 shows that just 48.8 per cent of the total population is either in a job or looking for work compared to 54.0 per cent across Australia.

Table 3-1 NGAA municipalities' labour force, March 2012

	Employed	Unemployed	Size of labour force	Unemployment rate (%)	Crude labour force participation rate (%)
NGAA municipalities	1,644,620	108,880	1,753,500	6.2	48.8
Australia	11,442,800	620,500	12,063,300	5.1	54.0

Note: Figures rounded.
Source: DEEWR 2012, ABS 2012a

Employment self-sufficiency

In 2011, based on ABS journey to work data, there were approximately 930,000 jobs in NGAA municipalities and a working population of approximately 1.6 million (2011). This represents just 0.58 jobs per working resident, compared with a ratio of approximately 1:1 for Australia's metropolitan areas in total. The 0.58:1 ratio represents an employment deficit of approximately 660,000 jobs. As Table 3-2 shows, in 2006 there were 0.62 jobs per working resident in NGAA municipalities and the deficit was 500,000 jobs, so there has been a decrease in employment self-sufficiency between 2006 and 2011.

Table 3-2 Employment self-sufficiency in NGAA municipalities, 2006 and 2011

	Jobs provided within municipalities	Employed residents of municipalities	Employment self-sufficiency ratio	Jobs deficit/ surplus
2006	797,860	1,295,450	0.62	-497,590
2011	927,537	1,589,339	0.58	-661,802

Note: Figures rounded.
Source: ABS 2012a, Essential Economics and Geografia

Industry sectors

Compared to national averages, there are significantly higher proportions of manufacturing, retail trade, education and training and transport, postal and warehousing jobs within NGAA municipalities, as can be seen in Table 3-2. Over the period 2006 to 2011, there has been little change in the types of jobs in NGAA municipalities, as illustrated by Table 3-3 and Table 3-4. However, the proportion of manufacturing jobs has declined at a greater rate than the national trend in NGAA municipalities and the number of professional, scientific and technical jobs has increased, although they are still well below national proportions.

Table 3-3   Percentage of jobs per industry sector, NGAA municipalities and
                   Australia (main sectors in NGAA municipalities), 2006

Sector	NGAA (%)	Australia (%)	Difference in percentage points (%)
Manufacturing	17.0	10.5	6.6
Construction	7.6	7.8	-0.2
Wholesale trade	5.1	4.4	0.8
Retail trade	13.7	11.3	2.3
Accommodation and food services	5.7	6.3	-0.7
Transport, postal and warehousing	6.5	4.7	1.8
Other services	3.9	3.7	0.2
Public administration and safety	6.0	6.7	-0.7
Education and training	9.6	7.7	2.0
Health care and social assistance	10.1	10.5	-0.4
Professional, scientific and technical services	3.2	6.6	-3.4

Note: Figures rounded.
Source: ABS 2007, Essential Economics

Table 3-4   Percentage of jobs per industry sector, NGAA municipalities and
                   Australia (main sectors in NGAA municipalities), 2011

Sector	NGAA (%)	Australia (%)	Difference in percentage points (%)
Manufacturing	14.4	9.0	5.4
Construction	8.4	8.2	0.1
Wholesale trade	5.0	4.0	1.0
Retail trade	13.4	10.5	2.9
Accommodation and food services	6.1	6.5	-0.4
Transport, postal and warehousing	6.4	4.8	1.6
Other services	4.0	3.8	0.3
Public administration and safety	5.9	6.9	-1.0
Education and training	9.9	8.0	1.9
Health care and social assistance	11.3	11.6	-0.3
Professional, scientific and technical services	3.6	7.3	-3.6

Note: Figures rounded.
Source: ABS 2012a, Essential Economics and Geografia 2012

Table 3-5 shows the main industries that NGAA residents work in. It can be seen that industries in NGAA municipalities are in traditional sectors like manufacturing, construction, transport, postal and warehousing, and wholesaling activities.

Table 3-5 NGAA industry structure (top 10 industries that NGAA residents work in), 2011

Sector	Number of people employed	NGAA (%)	Australia (%)	Difference in percentage points (%)
Manufacturing	201,222	12.7	9.0	+3.7
Construction	156,963	9.9	8.2	1.6
Retail trade	179,123	11.3	10.5	+0.8
Wholesale trade	78,368	4.9	4.0	+0.9
Accommodation and food services	84,904	5.3	6.5	-1.1
Transport, postal and warehousing	108,829	6.8	4.8	+2.1
Professional, scientific and technical services	79,157	5.0	7.3	-2.3
Public administration and safety	100,131	6.3	6.9	-0.6
Education and training	101,816	6.4	8.0	-1.6
Health care and social assistance	169,431	10.7	11.6	-0.9

Note: Figures rounded. Refers to jobs located in NGAA municipalities.
Source: ABS 2012a

Skills

Level of educational attainment

Table 3-6 shows that residents in NGAA municipalities have significantly lower levels of diploma and degree qualifications compared with the national average. In 2011, 20.1 per cent of NGAA residents held such qualifications compared to 27.2 per cent nationally. A relatively high proportion of NGAA residents hold vocational qualifications, but the NGAA municipalities have a significantly higher proportion of residents with no post-school qualifications when compared with the national average. These figures reveal a contrast between skill and attainment levels in outer metropolitan growth areas compared with the Australian average.

Table 3-6   Post-school qualifications for NGAA municipality residents aged 15 years and above, 2011

Qualification	Number of residents	NGAA (%)	Australia (%)	Difference in percentage points (%)
Bachelor or higher degree	326,540	12.4	19.1	-6.7
Advanced diploma or diploma	202,157	7.7	8.1	-0.4
Diploma and above	528,697	20.1	27.2	-7.1
Vocational	549,227	20.9	18.3	2.6
No qualifications	1,309,259	49.8	44.7	5.1
Not stated	240,834	9.2	9.7	-0.5
Total	2,628,017	100.0	100.0	0.0

Note: Figures rounded.
Source: ABS 2012a

Occupational status

Table 3-7 shows the occupational status of NGAA municipalities' residents compared with the Australian average. It can be seen that in NGAA municipalities the proportion of professionals and managers is lower and the proportion of technical and clerical workers is higher.

Table 3-7   Resident occupational status, NGAA municipalities and Australia, 2011

Occupational Group	Number	NGAA (%)	Australia (%)	Difference in percentage points (%)
Professionals and managers	388,688	24.5	34.2	-9.7
Technicians and trades workers	264,219	16.6	14.2	+2.5
Clerical and administrative workers	262,790	16.5	14.7	+1.8
Machinery operators and drivers	154,618	9.7	6.6	+3.2
Labourers	174,397	11.0	9.4	+1.6

Note: Figures rounded.
Source: ABS 2012a

Skills and jobs mismatch

Essential Economics and Geografia (2012) used composite indices to develop a more location-specific approach to discovering where municipalities fall along a spectrum of areas in which the skills profile is the dominant concern to areas in which the availability of jobs is the dominant concern.

At one end of the spectrum, in some regions there are a reasonable number of jobs attracting in-commuters. Yet these areas have higher unemployment (than NGAA averages), lower educational attainment and slower growth (relative to other areas). Population growth compounds these issues by expanding the pool of working-age residents without increasing the stock of jobs. Also, the growth does not address the mismatch between local skill sets and available jobs or ensure that local residents are

able to take advantage of local job opportunities. Such locations include traditional manufacturing areas.

At the other end of the spectrum, there are NGAA municipalities with lower unemployment rates, relatively skilled and educated resident labour forces and often faster population growth but with a chronic (and growing) undersupply of local jobs. There is a large amount of out-commuting in these largely residential areas and they often lack the infrastructure to attract new business investment or even community infrastructure to support the expanding population. In most cases, because of an undersupply of local employment opportunities in more skilled work, a large proportion of skilled residents must out--commute and this diminishes the local benefits of having a skilled resident workforce. A strategy to generate greater employment diversity in these areas and to increase the amount of skilled employment opportunities will reduce the need for out-commuting, bringing about a substantial productivity gain to the economy.

Without intervention, these NGAA typologies may converge over time. Some municipalities already show the signs of this. Firstly, the traditional manufacturing areas (with a relatively healthy supply of local jobs but a low skills base) are likely to experience population growth. This would cut into the job surplus and exacerbate the high unemployment rates that are already being generated by the downsizing and up-skilling of manufacturing. Secondly, there may be an increase in unemployment in the greenfield municipalities (which have more skills but fewer local employment opportunities) as the lack of local jobs affects new generations of residents looking for local, career entry opportunities. Moreover, given the current scale of existing skills and jobs deficits, even without further population growth pressure the NGAA municipalities already face long-term challenges.

Much emphasis has been placed on the concentration of high-growth industries in CBDs and major centres and the need to transport people more efficiently to these locations. However, there must be a commensurate emphasis on addressing skills and employment gaps in outer metropolitan growth areas. This includes the development of centres within outer metropolitan growth areas that draw on local strengths and relationships and address skills and/or employment deficits. Infrastructure provision, including transport and community facility infrastructure, are key components of this.

The potential

The NGAA municipalities have a number of strengths. These include available land; a strong vocational education skills base; ability to build on the existing manufacturing base to create advanced manufacturing opportunities, especially if there is a focus on skill development; existing food production which could be retained and further developed; and a high proportion of small to medium enterprises, including home-based businesses, that could benefit from access to high-speed broadband and business support.

The following activities are those expected to generate employment in the outer metropolitan growth areas:

- high-value manufacturing
- construction
- freight, transport and logistics
- wholesaling
- service sector
- community services.

Proposed actions focus on:

- creating job clusters through catalytic investment
- skilling the local workforce
- enabling employment diversity and growth by investing in and maintaining infrastructure
- ensuring intraregional and interagency coordination of efforts to tackle employment and skills issues.

Expected benefits

Modelling of hypothetical interventions by Essential Economics and Geografia (2012), which used five representative municipalities, highlighted the potential for significant returns to government and communities from well-targeted projects and programs in NGAA municipalities. Potential economic and social benefits identified from the projects included:

- increased direct and indirect employment
- increased GRP
- improved tax receipts to all levels of government
- reduction in unemployment rates
- reduction in government welfare payments
- improved local job sustainability
- reduction in congestion costs.

A summary of the aggregate results from the hypothetical interventions in the five municipalities is provided in Table 3-8.

Table 3-8   Hypothetical project impacts in five representative NGAA municipalities over a 20-year period

Impact	Mean estimate
Economic impacts	
Total cost	$5.2 billion
Total output	$8.8 billion
Gross regional product	$3.4 billion
Total full-time equivalent jobs Construction Operational	 2,290 FTE jobs 3,560 FTE jobs
Government revenue	$897 million
Net present value (NPV)	$7.46 billion
Social impacts	
Impact on unemployment rate	7.7% to 7.1%
Impact on local job self-sufficiency (local jobs provided per resident labour force participant)	0.75 to 0.77
Total welfare benefit savings (NPV)	$228 million
Total congestion cost savings (NPV)	$37 million

Source: Geografia and Essential Economics 2012

Improving the connection between work and home

In Australia's major cities, an increasing number of people are living further away from city centres. At the same time, many jobs – in particular, higher-skill, higher-paying jobs – are recentralising. In Australia's major cities this is leading to an increased distance between where people work and where they live and a growing need to effectively connect homes and workplaces.

There are many economic and social benefits to be derived from improving connections between where people live and where they work. There are three ways that this can be achieved: firstly, by bringing workplaces closer to homes; secondly, by increasing the number of dwellings in areas with good access to jobs so that people can live closer to work; and thirdly, by improving transport links between work and home. These three approaches are explored in the Grattan Institute report Productive Cities (Kelly et al. 2013).

Bringing work closer to home

One way to better connect people and jobs in major cities is to create more jobs in middle ring suburbs and outer suburban areas. This could be done by offering incentives for businesses to relocate there or by building new employment clusters in these areas. However, there is currently little evidence to show that these methods are cost-effective, that they will generate significant numbers of long-term jobs or that they will increase the productivity of businesses (Ahrend 2013, Kelly et al. 2013). A number of industry sectors, such as the finance and insurance sector, experience significant agglomeration benefits by being located in the inner suburbs. If these sectors relocated to the outer suburbs, they would lose these benefits, resulting in a decrease in productivity.

Jobs could be created in middle and outer suburban areas by building on existing agglomerations in those areas – for example, universities, hospitals and activity centres. This method is likely to be more effective than trying to build new employment clusters from scratch. However, it is unlikely to provide the number of jobs needed in middle and outer urban areas.

Enabling people to live closer to work

Another way to improve the connection between work and home in major cities would be to increase the number of dwellings in areas with good access to jobs – for example, areas where there are extensive job markets or that have good transport connections to job markets – thereby allowing more people to live closer to those jobs.

As discussed earlier in this chapter, in Australian cities there is a large difference in house prices between inner and outer urban areas. Because of high house prices in the inner and middle suburbs, many households in outer areas are unable to move into these areas, which have better access to jobs. It has also meant that wealthier households tend to predominate in areas where there are both better jobs and public transport.

A variety of factors exacerbate this situation. Resistance to change and restrictive planning practices mean that there are too few new and affordable types of dwellings being built in the inner and middle ring suburbs that could allow more residents to live closer to good jobs. Developers and builders face strong disincentives to address housing shortages in these locations (Kelly et al. 2013, Fensham 2013).

Improving transport links between work and home

A third way to improve the link between work and home in major cities is to improve the transport system to connect people, particularly those living in the outer suburbs, to more centralised jobs. This would involve improving roads and public transport networks, which would be expensive. However, there are ways to improve the use of existing transport links. Demand measures could be used to spread the demand for travel in morning and afternoon peak travel times and therefore reduce congestion and overcrowding.

As a result of an ageing population, Australia will increasingly face significant budgetary pressures at Commonwealth and State levels. Today one in seven Australians are aged over 65. By 2030, this proportion will be one in five. Tax revenue bases will decline as the proportion of the population in the workforce declines. The GDP spend on health and age-related pensions will increase substantially making it even harder to fund significant capacity increases in urban networks, particularly mass transit systems.

There are also physical constraints when considering building new transport infrastructure. Most cities have very few corridors preserved to accommodate new transport infrastructure links. Some also have geographical limitations that would make new transport links difficult and costly to build.

The three ways of connecting work and homes described above could all be used to exploit local and geographic circumstances to improve the productivity and liveability of major cities. Improving these connections between work and home will be critical if we are to build the productivity, sustainability and liveability of Australia's major cities.

Transport mode choice and transport accessibility

Trends in transport mode share

'Passenger transport mode share' refers to the proportion of travellers that use each type of transport – for example, the number that use light passenger vehicles (LPVs – private cars but also motorcycles and scooters) as opposed to mass transit. Passenger mode share is not the same across Australia's major cities or within them. Different parts of major cities often have different mode share breakdowns.

Australia's cities tend to have higher LPV use and lower mass transit use than cities overseas (Curtis and Scheurer 2012). LPVs are the most popular choice for all journeys in Australia's major cities although their popularity varies depending on the destination and purpose of the journey (BTS 2012a, Corpuz 2007).

Figure 3-3 shows the mode share for travel to work in 2011 for Australia's four largest cities and for the inner, middle and outer suburbs of these cities. LPV was the main mode of travel to work in all four cities and their inner, middle and outer suburbs. Melbourne's inner suburbs had the highest LPV use of any area of the four cities (84.4 per cent), while its outer suburbs had the lowest LPV use of any area (42.6 per cent). Sydney's inner suburbs had the highest mass transit usage (33.5 per cent) and Melbourne's outer suburbs had the lowest (9.2 per cent).

Approximately 16 per cent of all journeys in Australia's capital cities are for the purpose of travel to work, so these figures do not necessarily apply over all of the journeys made in major cities (BTS 2012b, SOAC 2012).

Figure 3-3   Mode of travel to work for commuters in Australia's four largest cities, 2011
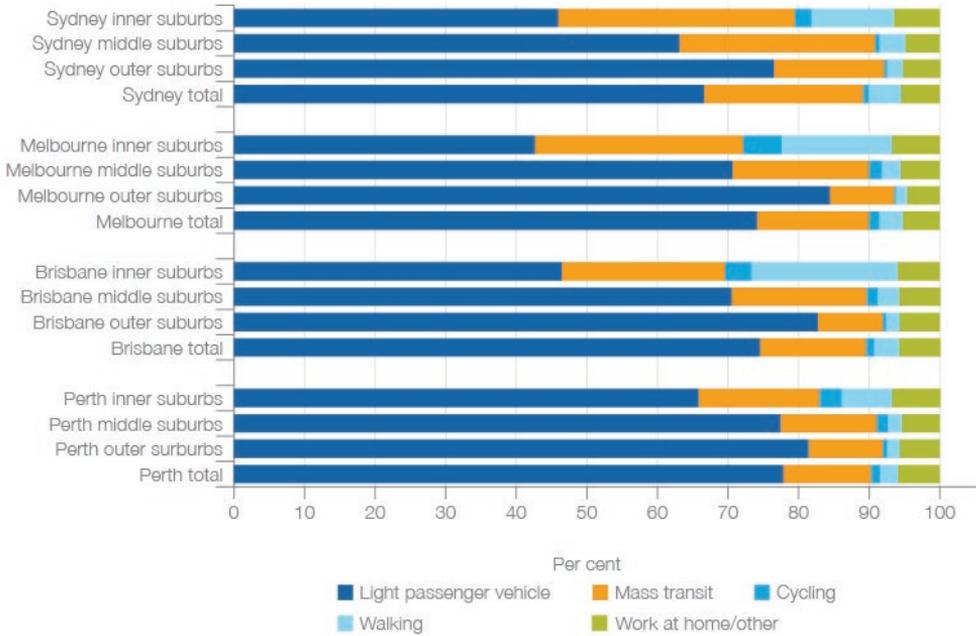
Although LPVs are the most popular mode of transport in Australia's major cities, overall vehicle kilometres travelled per person peaked in Australia in 2004 (Cosgrove 2011). There was a decrease in the proportion of trips to work using LPVs in Australia's four largest cities in the decade to 2011, as can be seen in Figure 3-4. There was an increase in use of mass transit, walking and cycling to get to work in all four cities, particularly in inner urban areas. The only area of the four largest cities to experience an increase in LPV usage in the decade to 2011 was Sydney's outer suburbs. The majority of people who travel to work by LPV are the sole occupants of the vehicle. The proportion of people travelling to work as a passenger in a car has been declining in recent years (BITRE 2013).

Figure 3-4   Change in mode of travel to work for commuters in Australia's four
                  largest cities, 2001–11
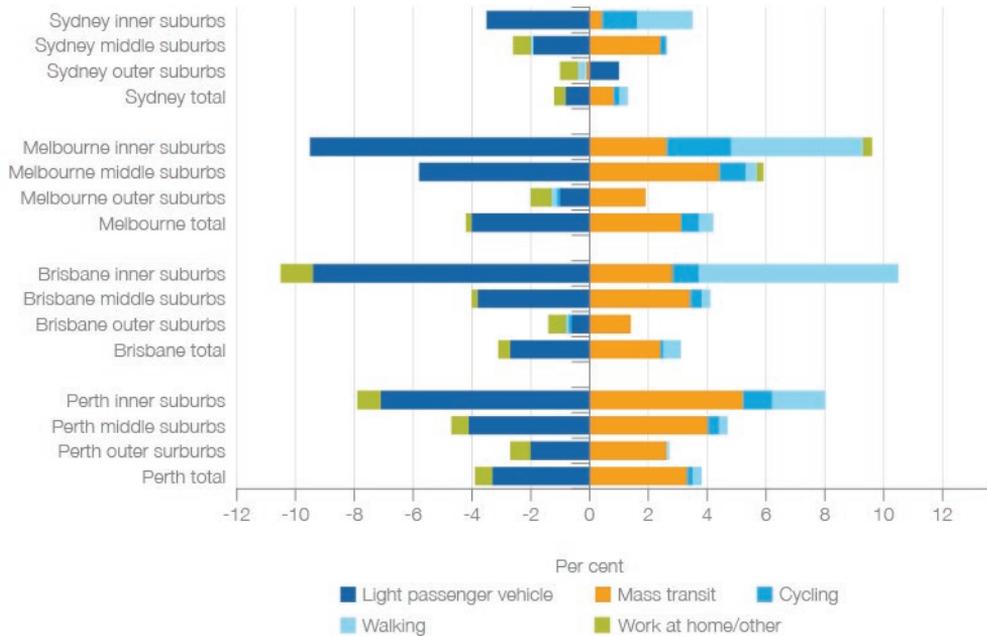
Census data shows that in the capital cities, at least for travel to work, the vast majority of trips by LPV are made by a single person – 53.7 per cent of all journeys to work in Sydney and up to 64 per cent of all journeys to work in Adelaide (ABS 2012a). Between 2006 and 2011 there was an increase in the proportion of people travelling to work by LPV as a driver in almost all capital cities, the exceptions being Melbourne and Perth. In all of the capital cities, there has been a decrease in the number of people travelling to work by LPV as passengers since 2006. This is particularly evident in Sydney, where there has been a decrease of approximately 15 per cent, and Melbourne where there has been a decrease of approximately 8.5 per cent (ABS 2012a).

Factors that influence the choice of transport mode

The decision a person makes about transport mode is influenced by a complex interaction of factors including price, reliability, accessibility, affordability, personal income, travel time and the level of comfort (or discomfort) of the mode. The decision is also influenced by the nature of a trip (for instance, commuting to work or visiting family) and the destination.

Pricing

Pricing can be used to influence the choices people make about transport mode. A recent Australian survey indicated that peak hour road pricing could encourage a shift of around 13 per cent in peak period from LPV to mass transit. In addition, it could encourage around 22 per cent more commuters to drive to work during an off-peak period instead of during a peak period (Institute of Transport and Logistics Studies 2013).

In Australia's major cities, mass transit services to low-density suburban communities have low levels of cost recovery and require high levels of public subsidies, as reported in *State of Australian Cities 2012*. Fare recovery and other revenue sources for mass transit systems in Australia, particularly rail, are low by international standards.

Cost recovery rates for mass transit systems are not uniform across Australia's major cities. For example, Sydney's metropolitan buses in 2011–12 had an overall cost recovery rate of 30 per cent, while its outer metropolitan buses have a cost recovery rate of 10 per cent (SOAC 2012). In south-east Queensland in 2011–12, five per cent of bus routes fully recovered running costs, 30 per cent had a cost recovery rate of 30 per cent and 14 per cent had a cost recovery rate of less than 10 per cent.

Income distribution and mass transit use

Average incomes appear to influence the type of mode of transport used for journeys to work. Those who use public transport for their journey to work tend to have higher average weekly individual incomes than those who use other transport modes (see Figure 3-5). Average incomes are about 10 per cent higher for public transport users in Sydney, Melbourne, Brisbane and Perth, but Adelaide public transport users have somewhat lower incomes (on average) than users of other transport modes.

Figure 3-5   Estimated weekly average individual income for users of selected transport modes for the journey to work in selected capital cities, 2011
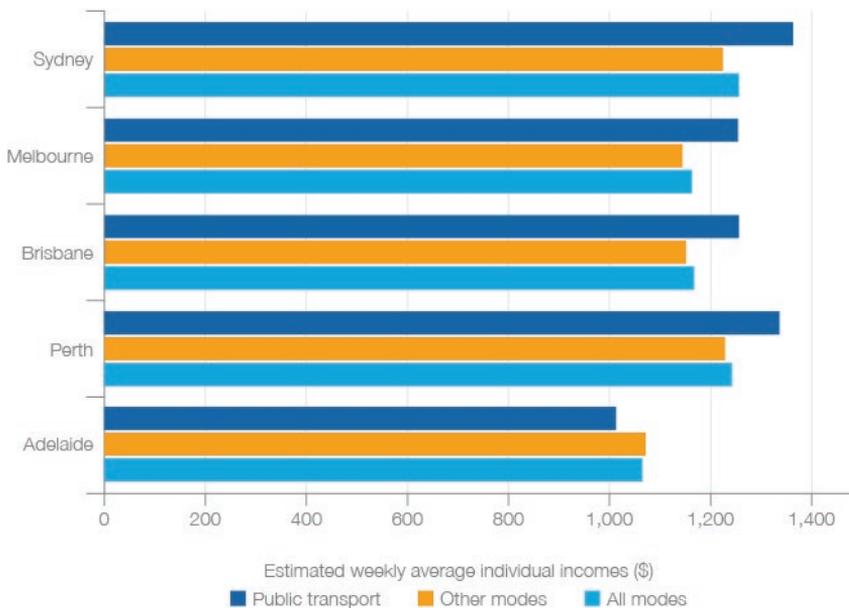
Note: Average income was estimated using the midpoint income of each Census income range, with 'negative' and 'not stated' income responses excluded from the calculation and the '2000 or more' category assigned a conservative average value of $3,000 (based on evidence from the ABS Survey of Income and Housing 2009–10 and ABS special tabulations of average Census incomes). The 'Other modes' category includes all modes except mass transit.

Source: BITRE analysis of ABS Census of Population and Housing 2011 place of work data

Figure 3-6 shows the proportion of people in each personal income category who use mass transit for the journey to work. In Australia, the highest income bracket (annual income of $104,000 or more) had the highest mass transit mode share of 19 per cent, while the mass transit mode share was lowest for those earning between $15,600 and $51,999 per annum (at 11 per cent).

The individual capital cities showed mixed patterns. For example, in Sydney, Melbourne and Perth, the mass transit mode share was highest in the top income group, while in Adelaide the top income group had the lowest mass transit mode share and the lowest income group ($0 to $15,599) had a comparatively high rate of mass transit use.

Figure 3-6   Users of mass transit for journey to work by weekly personal income category in selected capital cities, 2011
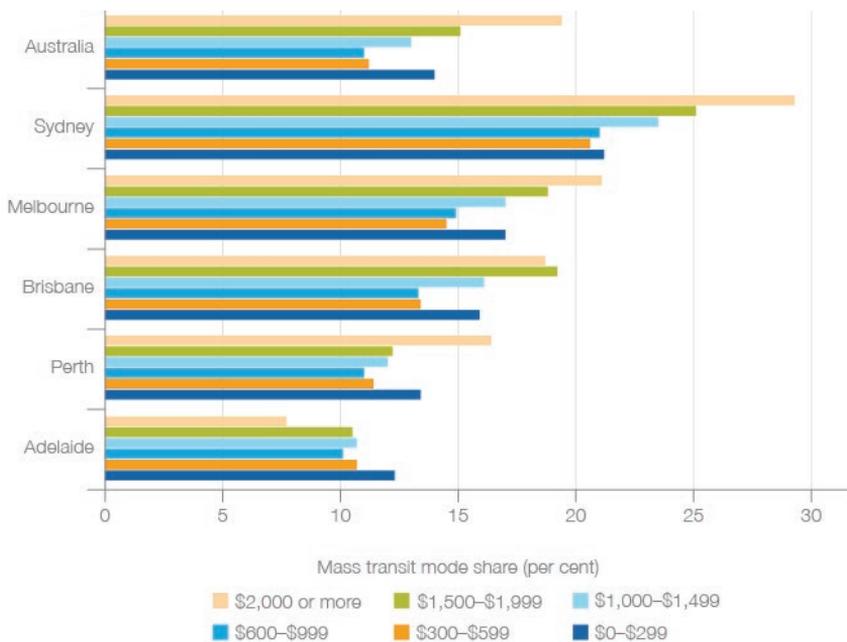
Note: Data for 'unknown' income category, which includes 'negative income' or 'not stated', are not shown. Annual incomes shown in brackets.

Source: BITRE analysis of ABS Census of Population and Housing 2011 place of work data

The relationship between income and mass transit use also differs across transport modes. Based on 2010–11 data from the Sydney Household Travel Survey, Bureau of Transport Statistics (2013) found that bus use was particularly common among those in the lowest personal income bracket ($25,000 or less), while a relatively high proportion of ferry and taxi users belonged to the highest income bracket (annual income of over $100,000).

A large proportion of high income users use mass transit, although they do not account for the majority of mass transit users. Instead, most of the mass transit users belong to the middle two income categories. Nationally in 2011 about one-quarter of those who commuted to work by mass transit earned between $31,200 and $51,999 per annum and a further one-quarter earned between $52,000 and $77,999 per year.

Travel by mass transit

Mass transit serves different travel needs for different groups of people in Australia's major cities. One in six people in the capital cities uses mass transit for daily commuting (Mees and Groenhart 2012), while many rely on mass transit for things like shopping, social and recreational activities and personal business. Children frequently use mass transit, including dedicated school bus services, to travel to and from school and older Australians may rely on mass transit to reach health and other social services and activities.

The NSW Government's Household Travel Survey for Sydney reveals that, of all age groups, young people are most reliant on mass transit (Figure 3-7). On an average weekday, mass transit accounts for nearly one-quarter of all trips made by 11- to 20-year-olds and one in five trips by 21- to 30-year-olds but less than 10 per cent of trips for Sydney residents between the ages of 31 and 70 (BTS 2012b).

Figure 3-7   Mass transit mode share for all trips on an average weekday in Sydney, by age of travellers, 2010–11
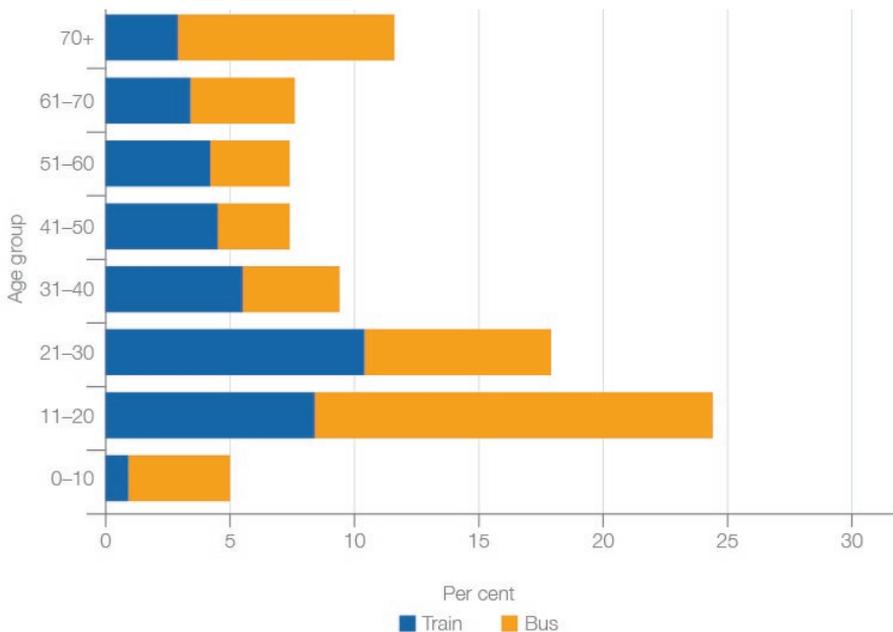
Source: BTS 2012b

Young people and mass transit

Young people have the highest dependence on mass transit. A recent Translink review of bus services in south-east Queensland showed that nearly half of all bus passengers are school students (12 per cent of all passengers) or university students (30 per cent) (Translink 2013).

Mass transit can also play an important role in alleviating the risk of social exclusion for some groups. A study on the social inclusion benefits of bus services in Melbourne has found that, while the benefits of mass transit services for relieving traffic congestion are substantial, the social benefits they produce are even more substantial (Stanley 2010).

People with drivers licences

Given that young people have the highest dependence on mass transit for everyday trips, they are particularly disadvantaged if there are few or no mass transit services. The importance of good mass transit provision is underlined by recent trends that have seen younger adults in Australia becoming less likely to hold a drivers licence (Raimond and Milthorpe 2010).

Between 1998 and 2009, people aged under 35 years in Sydney have become less likely to hold a drivers licence. Similar results have been found in both Melbourne and Brisbane (Raimond and Milthorpe 2010).

A Graduated Licensing Scheme was introduced in New South Wales in 2000 to reduce over-representation of drivers under 25 years of age among road fatalities. This scheme has delayed the minimum age at which an unrestricted licence can be obtained from 17.5 years to 20, mandated minimum supervised driving requirements and introduced additional driver testing at additional cost. While these changes have contributed to the decline in the number of young adults in New South Wales holding a licence, the trend predates the introduction of the scheme (Raimond and Milthorpe 2010), suggesting other factors are influencing young people's decisions about obtaining a drivers licence.

Crowding on mass transit

Crowding has been described as endemic on urban rail systems in Australia's major cities, particularly during morning and afternoon weekday peak periods. It is affecting the comfort of passengers and shows that some services are reaching capacity . In Australia's capital cities, around 40 per cent of urban heavy rail users stand for 60 to 100 per cent of their journey in peak periods, although this proportion does vary between cities (Institute of Transport and Logistic Studies 2013). Notably, each metropolitan railway system has its own definitions of 'crowding' (Currie 2012).

Passenger perceptions of mass transit

There is growing literature on user and non-user perceptions of mass transit that affect decisions to use mass transit. A Monash University study found high rates of discomfort, self-reported anxiety and physiological stress amongst mass transit users (Currie 2012). It also demonstrated that 'transfers' between modes of transport are perceived as a major deterrent to mass transit travel.

Among users of the CityRail, bus and ferry networks in Sydney, feelings of safety are generally highest on ferries and lowest on trains (Figure 3-8). Passengers feel marginally safer while travelling on services than waiting on platforms or jetties (BTS 2011).

Figure 3-8   Feelings of safety on Sydney mass transit by mode, 2011
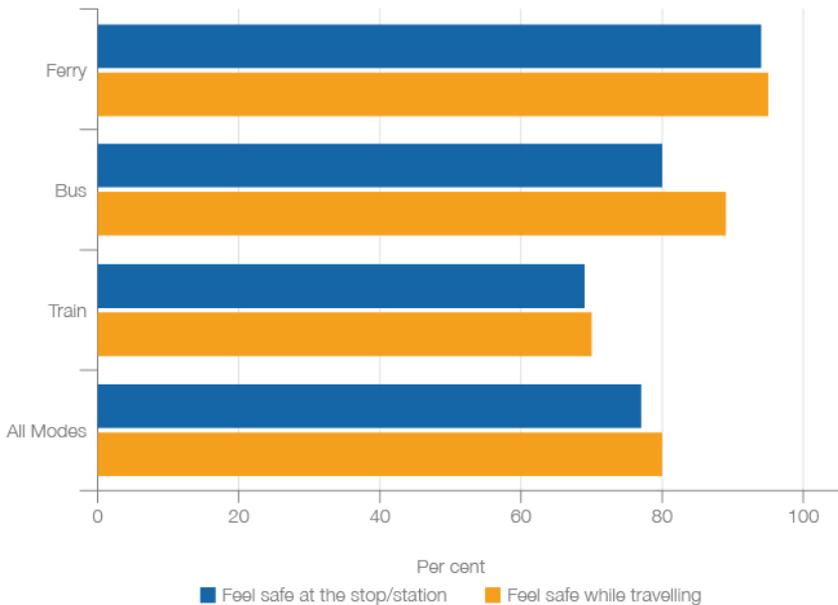
Sitting beside a stranger on a bus or train is ranked alongside crowded elevators as worst in terms of social discomfort (Thomas 2009). The fact that mass transit is referred to as an 'alternative' mode of transport reinforces the concept that it is 'alternative' behaviour, as opposed to the private car. The car represents convenience whereas alternative modes are more commonly linked with less important predicators of use, such as environmental factors (Thomas 2009).

Fear of crime is recognised internationally as a barrier to mass transit use and crime on mass transit often receives political commentary and media coverage. Research by Currie et al. (2010) with young people in Melbourne found that their feeling unsafe was highest at night using mass transit (43 per cent), followed by waiting at train stops (32 per cent). Very few young people surveyed had ever experienced a direct attack (four per cent of the sample), but one-quarter had been directly threatened at some point, while 30 per cent had seen someone attacked and 60 per cent had seen someone threatened. Moreover, 73 per cent had *felt* threatened at some point (Currie et al. 2010).

Currie et al. (2010) suggest that feelings of anxiety and discomfort associated with travelling in a relatively confined space with strangers is the most influential factor driving negative feelings of personal safety on mass transit. The frequency with which mass transit was used had no link to safety perceptions and country of birth had no influence. Actual experience of attacks or threats had some influence, but the most commonly cited source of information about safety incidents was media reports.

Negative journey to work responses about urban mass transit include indirect services, having to transfer between modes, travel time, and the timetable or services not being available at the origin or destination. It is difficult to know whether the reasons people choose instead to drive are based simply on negative perceptions and/or lack of knowledge of mass transit or whether it is based on the facts about different travel modes. Journey to work data shows that many commuting trips made by private cars are from locations that are well serviced by mass transit services (Hay and Shaz 2012).

In Perth, ferries receive the highest passenger satisfaction ratings for feelings of safety (Figure 3-9). As in Sydney, passengers felt safer on services than at stations or interchanges, where fear of crime is greatly increased at night. Train passengers felt less safe than bus passengers at night, particularly at stations or interchanges (32 per cent). Train passengers felt marginally safer during the day (WA Public Transport Authority 2012).

Figure 3-9   Feelings of safety on Perth mass transit, by mode and time of day, 2012
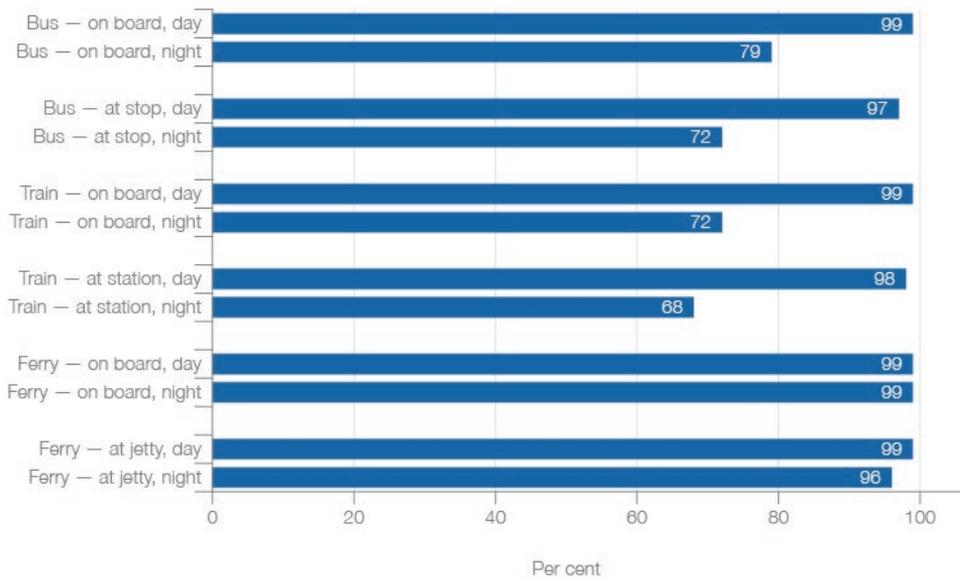
Source: Western Australian Public Transit Authority 2012

Accessibility

More jobs are easily accessible by private vehicles in Australia's major cities than by mass transit. Map 3-4 shows the proportion of jobs accessible within a 30-minute drive in Melbourne in 2011 and Map 3-5 shows the proportion of jobs accessible within a 45-minute mass transit trip. Only Melbourne's CBD and inner suburban areas can be reached within a 45-minute mass transit trip. The areas with the greatest mass transit accessibility in Melbourne tend to be those areas with higher average incomes, higher house prices, a greater proportion of residents with tertiary qualifications and higher EJD, as illustrated in Map 3-2.

Map 3-4   Accessibility of jobs within a 30-minute drive in Melbourne, 2011
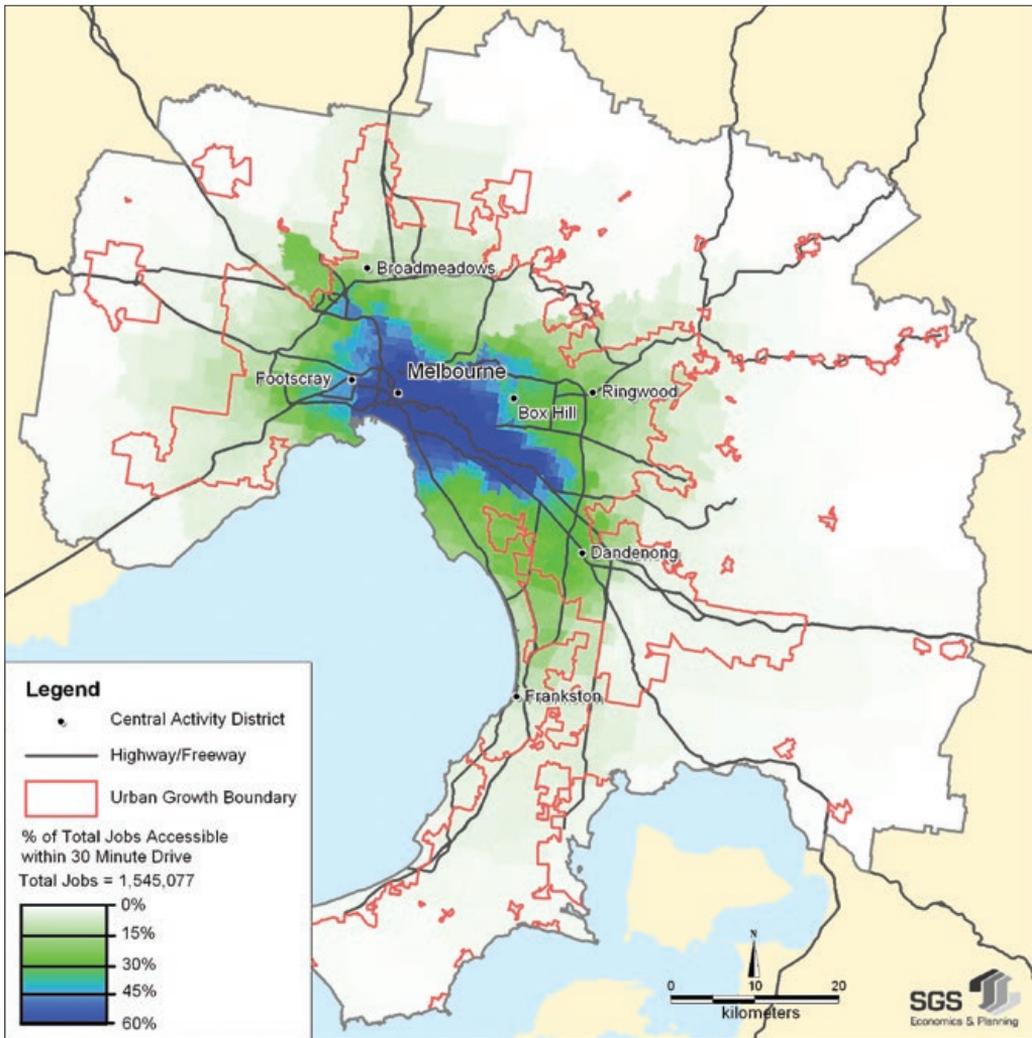
Source: SGS Economics and Planning 2013

Map 3-5   Accessibility of jobs within a 45-minute mass transit trip in
                 Melbourne, 2011
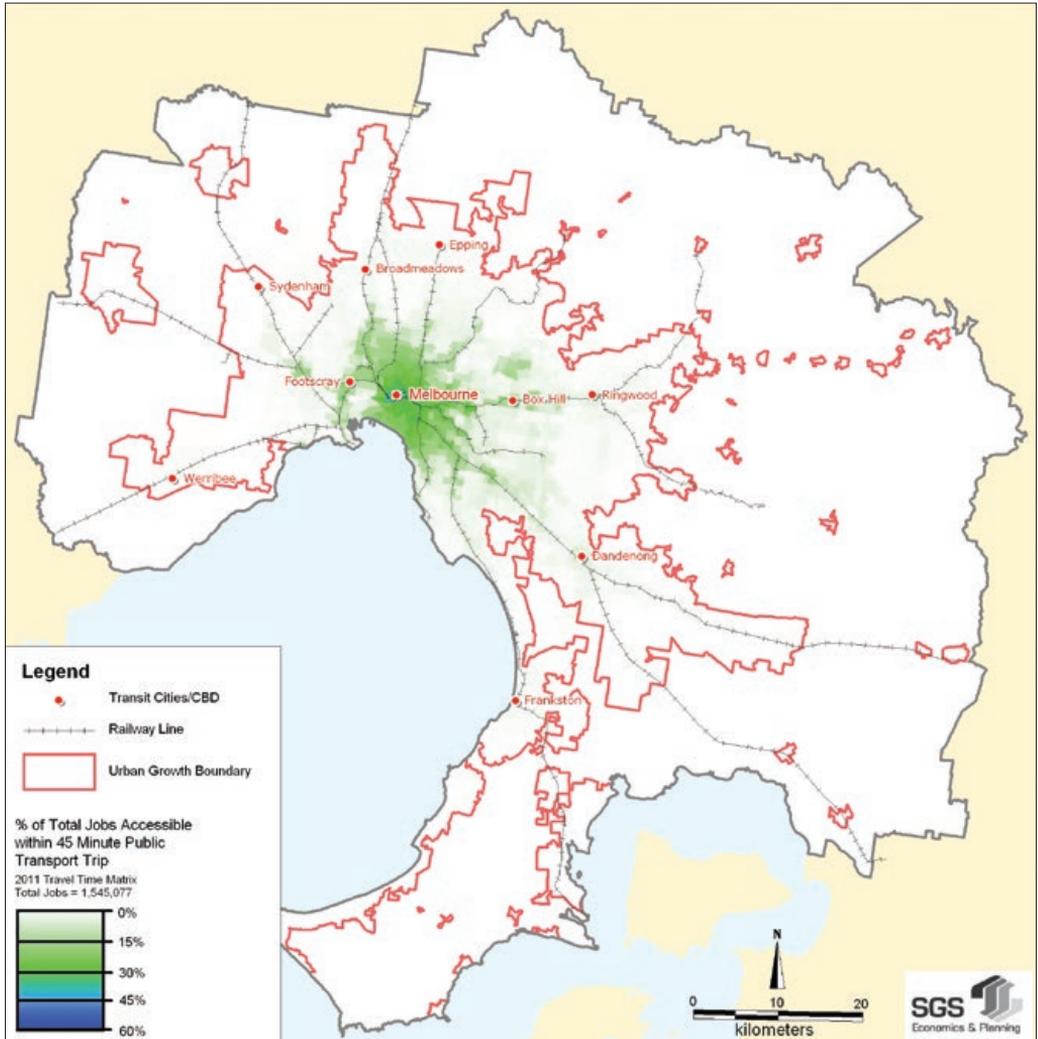
Source: SGS Economics and Planning 2013

Congestion

Congestion is a growing issue in Australia's largest cities and is predicted to cost Australians $20.4 billion per year by 2020 (BITRE 2007, Garnaut 2012). A 2013 study of six major cities showed that traffic congestion has been increasing in Perth, Melbourne and Sydney and has decreased in Brisbane and Canberra (Tom Tom International 2013) – see Table 3-9. A concurrent wider study of 123 world cities (including cities in Australia, New Zealand, Europe, Russia, North America and South Africa) rated Sydney as the seventh most congested city (Levy 2013). Averaged over the whole day, road congestion results in a time penalty over free-flowing roads of between 18 per cent (in Canberra) and 33 per cent (in Sydney). During peak periods congestion rises significantly, more than doubling in Sydney (Tom Tom International 2013).

Table 3-9   Congestion in selected capital cities, 2013

City	Congestion	Morning peak	Evening peak	Delay per hour driven peak period	Congestion change 2011 to 2012
Sydney	33%	70%	67%	40 mins	Increase of 1%
Perth	30%	55%	55%	33 mins	Increase of 4%
Melbourne	28%	56%	54%	33 mins	Increase of 1%
Adelaide	28%	50%	45%	28 mins	Decrease of -1%
Brisbane	25%	45%	50%	28 mins	Decrease of -1%
Canberra	18%	41%	34%	22 mins	Decrease of -1%

Note: Percentages refer to the Increase in overall travel times when compared to a free-flow situation. For example, a congestion level of 12 per cent corresponds to 12 per cent longer travel times compared to a free-flow situation. Delay in minutes per hour driven during morning and evening peak times is as compared to free-flow situations. For example, 22 minutes delay per hour at peak times indicates that a one-hour journey driven at free-flow times will take an additional 22 minutes at peak times.

Source: Derived from Tom Tom International 2013

Although travel during peak periods might be considered inevitable by some, research conducted by the Institute of Transport and Logistic Studies (2013) has indicated that at least one in four drivers in Sydney and one in three drivers in most other major cities during peak periods do not need to make their trip at that time. The study also looked at the impacts of pricing major roads, finding that peak hour road pricing could encourage approximately 13 per cent of commuters to switch to mass transit modes and a further 22 per cent of commuters would change their travel time to drive during off-peak periods (Institute of Transport and Logistic Studies 2013). Proposals to use time and distance based pricing to ease congestion were considered by a review of mechanisms to fund and maintain transport infrastructure conducted by Australian governments (Infrastructure Finance Working Group 2012).

Density

Density refers to the intensity of land use. Higher densities are thought to make mass transit services more viable. The more residences and destinations there are within mass transit catchments, the more people there are that might use mass transit.

Professor Mees (2009a, 2009b) recently argued that, while density does have an impact on mass transit usage, this can be outweighed by other factors unless the differences in density are large. He suggests that making cities more compact and lifting their densities is unlikely to produce substantial shifts away from the LPV. His research found that the relative attractiveness of competing urban transport modes influences mode choice much more than differences in density. Mees argues that this is important because improving the relative attractiveness of a mode is easier and more cost-effective than changing the urban densities of large cities, which could be slow and controversial. Nonetheless, Australian cities are some of the least dense in the world and increasing densities would be likely to encourage a mode shift towards mass transit use.

Car parking cost and availability

Parking availability and cost greatly influence mode choice. Results of annual household travel surveys have consistently shown that parking availability and cost is the main reason for the decision to travel to work by mass transit (Hay and Shaz 2012 using BTS 2012b, TDC various years).

CBD car parking is becoming scarcer per capita in Australia's major cities and it is getting more expensive. By monthly parking rate, Sydney, Melbourne and Brisbane have been ranked the ninth, 11th and 14th most expensive CBDs to park in (in the world). By daily parking rate, Melbourne has been ranked the third most expensive and Sydney the fourth most expensive (Colliers International 2012a). Extending parking restrictions to streets in an around CBDs is not believed to reduce traffic volumes, because they create more capacity for through traffic (Willett 2006).

Brisbane.
Image courtesy of Brisbane Marketing

Industry structure

The national context

Industry structure is the only measure for which data is available at major city level in Australia, so it is explored in more detail in this section. So that comparisons can be easily made across the major cities, the industry sectors have been grouped into five categories: producer services, trade, other services, transaction services and cultural services. The makeup of these groupings is detailed in Table 3-10.

Table 3-10   Industry sector descriptions and groupings

> ### Producer services
> Manufacturing
> Construction
> Agriculture, forestry and fishing
> Mining
> Electricity, gas, water and waste services (Electricity, gas and water supply in 2001)
>
> ### Trade
> Retail trade
> Wholesale trade
> Transport, postal and warehousing (Transport and storage in 2001)
>
> ### Other services
> Health care and social assistance (Health and community services in 2001)
> Education and training (Education in 2001)
> Public administration and safety (Government administration and defence in 2001)
> Accommodation and food services (Accommodation, cafes and restaurants in 2001)
> Administrative and support services; and other services (Personal and other services in 2001) – abbreviated in figures as administrative and other services
>
> ### Transaction services
> Professional, scientific and technical services; and rental, hiring and real estate services (Property and business services in 2001) – abbreviated in figures as professional and real estate services
> Financial and insurance services
> Rental, hiring and real estate services
>
> ### Cultural services
> Information media and telecommunications (Communication services in 2001)
> Arts and recreation services (Cultural and recreational services in 2001)

Source: Derived from ABS 2012a and ABS 2002

Figure 3-10 illustrates the contribution to GDP of these industry groups between 1985 and 2012. Producer services was the group that made the largest contribution. The transactional services group has shown the greatest increase in value during the period and has overtaken the trade group in its contribution to GDP.

Figure 3-10   National Gross Value Added (GVA) by industry group, 1985–2012
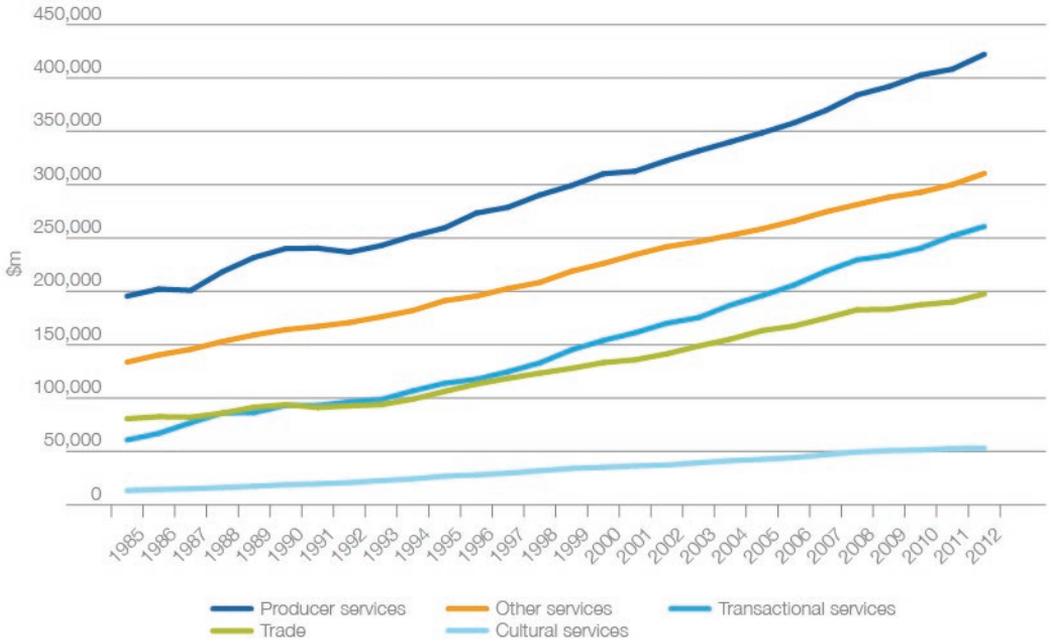
Note: See Table 3-10 for the breakdown of the industry groups by industry sector.
Source: Derived from ABS 2012a and ABS 2012b

Figure 3-11 illustrates the contribution of the highest earning industry sectors to national gross value added (GVA). Mining is by far the largest contributor and its earnings have increased significantly since 1985. The health care and social assistance sector is the second highest contributor and its contribution has been increasing in recent years.

Figure 3-11   Contribution of highest earning industry sectors to national Gross Value Added, 1985–2012
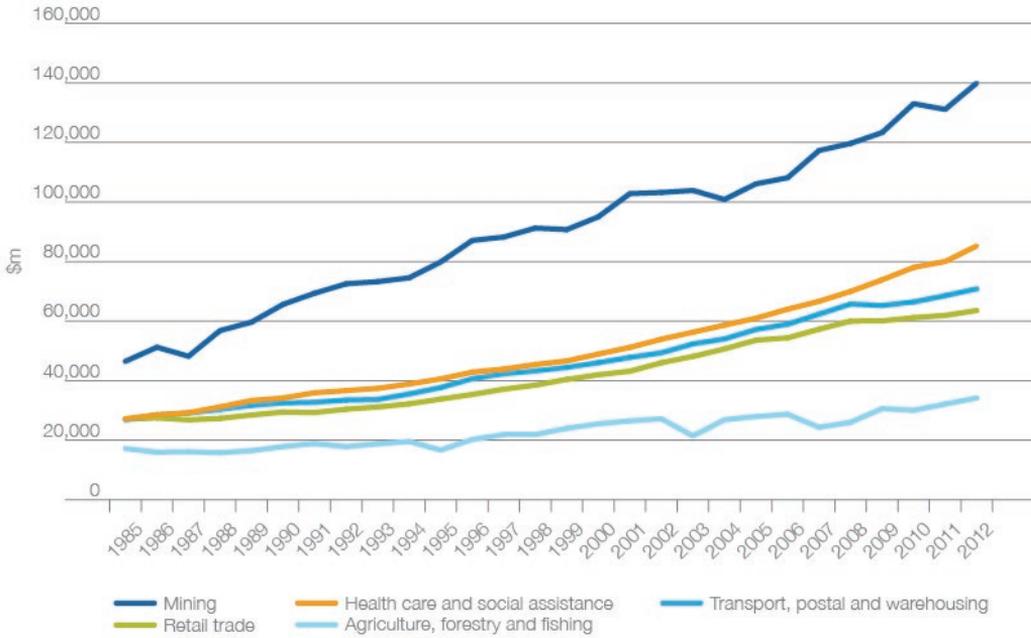
Source: Derived from ABS 2012a and ABS 2012b

Figure 3-12 shows the contribution of the highest employing industry sectors to GDP. Of these sectors, construction contributes the most to GDP. Its contribution has increased significantly since 2001 and it has recently overtaken the contribution of manufacturing.

Figure 3-12   Contribution of highest employing industry sectors to national Gross Value Added, 1985–2012
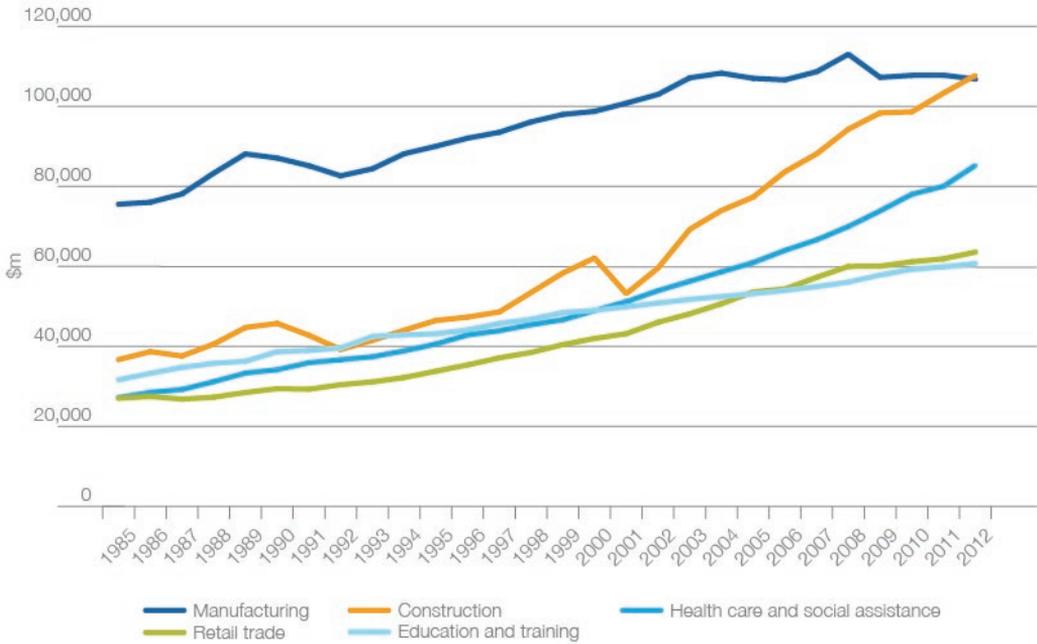
Source: Derived from ABS 2012a and ABS 2012b

Figure 3-13 illustrates the highest employing industry sectors' share of national GVA. The contribution of manufacturing has declined notably since 1989, while the contributions of construction and health care and social assistance have increased since 2005.

Figure 3-13   Highest employing industry sectors' shares of national Gross Value Added, 1985–2012
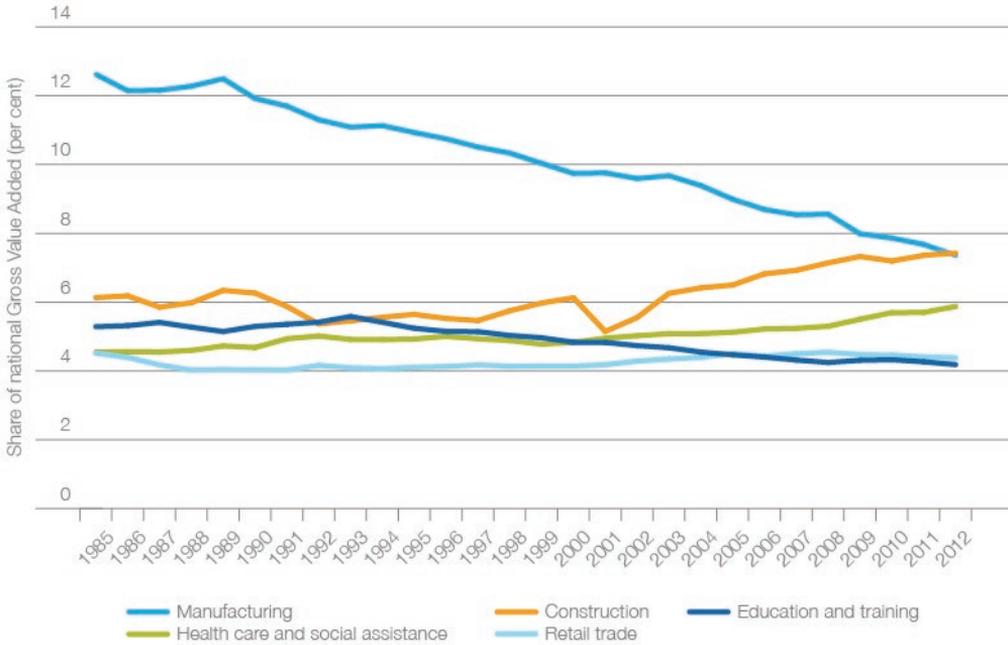
Source: Derived from ABS 2012a and ABS 2012b

Employment by industry for males and females

This section looks at the proportion of males and females employed by industry, nationally and at major city level. Figure 3-14 and Figure 3-15 show the proportion of males and females employed by industry sector nationwide. The health care and social assistance sector employed more Australians than any other industry sector in 2011 (11.6 per cent). This sector was the largest employer of women in 2011, employing one in five working women.

Figure 3-14   Industry sector of employment for males in Australia, 2001 and 2011
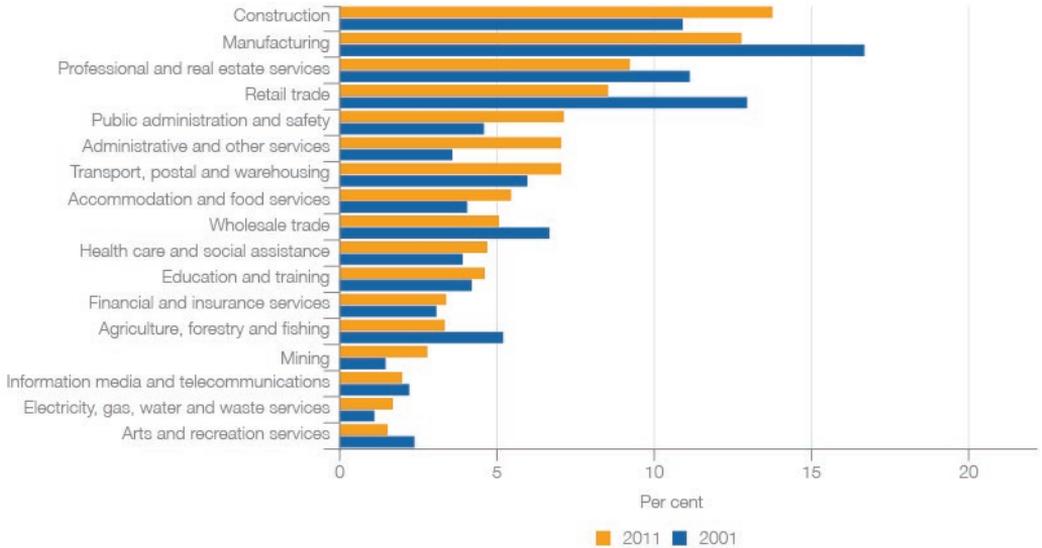
Note: Some industry sector categories have changed slightly since 2001, which may have a minor effect on the percentage of change in some industries. The changes are detailed in Table 3.1. Data where industry of employment was not stated or inadequately described have been excluded.

Source: Derived from ABS 2012a and ABS 2002

Figure 3-15   Industry sector of employment for females in Australia, 2001 and 2011
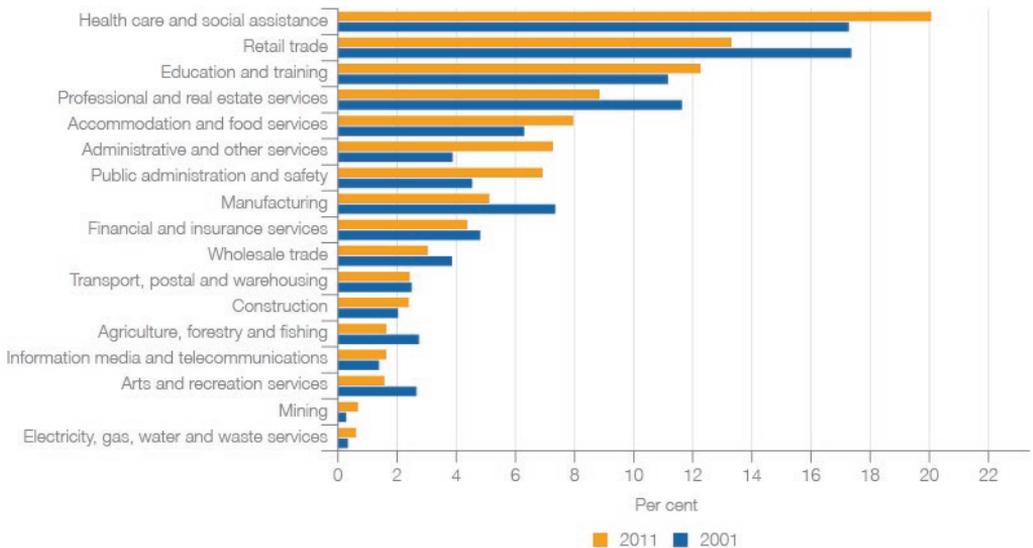
Note: Some industry sector categories have changed slightly since 2001, which may have a minor effect on the percentage of change in some industries. The changes are detailed in Table 3.1. Data where industry of employment was not stated or inadequately described have been excluded.

Source: Derived from ABS 2012a and ABS 2002

Areas with higher proportions of employed people working in the health care and social assistance sector tend to be clustered around secondary employment hubs, such as hospitals, rather than CBDs. This is illustrated by Map 3-6 and Map 3-7, which show the proportion of employed people working in health care and social assistance in Hobart and the Sunshine Coast by place of work.

Map 3-6   Proportion of employed persons working in the health care and social assistance sector by place of work in Hobart, 2011
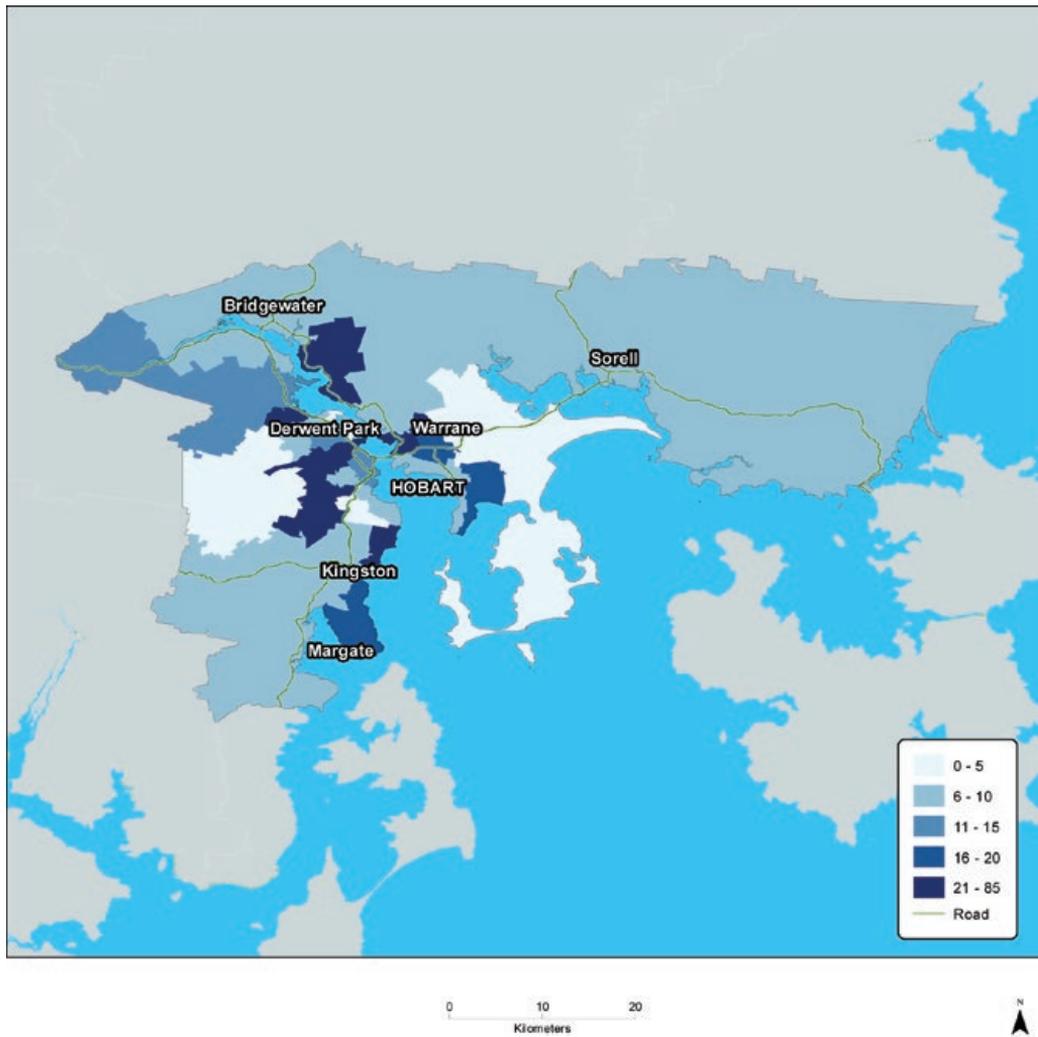
Map 3-7   Proportion of employed persons working in the health care and social
               assistance sector by place of work in Sunshine Coast, 2011
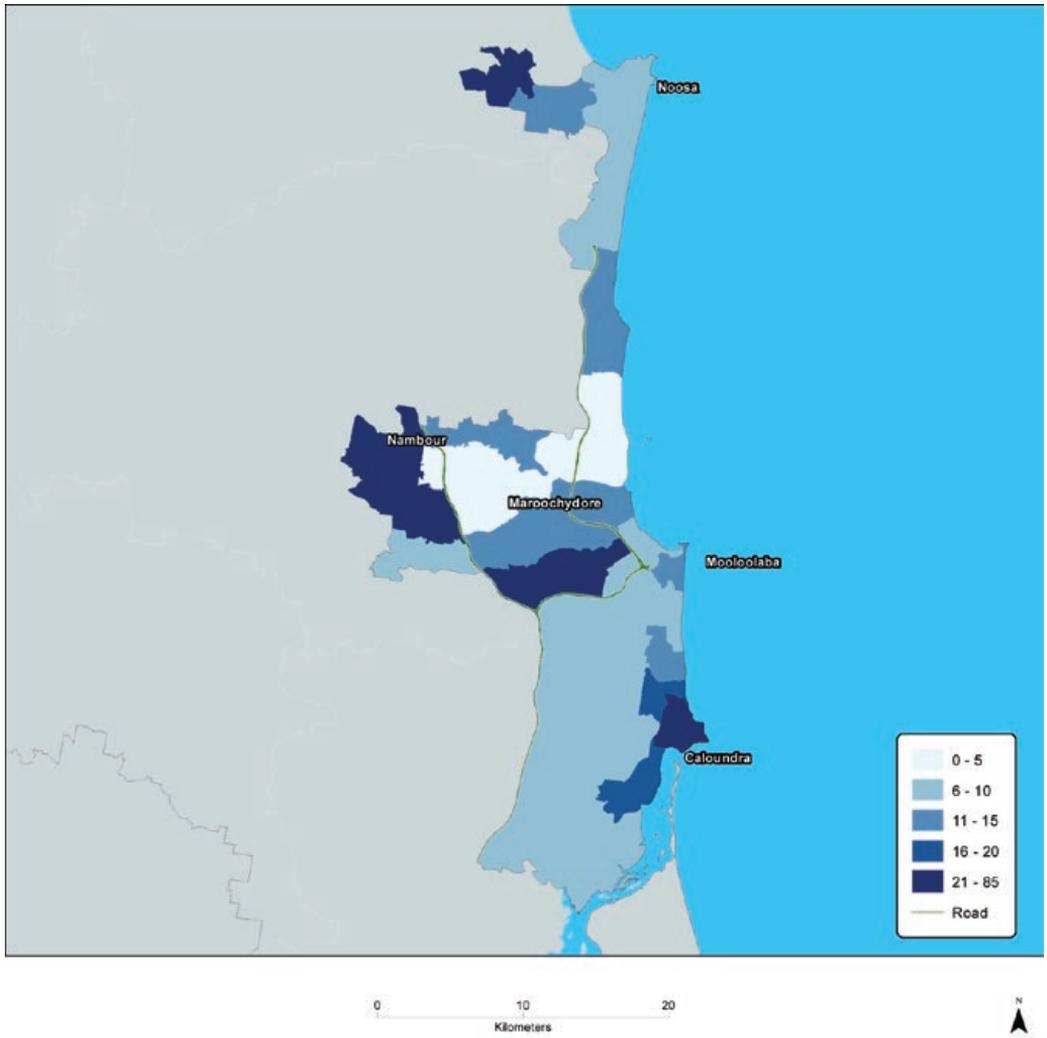
The construction sector was the biggest employer of Australian males in 2011, employing 13.8 per cent of working males, up from 10.9 per cent in 2001. Employment in this sector tends to be concentrated in the outer suburbs of major cities, where the most residential construction occurs. Map 3-8 and Map 3-9 illustrate this phenomenon in Adelaide and Wollongong. Map 3-8 shows that in Adelaide's outer suburbs a higher proportion of employed people work in the construction sector than anywhere else in the city.

Map 3-8   Proportion of employed persons working in the construction sector by place of work in Adelaide, 2011
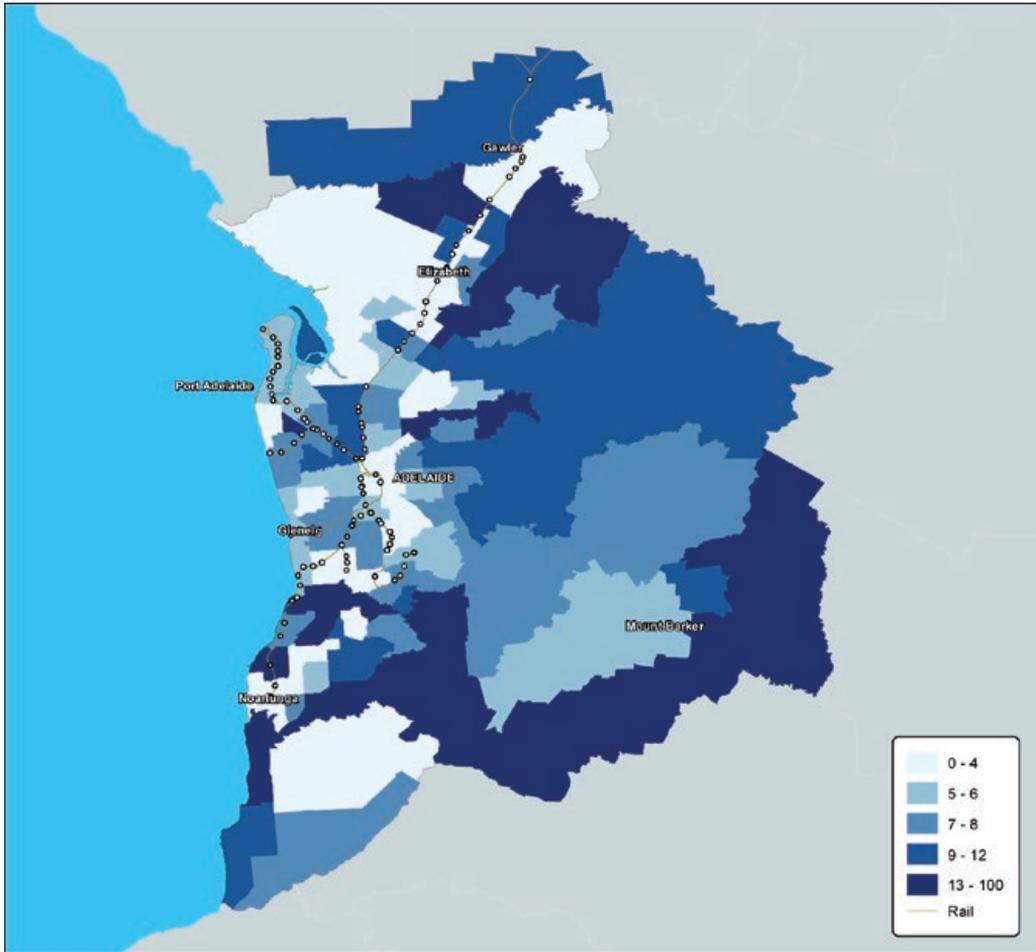
Map 3-9 shows that in Wollongong the areas that have the highest proportion of workers employed in construction tend to be the areas with the most greenfield residential development.

Map 3-9   Proportion of employed persons working in the construction sector by place of work in Wollongong, 2011
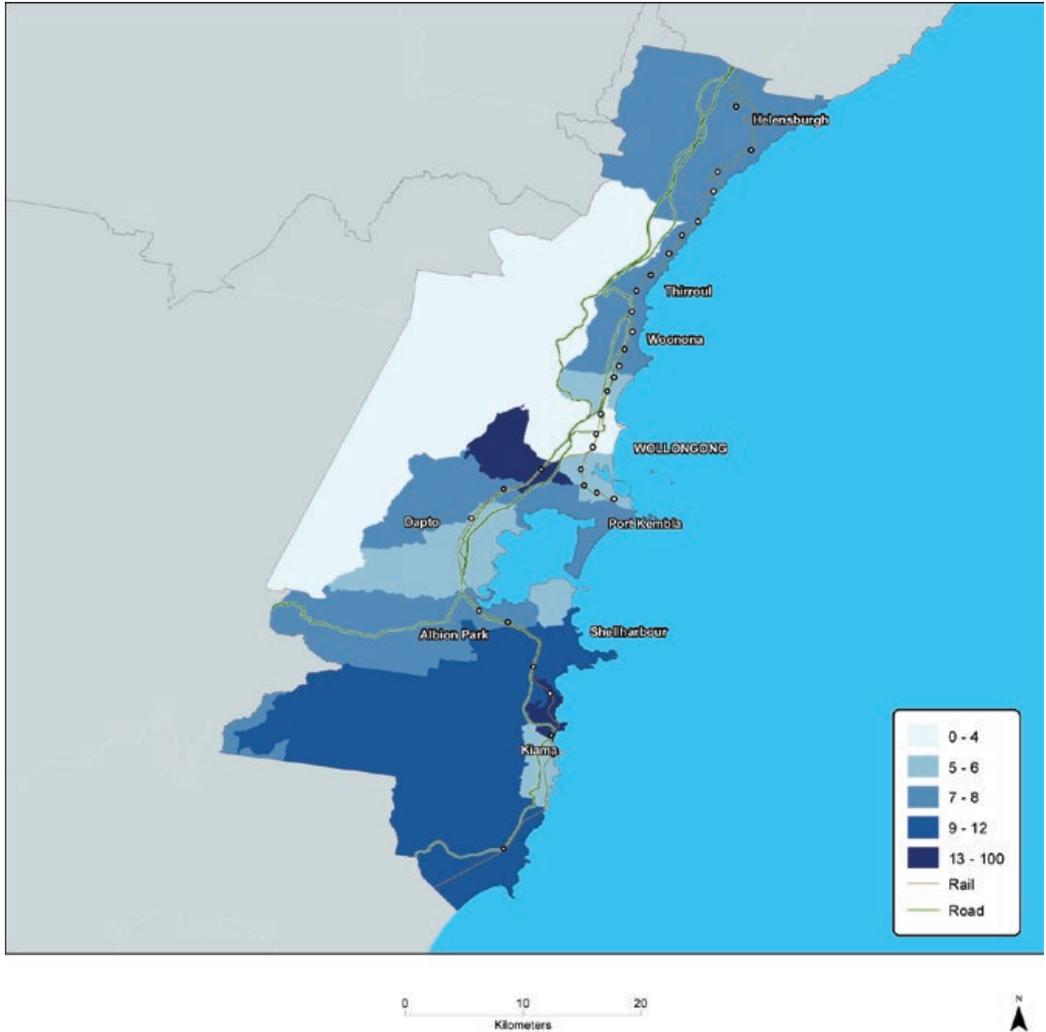
Table 3-11 shows average weekly earnings in industry sectors in November 2012. The average wage for the accommodation and food services sector in 2012 was less than half the average wage for all industries, while the average wage for mining was more than double the average of all industries.

Table 3-11   Average weekly earnings nationally by industry sector, November 2012

Industry Sector	Average weekly earnings (persons 2012)
Accommodation and food services	$530.30
Retail trade	$647.10
Arts and recreation services	$745.30
Other services	$878.10
Administrative and support services	$890.00
Health care and social assistance	$903.00
Education and training	$1,045.90
Rental, hiring and real estate services	$1,074.60
Manufacturing	$1,157.50
Wholesale trade	$1,299.20
Transport, postal and warehousing	$1,317.50
Public administration and safety	$1,333.10
Construction	$1,377.90
Professional, scientific and technical services	$1,392.70
Financial and insurance services	$1,423.90
Information media and telecommunications	$1,434.90
Electricity, gas, water and waste services	$1,665.10
Mining	$2,381.20
Average of all industries	$1,081.30

Source: Derived from ABS 2012a

Higher paying industries tend to employ more males than females. For example, the high paying mining sector employed four times as many males as females in 2011, while the lower paying health care and social assistance sector employed four times as many females as males (ABS 2012c). The persistent difference in proportion of males and females in industries of employment is likely to be contributing to the gap between the average full-time Australian male wage and the average full-time Australian female wage, which has remained at approximately 17.6 per cent over the past 30 years (ABS 2012c).

There is a significant difference in the amount that men and women are likely to earn over their lifetime. A 2009 report by AMP and the National Centre for Social and Economic Modelling found that a 25-year-old man in 2009 was likely to earn $2.4 million over his working life, whereas his female counterpart was likely to earn $1.5 million (Summers 2013). Again, one of the factors that may be contributing to this is the difference in proportion of males and females in various industries of employment.

Figure 3-16 and Figure 3-17 show the proportion of males and females employed by industry group categories in major cities in 2011. The producer services group was the largest employer of males Australia-wide and in most of the major cities in 2011. The next highest proportion of males nationwide was employed in the other services group. A higher proportion of males worked in this category in major cities than the nationwide average, which may reflect the fact that cities are hubs and service centres.

Figure 3-16   Proportion of males employed by industry group, 2011
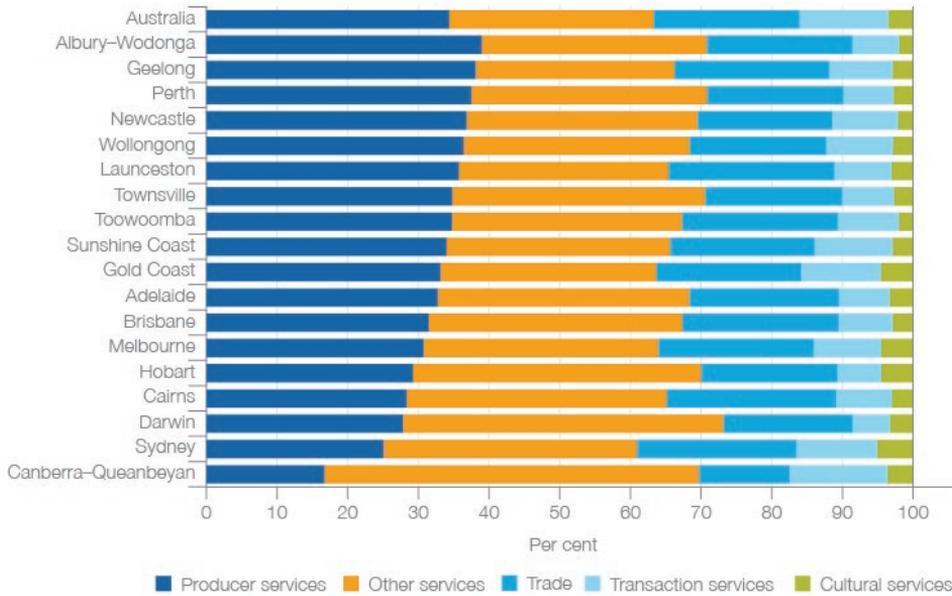
Note: See Table 3-10 for the breakdown of the industry groups by industry sector. Data where industry of employment was not stated or was inadequately described have been excluded.

Source: Derived from ABS 2012a

Figure 3-17 shows that the 'other services' group is by far the largest category of employment for females Australia-wide and in the major cities. A higher proportion of women worked in this group in the major cities than nationwide in 2011, with the exception of the Gold Coast–Tweed. Compared with men, a significantly lower proportion of women are employed in the producer services group (34.3 per cent for males versus 10.4 per cent for females nationwide).

The producer services group has perhaps the most potential for labour productivity growth which often leads to a boost in employee wages. There is more opportunity for additional capital to be used in these sectors to enhance labour productivity (Moretti 2012). As more males are employed in these sectors than females, there is potential to further exacerbate or prolong the wage gap between males and females.

Figure 3-17   Proportion of females employed by industry group, 2011
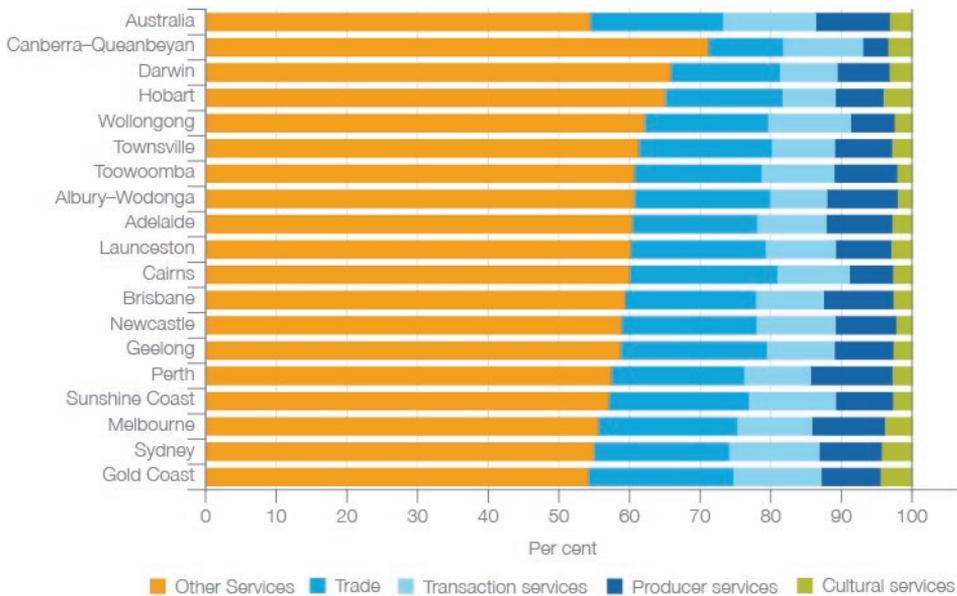
Note: See Table 3-10 for the breakdown of the industry groups by industry sector. Data where industry of employment was not stated or was inadequately described have been excluded.

Source: Derived from ABS 2012a

Between 2001 and 2011, all major cities experienced a significant increase in the proportion of males employed in the other services group, as can be seen in Figure 3-18. There was an increase in the proportion of males employed in the producer services group in 11 major cities, although this was significantly lower than the increase for the other services group. The other cities experienced a decline in the proportion employed in the producer services group. All major cities experienced a decline in the proportion of males employed in the trade, transactional services and cultural services groups.

Figure 3-18   Change in the proportion of males employed by industry group, 2001–11
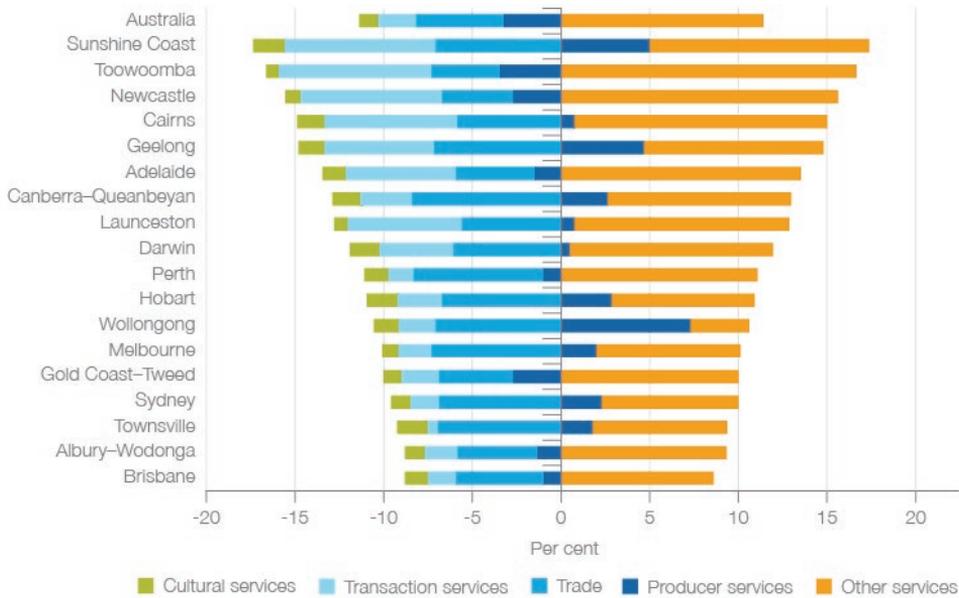
Note: See Table 3-10 for the breakdown of the industry groups by industry sector. Data where industry of employment was not stated or was inadequately described have been excluded.

Source: Derived from ABS 2012a and ABS 2002

In all major cities there was a significant increase in the proportion of females employed in the other services group, as shown in Figure 3-19. There were declines in the proportion of females employed in the trade, transaction services and cultural services categories in all major cities.

Figure 3-19   Change in the proportion of females employed by industry group, 2001–11
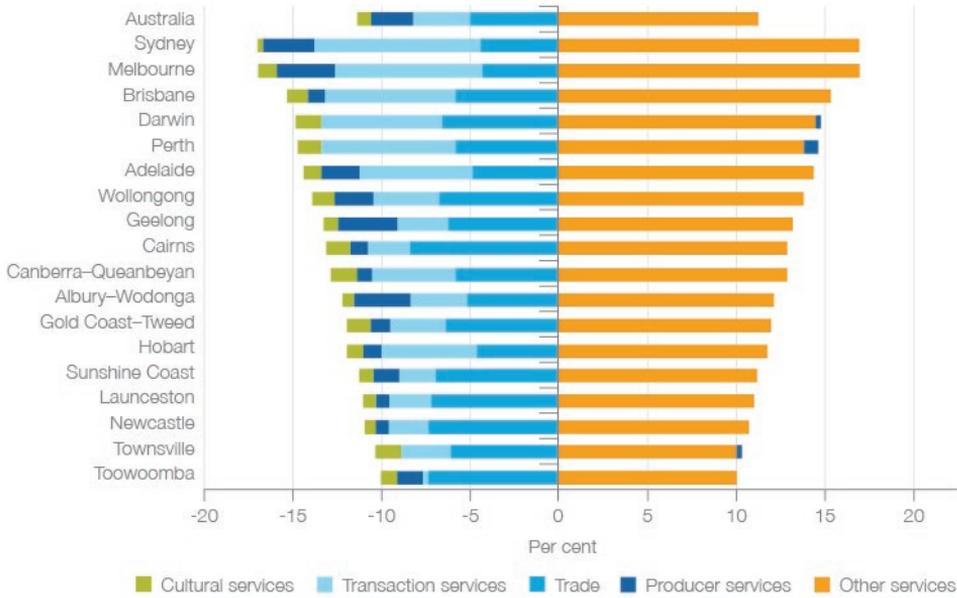
Note: See Table 3-10 for the breakdown of the industry groups by industry sector. Data where industry of employment was not stated or was inadequately described have been excluded.

Source: Derived from ABS 2012a

Figure 3-20 to Figure 3-23 illustrate the share of employment by industry structure for both males and females in 2011 in major cities. They show that industry structure in cities is highly variable, indicating that each city plays a unique role in the nation's economic system. They also show a significant difference in the top employing industries for males and the top employing industries for females.

Figure 3-20   Proportion of males employed by industry sector in capital cities, 2011
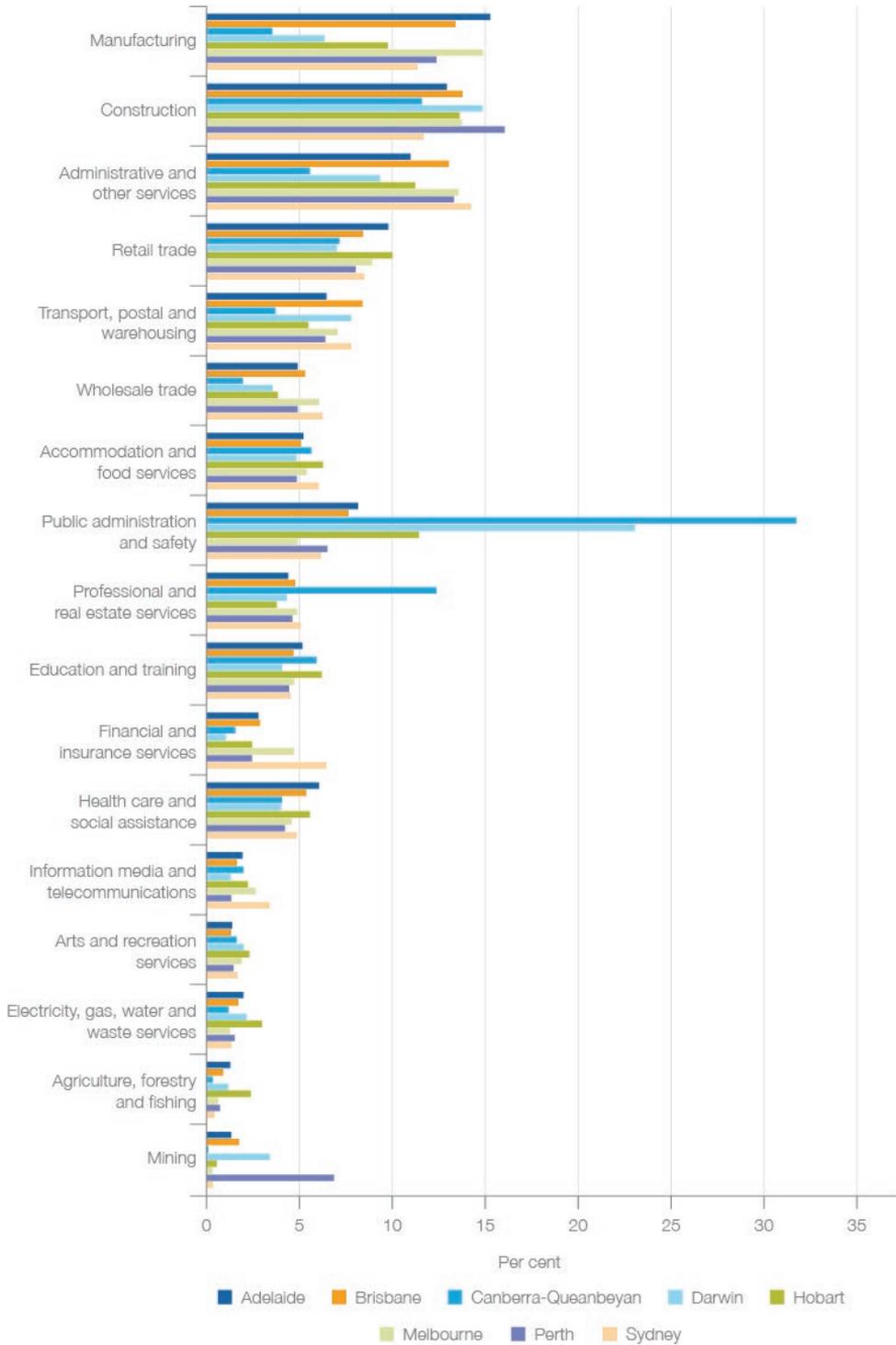
Source: Derived from ABS 2012a

Canberra and Darwin have a unique government service focus. Both cities have also seen a significant increase in reliance on the public sector for employment between 2001 and 2011. The large capital cities have a focus on financial, insurance, professional, scientific and technical services. Sydney and Melbourne have by far the highest share of employment in the finance and insurance sectors. This is likely to be a reflection of agglomeration, the large population bases in these cities and their global focus. Sydney and Melbourne are Australia's national business and finance centres and connect Australia with the global market (BITRE 2009).

Sydney's and Melbourne's employment in these sectors tend to be clustered in central locations rather than spread across the larger metropolis. Map 3-10, Map 3-11, Map 3-12 and Map 3-13 show the geography of the proportion of employed people working in the finance and insurance and in professional, scientific and technical services by place of work. They reveal that jobs in these sectors tend to be clustered in central areas.

Map 3-10   Proportion of employed persons working in the financial and insurance sector by place of work in Sydney, 2011
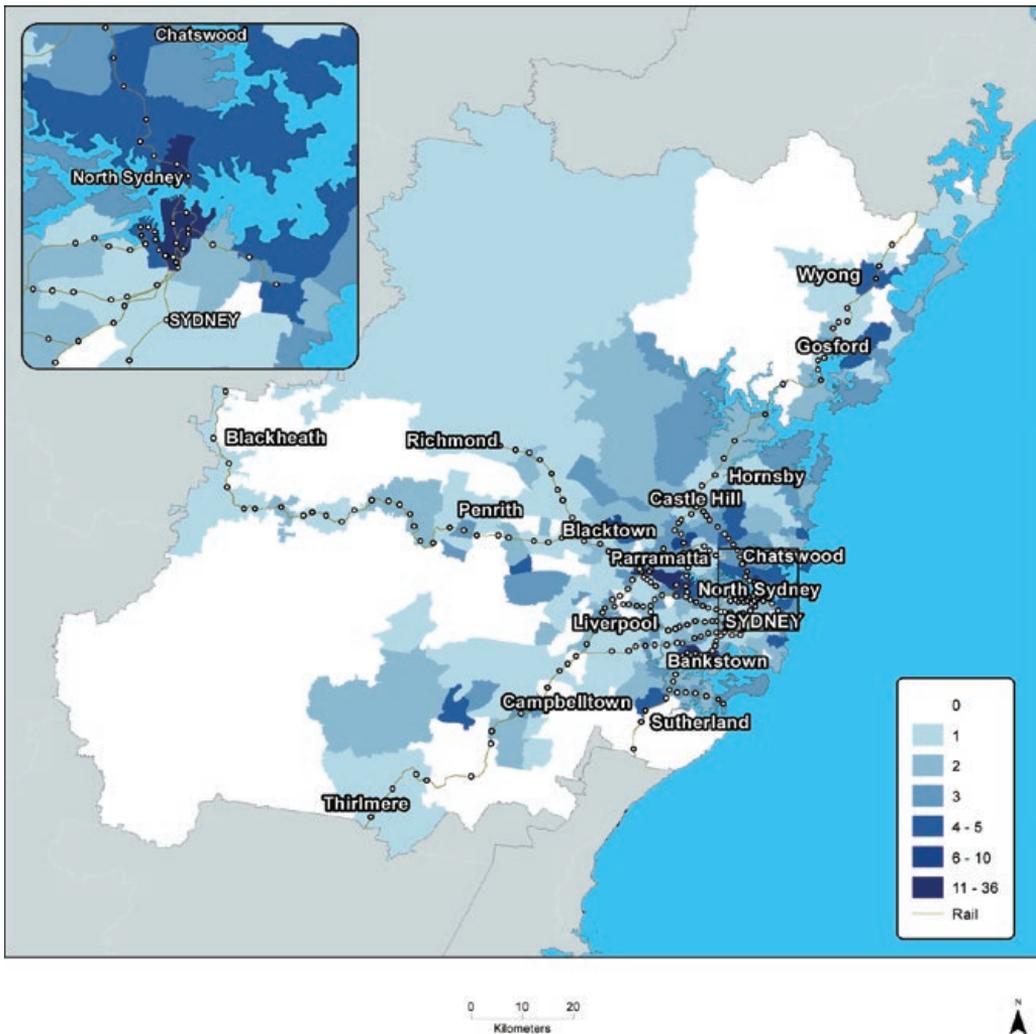
Map 3-11   Proportion of employed persons working in the financial and
insurance sector by place of work in Melbourne, 2011
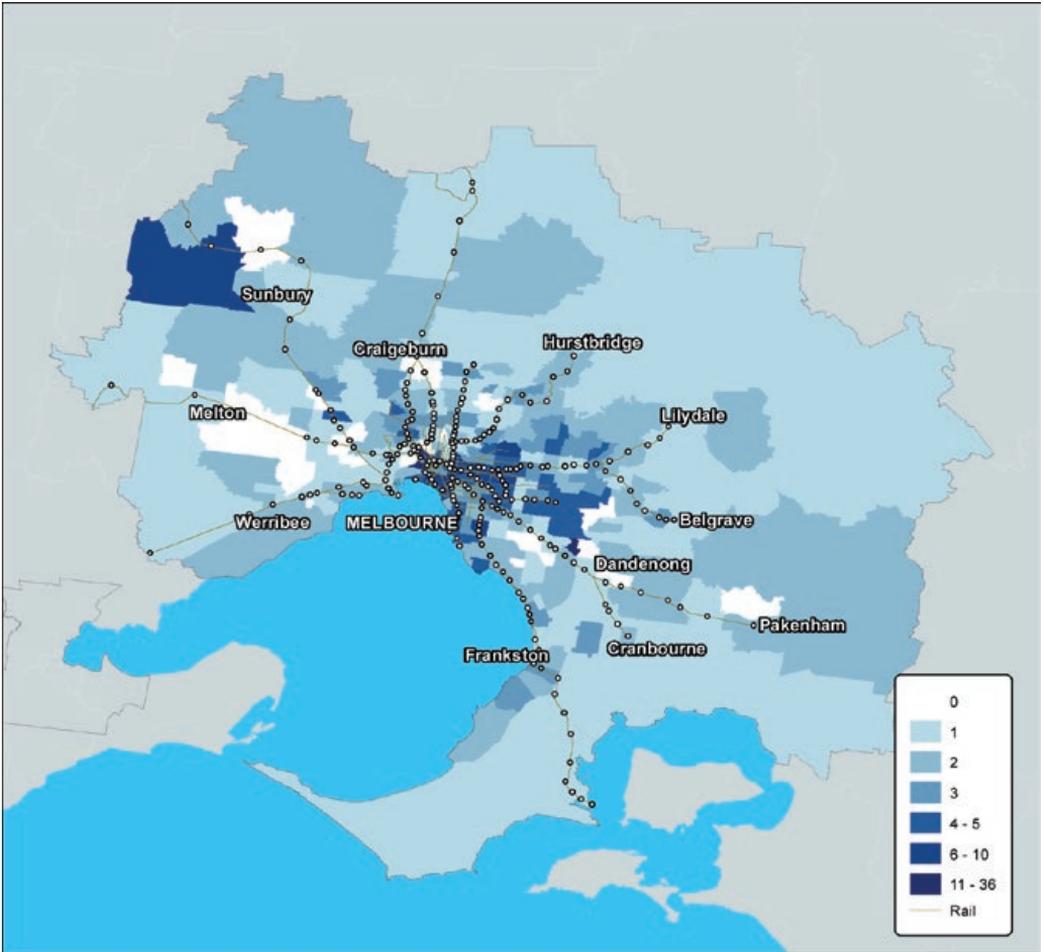
Map 3-12   Proportion of employed persons working in the professional, scientific and technical services sector by place of work in Sydney, 2011
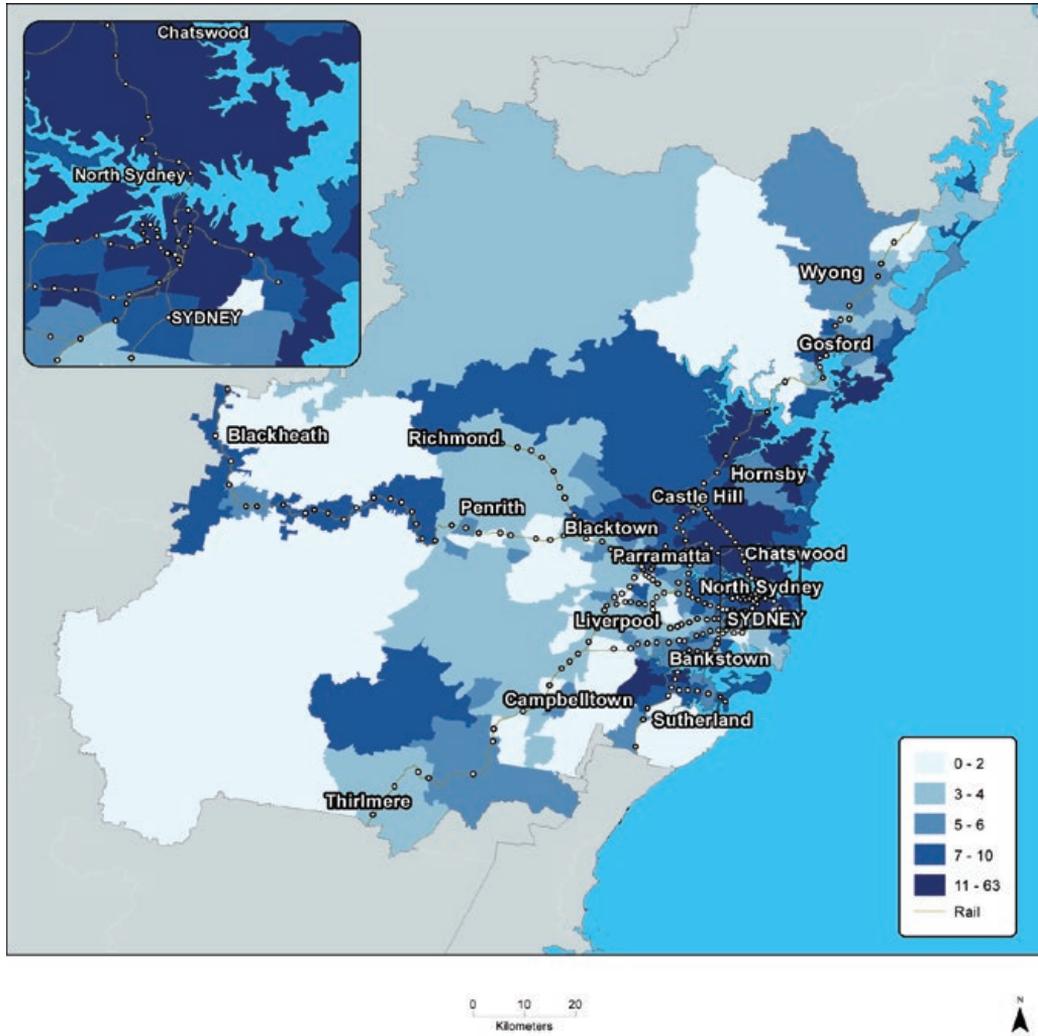
Map 3-13   Proportion of employed persons working in the professional, scientific and technical services sector by place of work in Melbourne, 2011
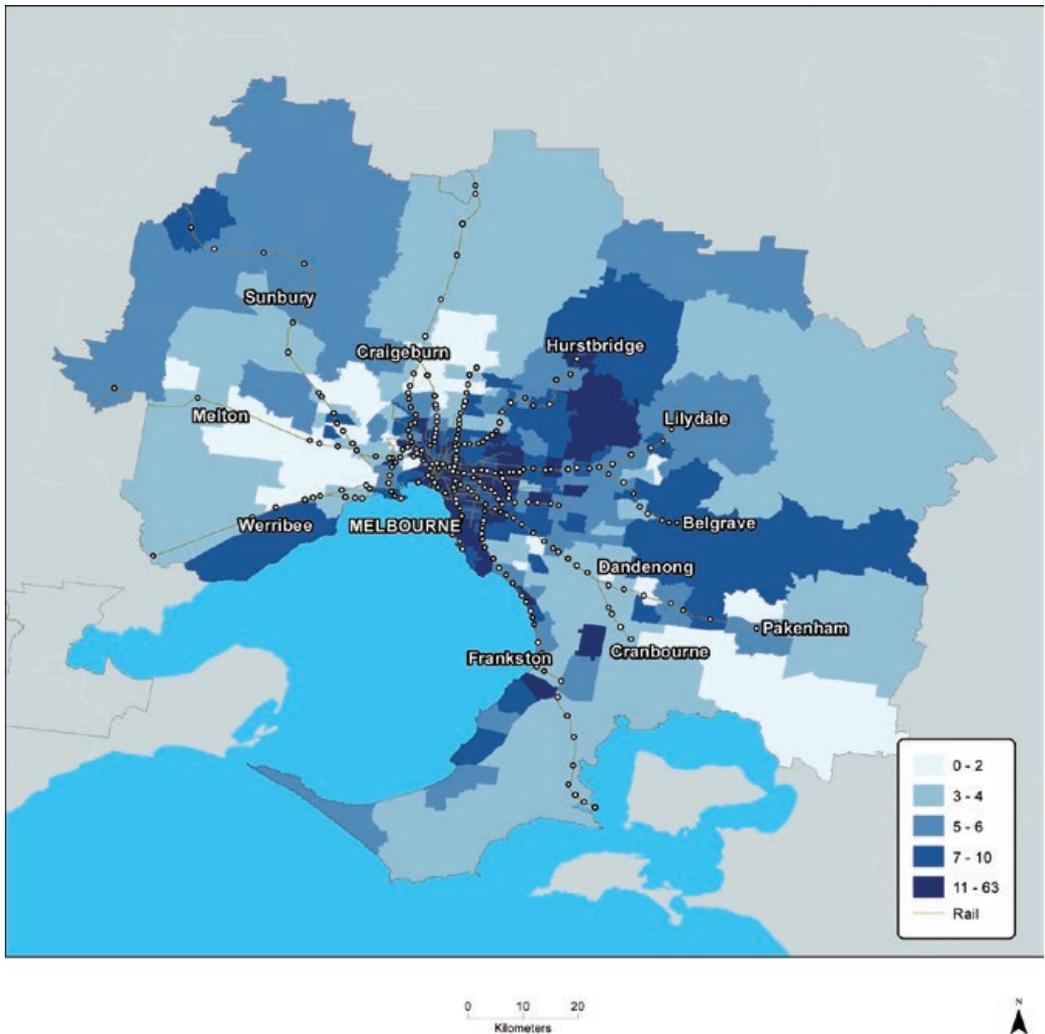
Non-capital cities show more variability, reflecting their more unique and specialised industry focuses (see Figure 3-21 and Figure 3-23). Albury-Wodonga and Geelong both specialise in manufacturing, while Cairns, the Sunshine Coast and the Gold Coast have the highest proportion of workers employed in the accommodation, cafes and restaurants sector than the other major cities, a reflection of their tourism focus. While regional cities tend to have specialised industry focuses, the industry structure of male employment in the non-capital cities tends to show greater variation between cities than the structure of female employment.

Figure 3-21   Proportion of males employed by industry sector in non-capital major cities, 2011
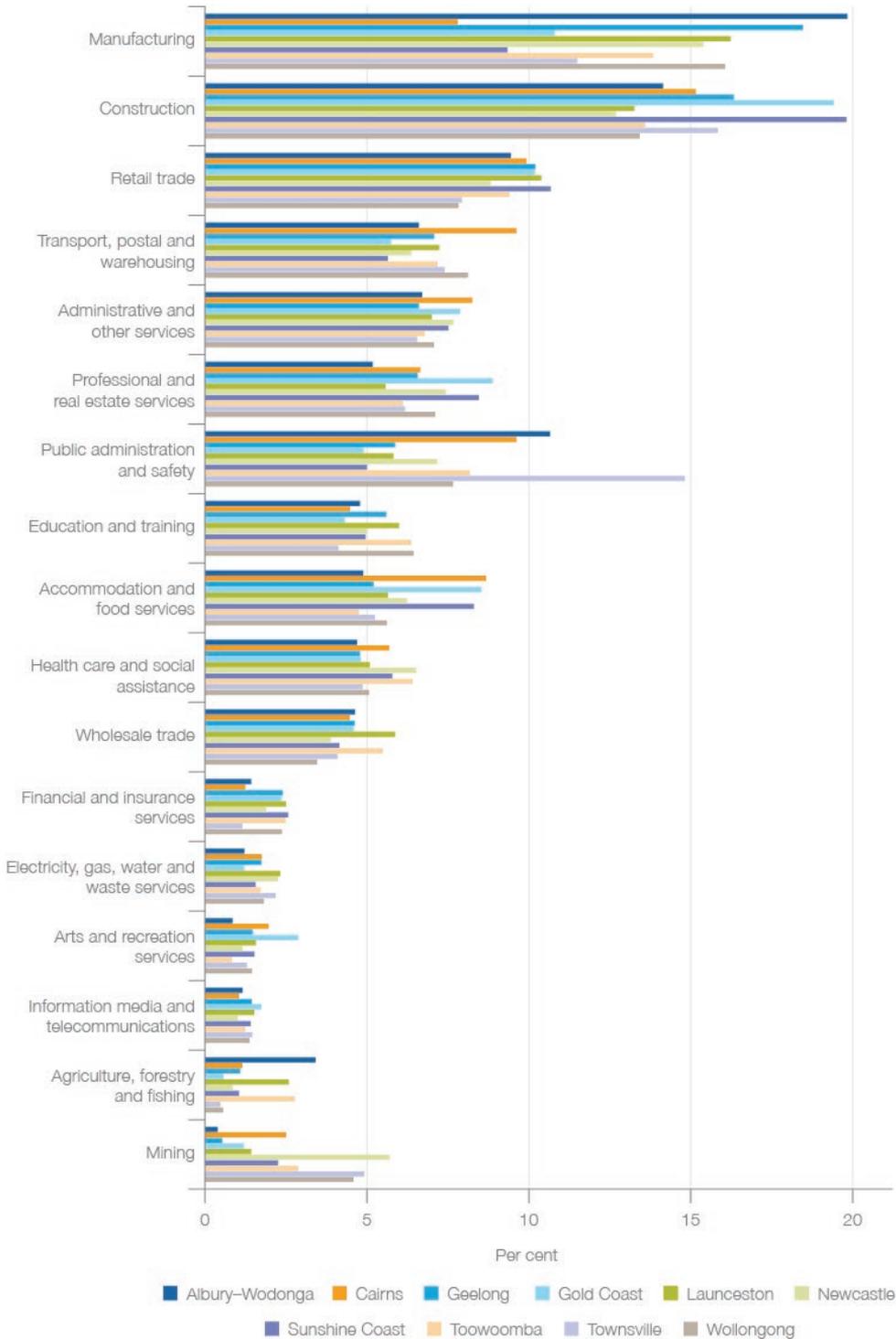
Source: Derived from ABS 2012a

Figure 3-22   Proportion of females employed by industry sector in capital cities, 2011
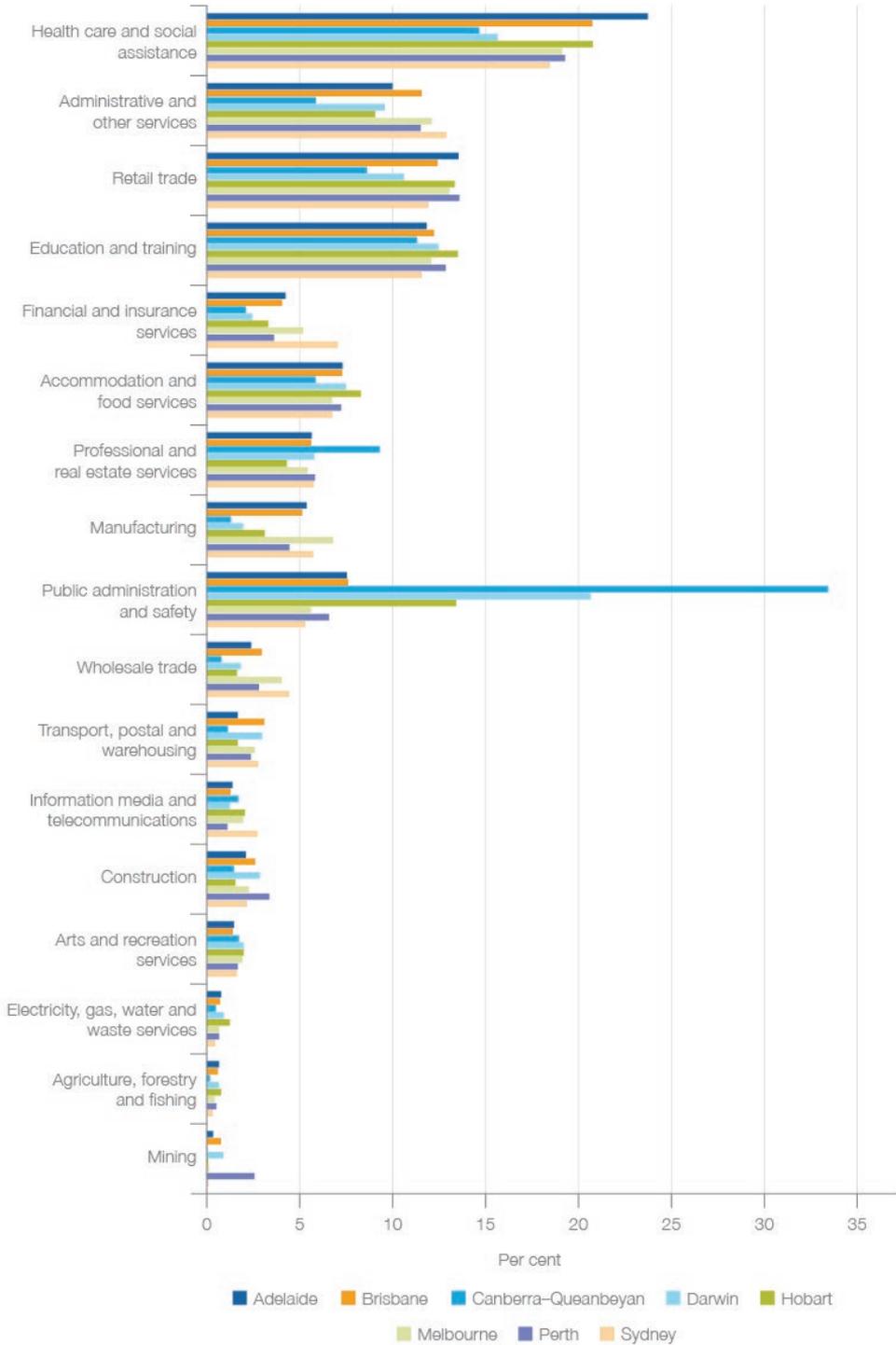
Source: Derived from ABS 2012a

Figure 3-23   Proportion of females employed by industry sector in non-capital
major cities, 2011
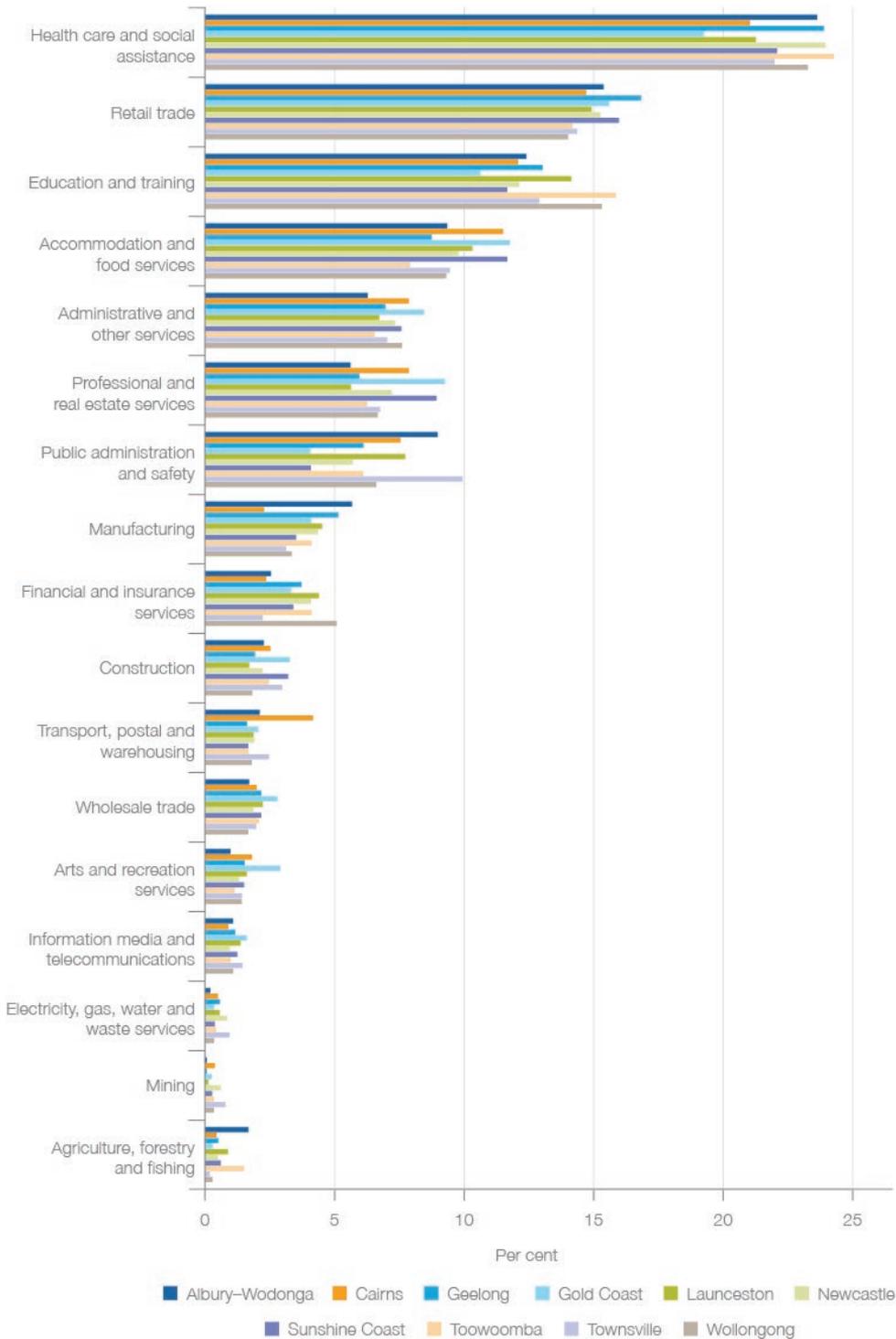
Figure 3-24 to Figure 3-27 show that employment by industry has changed noticeably in Australia's major cities between 2001 and 2011. There were notable declines in the proportion of people employed in retail trade and manufacturing in all major cities between 2001 and 2011. There were increases in the proportion of people employed in the public administration and safety sector and the accommodation and food services sector in most cities. There were significant increases in the proportion of males employed in construction in all major cities and most females were employed in health care and social assistance. All non-capital cities experienced increases in the proportion of males employed in mining.

Ship berthed at Kwinana.
Image courtesy of Ceri Breheny

Figure 3-24   Change in the proportion of males employed by industry sector in
capital cities, 2001–11
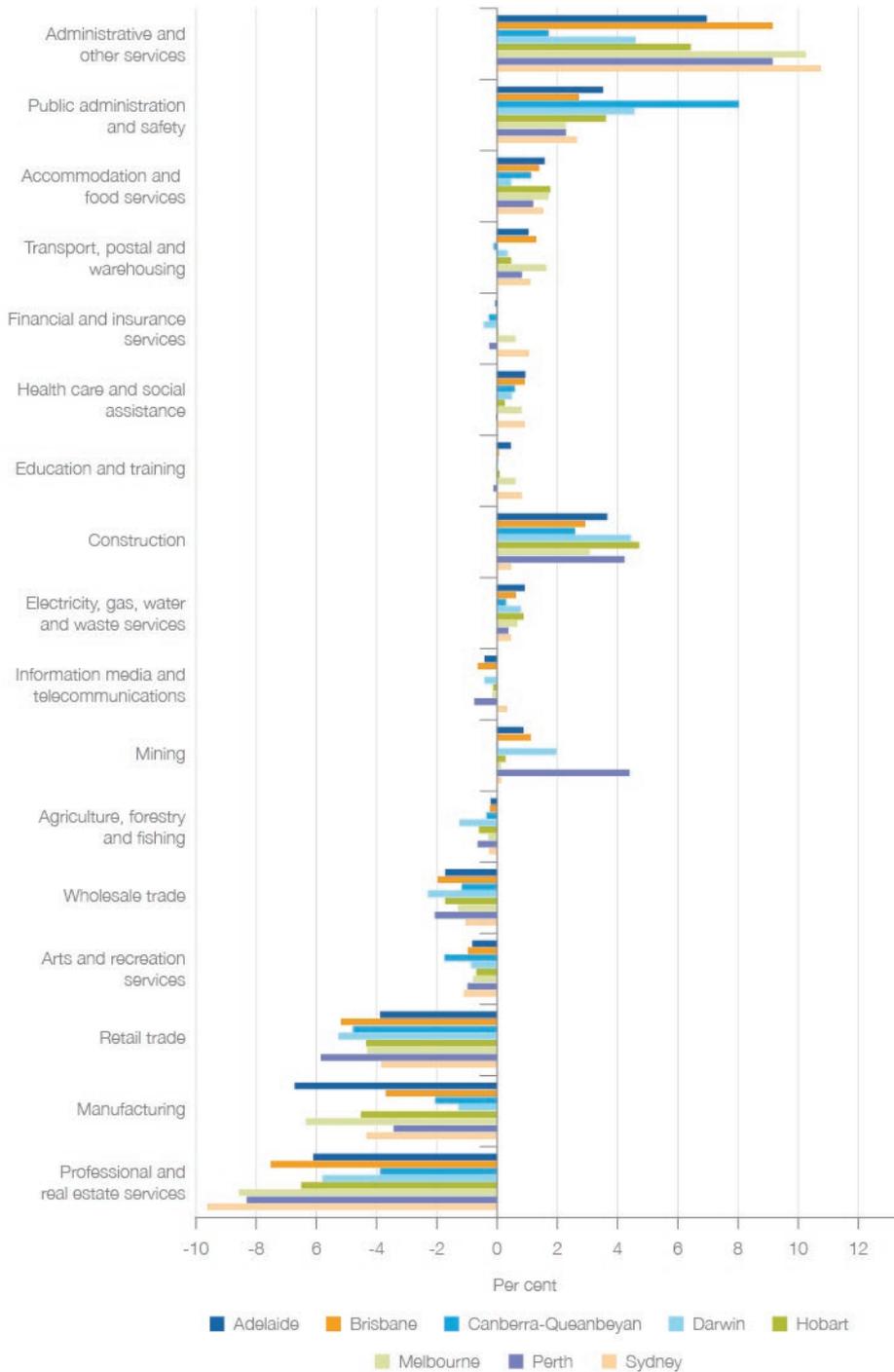
Note: Some industry sector categories have changed slightly since 2001, which may have a minor effect on the
percentage of change in some industries, particularly professional and real estate services and administrative
and other services.

Source: Derived from ABS 2012a

Figure 3-25   Change in the proportion of males employed by industry sector in non-capital major cities, 2001–11
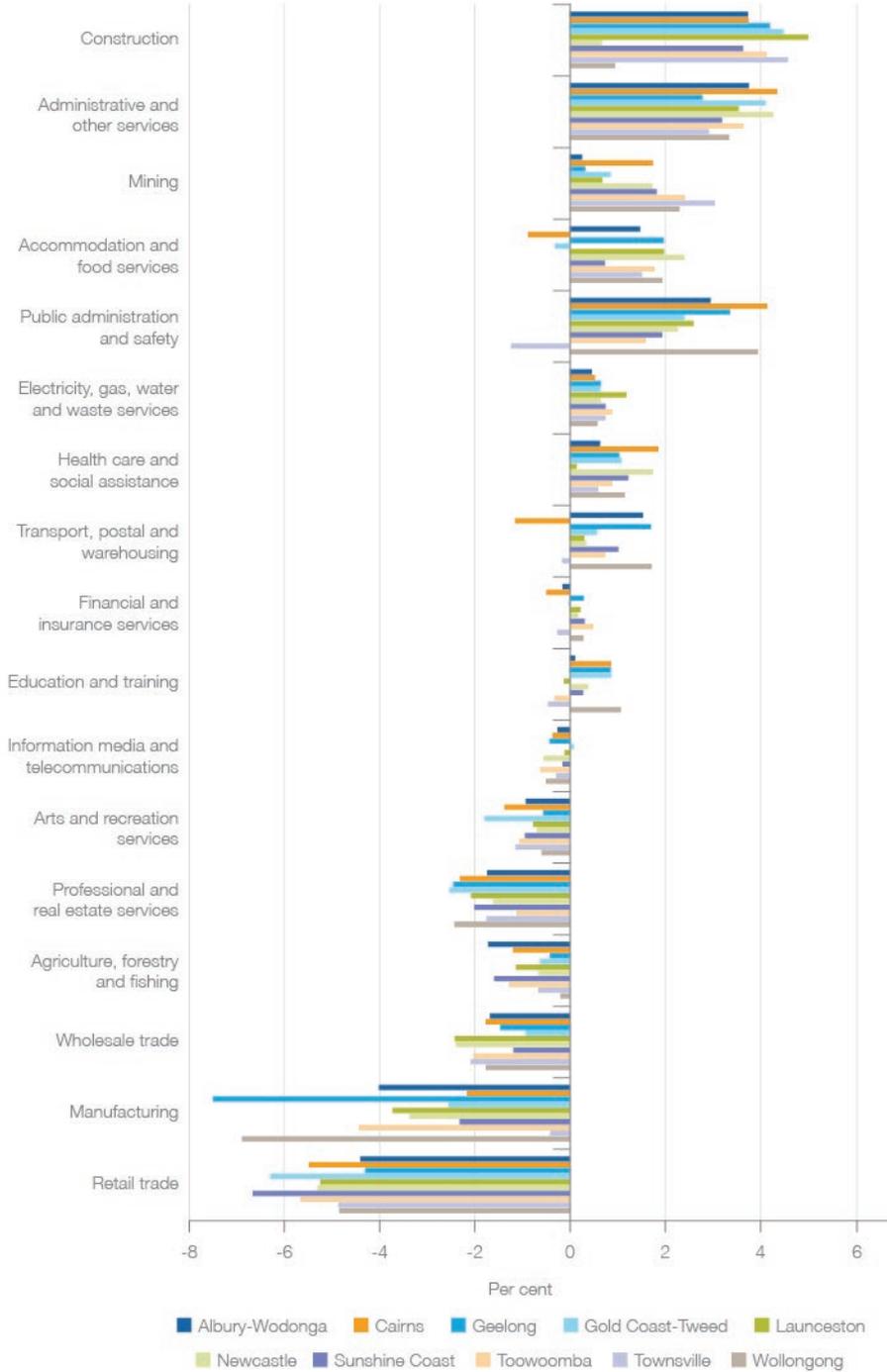
Note: Some industry sector categories have changed slightly since 2001, which may have a minor effect on the percentage of change in some industries, particularly professional and real estate services and administrative and other services.

Source: Derived from ABS 2012a

Figure 3-26   Change in the proportion of females employed by industry sector in capital cities, 2001–11
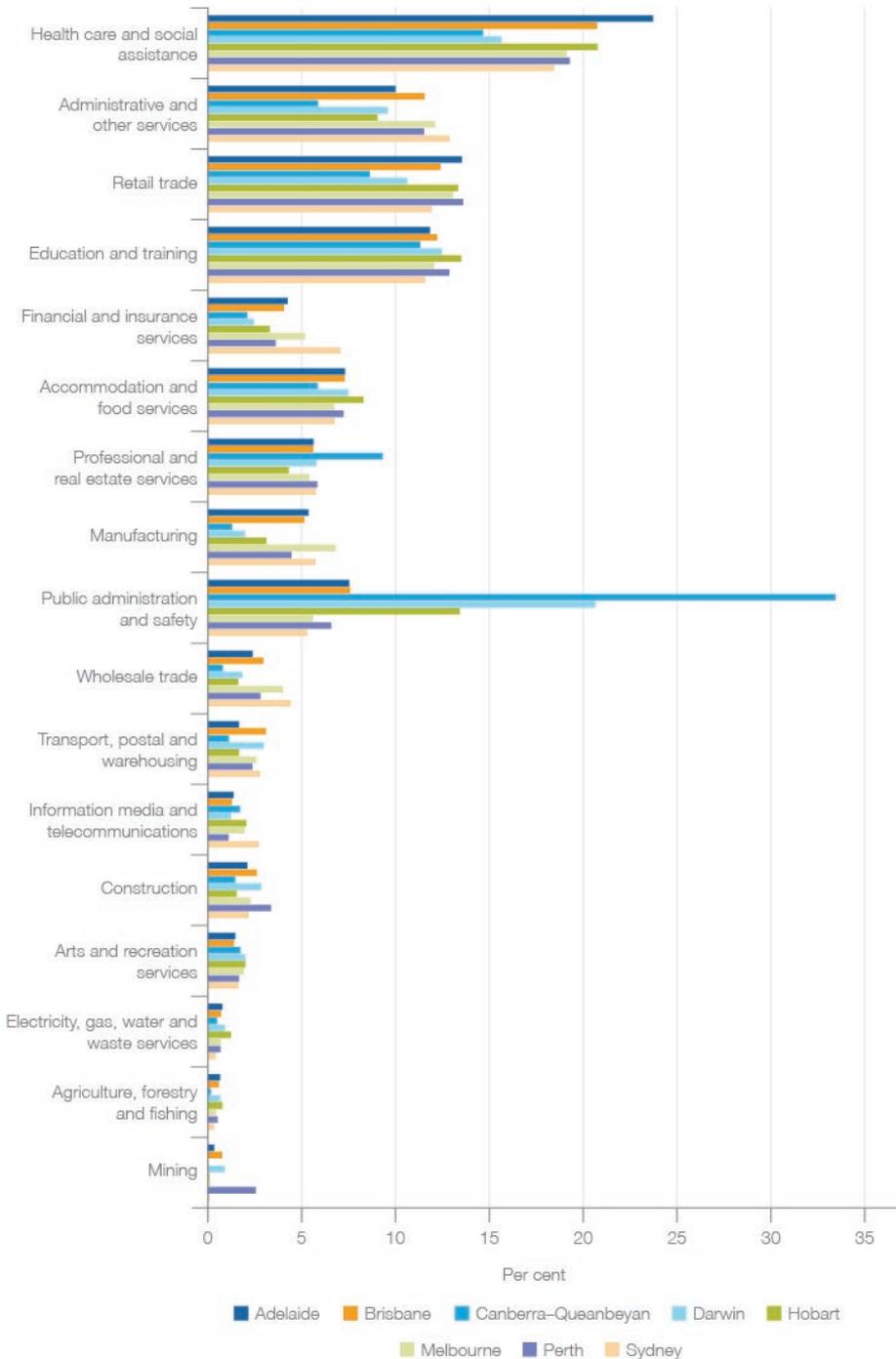
Note: Some industry sector categories have changed slightly since 2001, which may have a minor effect on the percentage of change in some industries, particularly professional and real estate services and administrative and other services.

Source: Derived from ABS 2012a

Figure 3-27   Change in the proportion of females employed by industry sector in non-capital major cities, 2001–11
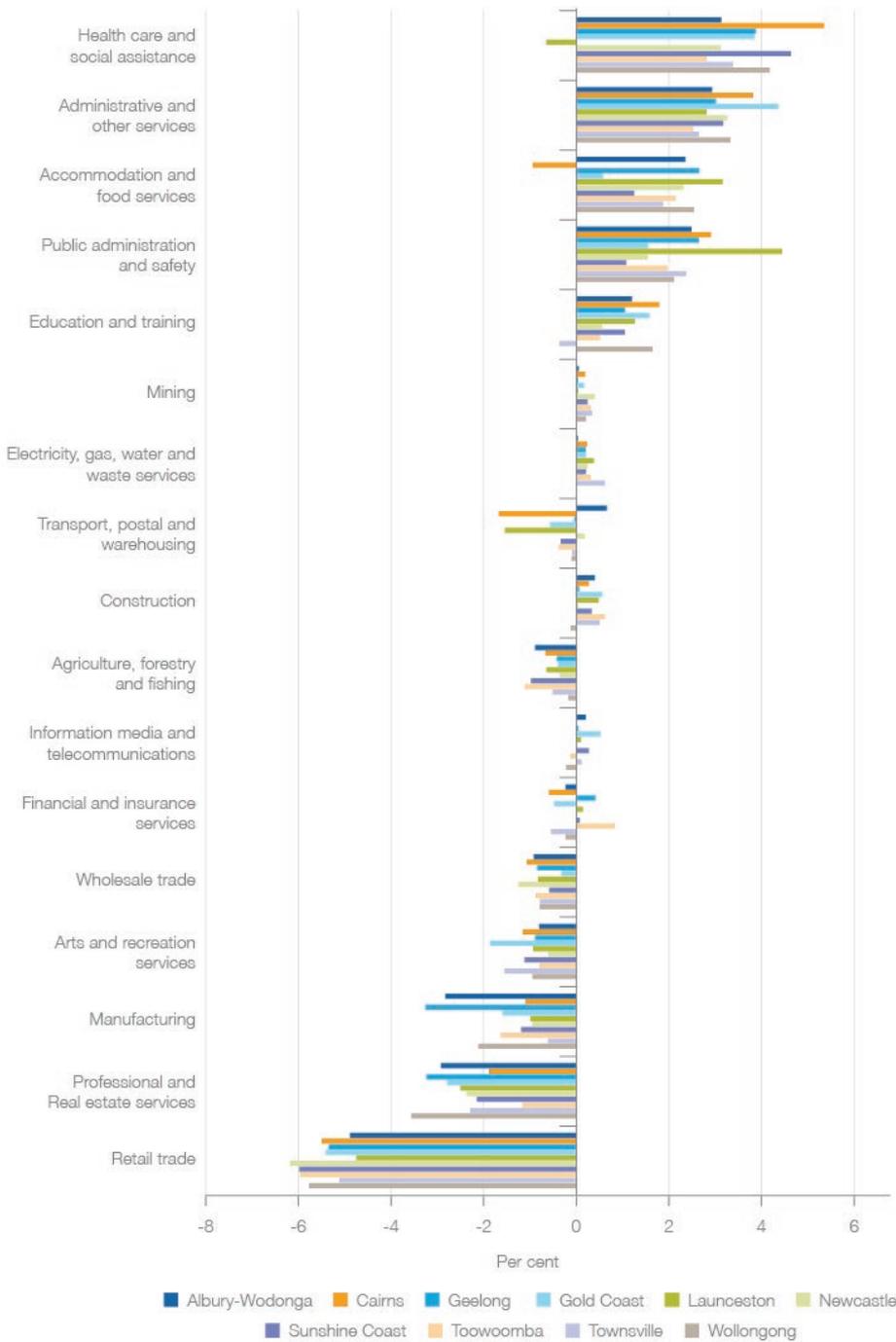
Note: Some industry sector categories have changed slightly since 2001, which may have a minor effect on the percentage of change in some industries, particularly professional and real estate services and administrative and other services.

Source: Derived from ABS 2012a

Manufacturing

Manufacturing is one of Australia's most productive and largest employing sectors (Australian Business Chamber 2011). In 2011–12, manufacturing was the third largest contributing sector to Gross value added (GVA) in Australia, contributing 10.1 per cent to total GVA or $102.1 billion (ABS 2013a). Manufacturing has a multiplier effect on the economy and drives jobs, investment and sales in other sectors (Prime Minister's Manufacturing Taskforce 2012).

The rise in the productivity of workers in the manufacturing sector was a major driver of the great leap in living standards in most developed nations during the last century (Australian Business Chamber 2011, Moretti 2012). More recently, manufacturing jobs have been doing the same for living standards in India and China (Moretti 2012).

Manufacturing is a very important economic contributor to Australia's major cities and regions within them. In Western Sydney, for example, the manufacturing sector drives approximately 16 per cent of its estimated $100 billion gross regional product (Morton and Bennet 2013, derived from ABS 2013). The manufacturing sector is an important employer because, like retail trade, it is accessible to a wide range of labour force entrants, particularly young workers (BITRE 2009). In addition, it is a relatively well paid sector. In 2012 on average it paid above the average for all industries (see Table 3-11).

Map 3-14 shows that in Sydney a high proportion of workers are employed in the manufacturing sector in pockets of the city, particularly in the outer suburbs. Similar maps for other major cities can be viewed using the supplementary online map application.

Map 3-14   Proportion of workers employed in the manufacturing sector by place of work in Sydney, 2011
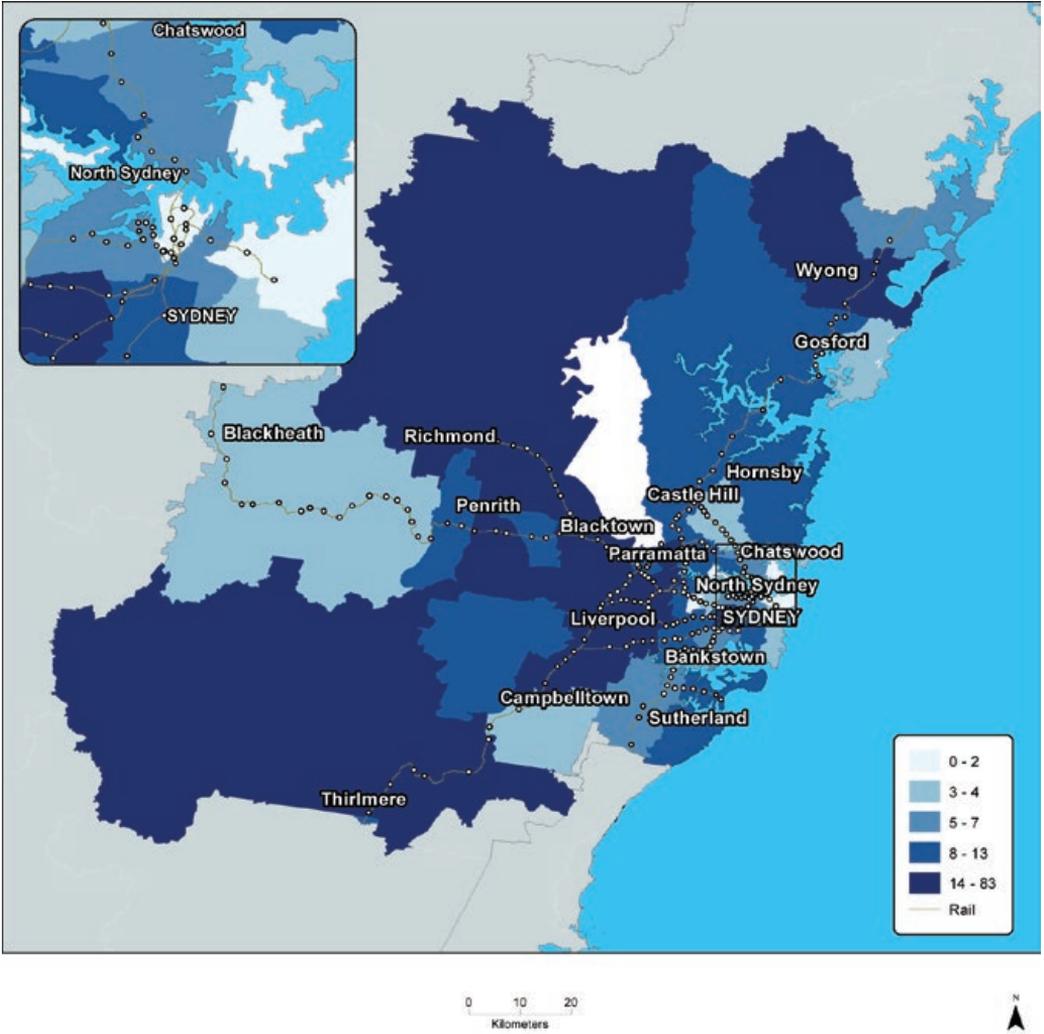
Map 3-15 shows which areas gained jobs in the manufacturing sector and which areas lost jobs in the decade to 2011. Almost all inner and middle areas lost manufacturing jobs over the period, while selected areas in the outer suburbs gained some jobs.

Map 3-15   Change in the proportion of workers employed in the manufacturing sector by place of work in Sydney, 2001–11
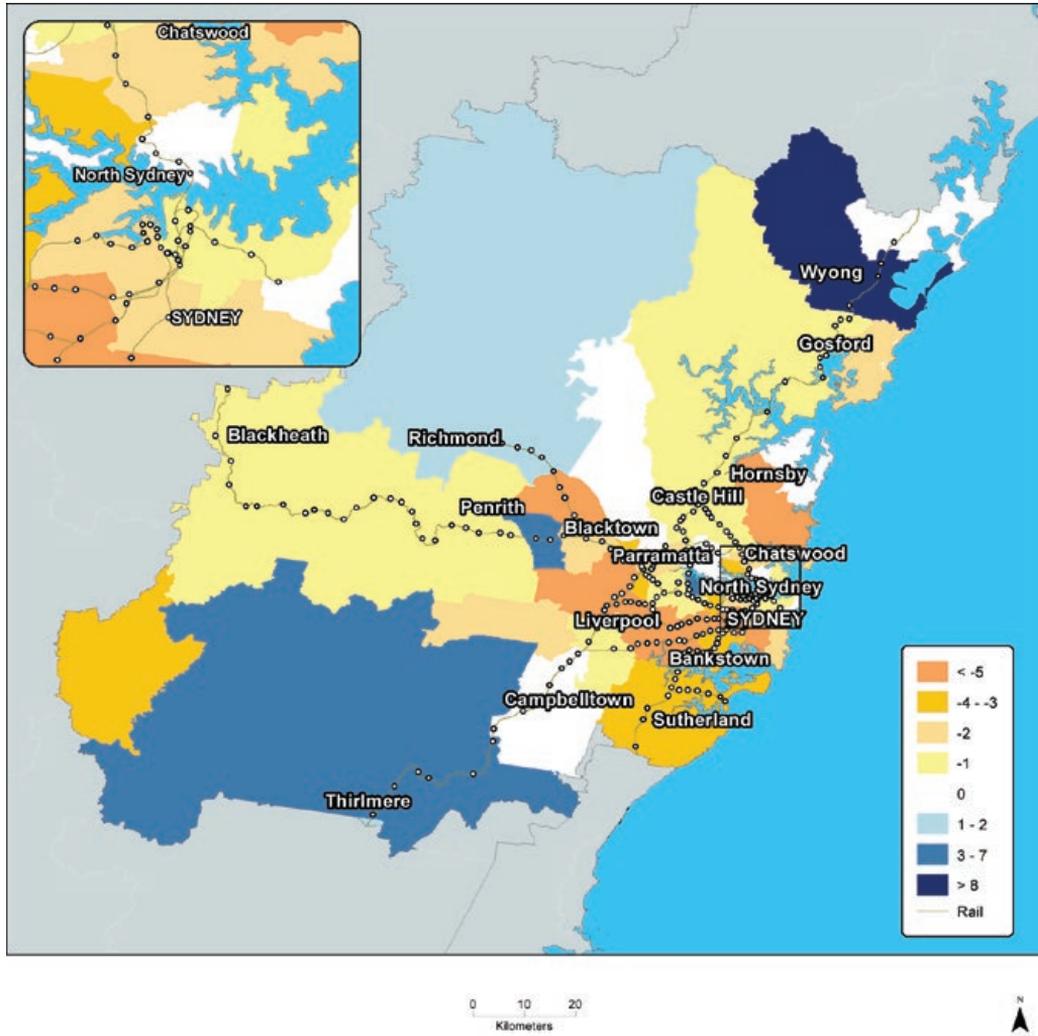
Note: To avoid reporting changes caused by SLA redefinitions or coding changes between 2001 and 2011, some SLAs have been grouped together prior to calculating the change.

Map 3-16 shows that in Melbourne a high proportion of workers are employed in the manufacturing sector in certain parts of the city, particularly in certain areas of the middle suburbs.

Map 3-16   Proportion of employed persons working in the manufacturing sector by place of work in Melbourne, 2011
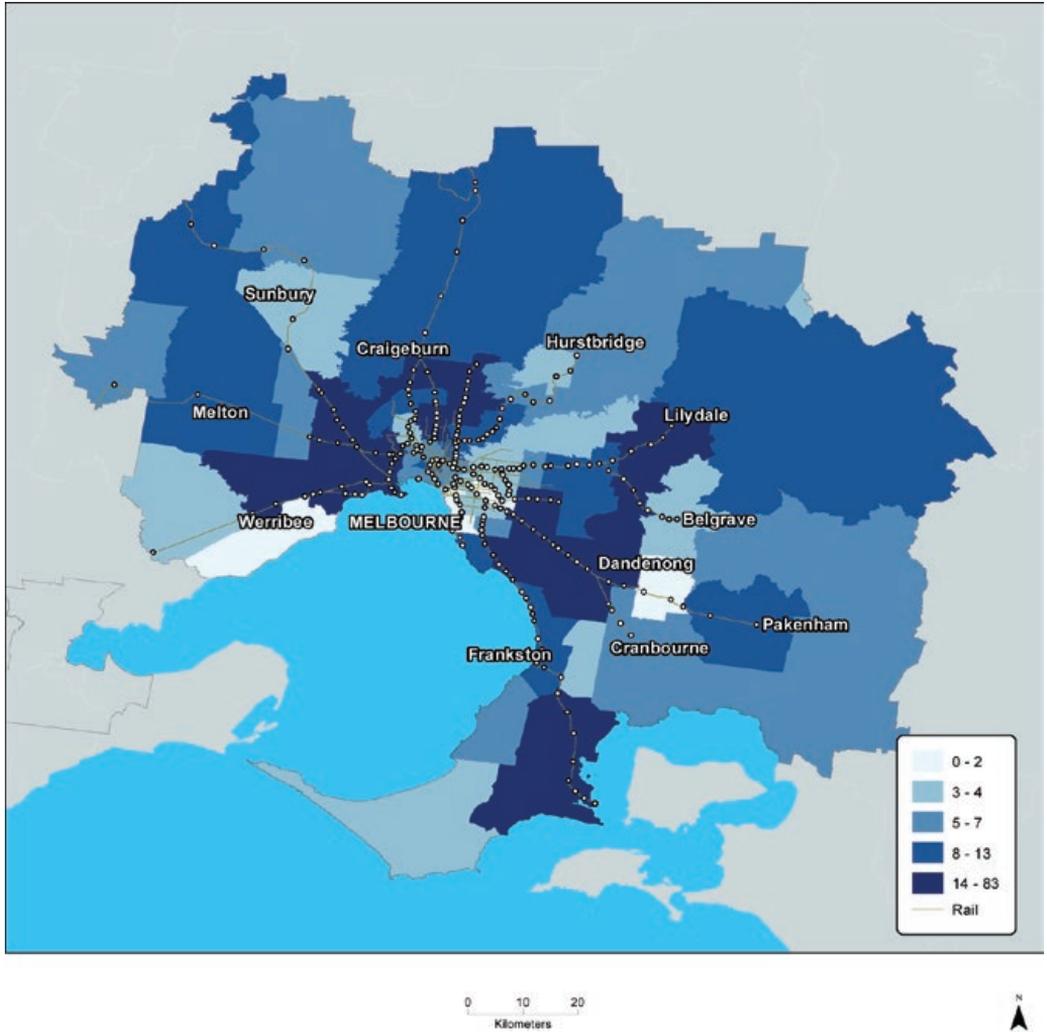
Map 3-17 reveals that between 2001 and 2011 Melbourne's inner and middle areas also lost manufacturing jobs, similar to the trend experienced in Sydney. Some pockets of the outer suburbs gained some manufacturing jobs.

Map 3-17   Change in the number of workers employed in the manufacturing sector by place of work in Melbourne, 2001–11
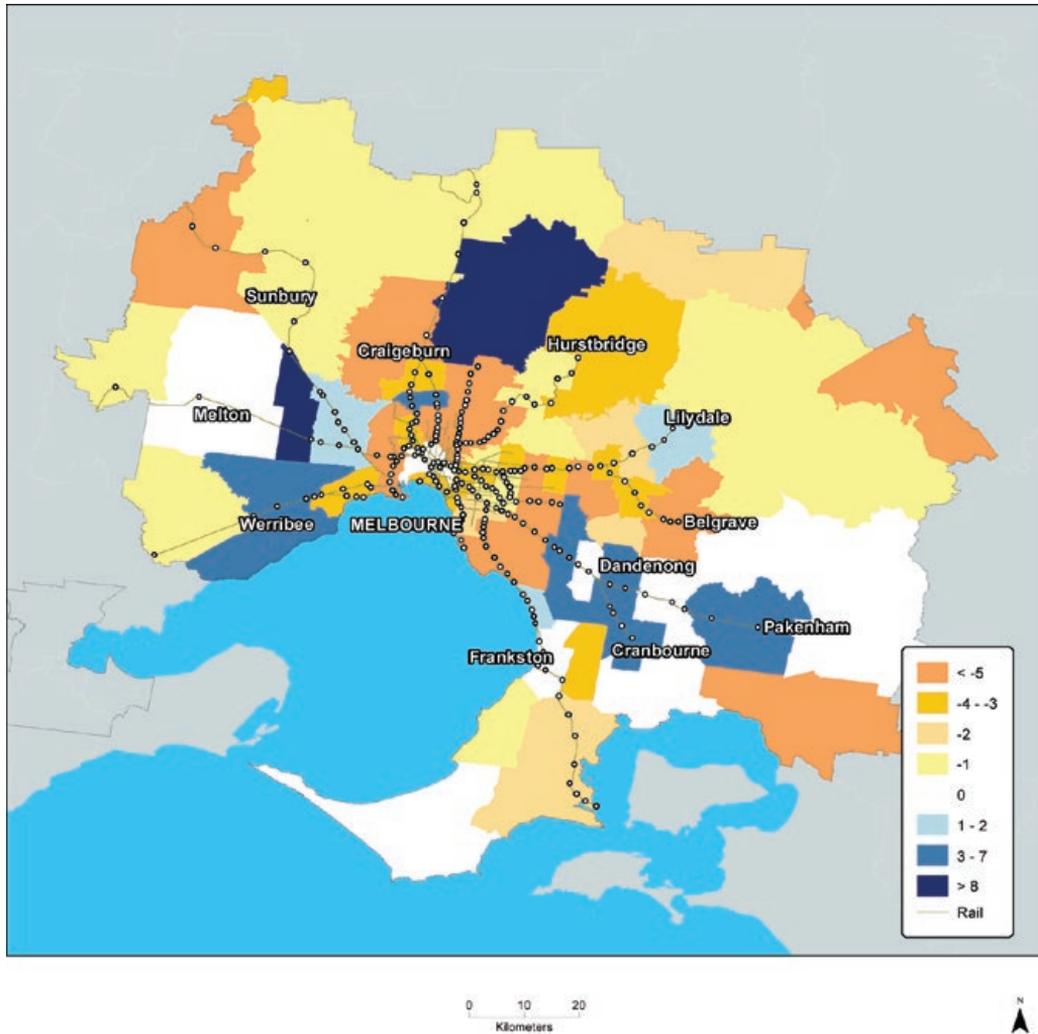
Note: To avoid reporting changes caused by SLA redefinitions or coding changes between 2001 and 2011, some SLAs have been grouped together prior to calculating the change.

Despite the recent reduction in the proportion of people employed in manufacturing in Australia's major cities, the sector is not in decline; rather, it is undergoing transformation. There are two aspects driving this transformation:

- the growing interdependence between manufacturing and other sectors of the economy, particularly services

- the rise of the knowledge economy and high-skilled, high-value jobs emerging as a driver of business innovation and productivity (Australian Business Chamber 2011).

It is becoming increasingly important for the manufacturing productivity to create increased value for customers and capture part of this value. Australian manufacturing firms are becoming more innovative and knowledge-intensive, creating customised business offerings by joining products and services together in diverse ways to meet customer needs (Australian Business Chamber 2011). This may have implications for the location and nature of manufacturing jobs in major cities into the future.

Toowoomba.
Toowoomba Regional Council

Retail trade

Retail trade is another one of Australia's largest employing sectors. As is the case with manufacturing, the number of people employed in the sector has declined from 14.9 per cent of Australians in 2001 to 10.5 per cent in 2011 (ABS 2012b). This reduction may have been partly due to a change in the savings behaviour of households following the Global Financial Crisis. The retail trade industry is affected by the economic cycle so interest rates, disposable incomes, consumer confidence and technological change all affect performance (DEEWR 2008a in BITRE 2009). Employment in retail trade in major cities tends to be spread across cities and concentrated around secondary employment hubs such as activity centres, rather than in CBDs. Map 3-18 and Map 3-19 show the proportion of workers employed in retail trade by place of work in Adelaide and Gold Coast – Tweed in 2011.

Map 3-18   Proportion of employed persons working in the retail trade sector by place of work in Adelaide, 2011
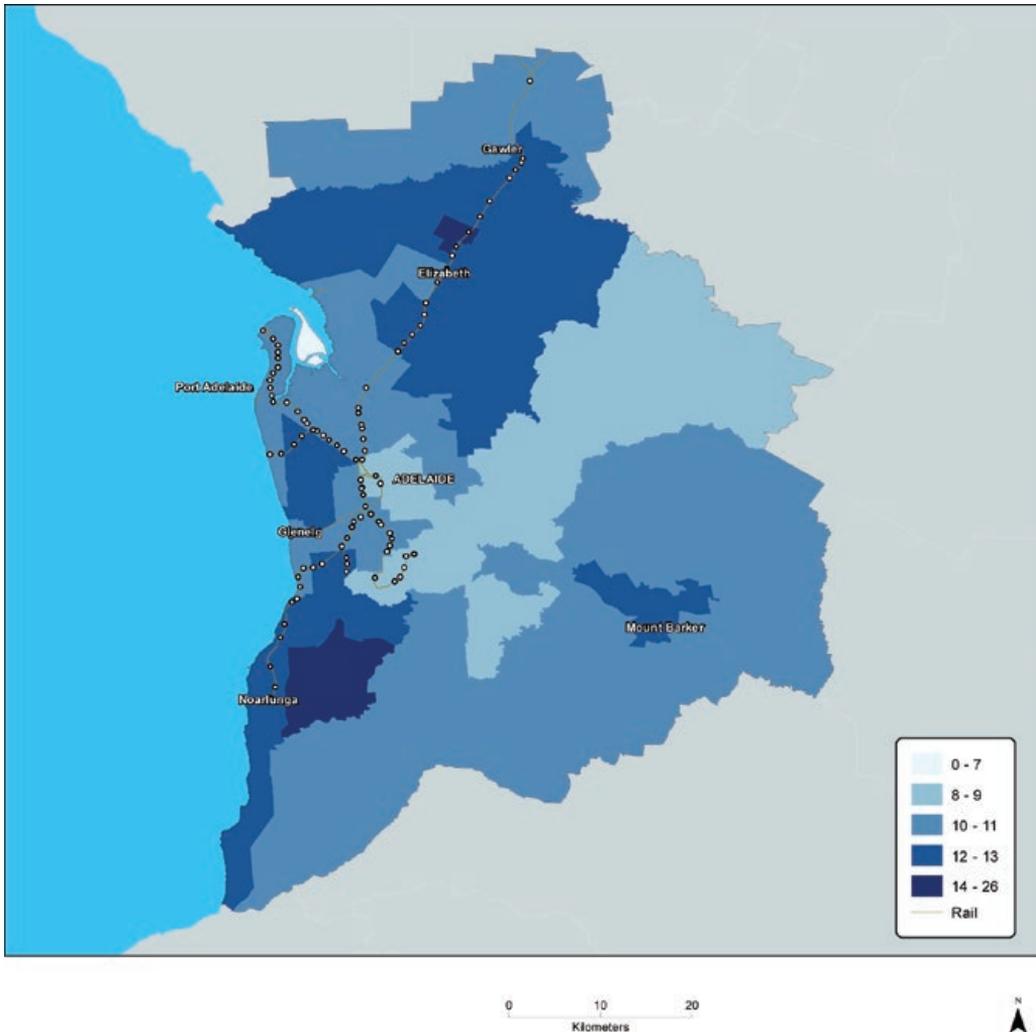
Map 3-19   Proportion of employed persons working in the retail trade sector by place work in Gold Coast – Tweed, 2011
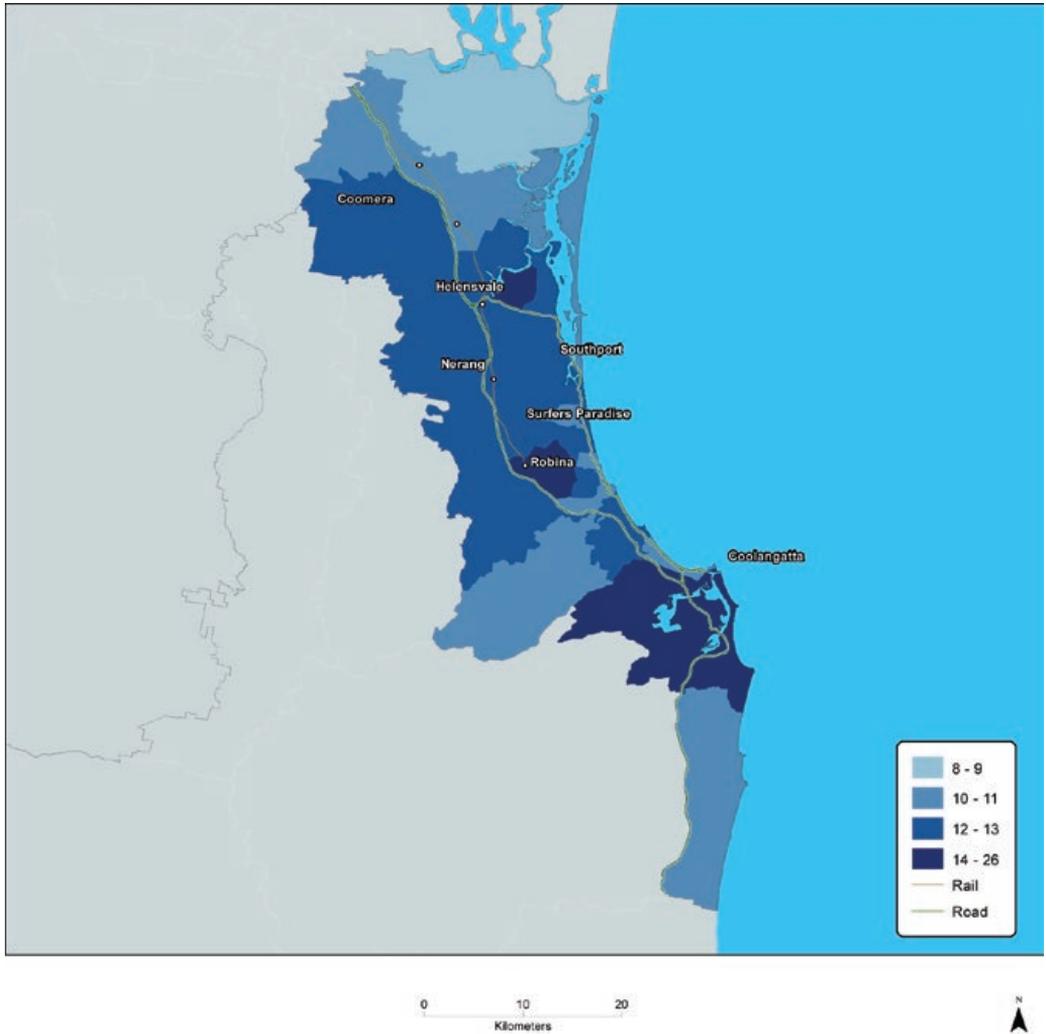
The night-time economy

'Night-time economy' (NTE) refers to night-time leisure or work that generates economic activity. Hospitality is a main driver of night-time activity, but other examples include evening sports, nightclubs, hospitals and convenience stores. A recent report (TBR Economic Research & Business Intelligence 2013) valued the Australian NTE at $92 billion and estimated that its value increased by 8.2 per cent between 2009 and 2011. The report estimated that the NTE employed 8.4 per cent of all Australian employees in 2011 – an increase of 6.9 per cent since 2009.

Comparing the outputs of LGAs is difficult because of differences in population growth, wealth, age and size. However, changes in the size of the night time economies of our major city centres can be compared. Figure 3-28 shows changes in the size of night time economies between 2009 and 2011. The central city LGAs of selected major cities are compared, as they are the only areas for which substantial data is available.

Figure 3-28   Change in the size of the night-time economy in selected major city central LGAs, 2009–11
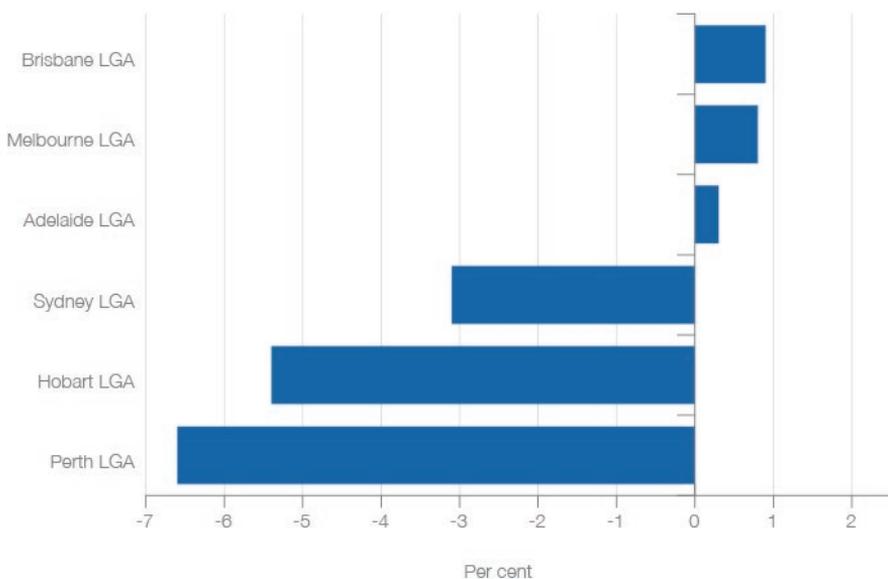
Note: These are the only major city central LGAs for which data is available.

Source: TBR Economic Research & Business Intelligence 2013

Increasingly, cities are competing to attract skilled workers. The liveability of a city and its vibrancy, particularly at night, influence a city's attractiveness. The NTE is important for attracting visitors to cities.

Many night-time activities are rely on late-night transport. Public transport services often finish or significantly reduce in frequency in the late evening, limiting the options available for night-time workers and visitors to move across the city and return home safely.

The impact of the mining sector and associated fly in, fly out and drive in, drive out practices on Australia's major cities

One might assume that the mining boom is something that is confined to regional and remote areas. However, in reality it is as much an urban industry as a regional and remote industry. Figure 3-29 shows the mining sector's contribution to Gross Regional Product in Brisbane compared with its contribution to the rest of Queensland.

Figure 3-29   Mining sector contribution to Gross Regional Product in Brisbane and the remainder of Queensland, 2012

■ Mining sector contribution to GRP ($ millions) in the remainder of Queensland
■ Mining sector contribution to GRP ($ millions) in Brisbane

24,125   24,250
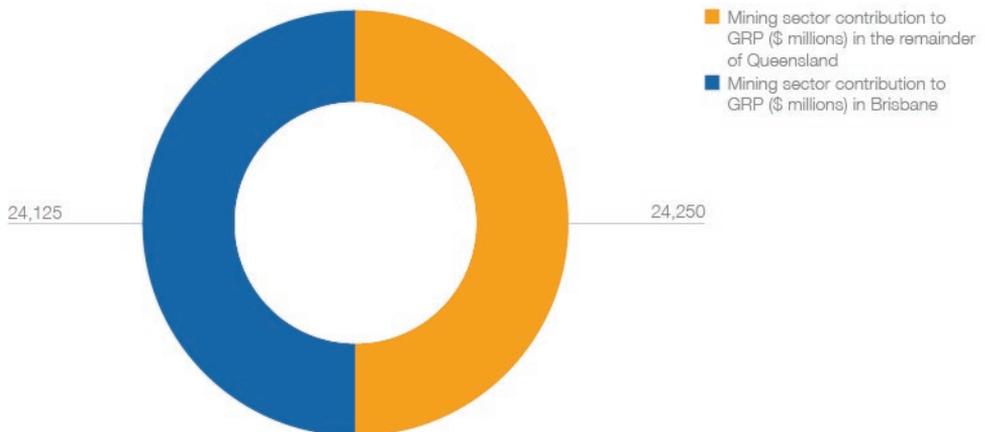
Source: SGS Economics and Planning 2012

The mining sector currently employs approximately 276,300 Australians (ABS 2013a). It employed 1.8 per cent of working Australians in 2011, up from 1.2 per cent in 2006 (ABS 2012c). The sector has the highest average weekly wage for any sector – $2,381.20 in November 2012, more than double the average for all industries ($1,081.30). Its workforce is predominantly male and has a slightly higher than average median workforce age – 40 compared with the national average of 37.

Figure 3-30 shows the large proportion of mining sector employees that resided in Australia's major cities in 2011. More mining sector employees resided in Perth – 40,919 or approximately 22 per cent of Australia's mining sector employees – than in any other city or town in Australia in 2011 (ABS 2012a). In 2011, 12,822 Greater Perth residents worked in the mining sector and reported a place of work outside of Perth. Many of these residents are likely to be engaged in fly in, fly out (FIFO) or drive in, drive out (DIDO) practices (ABS 2013b).

Figure 3-30   Proportion of Australia's mining sector employees that resided in selected major cities, 2006 and 2011
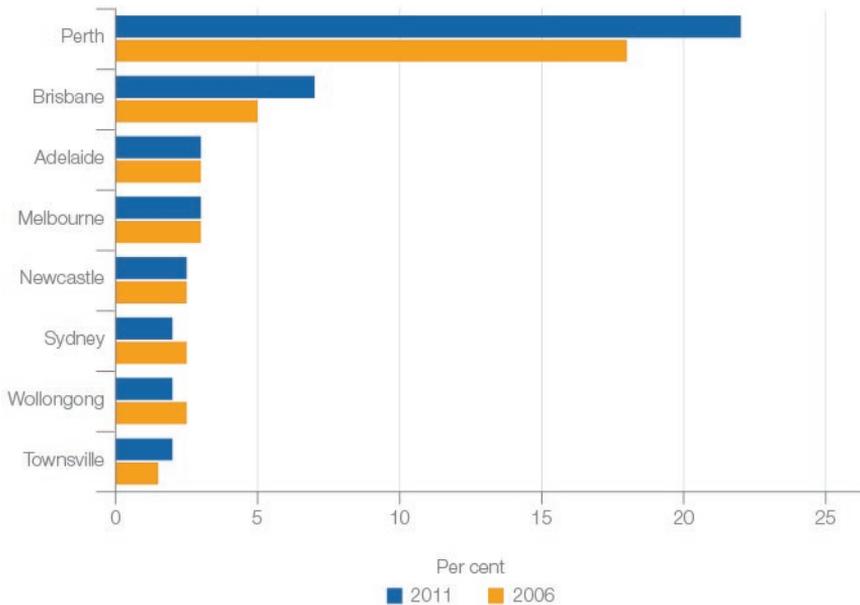
Per cent
■ 2011   ■ 2006

Source: ABS 2013b

Brisbane had the fifth largest number of people who work in the mining sector in 2011 (10,229) of any Australian town or city. Approximately seven per cent of Australia's mining sector employees live in Brisbane (ABS 2013b). For every mining sector job in Brisbane, it is estimated that up to 19 more ancillary support jobs are created in mining support jobs, supplying industries and flow-on jobs from increased expenditure (Brisbane City Council 2012). The mining sector directly and indirectly contributed to approximately 124,000 full-time jobs in Brisbane in 2012 (SGS Economics and Planning 2012). Additionally, Brisbane receives the largest proportion of the mining sector's gross regional product in Queensland (approximately 21 per cent) (SGS Economics and Planning 2013). The Brisbane City LGA alone received approximately 22 per cent of its gross regional product from the mining sector in 2011, approximately $25 billion (Brisbane City Council 2012).

Port Hedland, Western Australia.
Image courtesy of Charlene Liau

The mining sector's influence on office space demand in major cities

The mining sector significantly influences demand for office space in several major cities, particularly Perth and Brisbane (CBRE 2012). During the first half of 2012, approximately three-quarters of Australia's net CBD office absorption (the total amount of office space leased minus the total amount of office space vacated over a period) occurred in Perth and Brisbane (PropertyOz 2012b). Demand for this space was largely driven by the mining sector.

Australia's four largest mining companies directly accounted for the occupation of approximately 20 per cent of Perth CBD office space in 2011 (Property Observer 2011). Approximately half of total occupied office space in Perth is taken up by mining and associated sectors which largely service the mining sector (PropertyOz 2013).

Perth's office space rental growth increased faster than all other Australian capital cities in the quarter to 30 September 2012, largely driven by the mining sector. Perth was the second largest growth market for A-grade office space in the Asia Pacific region in this quarter behind Beijing. Perth is now one of the top 10 most expensive office markets in the world (PropertyOz 2012a).

In the inner Brisbane office market between 2008 and 2011, 21 per cent of the lease transactions were linked to the mining sector and a further 22 per cent were in related sectors that largely service the mining sector (Colliers 2012). The mining sector and related sectors are thought to have accounted for approximately half of the large leasing transactions (more than 1,000 square metres) in the inner Brisbane office market in recent years (Colliers International 2012b).

Perth.
Image courtesy of Jacqueline McKinnon

Long-distance commuting

Although commuting is traditionally thought of as intra-urban trips, the long-distance commutes made by workers from their homes to workplaces in remote mining regions are also commuter journeys – popularly referred to as FIFO and DIDO. The key differences between FIFO and DIDO commutes and traditional intra-urban commutes are that FIFO and DIDO workers spend more time at their worksites – often several days or weeks at a time – and travel much further to reach them, often over 1,000 kilometres.

FIFO and DIDO practices are not new. They have been used in Australia at least since the 1980s. However, they have increased in prevalence in recent years, mainly due to the difficulty in attracting workers to live and work in remote locations, lower costs of air transport and the high cost of housing in remote and regional mining site areas (Australian Government 2013). In Port Hedland, for example, median weekly rents are approximately $2,650 per week and the median house price is $980,000 (Australian Financial Review 2012).

Analysis of 2011 Census estimates of long-distance commuting (over 400 kilometres between LGA of residence and LGA of workplace was used as an assumed threshold between FIFO and DIDO) by mining industry employees shows that six of the 25 most popular residence/workplace LGA pairs had Perth as the place of residence and the Pilbara or northern Western Australia as the place of work. Indeed, the three most popular commuting pairs in Australia are between Perth and the Pilbara (Newman, Paraburdoo and Karratha), representing 44 per cent of all commuters between the 25 most popular LGA pairs (BITRE 2013a).

Population and commuter flows

Chapter 2 of this report (Population and Settlement) discussed both permanent and temporary migration flows within and between Australian cities. It also introduced the concept of domestic movers as distinct from domestic migrants. Domestic mover arrangements are more fluid and temporary in nature. FIFO and DIDO commuters are essentially domestic movers who straddle the city and regional divide. In most cases, the city is 'home' and FIFO and DIDO workers are 'temporary residents' at a worksite, often residing in staff quarters or other temporary accommodation. A typical characteristic of an area with large temporary population movements (and long-distance commuters) is the large number of people who reported that they were staying in staff quarters. For example, the Pilbara had the highest proportion of people staying in staff quarters on Census night than anywhere else in Australia (34 per cent compared to the Australian average of 0.4 per cent) (ABS 2012d).

Western Australia and Queensland are the States with the most mining sector employees, many of whom reside in the major cities located in these States. In Queensland, approximately 40 per cent of mining employees are long-distance commuters (BITRE 2013a). In Western Australia, approximately 50 per cent of mining employees are long-distance commuters (Morris 2012, BITRE 2013a, Australian Government 2013). This figure is expected to rise to 57 per cent by 2015 (BITRE 2013a).

Some major cities are encouraging FIFO and DIDO workers to base themselves in that city so that the city secures some of the economic benefits. For example, to attract domestic migrants, Townsville, Cairns and the Gold Coast are promoting their quality of life, amenity, educational opportunities and connectivity to mining centres (Australian Government 2013). Cairns has a FIFO Coordinator Project that aims to identify opportunities for employment in the mining and resource sector in the Cairns region (Cairns Regional Council 2011). It also has a website promoting its attributes as a base city for new residents working on FIFO rosters, including the city's comparatively lower house prices, its major airport and its relatively close proximity to mining centres such as Moranbah and Kununurra (FIFO Cairns 2013).

The impact of FIFO on aviation

The increasing use of FIFO practices has triggered significant growth in the aviation sector and has added pressure on airports in some major cities, particularly Perth. Approximately 30 per cent of total domestic passenger movements at Perth Airport between 2011 and 2012 were directly related to FIFO practices (Perth Airport 2013). Approximately 75 per cent of all Perth Airport's intrastate passenger movements are now related to the mining sector (Perth Airport 2013). It has been reported that FIFO traffic out of Perth Airport has increased by 58 per cent over the past five years (Australian Financial Review 2013).

Perth Airport has experienced bottlenecks in peak times, particularly between 5.30am and 8.30am, when returning intrastate aircraft largely servicing FIFO commuters overlap with interstate and international aircraft arrivals (Perth Airport 2012). Domestic air passenger movements at Perth Airport increased by an average of 10.2 per cent per year over the 10 year period to 2012 – the largest increase of any capital city airport.

Although the majority of FIFO commuters use regular scheduled flights, many charter flights are also scheduled to mining regions to service FIFO commuters. It is estimated that more than one-third of Australia's fixed-wing charter passengers pass through Perth Airport (BITRE 2013a) and almost all are likely to be related to the mining industry.

Perth to Karratha was the 19th busiest Australian air route in 2012 (27th busiest in 2002) and Perth to Port Hedland was the 26th busiest (45th busiest in 2002). In 2012, passenger numbers on the Perth–Karratha route were more than five times those experienced in 2002 and for the Perth–Port Hedland route the passenger numbers were more than seven times the 2002 passenger levels. In contrast, the total number of passengers carried on Australian domestic airlines doubled between 2002 and 2012 (BITRE 2013b).

In 2012 the greatest percentage increase in passenger numbers, compared to the year ending December 2011, was on the Newman Perth route (up 48.9 per cent). There were also large increases on the air routes of Perth – Port Hedland (up 33.6 per cent) and Karratha–Perth (up 12.3 per cent) (BITRE 2013b). Such increases demonstrate the impact of FIFO workers on the aviation sector (SOAC 2012).

Other major city airports have also experienced significant growth in FIFO passenger numbers. It has been estimated, for example, that 5,000 FIFO workers pass through Townsville Airport each week. Approximately 22 per cent of passengers passing through Townsville Airport in the first quarter of 2012 were mining industry employees, up to 15 per cent of them FIFO workers (Galloway 2012).

Cairns, Queensland.
Image courtesy of Chay Garde

Implications of FIFO and DIDO practices

FIFO and DIDO practices allow workers to live in towns or cities with access to urban services while commuting to worksites in remote locations on a roster system. However, there are some personal and social disadvantages associated with these practices on workers, their families and regional and remote communities. They can also have social impacts on the remote communities where the mines are located (Australian Government 2013; Australian Financial Review 2012). A recent inquiry identified an emerging trend of an 'us versus them' mentality in some remote mining regions and in certain cases an 'anti-FIFO worker' mentality (Australian Government 2013).

A common criticism of FIFO is that the remote region where the mining occurs does not receive the economic benefits of mining. This is known as the 'fly-over' effect and it can create tensions between cities and remote mining areas (Haslam et al. 2009). A recent Queensland study, however, concluded that, whilst 59 per cent of the direct effects of the mining sector flow to the Brisbane region, a significant proportion still goes to Queensland's remote mining regions (Rolfe et al. 2011).

The increasing use of automation by the mining sector

There is evidence that the FIFO and DIDO phenomena may be finite given the increasing use of automation by the sector – fewer mining sector workers will need to be physically located at mine sites in coming years. Larger mining companies are moving towards automation of mine sites, aiming to largely run them remotely from city offices (Garvey 2013).

BHP already has a remote operating centre in Perth employing 340 people. Rio Tinto has one located near Perth airport in which 450 employees remotely control driverless trucks at its Pilbara mining site. There are also plans for driverless trains at Rio Tinto's Pilbara mining site, which would also be controlled remotely from Perth (Chambers 2012).

Human capital

Labour force participation

The proportion of people in the labour force in a city influences its productivity. A larger proportion of people in the labour force leads to greater capacity for higher productivity levels. *State of Australian Cities 2012* looked at workforce participation rates by age and gender. This section looks at the geography of labour force participation within cities.

Labour force participation rates are not the same across Australia's major cities and they are also different for males and females. Map 3-20 and Map 3-21 illustrate this using Sydney as an example. Maps of the other major cities can be viewed using the supplementary online map application. The maps highlight the areas in Sydney which may have underutilised labour potential that could be tapped into to raise participation rates. Areas where there is a large difference between male and female participation also indicate there may be underutilised labour potential.

Map 3-20　　　　Male workforce participation in Sydney, 2011
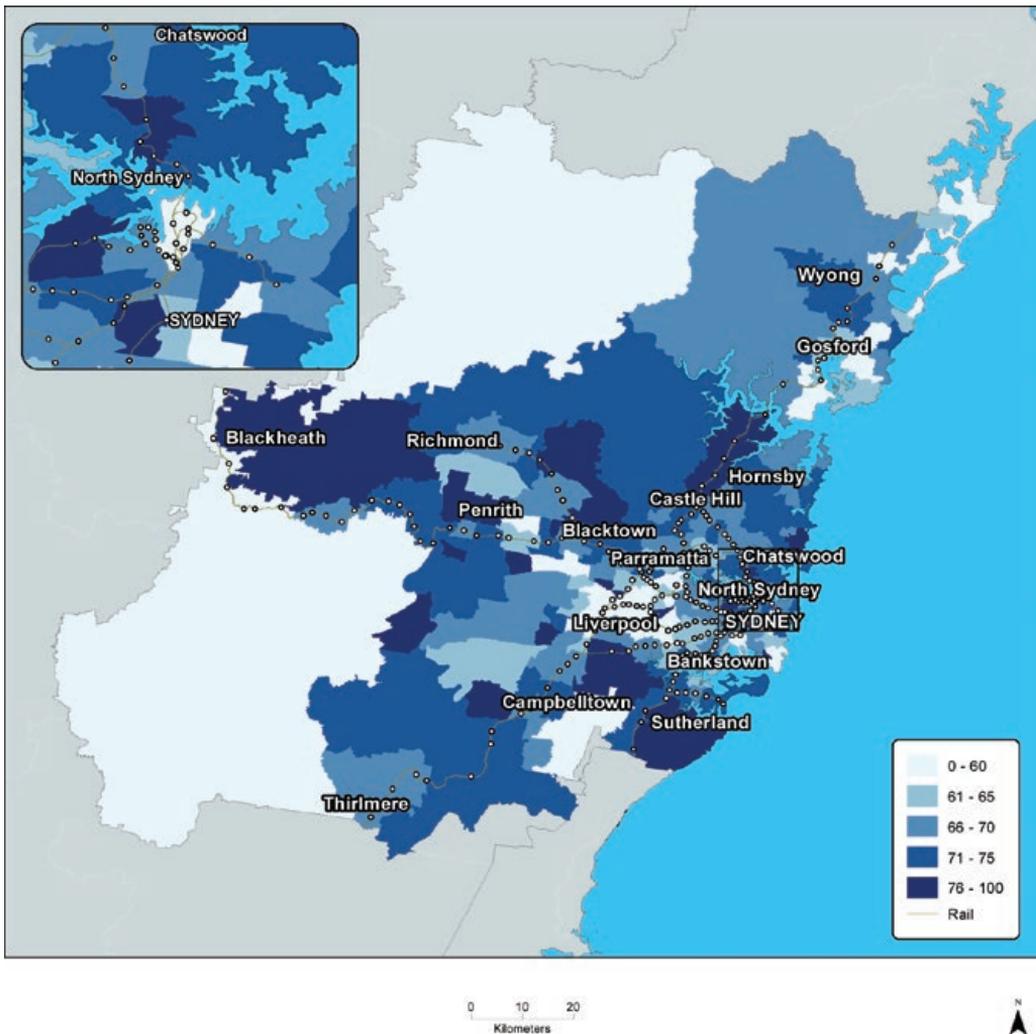
Map 3-21   Female workforce participation in Sydney, 2011
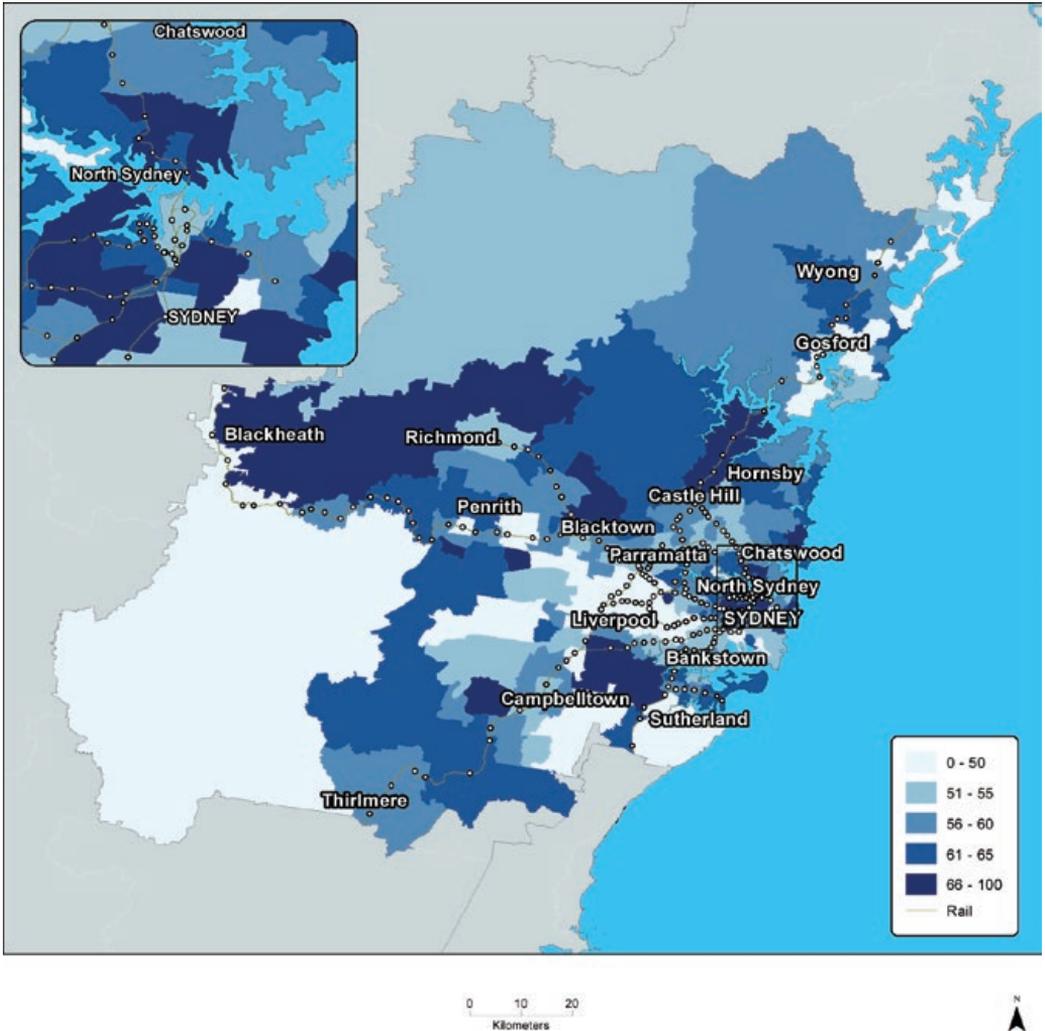
Map 3-22 and Map 3-23 show areas that have experienced the largest change in workforce participation between 2001 and 2011 in Sydney. Male participation has declined across most of Sydney, while female participation has increased in most areas. This trend is occurring in many major cities. The key exceptions are Canberra, Cairns and Darwin, where female participation declined in many areas, and Perth and the Sunshine Coast, where male participation increased across most of the city.

Map 3-22   Proportion change in male workforce participation in Sydney, 2001–11

Legend:
- < -6.50
- -6.49 - -3.50
- -3.49 - -1.50
- -1.49 - 0.00
- 0.01 - 2.50
- > 2.50
- Rail
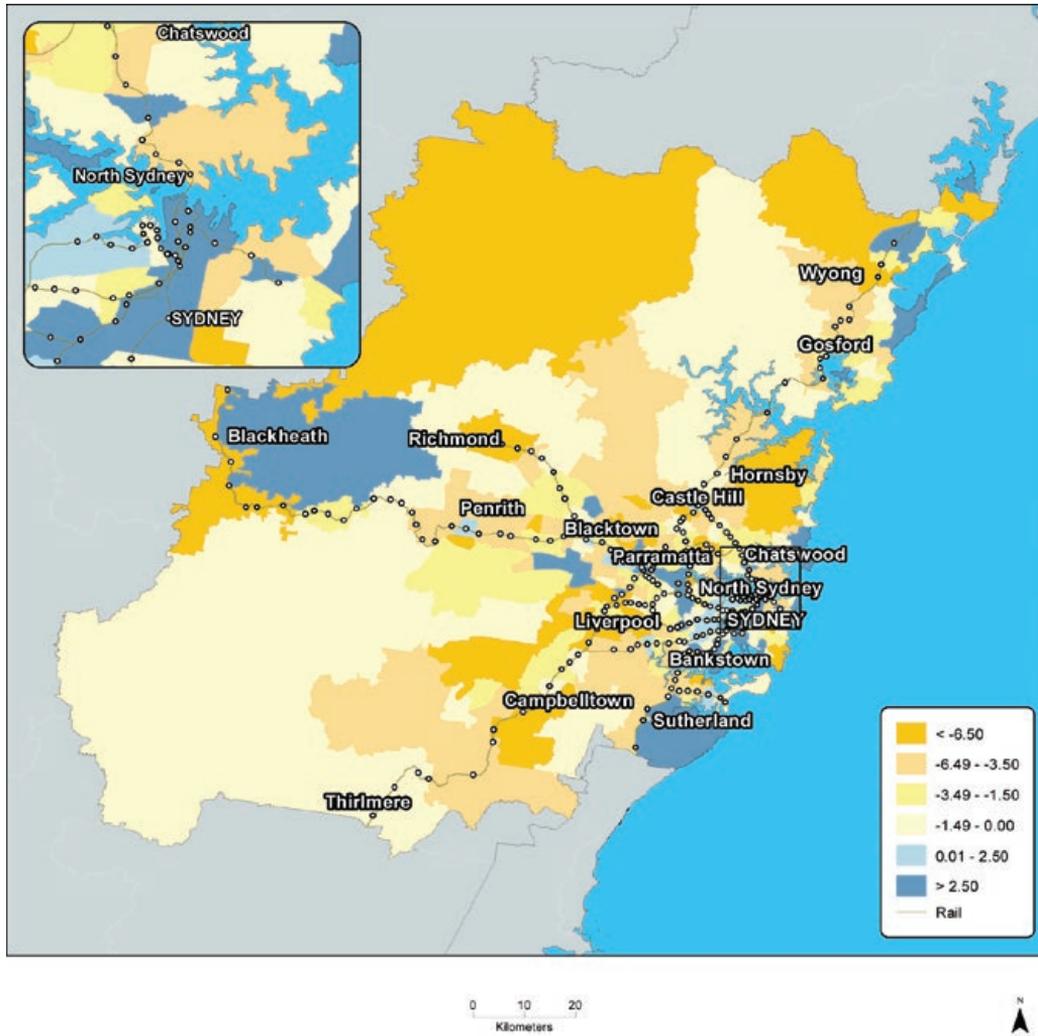
Map 3-23   Proportion change in female workforce participation in Sydney, 2001–11
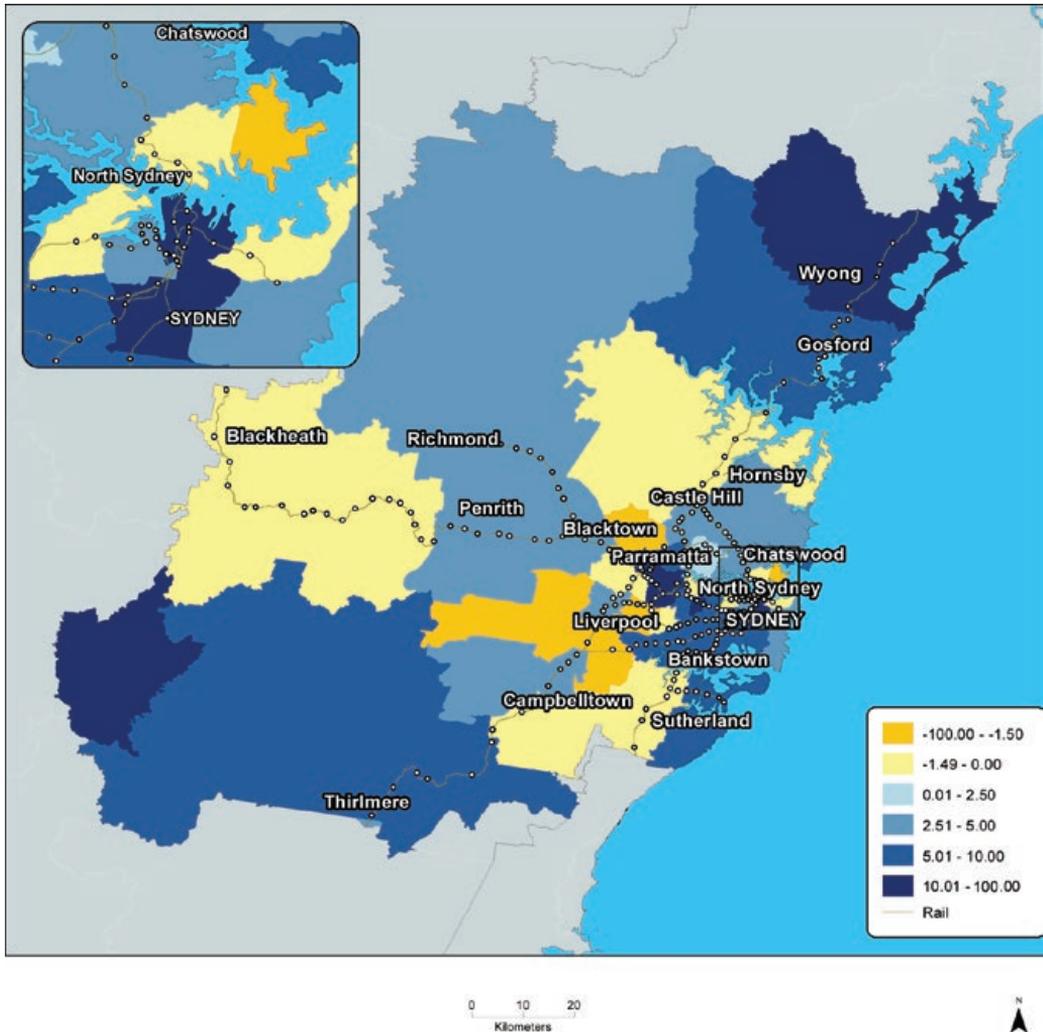
Commuting distances have a large effect on people's capacity to undertake certain jobs. In particular, this can affect women who often have primary responsibility for the care of young children and/or aged relatives and need to be fairly close to home. They may need to able to tend to them quickly in the event of an illness or other needs. More women than men may therefore be unable or unwilling to take up jobs that require a longer commute. Pocock, Skiller and Williams have described this as a 'spatial leash' (2012). They described this phenomenon as follows (2012, p. 90):

'The result for families is reinforcement of a traditional division of labour, with many highly educated and skilled women forced to abandon careers and take lower skilled jobs close to home in order to be available to their children … On the other hand, many men are forced to trade time with their children for long commutes and long working hours. This is particularly evident in new suburbs that are not well integrated with industry, employment or educational opportunities.'

If women have less access to job opportunities or their choice is limited by the time and constraints due to their caring responsibilities, they are more likely not to work or to choose a job that does not optimally match their skills and experience. Many areas of major cities have a lack of readily accessible jobs, particularly high-skilled and professional jobs. As a result, women in these areas, in an effort to spend more time with and be available to their children and/or aged relatives, may trade full-time city jobs for part-time jobs closer to home.

Today, it is more common for couples in Australia to have two careers than it was in the past. This is changing not only how people live but also where they live. An indication of how many couples have two careers is the proportion of mothers working full-time. While it is most common for mothers to work part-time in Australia (36 per cent of mothers did this in 2011), approximately 25 per cent of mothers worked full-time in 2011, up from 23 per cent in 2011 (Baxter 2013 derived from ABS 2001 and 2011). In situations where couples or families have two careers, they may face location challenges. Labour markets that have sufficient professional matches for both partners are the best way to meet this challenge. These tend to be in the inner suburbs of cities. A recent study found that more than half of increased agglomeration in the inner suburbs of United States cities is due to so-called 'power couples' relocating to areas with the best access to a range of high-skilled, high-paying jobs (Moretti 2012). Similar trends are evident in Australia.

Full-time and part-time workers

This section uses the latest Census data to look at the proportion of employed males and females aged 15 to 64 that were employed full-time versus part-time in Australia's major cities. 'Full-time' in this section refers to employees who worked 35 hours or more in the week before the 2011 Census night and 'part-time' refers to employees who worked at least one hour but less than 35 hours in the week before the 2011 Census night.

In the week before the 2011 Census night, 10.7 million Australians reported being in the workforce. Of these, 59.7 per cent were employed full-time and 28.7 per cent were employed part-time. An additional 5.9 per cent were employed but away from work in the week before the Census night and 5.6 per cent were unemployed (ABS 2013c).

Across Australia, 81.7 per cent of employed males aged 15 to 64 worked full-time in the week before the 2011 Census night. For females, the proportion was 53.0 per cent. The proportion of males in major cities working full-time was slightly lower than the national average at 81.4 per cent. However, the proportion of females in major cities working full-time was one percentage point higher than the national average (54.0 per cent versus 53.0 per cent).

Most major cities were roughly on par with the 2011 national average for the proportion of employed males aged 15 to 64 working full-time (81.7 per cent), as can be seen in Figure 3-31. Of the major cities, Darwin and Townsville had the highest proportion of males working full-time in 2011 (86.4 per cent and 84.9 per cent). There were increases in the proportion of employed males aged 15 to 64 working full-time between 2001 and 2011 in all major cities, although some were only slight increases. The largest increases in the proportion of employed males working full-time between 2001 and 2011 were in Darwin, Townsville and Perth.

Figure 3-31   Proportion of employed males aged 15 to 64 working full-time,
2001 and 2011
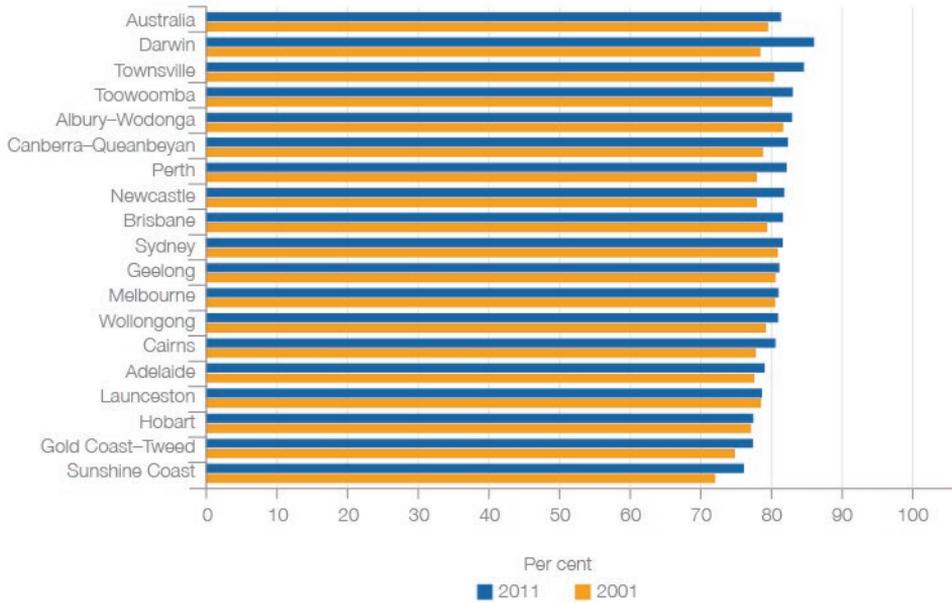
Note: Full-time work is defined as working 35 hours or more in the week before Census night and part-time work is classified as working one to 34 hours in the week before Census night. Data for people who were employed but away from work in the week before the Census have been excluded. Data where employment status was not stated have been excluded.

Source: Derived from ABS 2012a and ABS 2002

The proportion of employed females aged 15 to 64 working full-time nationwide is significantly lower than the proportion of males working full-time. This is reflected across the major cities. Despite significant changes in gender relationships over the past couple of decades, research shows women still do the majority of care work in Australian households, such as looking after children and older family members. This is one of the reasons that they are more likely to reduce their work hours from full-time to part-time (Ibid, p. 76 in Kelly et al. 2013, p. 31).

Darwin and Canberra-Queanbeyan had the highest proportion of employed females aged 15 to 64 working full-time in 2011 (69.5 per cent and 63.0 per cent) while Geelong, the Sunshine Coast and Launceston had the lowest proportion (45.4 per cent, 45.8 per cent and 45.9 per cent). There was a slight decrease in the proportion of employed females aged 15 to 64 working full-time in Melbourne between 2001 and 2011. All other major cities experienced increases, although many were only slight increases.

Figure 3-32   Proportion of employed females aged 15 to 64 working full-time,
2001 and 2011
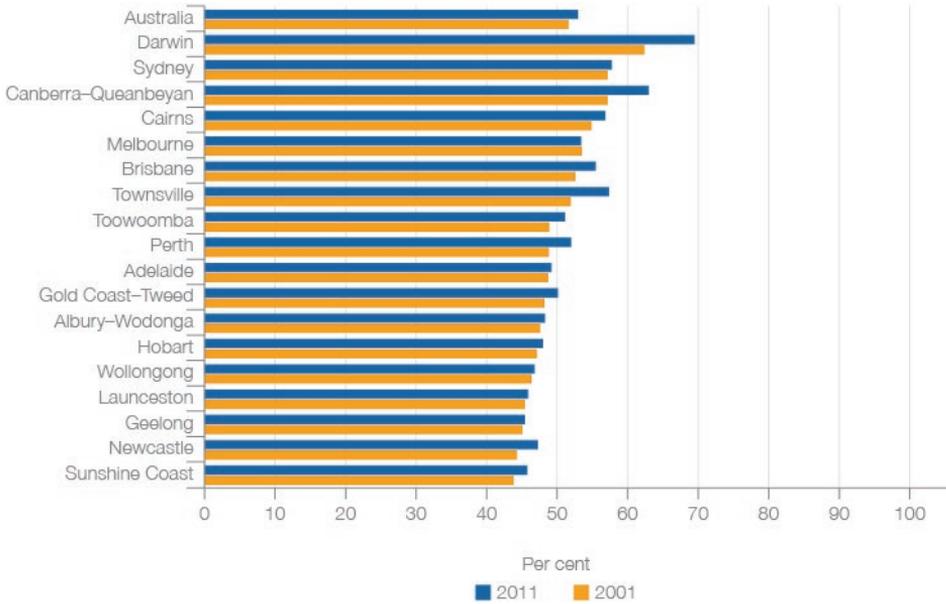
Note: Full-time work is defined as working 35 hours or more in the week before Census night and part-time work is
classified as working one to 34 hours in the week before Census night. Data for people who were employed
but away from work in the week before the Census have been excluded. Data where employment status was
not stated have been excluded.

Source: Derived from ABS 2012a and ABS 2002

Figure 3-33 and Figure 3-34 show the change in the proportion of employed males and
females aged 15 to 64 working full-time between 2001–06 and 2006–11. These figures
show that most of the increases in the proportion of males and females working full-time in
the major cities were between 2001 and 2006. Declines were most commonly experienced
across the major cities between 2006 and 2011. This decrease is likely to be at least partly
due to the Global Financial Crisis, which is believed to be linked to a reduction in the number
of hours worked by Australians (ABS 2013d).

Figure 3-33   Change in the proportion of employed males aged 15 to 64 working full-time, 2001–06 and 2006–11

Note: Full-time work is defined as working 35 hours or more in the week before Census night and part-time work is classified as working one to 34 hours in the week before Census night. Data for people who were employed but away from work in the week before the Census have been excluded. Data where employment status was not stated have been excluded.

Source: Derived from ABS 2012a, ABS 2007 and ABS 2002

Between 2006 and 2011 there were declines in the proportion of employed males aged 15 to 64 working full-time in almost all major cities except Newcastle, Canberra-Queanbeyan and Darwin. However, the 2006–11 reductions were significantly less than the 2001–06 gains, meaning that all the major cities experienced increases in the proportion of employed males working full-time between 2001 and 2011.

The change in the proportion of employed females aged 15 to 64 working full-time between 2006 and 2011 was more varied. In just over one-third of the major cities there were increases between 2006 and 2011 and in the remaining cities there were declines. However, almost all declines between 2006 and 2011 were at least matched by increases between 2001 and 2006, the exception being Melbourne.

Figure 3-34   Change in the proportion of employed females aged 15 to 64 working full-time, 2001–06 and 2006–11

Note: Full-time work is defined as working 35 hours or more in the week before Census night and part-time work is classified as working one to 34 hours in the week before Census night. Data for people who were employed but away from work in the week before the Census have been excluded. Data where employment status was not stated have been excluded.

Source: Derived from ABS 2012a, ABS 2007 and ABS 2002

The proportion of males working full-time does not show the same pattern between or within the major cities and it is not the same as the pattern for females. This is illustrated in Map 3-24, Map 3-25, Map 3-26 and Map 3-27. Significantly more males than females work full-time in Perth, with the inner city having the highest proportion of females working full-time and the middle ring suburbs tending to have the highest proportion of employed males working full-time. More employed males tend to work part-time in Perth's inner suburbs, but this situation is not the same for females.

Map 3-24   Proportion of employed males aged 15 to 64 working full-time in Perth, 2011
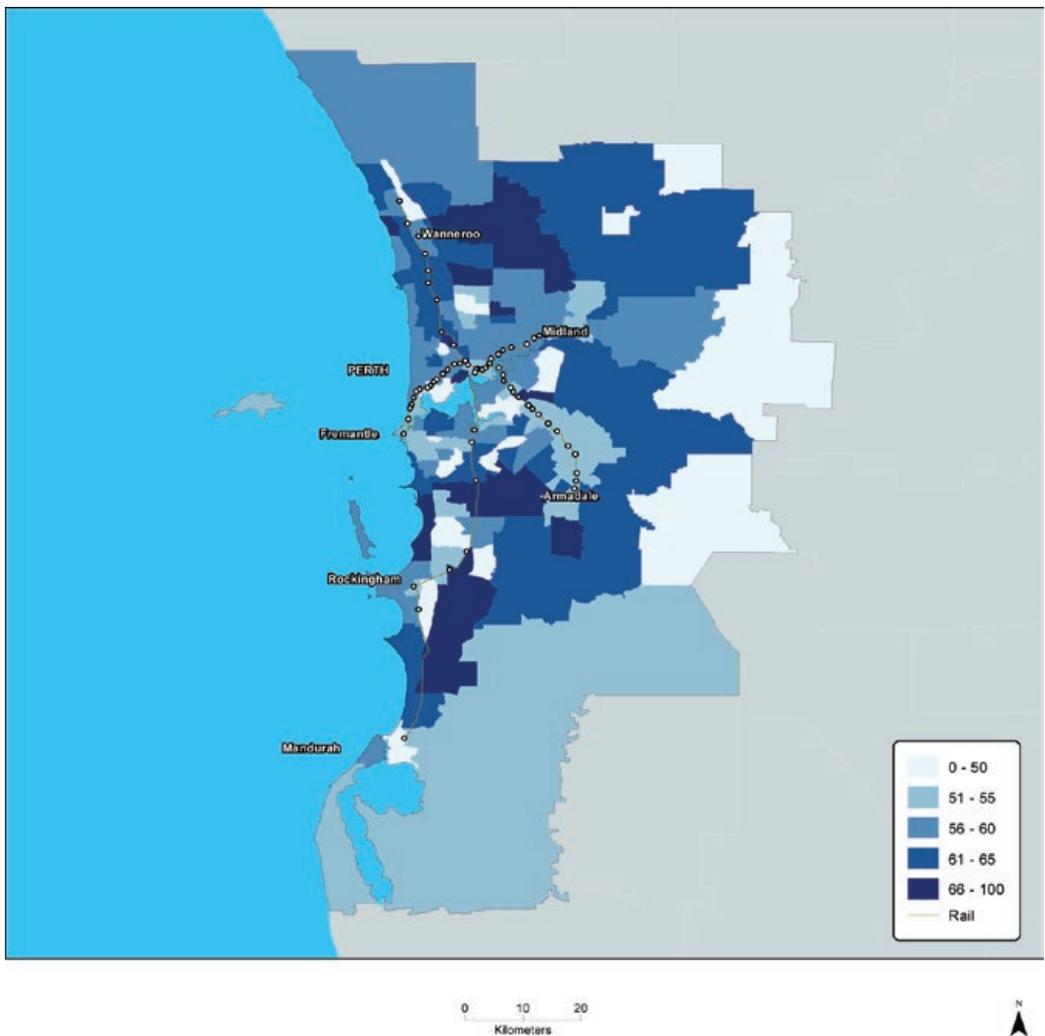
Map 3-25   Proportion of employed females aged 15 to 64 working full-time in Perth, 2011

Legend:
- 0 - 25
- 26 - 30
- 31 - 35
- 36 - 40
- 41 - 100
- Rail

0   10   20
Kilometers
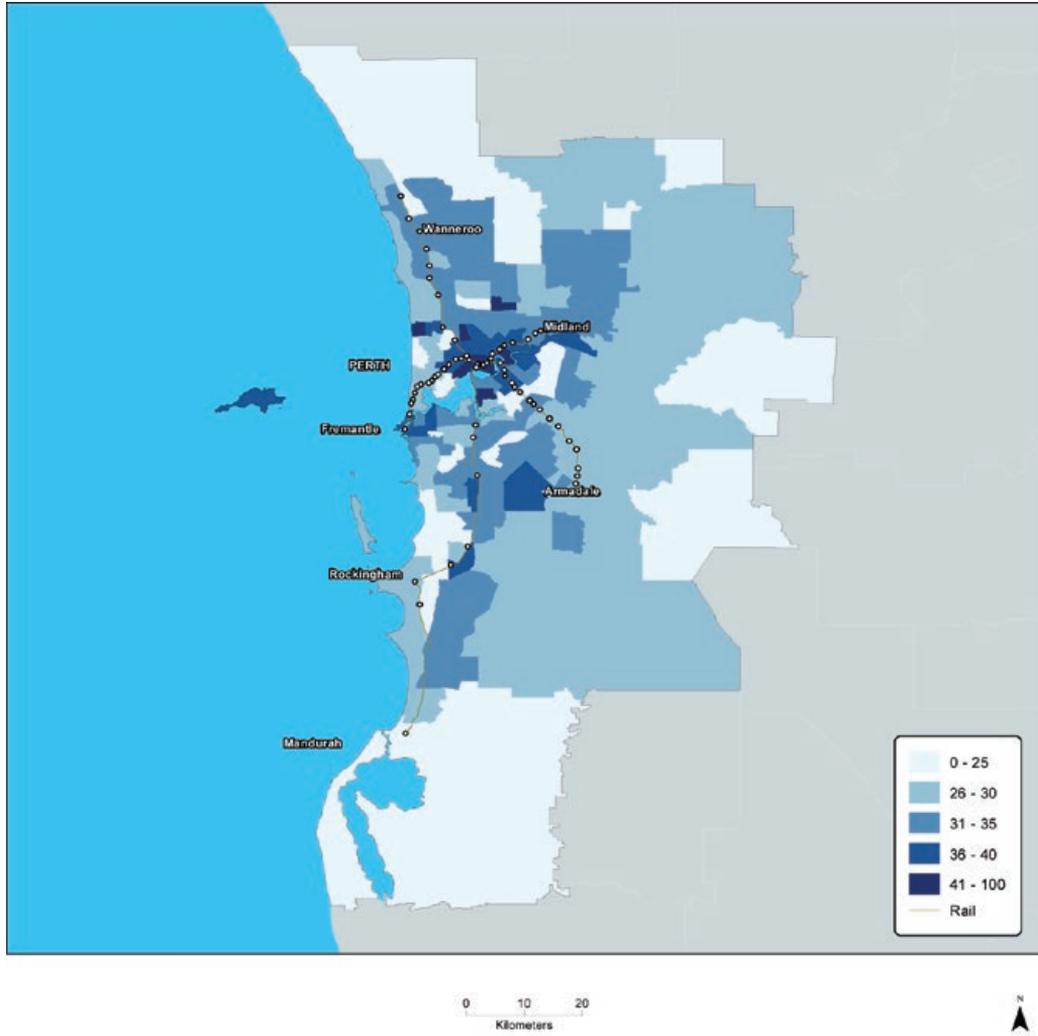
Map 3-26   Proportion of employed males aged 15 to 64 working part-time in
                Perth, 2011
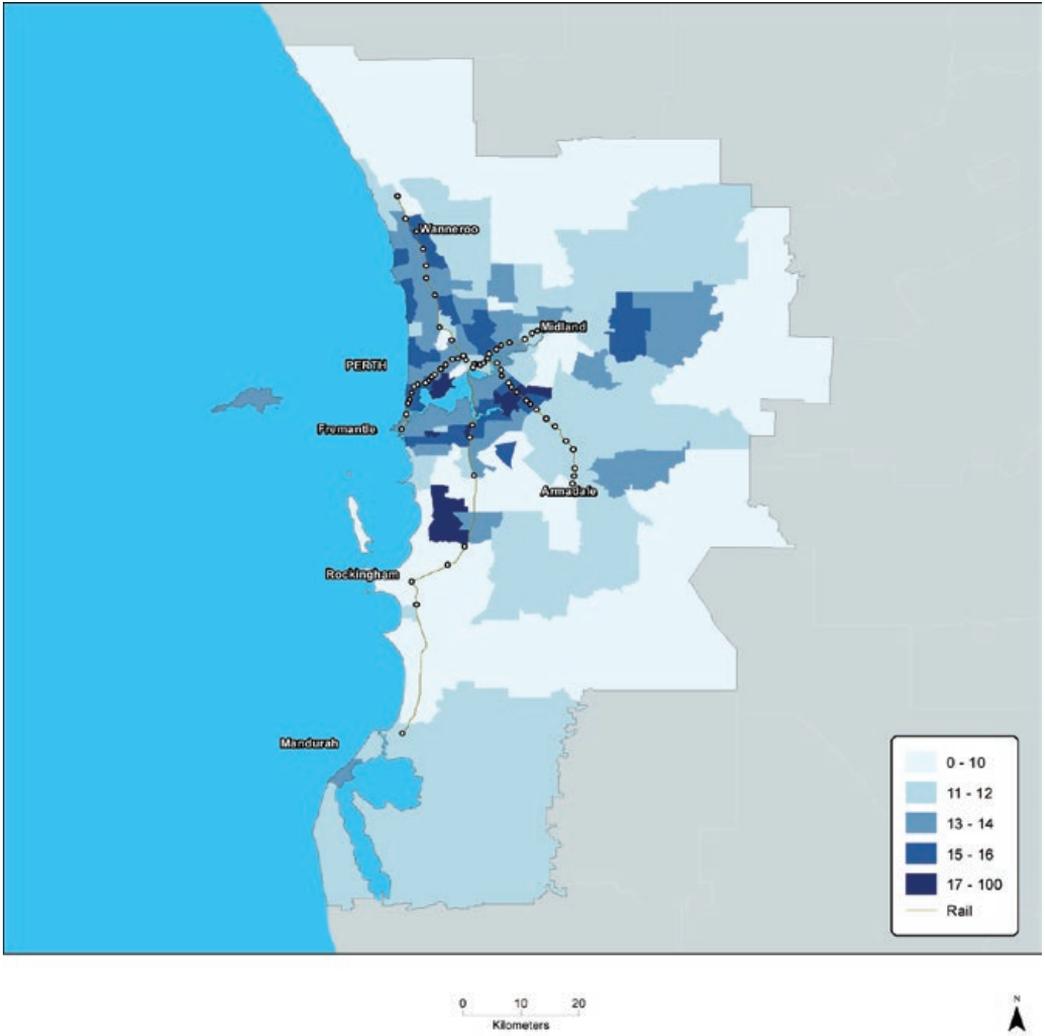
Map 3-27   Proportion of employed females aged 15 to 64 working part-time in Perth, 2011
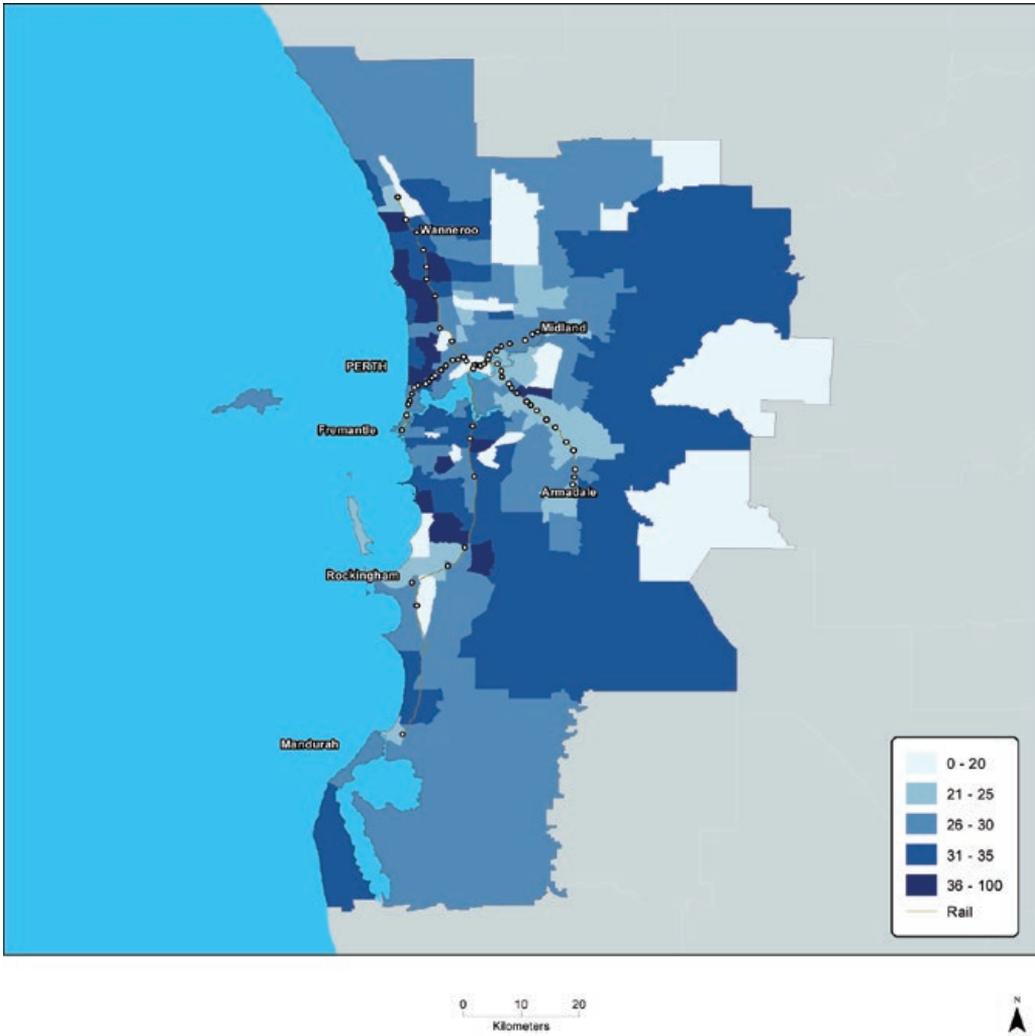
Qualifications

Higher education qualifications play a key role in Australia's productivity. There is an increasing demand for higher skill levels in the Australian workforce. The OECD has found that post-school qualifications are becoming increasingly important in OECD countries, while the number of unskilled jobs is declining, leaving people without qualifications more vulnerable to unemployment (Coughlan 2013).

Figure 3-35 and Figure 3-36 show the proportion of males and females in Australia's major cities aged 15 and over with post-school qualifications in 2011. They allow a time series comparison to be made with 2001 data. By using data for those aged 15 and over rather than just that for core working age of 25 to 64 a different picture is revealed: 15 to 24 year olds are often still obtaining qualifications and people aged 65 and over are less likely to have post-school qualifications. The proportion of males of core working age with post-school qualifications was approximately 52 per cent in 2011 and for females it was approximately 43 per cent.

Figure 3-35   Proportion of males aged 15 and over with certain post-school qualifications, 2011
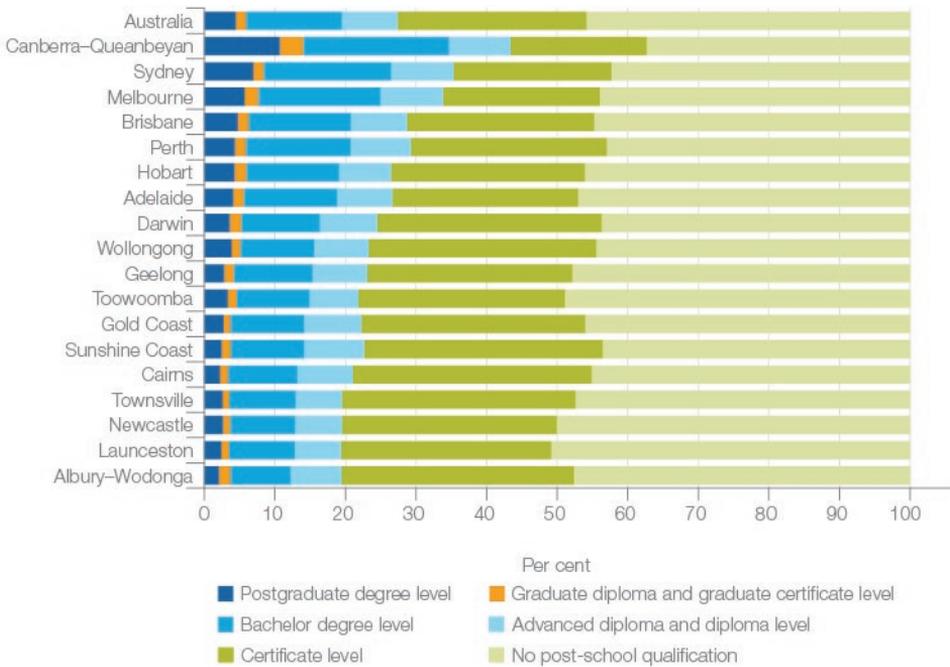
Note: Data is for males aged 15 years or over. Data is based on highest qualification obtained. Data where industry of employment was not stated or inadequately described have been excluded. Data also excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED).

Source: Derived from ABS 2012a and ABS 2002

Figure 3-36   Proportion of females aged 15 and over with post-school qualifications, 2011
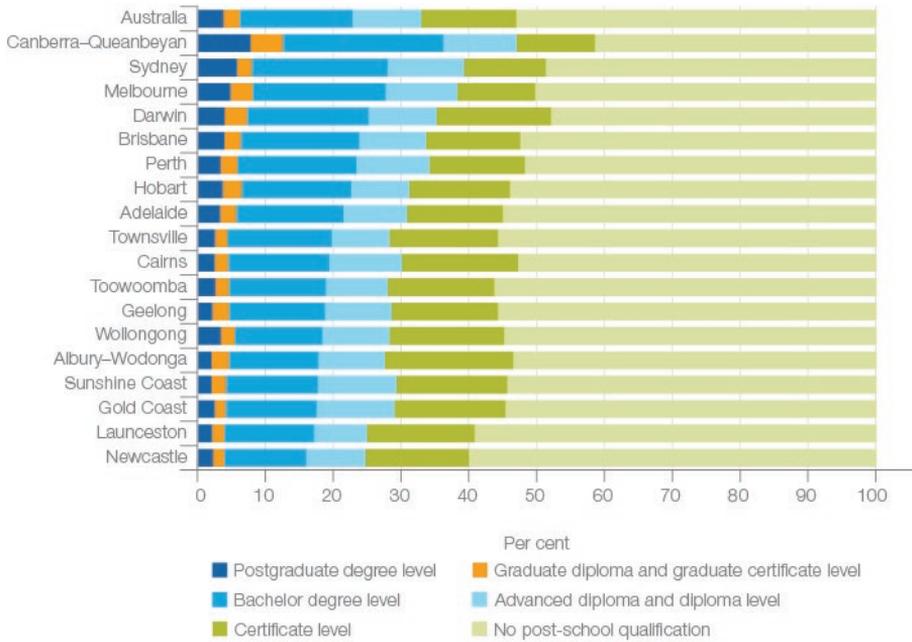
Note: Data is for females aged 15 years or over. Data is based on highest qualification obtained. Data where industry of employment was not stated or inadequately described have been excluded. Data also excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED).

Source: Derived from ABS 2012b and ABS 2002

Due to differences in the way that qualifications are classified internationally, it is not possible to compare the number of core working age people with post-school qualifications in Australia against the number in OECD countries. However, the proportion of 25- to 64-year-olds with a tertiary education can be compared: in 2007, 34 per cent of Australians aged 25 to 64 years had a tertiary education, ranking it six percentage points above the OECD average (28 per cent) and the seventh highest amongst the 30 OECD member countries (ABS 2010).

Despite the increasing number of women completing tertiary education, the proportion of females holding post-school qualifications was still significantly lower than for males in 2011 (46.9 per cent for females nationwide versus 54.1 per cent for males). Even when women hold the same qualifications as men, they are less likely to earn the same amount. A 2009 report by AMP and the National Centre for Social and Economic Modelling (NATSEM) found that an Australian man with a bachelor degree or higher qualifications and who had children was estimated to earn $3.3 million over his working life, whereas a woman with the same qualifications who had children was estimated to earn $1.8 million (Summers 2013).

The post-school qualification category where the biggest difference can be seen between males and females is the certificate level qualification. The proportion of males with certificate qualifications is 26.8 per cent nationwide, compared with 14.0 per cent for females. One reason for this is that fewer females seek work in technical and trade occupations. Almost all women studying certificate qualifications between 1995 and 2010 were in the lower-paid trades of hairdressing and hospitality (NCVER 2011). International research has shown that it

is challenging not only to attract women to technical and trade occupations but also to retain women in them (NCVER 2011).

The figures also show that there is a higher proportion of males with certificate qualifications in non-capital cities, while there are higher proportions of males with bachelor degree level or higher qualifications in large capital cities. There are lower proportions of women with certificate qualifications than the national average in all major cities and there are higher proportions of females with bachelor degree level or higher qualifications in large capital cities.

Figure 3-37 and Figure 3-38 show that in most cities there were increases in the proportion of males and females with post-school qualifications between 2001 and 2011, except in Newcastle and Sydney, where there were slight declines in the proportion of males with certificate level as their highest post-school qualification. The proportion of females with post-school qualifications increased at a greater rate than for males in all major cities.

Figure 3-37   Change in the proportion of males aged 15 and over with post-school qualifications, 2001–11
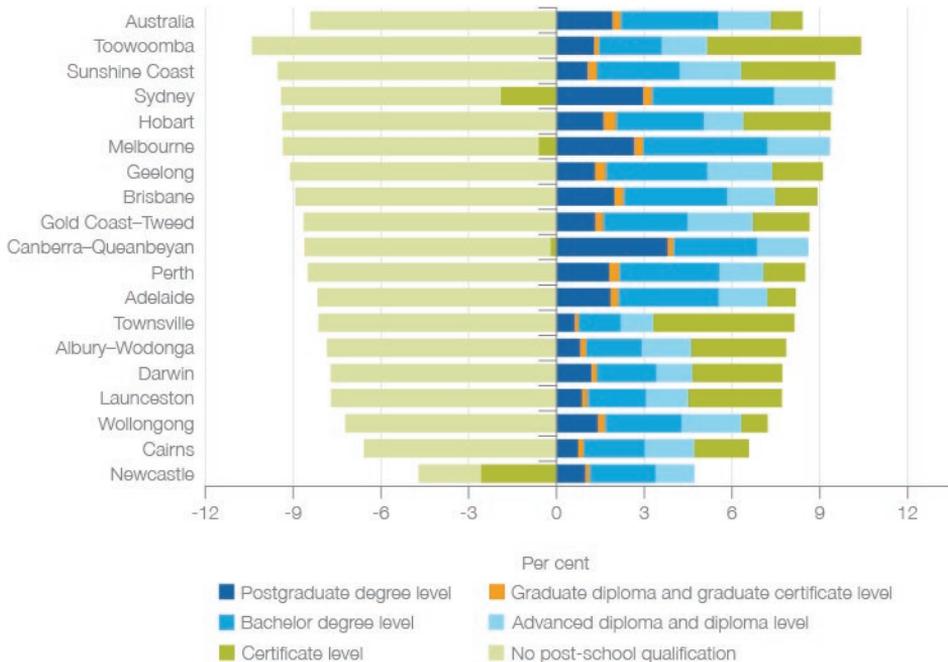
Note: Data is for males aged 15 years or over. Data is based on highest qualification obtained. Data where industry of employment was not stated or inadequately described have been excluded. Data also excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED).

Source: Derived from ABS 2012b and ABS 2002

Figure 3-38   Change in the proportion of females aged 15 and over with post-school qualifications, 2001–11
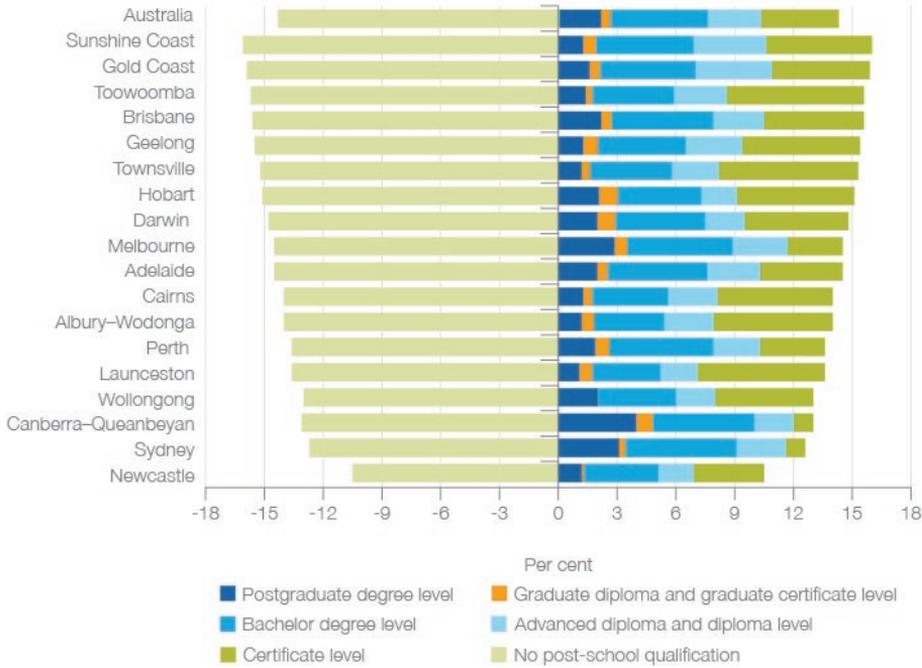
Note: Data is for females aged 15 years or over. Data is based on highest qualification obtained. Data where industry of employment was not stated or inadequately described have been excluded. Data also excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED).

Source: Derived from ABS 2012b and ABS 2002

The proportion of people with certain qualification levels is not the same between and within major cities. A higher proportion of people with bachelor degree level qualifications or higher tend live in central areas of major cities, while a higher proportion of people with certificate level qualifications or no post-school qualifications live in outer areas.

Map 3-28 details the proportion of the population in Brisbane in 1996 aged between 15 and 74 with a bachelor degree or higher. It shows that people with this level of qualification were largely concentrated in the inner suburbs. Map 3-29 shows that in 2011 a much higher proportion of people living in Brisbane had this level of qualification and this group was concentrated in Brisbane's inner and middle ring suburbs. Maps for other cities can be viewed using the supplementary online map application.

Map 3-28   Proportion of the population aged 15 to 74 with a bachelor degree or higher in Brisbane, 1996

Map 3-29   Proportion of the population aged 15 to 74 with a bachelor
            degree or higher in Brisbane, 2011
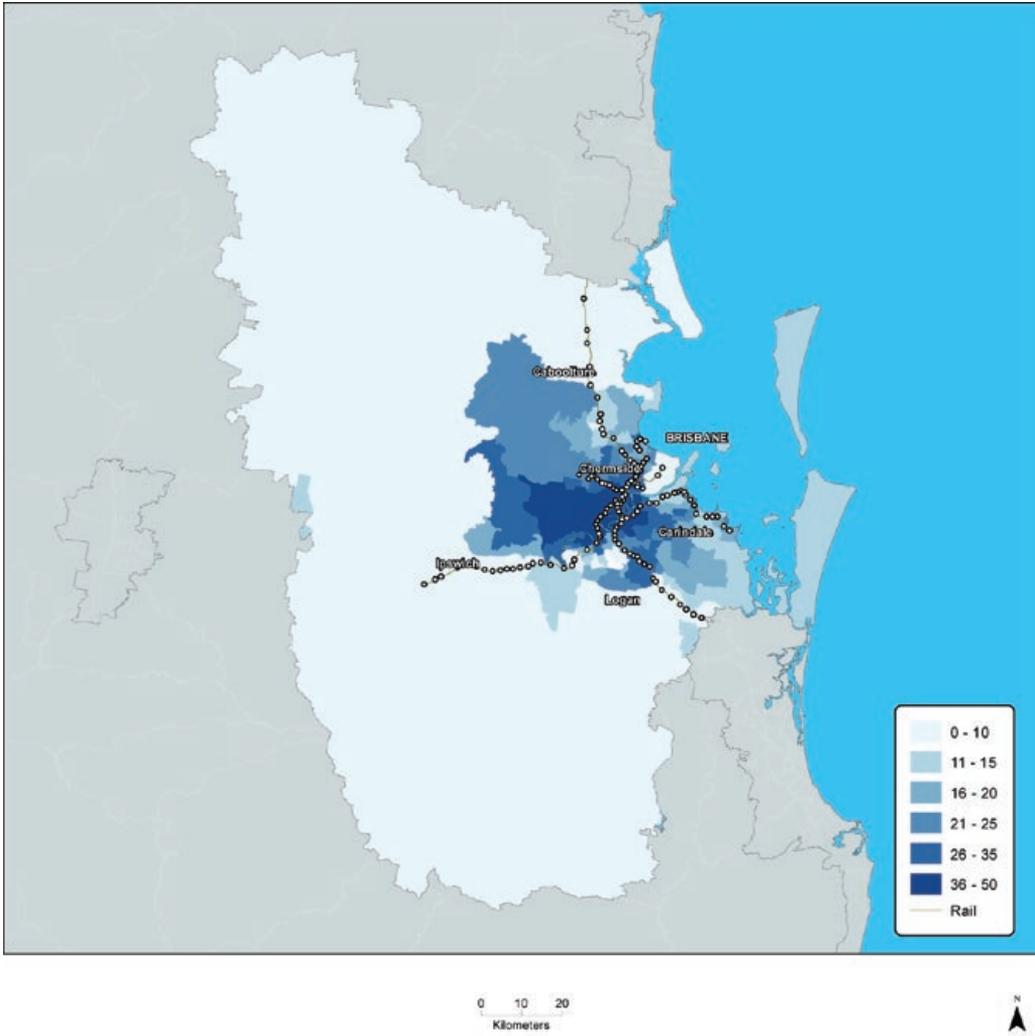
Map 3-30 shows the proportion of the population aged between 15 and 74 with certificate level qualifications in Brisbane in 2011. People with this level of qualification were more likely to live in the outer suburbs. Map 3-31 shows that the proportion of the population aged between 15 and 74 with no post-school qualifications in Brisbane in 2011 were also more likely to live in the outer suburbs.

Map 3-30   Proportion of the population aged 15 to 74 with highest qualification being certificate level in Brisbane, 2011
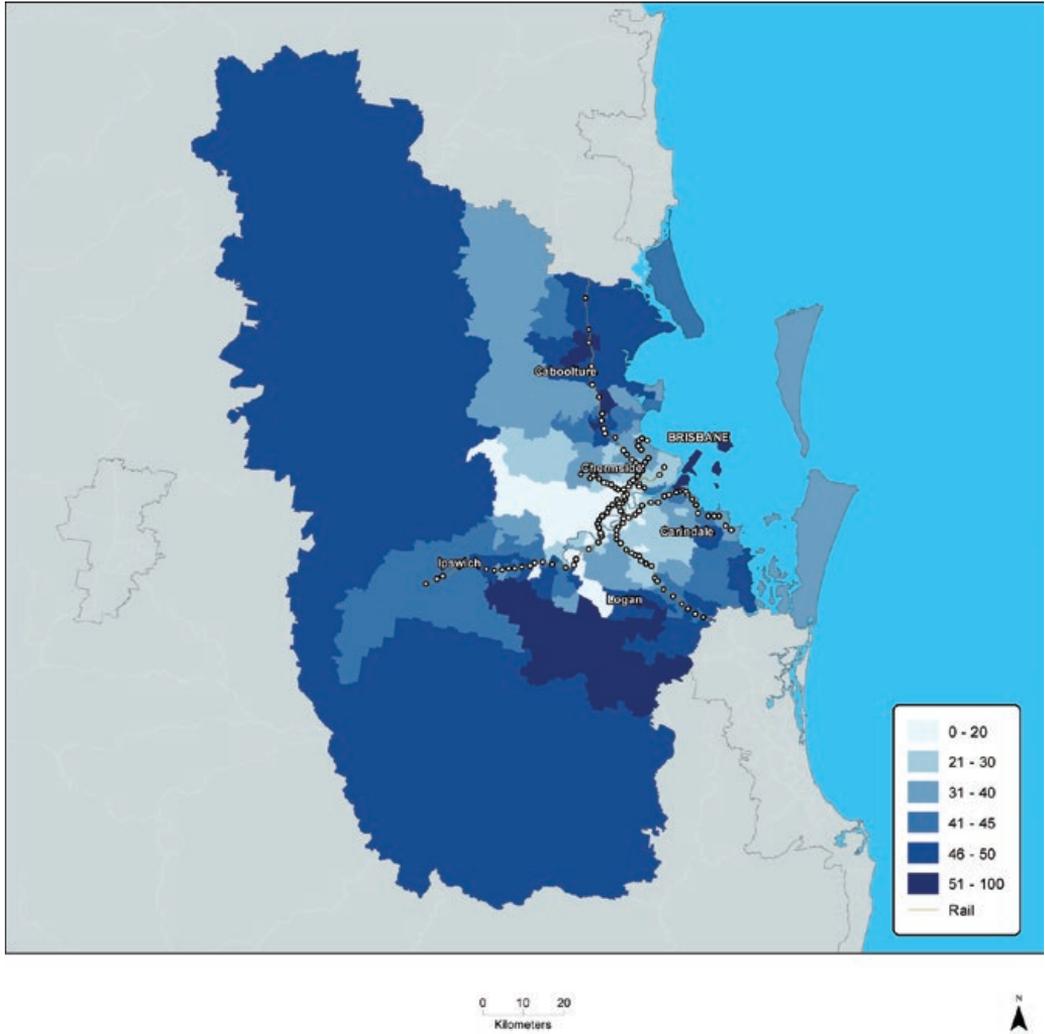
Map 3-31   Proportion of the population aged 15 to 74 with no post-school
                  qualification in Brisbane, 2011
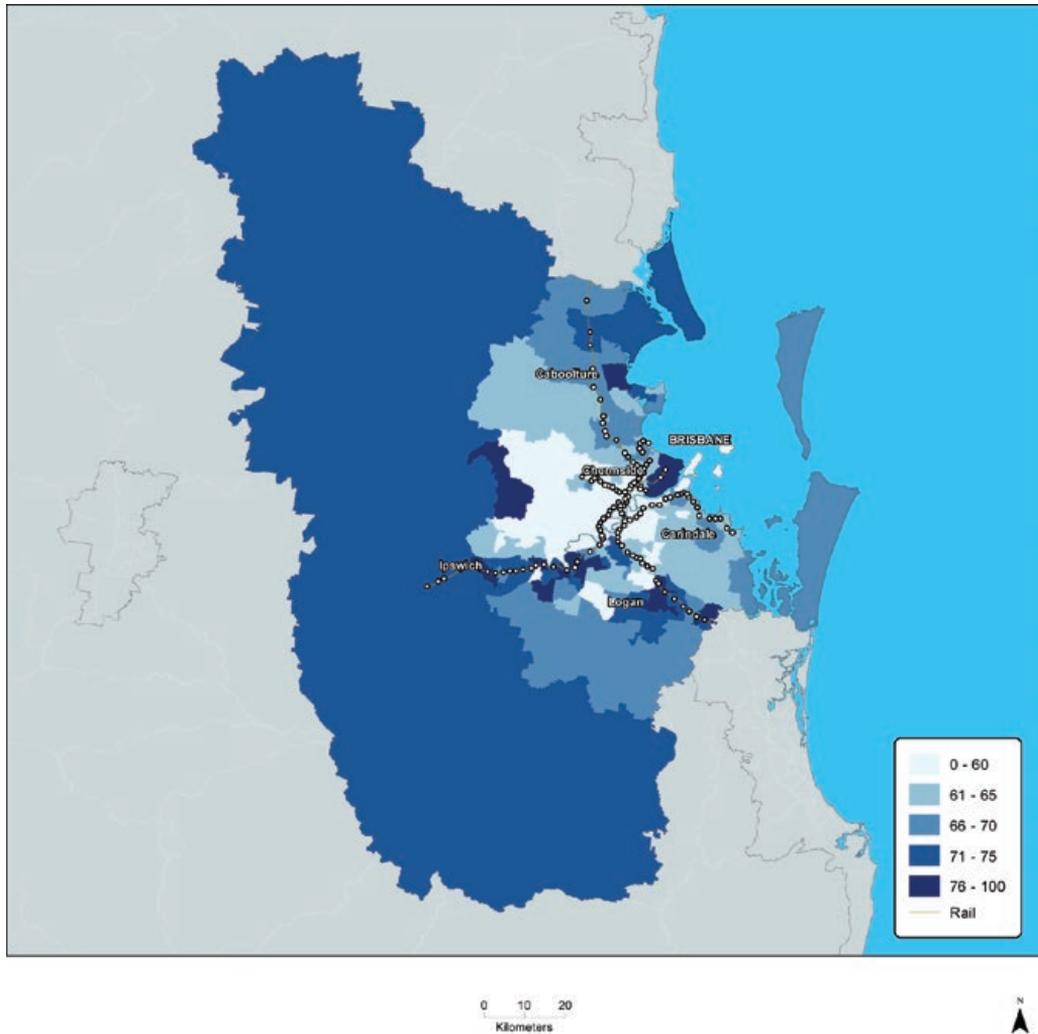
Conclusion

Australia's labour market is undergoing a fundamental shift. Some industries and occupations are under increasing pressure, others are growing stronger and other promising industries are emerging. This has implications for major cities because, while changes in the labour market are being experienced on a national and sometimes even global scale, their effects are very different in different cities and different regions within cities.

Knowledge-intensive jobs account for a small proportion of all jobs overall in Australia's major cities, but they are increasingly important for productivity and national prosperity. They trigger a large multiplier effect, increasing employment and salaries for people who work in the region, particularly in local services jobs that cannot be exported elsewhere. Knowledge-

intensive jobs benefit significantly from agglomeration and therefore tend to cluster in the inner suburbs of Australia's major cities. This is one of the reasons that major cities may be beginning to shrink in on themselves, reversing the dispersing forces that have been dominant since the end of World War II. Additionally, work opportunities in manufacturing and retail in the middle and outer suburbs have been decreasing. These changes to labour markets may be resulting in Australia's major cities becoming more divided, not just by socioeconomic status but also by geography.

Major cities are the economic powerhouses of the nation and will be relied upon to boost Australia's productivity growth during the Asian Century. Connections between the places that people live and where they work in major cities are important to their productivity and also to equality of opportunities. The better we understand productivity and where people live and work, the better placed we will be to boost productivity and liveability.

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Sustainability

Chapter 4

This chapter examines sustainability issues for Australia's major cities in two parts: climate impacts; and residential and transport energy use.

In recent years, heatwaves, floods, fires and storms have occurred more frequently in many cities. This chapter looks at some of these recent events and what our major cities are doing to adapt and prepare for them. Continuing from previous State of Australian Cities reports, this chapter also looks at the critical issue of heat in cities. The chapter features examples of adaptation strategies such as increasing the amount of vegetation in the built environment.

This chapter discusses urban energy use with a focus on the residential and transport sectors' energy consumption. Households in our major cities are becoming more energy efficient, but population growth and the increasing number of one and two person households have led to overall emissions rising. This chapter's analysis of residential energy use considers the different sources and uses of energy in city households, including heating, cooling and appliances. Transport is a major consumer of energy in Australian cities. This chapter also examines the energy efficiency and greenhouse gas emissions of different types of urban transport.

The energy consumed in Australia's cities is a major element of the country's natural resource consumption; it continues to stand out as one of our major long-term sustainability issues. While the United States and Europe show signs of levelling-off per capita energy use (and hence emissions), according to some sources, Australia shows no clear signs of a long-term trend (1971–2009) in that direction. Our energy use and emissions have both climbed along with per capita GDP (International Energy Agency 2011 p.13). Much of this growth has been driven by energy-intensive and emission-intensive exports rather than domestic consumption but, as industry energy intensity has recently been reducing, the role of household energy use is becoming important in seeking to reduce emissions.

Waste is another key measure of sustainability considered in this chapter. The focus is on organic waste production and recycling (including e-waste) and the value of waste.

Key findings

Heat

- Based on current trends, heat-related deaths in Australian cities, especially Perth and Brisbane, are predicted to increase.
- Policy responses to previous heat events were tested during the record-breaking summer of 2012–13, when Australia registered the hottest September to March period on record, the hottest summer on record, the hottest month on record and the hottest day on record and the longest national-scale heatwave. It was also the hottest summer on record for Australian sea-surface temperatures.

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- Despite these records, most Australian cities did not exceed their long-term average highest monthly maximum and minimum temperatures during the summer months of 2012–13. There were also significant differences in rainfall, particularly between Queensland coastal cities (many of which received record rainfall) and southern cities (some of which received hardly any rain during this period).

- The Bureau of Meteorology has developed an improved method of recording and predicting heat events. These can now be compared and mapped using the 'excess heat factor' (EHF) measure.

- The liveability of Australia's cities will be affected by how their sustainability is managed. Many cities are making significant progress in introducing areas of vegetation (including plants, trees, open green spaces and even forests) at various scales across cities – from buildings to districts and metropolitan regions – to reduce the Urban Heat Island UHI effect and thereby increase liveability and reduce energy use.

Household energy

- Since 2008, residential energy use has accounted for 12 per cent of the nation's total consumption.

- Energy demand for space heating and cooling is projected to increase in the coming decades. Factors influencing increased demand include houses with the largest average floor areas in the world, the decreasing occupancy rate of dwellings and the increasing use of whole-house heating and cooling systems.

- Airconditioner use in the residential sector has increased significantly. Ownership of airconditioning units almost doubled between 1994 and 2004, rising from an average of 0.395 units to 0.762 units per household. This is projected to increase even further. The rapid growth in air conditioner ownership has effectively negated energy consumption reductions gained by improved efficiency over the same period.

- Appliances account for 23 per cent of Australia's residential sector energy consumption, with electricity being the predominant power source. Attempts to reduce appliance-related energy consumption by the residential sector have focused on achieving greater product efficiency. The overall gains from these efficiency initiatives have, however, been offset by the increased number and variety of appliances in homes.

Transport energy

- Nearly 40 per cent of total national energy use is spent moving people and freight. The transport sector uses 73 per cent of Australia's total liquid fuel, with over half of that being used by road transport.

- The transport sector also contributes the largest proportion of average household carbon dioxide (CO_2) emissions, at almost 42 per cent. Light passenger vehicle use alone accounts for 35 per cent of Australia's average household emissions, by far the largest overall component of the transport sector's emissions.

- Energy use in light passenger vehicles is relatively well documented. There is less publicly available information for mass transit systems, particularly taking into account occupancy rates. The potential energy efficiency savings of urban mass transit systems are considerable; however, further information in this area will be needed to inform public policy decisions.

Waste

- Australia generated 54 million tonnes of waste in 2009–10: 47 per cent of this was recovered domestically, 46 per cent went to landfill and the remaining seven per cent was exported.

- Waste worth $2.4 billion was one per cent of Australia's exports in 2011–12: 82 per cent of this was ferrous metals, gold, copper and aluminium.

- Australia's waste management industry has been valued at $9.5 billion annually, with income from waste products valued at $4.5 billion annually.

Heat

Understanding the human impact of heatwaves

Major heatwaves are Australia's deadliest natural hazards, particularly for cities. Major heatwaves have caused more deaths since 1890 than bushfires, cyclones, earthquakes, floods and severe storms combined (Table 4-1). As discussed in State of Australian Cities 2011, the 2009 heatwave endured by south east Australia caused over 400 deaths in Melbourne and Adelaide alone and more than 400 people perished in each of the 1939 and 1895 heatwaves.

Table 4-1   Estimated deaths from natural disasters and epidemics in Australia, 1890–2013

	Bushfire and urban fire	Cyclone	Earthquake	Epidemic	Flood	Hail, severe storm, tornado	Heatwave
No. of events with fatalities	75	37	1	11	66	69	29
No. of deaths	843	935	13	10,375	453	124	2,887

Source: Australian Emergency Management Institute 2013

Various climate change scenarios for Australia show that heatwaves are predicted to increase in frequency, geographic spread and duration. Pricewaterhouse Coopers undertook a study in collaboration with the Australian Government using excess heat factor (EHF) to forecast heatwave impacts. The results are summarised in Figure 4-1, which shows that heatwave-related deaths (from major heatwave events) in Australia's cities are predicted to more than double in the next 40 years as a result of climate change, population growth and an ageing population (Pricewaterhouse Coopers 2011).

Studies have found that those at high risk from heatwaves include the elderly (Hansen et al. 2011), people who live alone (Zhang et al. 2013), the socially disadvantaged such as those on lower incomes or the homeless (CSIRO 2011) and those with underlying medical conditions (Nitschke et al. 2011). With our ageing population, heat vulnerability will increase: Chapter 5 of this report notes that by 2056 most capital cities, with the exception of Darwin, are estimated to have at least 19 per cent of their populations aged over 65.

People living in cities, particularly those in Australia's inland cities, can be more susceptible than non-urban dwellers to the effects of heatwaves as a result of the urban heat island (UHI) effect. This is caused by the prevalence in cities of heat-absorbing materials such as dark coloured pavements and roofs, concrete, urban canyons trapping hot air, and a lack of shade and green space in dense urban environments. It can result in substantially higher average temperatures (particularly overnight) than surrounding non-urban areas (VCOSS 2013). Heatwaves also affect cities by causing blackouts and accelerating the ageing of infrastructure (CSIRO 2011).

Figure 4-1   Estimated annual average number of heat-related deaths, selected capital cities and States/Territories, 2011–2050
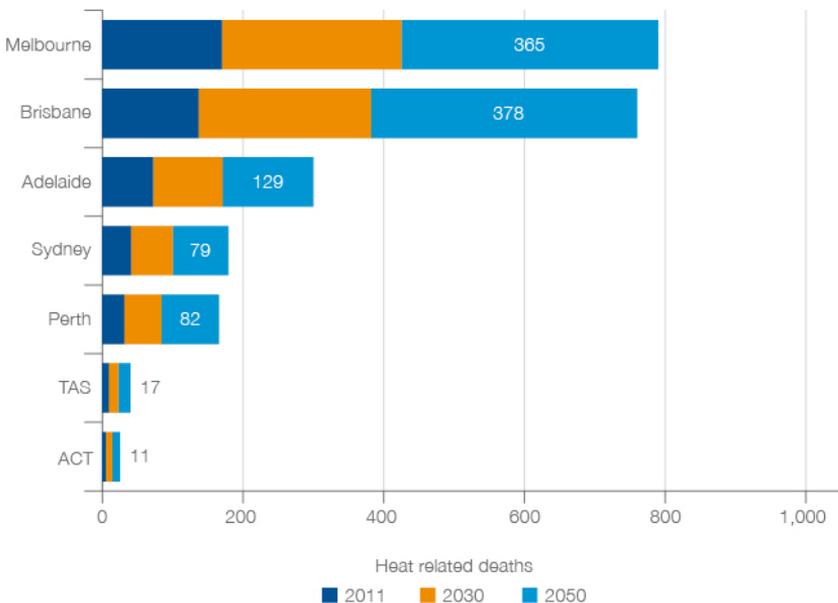
Note: Population growth alone would account for a significant proportion of these "top Heat Event" related deaths.

Source: Pricewaterhouse Coopers (2011), p. 30

Following recent heatwaves in Australia, governments have taken action to increase heatwave preparedness and mitigate impacts. In November 2011 New South Wales published its State *Heatwave Subplan* (NSW Government 2011), part of the *NSW State Disaster Plan*. In December 2012 Western Australia released its *State Emergency Management Plan for Heatwave* (Department of Health Western Australia 2012). Since 2009 the Victorian Government has developed a heatwave plan and a heat alert system. It has also provided funding to help councils prepare plans, with guidance from the Victorian Government's 2012 *Heatwave Planning Guide* and the *Heatwave Plan Review Tool* (Department of Health (Vic) 2012). The City of Greater Geelong and the municipalities of Swan Hill and Frankston now have plans in place.

In South Australia, government agencies have developed the Extreme Heat Operational Plan (SA Health 2013), which seeks to reduce the harmful effects of extreme heat on the community by:

- ensuring a planned, managed, and effective response to a heatwave;
- providing a coordinated SA Health communication plan; and
- promoting community resilience and adaptation.

The Operational Plan provides information on coping with heat stress and ensuring that vulnerable individuals, such as those with mental health issues, are provided with support.

Research to map the vulnerability of cities to heat has been undertaken by the National Climate Change Adaptation Research Facility (NCCARF), Monash University and the CRC for Water Sensitive Cities (Loughnan et al. 2013). The CRC has developed a public mapping application overlaying Google Earth images with measures of heat vulnerability for Australia's capital cities (see www.mappingvulnerabilityindex.com).

NCCARF has also published research on the vulnerability of low-income households to heat in various capital cities, finding connections between parts of the outer urban areas of those cities and lower wealth and exposure to excess heat (Barnett et al 2013).

The Australian Government Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education released a paper in 2013 titled *Climate adaptation outlook: a proposed National Adaptation Assessment Framework* (see http://www.climatechange.gov. au/climate-change/adapting-climate-change/climate-adaptation-outlook). The proposed framework will allow governments, businesses and communities to assess national progress in climate change adaptation. Its aim is to help understand how well Australia is adapting to the impacts of climate change in terms of drivers, activities, and outcomes. The Department will consult with stakeholders about the proposed framework in the second half of 2013.

Internationally, the Carbon Disclosure Project in June 2013 released its *Wealthier, healthier cities* report (see http://carbondisclosureproject.net). The report analyses a 2013 survey of 110 'global cities', including Melbourne and Sydney, looking at how climate change action is improving the health and wealth of cities. Key findings include:

- half of the city-wide greenhouse gas emissions-reduction actions that cities undertake improve efficiency
- 62 per cent of these actions have the potential to attract investment
- 55 per cent of the cities surveyed are undertaking emissions-reduction actions that promote walking and cycling.

Measures have also been developed to better anticipate heatwave incidents and improve understanding of the effects on communities. The Bureau of Meteorology (BOM) has defined and mapped the intensity of heatwaves using the new heatwave measure Excess Heat Factor (EHF). This is explored in the following feature article.

Heatwaves – Australia's most dangerous natural hazard

Contributed by John Nairn of the South Australian office of the BOM

Heatwaves are a familiar feature of the Australian landscape, yet only recently has there been a reliable way of recording and predicting them. They are caused by slow-moving high pressure systems where air circulates across a hot and dry surface of land, building a pool of increasingly hot air (as shown in Figure 4-2).

Figure 4-2   Adelaide heatwave air movements, March 2008
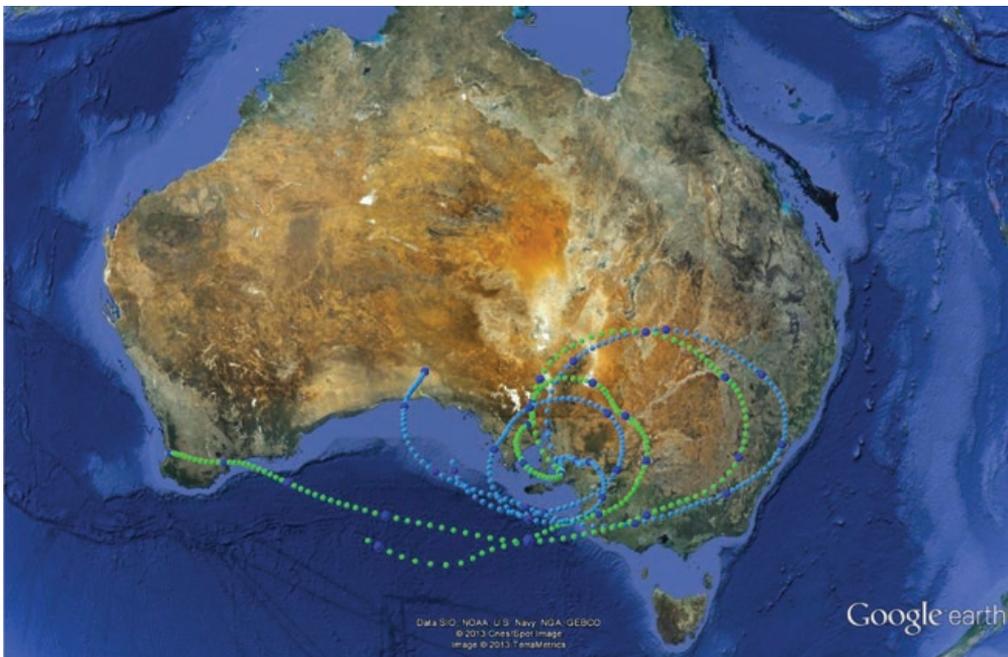
Note: Five-day backward trajectories (i.e., air-flow paths that arrive at Adelaide at the chosen times) calculated using the HYSPLIT trajectory model on ACCESS fields. The back-trajectories are from the city of Adelaide. Starting times are for 10 March 2008 and 14 March 2008. Trajectories are shown at hourly intervals for air ending over Adelaide at those times at the 850 hPa level (blue) and for the 700 hPa level (green).

Source: McBride et al. 2009

Heatwaves are generically defined as excess heat events lasting at least three consecutive days. They can be particularly stressful when combined with another form of heat excess. This occurs when a relatively sudden temperature change requires rapid adjustments in natural or engineered systems to manage the excess heat. There is a significant difference in impact between a heatwave that arrives after a spell of relatively high temperatures and one that develops suddenly after a milder period. Abnormally high temperatures expose systems to levels of heat for which they are not designed. For vulnerable people such as the elderly or very young children, this can be challenging, particularly if health facilities, emergency agencies and power and transport networks are not prepared for the conditions.

Research shows that high levels of individual stress can occur following a season of heatwaves if temperatures become exceptionally high over a prolonged period. This occurred in France in 2003, when 15,000 people died suddenly at the end of a long hot summer. This and other extreme heat events can now be compared and discussed using the EHF. The heatwave illustrated in Map 4-1 is a snapshot of the levels of EHF severity that occurred over south-east Australia for the three-day period starting on 28 January 2009. This extreme heatwave accounted for over 400 deaths, mostly in Melbourne and Adelaide.

Map 4-1   Areas of Australia with positive EHF, 28–30 January 2009
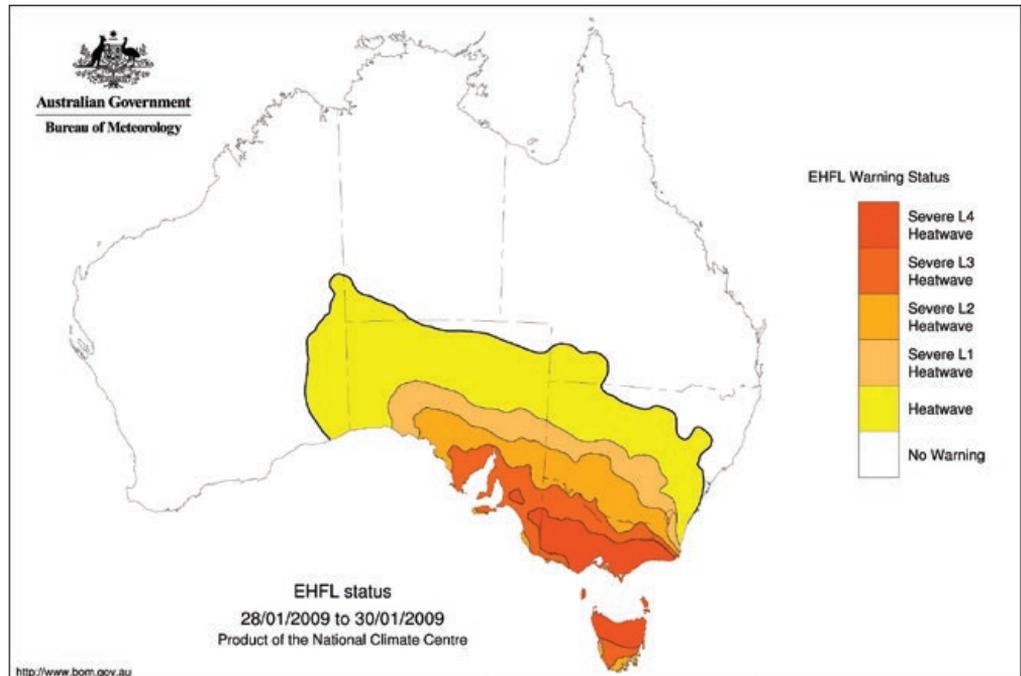
Note: Areas with positive EHF for the period 28–30 January 2009 as mapped for incidence of heatwave and level of severity. The contour band "Severe L1 Heatwave" indicates EHF values between one and two times the EHF severity threshold, while the contour band "Severe L2 heatwave" indicates EHF values between two and three times the EHF severity threshold, and so on.

Source: BOM 2013

Being able to forecast the slow-moving weather systems associated with heatwaves well ahead of their arrival is key when it comes to preparing authorities and communities. This is why the Bureau of Meteorology (BOM) seeks to continually improve its seasonal, multi-week and seven-day forecasts, as well as its work in defining, understanding, tracking and recording heatwave events.

Central to the EHF measure is a consistent definition of heatwave. Until now, there has not been a single heatwave definition that can enable a useful comparison of heatwaves across Australia or, indeed, the world. The EHF measure makes it possible to map the severity of past and future heatwave as experienced by different communities. From Alice Springs to Hobart, the intensity of heatwaves can be mapped in a way that is relevant for each community.

Each point on EHF heatwave maps represents a temperature range that is familiar to the community at that location. When temperatures exceed the top of this familiar range, local people and infrastructure are affected by heat stress. What is considered a heatwave in one location can be a manageable level of heat for another.

Mapping heatwave data this way also offers opportunities for international cooperation. Heatwaves in both the southern and northern hemispheres can now be compared, allowing us to learn from one another's experiences and to share strategies for responding to these increasingly frequent events.

The science behind EHF maps of heatwave severity is under review and is likely to form the basis for a future national heatwave warning service, helping agencies and the community understand the relative intensity of a forecast heatwave.

For more information on EHF, see the Pricewaterhouse Coopers report *Protecting human health and safety during severe and extreme events: a national framework,* available at http://www.pwc.com.au.

Extreme weather in 2012–13

Previous State of Australian Cities reports highlighted climate change-related weather events, including increased drying and heatwaves in southern and parts of inland Australia. Australia's governments and research community are taking these issues seriously. The Cooperative Research Centre for Water Sensitive Cities has a research budget of $100 million and is funded until 2021. Australia's southern cities have experienced droughts in the past. However, population growth and associated increased demand for water puts pressure on water supplies. Any worsening of drought duration and frequency (as predicted by some climate change modelling) would necessitate radical changes to buildings, industry, and urban landscapes in order to maximise water capture, reuse and efficiency measures (Kenway et al. cited in Risbey 2011).

In the next few decades, climate change (as opposed to short-term weather variability) is expected to increase the pressure on already stressed urban water resource systems in Australia's southern cities. While the probability of major climate change-related events occurring is lower in the short term, the stresses caused by incremental climate change such as more frequent heatwaves and droughts, may bring greater risks and costs for some cities, particularly those already using water resources to capacity.

Events such as the record-breaking heatwave of 2012–13, which occurred only three years after the previous extreme heat event affecting southern Australia, affect urban water storage inflows via reduced rainfall and increased evaporation and increase domestic, horticultural and agricultural demand.

In 2012–13 Australia registered the warmest September to March period on record, the hottest summer on record, the hottest month on record, the hottest day on record and the longest national-scale heatwave. It was also the hottest summer on record for Australian sea-surface temperatures (BOM 2013a).

The Climate Commission's The Angry Summer report addressed questions about the influence of climate change on the extreme summer weather of 2012–13. It highlighted that, in three months, 123 weather records were broken across Australia, including the hottest January, the hottest summer, and the hottest day on record for Australia as a whole. The

Climate Commission places the extreme events of summer 2012–13 in the context of a climate that is warmer and moister than 50 years ago, which influences the nature, impact and intensity of extreme weather events. It concludes that the summer of 2012–13 shows that climate change is already affecting Australians and that it is highly likely that extreme hot weather will become even more frequent and severe.

According to Salby (2013), however, the mean temperature for Australia in January 2013 was not unprecedented, being about one standard deviation above the average January temperature. The anomalous summer temperatures of 2012–13 are within the range of other warm periods in the past 30 years.

The following section is an abridged version of the BOM Special Climate Statement 43 – extreme heat in January 2013, available from **http://bom.gov.au/climate/current/statements/scs43e.pdf**.

BOM Special Climate Statement 43

The start of 2012 saw cooler and wetter conditions, which by the end of the year shifted to warmer and drier conditions. The Australian area-averaged mean temperature for 2012 was 21.9°C, which, at 0.1°C above the 1961–90 average of 21.8°C, ranks near the median of observations. Nationally, winter minimum temperatures were the 11th-coolest on record, 0.86°C below average. Despite this, the last decade (2003–12) remains one of Australia's warmest. In terms of mean temperature, cooler-than-average conditions predominated in northern and eastern Australia while Tasmania, the mainland's southern coast and the south-western half of Western Australia (WA) experienced above-average temperatures (BOM 2013b).

The 2012–13 heatwave event saw Australia experience its hottest summer on record and the hottest January on record. It included the hottest day on record for Australia as a whole and, for the first time, seven consecutive days with maximum temperatures over 39°C for Australia as a whole. The previous record-breaking nationwide heatwave occurred in 1972–73. However, the most extreme aspects of the 1972–73 heatwave were confined to inland areas, whereas in late 2012 and early 2013 every capital city except Brisbane and Darwin reached 40°C at least once during the heatwave. Particular features of the 2012–13 heatwave were the wide spatial extent of high temperatures and how long it lasted, particularly in inland areas. Some weather stations experienced well above average temperatures on most days over a period of three weeks or more. These two factors created a vast bubble of very hot air over central Australia which affected southern and eastern cities. The only large areas over which significant temperature extremes did not occur were the northern tropics, the west coast of WA from Perth northwards, and coastal Queensland.

Map 4-2 illustrates the highest maximum temperatures across Australia during the heatwave in January 2012. In December 2012 the heat began with a build-up of extreme temperatures in the south-west of WA from 25 to 30 December 2012 which then moved eastward. By 4 January 2013 the high-pressure system had moved off eastern Australia, with northerly winds directing very hot air into south-east Australia, while southerly winds eased temperatures in WA. The most extreme day of the event in Tasmania and coastal areas of Victoria and South Australia was 4 January. In Hobart, the maximum was 41.8 °C, the highest on record. On 4 January Adelaide reached 45°C for only the fourth time in its history; it also had temperatures above 40°C on 3, 7 and 17 January.

Map 4-2   Highest maximum temperature, 1–18 January 2013
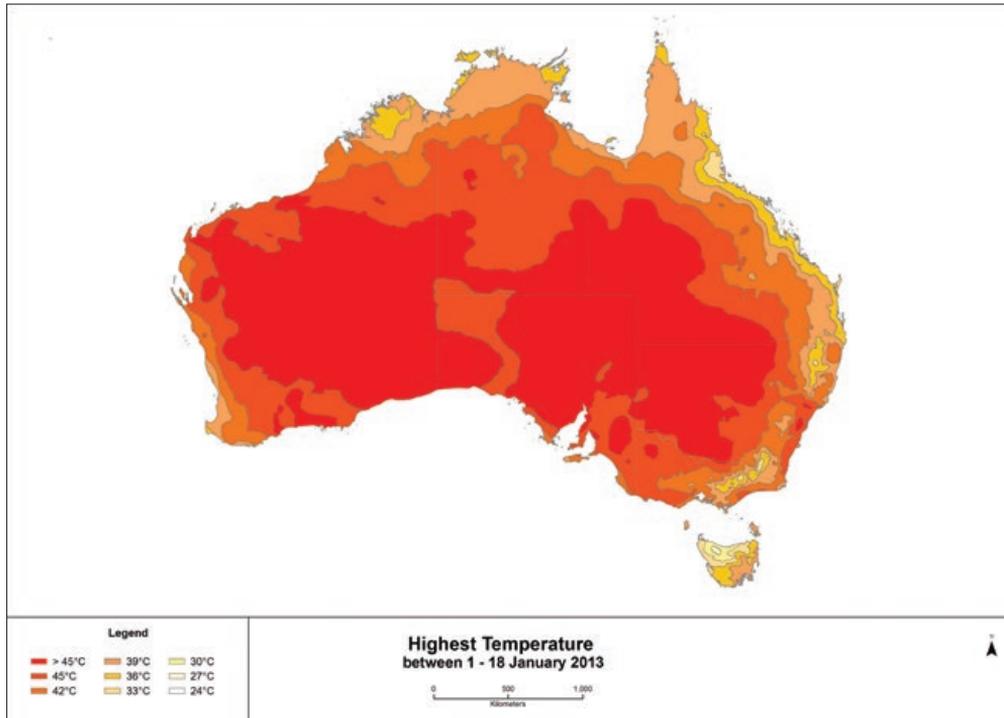
Source: BOM 2013

Southern coastal areas of Australia cooled from 5 January onwards, but areas of intense heat lingered inland over eastern SA and the southern half of New South Wales (NSW) until 8 January, when the heat extended to coastal NSW with temperatures widely exceeding 40°C from Sydney southwards, and fire danger reaching catastrophic levels in parts of the State's southern inland. Conditions cooled temporarily in the eastern States after 8 January. Meanwhile, WA saw a second wave of record-breaking heat on 8–10 January as a second high pressure system moved into the Great Australian Bight directing hot easterly winds into the State.

Intense heat from the interior of Australia moved east again on 11 January, with the most extreme heat occurring on the weekend of 12–13 January. Temperatures exceeding 48°C were recorded at numerous locations in north-western NSW, north-eastern SA and western Queensland. Overnight minimum temperatures were also very high, with Bedourie (Queensland) falling to only 34.1°C on 14 January – the highest in Queensland since 2006. North-westerly winds brought a final phase of extreme heat to SA and Victoria on 17 January and NSW on 18 January. Conditions were particularly extreme on the coast and adjacent ranges of central and southern NSW. Sydney's longstanding record high temperature (since 1939) was broken by 0.5°C when it reached 45.8°C at Observatory Hill at 2.55pm on 18 January and 46.1°C at Bankstown; Parramatta reached 41.3°C on 8 January and 45.5°C on 18 January. According to the *Sydney Morning Herald* (19 January 2013) more than 220 people were treated for heat exposure by late afternoon on 18 January.

It is interesting to observe the strong temperature moderating effect of a large water body such as Sydney Harbour, illustrated in Figure 4-3. The figure also shows that on this record breaking day in Sydney, the inland centre of Parramatta was cooler during the early hours of the morning, and conversely did not enjoy the benefits of the afternoon cool change until about two hours after the city and airport. It is also noteworthy that Sydney Airport, despite being on the coast with few tall buildings around it to create a heat island effect, is nevertheless much warmer overnight and is not cooled as much as the city by the afternoon cool change. This could in part be due to the minimal green space and large amount of tarmac which absorbs and re radiates heat. The Section later in the chapter on greening the built environment explores this further.

Figure 4-3   Twenty-three-hour temperature readings at various weather stations around Sydney, 18 January 2013
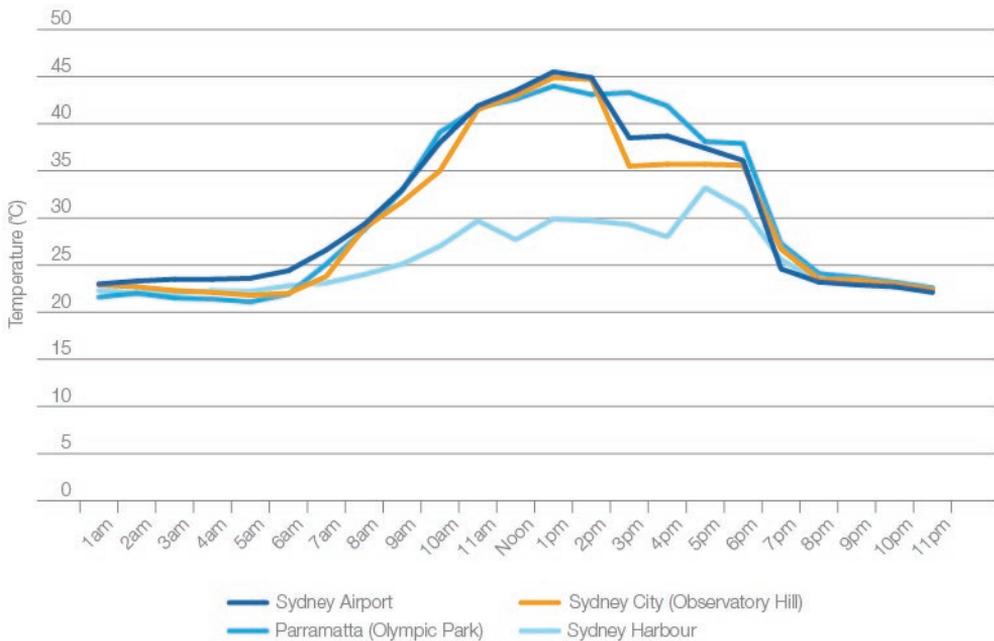
Source: BOM

Numerous other records were broken during the 2012–13 heatwave:

- Newcastle reached 42.5°C

- Canberra reached 42.0°C

- four other major cites experienced maximum temperatures in the forties

- Geelong experienced 42.2°C on 4 January

- Melbourne reached 41.1°C on 4 January and 40.8°C on 17 January

- Wollongong Airport reached 43.1°C on 8 January and 45.8°C on 18 January.

- Albury-Wodonga had the longest consecutive run of extreme heat of any major city in January 2013, experiencing maximum temperatures above 40°C on 4, 5, 6 and 7 January and again on 18 January, when it peaked at 43.4°C.

Despite the spikes of high daily temperatures during the summer of 2012–13, some southern cities did not experience average maximum temperatures significantly above the long-term mean. Sydney, for example, reached 32°C or above on just three days.

In terms of overnight minimum temperature, Albury-Wodonga had three consecutive nights when the minimum temperature did not drop below 21°C. Hobart had its warmest January night on record, dropping to only 23.4°C on 4 January, although its average minimum for January 2013 was below the highest monthly mean for all years (14°C). Sydney's Observatory Hill had the longest run of minimum temperatures above 20°C of all southern major cities: nine nights between 5 and 13 January and 12 consecutive nights between 17 and 28 January. This is significantly more hot nights than western Sydney locations such as Parramatta and Bankstown, although Sydney's average minimum temperature for the month of January 2013 of 20.5°C is below the highest monthly mean for all years of 21.0°C. Bankstown's and Parramatta's highest monthly mean minimums for January were up to one degree cooler than Sydney's. Newcastle's minimum temperature dropped below 20°C on only five nights during January. Such relatively long sequences of above-average minimum temperatures – exceeded only by Queensland's major cities and Darwin, which have higher average minimums – have serious health implications for populations not acclimatised to such conditions.

In most of Australia, the main part of the 2012–13 heatwave ended on 19 January as southerly winds cooled the southern states and tropical moisture from a late-developing monsoon moderated conditions further north. January 19 was the first day since 31 December 2012 that it did not reach 45°C somewhere in Australia, with above-normal temperatures becoming confined to the southern half of Queensland.

Other extreme weather events that occurred in the summer of 2012 were the floods in coastal Queensland. Tropical Cyclone Oswald weakened into a tropical low-pressure system that moved slowly south inland of the coast from 22 January 2013, finally dissipating offshore near Sydney on 29 January (Climate Commission 2013a). On 28 January the system caused extremely heavy rain over the Gold Coast hinterland and the NSW border ranges, with the Gold Coast breaking its record for highest one-day total rainfall, receiving 319 millimetres according to BOM observations (Map 4-3). In addition to the rain, the system brought strong winds and storm surges, high waves and tornadoes, which caused significant damage to property in urban areas. On 26 January damaging tornadoes hit Bundaberg and other coastal Queensland towns. Tornadoes also hit the Kiama area south of Wollongong on 24 February, damaging approximately 170 houses. Tornadoes also occurred in the Rutherglen area of Victoria on 21 March, hospitalising at least 20 people. Map 4-3 shows rainfall levels across Australia from 22–29 January 2013.

Map 4-3   Australian rainfall, 22–29 January 2013
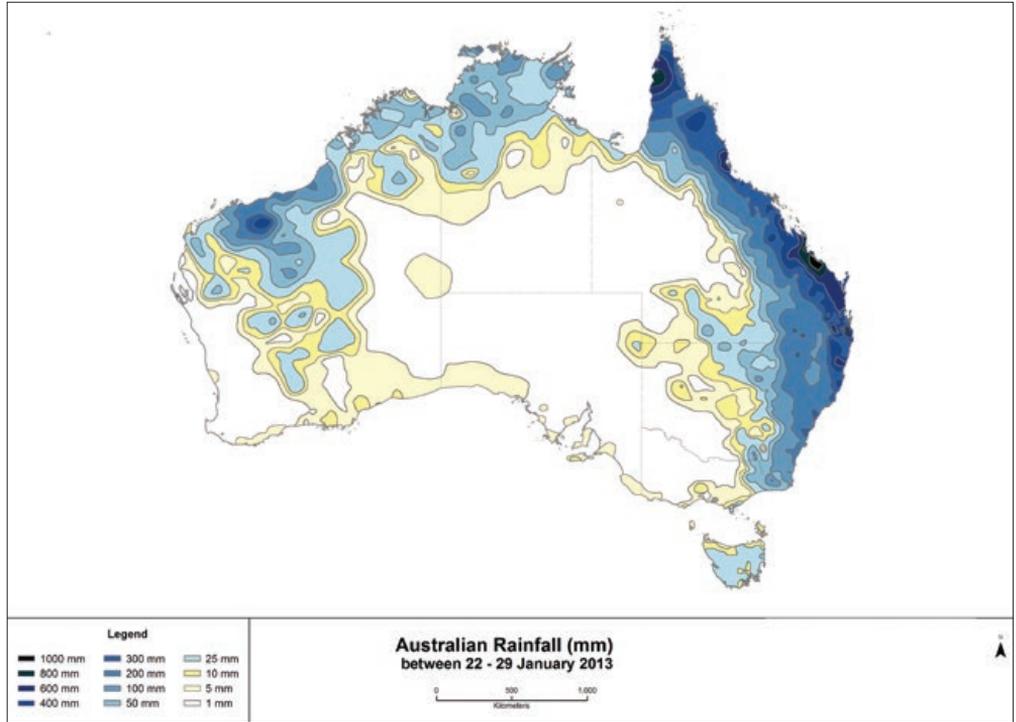
Source: BOM 2013

Increasingly warm weather also affects winter temperatures. Frost formation is affected by a series of factors including cloud coverage, humidity, surface winds, topography and location. In Australia, frost is more likely to form under a clear sky, with low humidity and light surface winds (BOM 2013c). Frost has a major influence on agricultural production because of its effects on the timing of planting and harvesting. The decreasing number of frost nights, as illustrated by Map 4-4, while indicative of warming average temperatures, may help increase agricultural productivity. It may also help increase the productivity of peri-urban agriculture around Australia's southern cities, as examined in *State of Australian Cities 2012*. Map 4-4 shows not all cooler areas of Australia are experiencing a decrease in the number of frost nights. The Climate Commission (2013, p. 23) attributes this to reduced cloud cover associated with a decrease in rainfall.

Map 4-4   Trend in the numbers of frost nights (days per decade) in selected Australian locations, 1970–2012
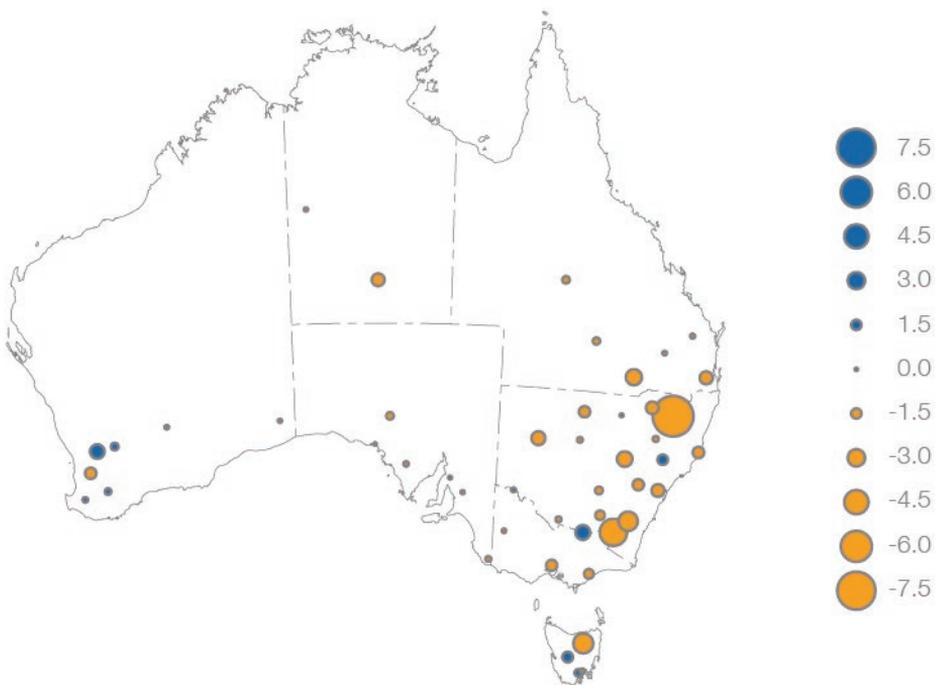
Note: Blue dots represent an increase in the average number of nights with frost and orange dots represent a decrease. The size of the dots indicate the number of nights changed.

Source: BOM 2013

The following graphs of Australia's major cities' average temperatures each contain three sets of comparative data. The horizontal axis shows temperature and rainfall observations for December 2012, January 2013 and February 2013. This data is in pairs: the left-hand set of data shows actual data for the month and the right-hand set of data shows the averages for that month ('All years'). Within the right-hand dataset are two types of average temperatures: the average maximum and minimum temperatures for a given month, and the highest average maximum and minimum temperatures for that month ('historic high' average). The latter are represented by short bars, the former by triangles. Rainfall figures are represented by circles. The total rainfall for each month is represented by solid blue circles,

and the long-term average rainfall for that month is represented by open orange circles. Some key points illustrated by the graphs are noted below.

- During the major heat event of the summer of 2012, maximum daytime temperatures in most of Australia's major cities did not exceed the highest average maximum temperature for any given month. Canberra and Wollongong were the exceptions (January). Cairns and Darwin came very close to their highest average maximum in December, Brisbane very close in December and January, Perth very close in December, and Albury-Wodonga close in January.

- Surprisingly few cities approached their highest average night-time minimum temperatures. Some cities, such as Geelong, actually recorded below long-term average minimums for all three months. Albury-Wodonga was virtually on average for December and January, as were Canberra and Darwin for December and February. Newcastle almost reached its all-time high average overnight temperature in January.

- The graphs show striking differences in rainfall between major cities. In January the Gold Coast exceeded its record for total rain in a 24-hour period. This is reflected in its total of 500 millimetres for January 2013, over three times its long-term average monthly figure of 180 millimetres – itself a fairly hefty total. Toowoomba too received over 400 millimetres in January, compared to a monthly average of 132 millimetres.

- Conversely Perth, Geelong and Albury-Wodonga had almost no rain in January/February. Adelaide, Melbourne, Launceston and Hobart also had very low readings for some of the three months. Canberra had above-average rainfall in January. Wollongong, Sydney, Parramatta and Newcastle had above-average rainfall in January and February. The northern tropical cities of Townsville, Cairns and Darwin also received either average or below-average rainfall for the three months.

Brisbane.
Image courtesy of Olivia Silverwood

Major cities' temperature and rainfall during the summer of 2012–13 compared to long term averages

Minimum temperature
Minimum temperature – historic high
Total monthly rainfall

Maximum temperature
Maximum temperature – historic high
Average monthly rainfall

Townsville

Cairns

Darwin
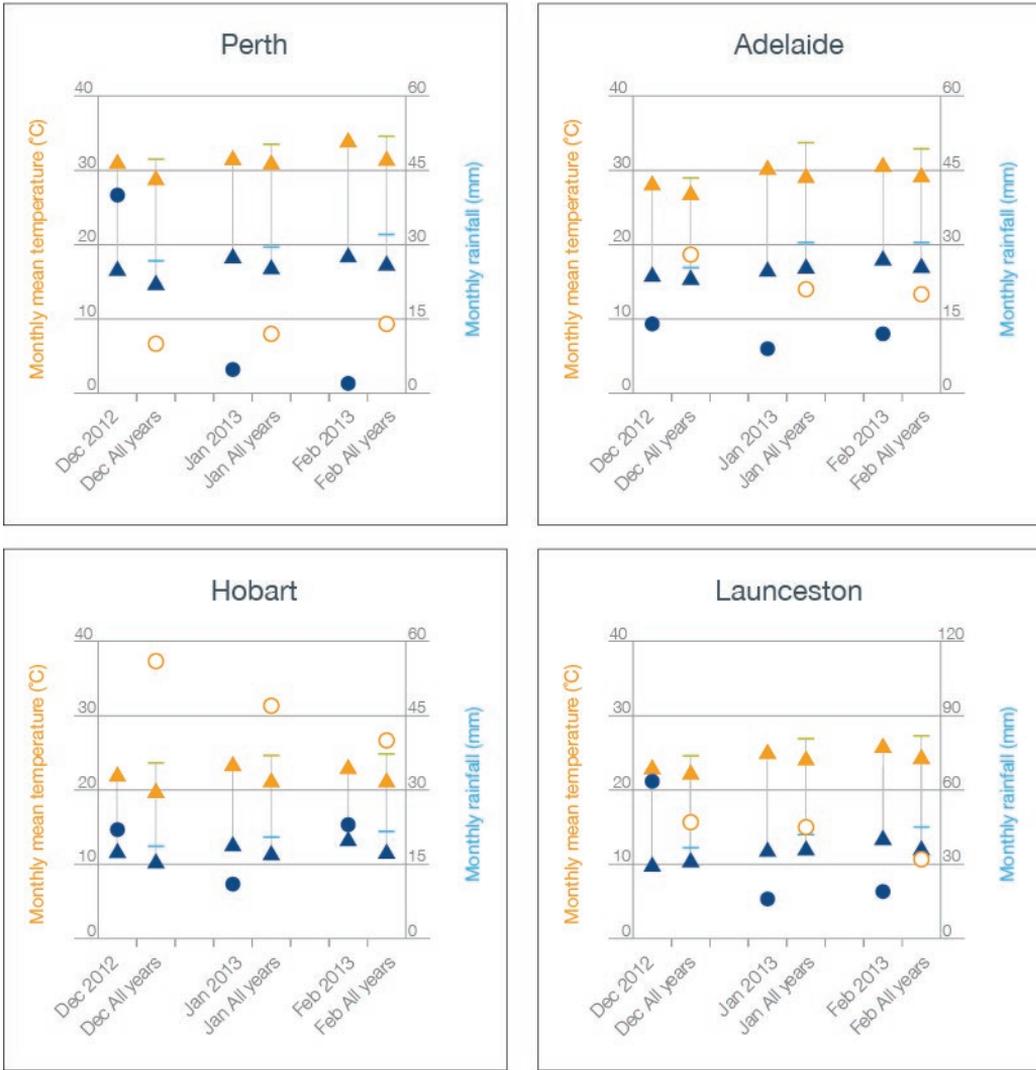
▲ Minimum temperature   ▲ Maximum temperature
— Minimum temperature – historic high   — Maximum temperature – historic high
● Total monthly rainfall   O Average monthly rainfall

Adaptation measures

In addition to BOM's work predicting heatwaves and factoring in EHF for communities, climate change and heat adaptation efforts are being pursued in various cities around Australia, as illustrated in the featured examples below.

Geelong: Climate Change Adaptation Toolkit

Contributed by the City of Greater Geelong

The City of Greater Geelong has been addressing its capacity to manage climate change. It published in 2012 a Climate Change Adaptation Toolkit, specifically designed to help local governments address climate change in a practical way. The Toolkit was developed in collaboration with RMIT University and the Net Balance Foundation.

In 2011, the City of Greater Geelong released its Climate Change Adaptation Strategy and Roadmap to respond to the impacts of climate change. Its purpose was to identify and communicate the key risk areas for the City of Greater Geelong and propose a roadmap for action. It acknowledged the uncertainties associated with climate change on Council's operations and provided a framework for organisational change and to embed risks into decision making.

In developing the Strategy, it was clear that traditional tools were not adequate to guide Local Government decision making about climate change. The Adaptation Toolkit was developed to help integrate climate change into decision making. The challenge was to make it flexible enough to meet the widest range of future climate scenarios.

The Adaptation Toolkit is based on the ISO 31000:2009 Risk Management Standard, and took approximately 12 months to develop. Its concepts and structure were tested with the Engineering and Community Development Departments of the City of Greater Geelong.

The Toolkit aims to help organisations to:

- integrate adaptation into existing processes
- develop effective risk management strategies
- make consistent decisions regarding climate change
- incorporate uncertainty into decision making by:
  - making decisions that are flexible and work across a range of future scenarios;
- be more responsive to climate change shocks and trends
- maintain standards of service delivery during extreme weather conditions
- form linkages across different work areas, internally and externally.

The Toolkit is designed to be implemented once an organisation has developed a list of priority climate risks. It offers three tools that can be implemented in sequence or used as standalone steps:

1. exploring the risk context

2. developing adaptation actions

3. screening for climate change interactions

Tool 1: Achieve a better climate change risk definition

Climate change risks do not occur in isolation. Tool 1 explores interactions with other stressors (environmental, social or economic). It helps users to recognise links between existing risks, their context and climate change.

Tool 2: Provide a process for identifying, exploring, evaluating and prioritising adaptation actions to test against climate scenarios.

Tool 3: Help organisations embed climate change adaptation considerations into processes and operations.

Tool 3 helps identify climate change risks and adaptation actions, when developing new projects and strategies.

The City of Greater Geelong is currently integrating the Toolkit into risk management and project management processes by applying it to decisions and assessments.

It is now in an interactive web-based format so that it is easier for staff to use.

The City of Greater Geelong intends to write case studies to help the Toolkit's use as a standard tool across the City.

The Climate Change Adaptation Strategy and the Toolkit have raised climate change awareness throughout the City's staff and beyond. Staff are now considering climate change when making decisions about planning, infrastructure investments and environmental management.

The Toolkit is available on the websites of the City of Greater Geelong, Net Balance and RMIT. http://www.geelongaustralia.com.au/ct/tag/article/item/8cf7e8cfb9bad9d.aspx.

Responding to the urban heat island (UHI) effect: Chippendale, Sydney

Contributed by Michael Mobbs, residential sustainability consultant

In response to community requests and a plan to make the suburb of Chippendale sustainable, Sydney City Council is trialing the construction of 'cool' roads in the suburb, with work to be completed in 2013.

Council and the community wish to reduce the UHI effect in the suburb by cooling the streets. Streets cover over 24 per cent of the land surface of this closely-built inner city suburb. The streets are surfaced with black bitumen, many of them receiving full sun throughout the day. Figure 4-4 is a thermal image of part of Chippendale taken in the early hours of the morning of 6 February 2009 clearly showing the temperature of the roads (red). Since 2008 the City of Sydney has been monitoring the temperatures of two streets in Chippendale, one running east-west and one running north-south. The two monitoring stations take temperature measurements every five minutes, day and night. The data is made publicly available on the Council's web site at **http://www.cityofsydney.nsw.gov. au/vision/sustainability/sustainable-city-living/urban-heat-island**.

The east-west street is in full sun, whereas the north-south street is shaded on the western side by buildings and a large tree canopy. On average, when there is minimal or no cloud cover, the east-west street is always 2°C hotter than the shaded street, day and night.

A temperature rise of 1°C increases air conditioning use by around five per cent. Research in the United States shows that every 1°C increase adds about 500 megawatts to the air conditioning load in the Los Angeles Basin (Akbari 2001). From inside a building, increasing an air conditioner's thermostat set point by 1°C can save around 10 per cent of energy use (NSW Office of Environment and Heritage 2013).

Figure 4-4   Thermal image of Chippendale, Sydney, taken between
              1am and 5am 6 February 2009

Source: City of Sydney

The black, unshaded road drives up air conditioning and energy use in the adjoining buildings and ultimately increases greenhouse gas emissions. By changing from black bitumen to pale-coloured road surfaces that absorb and re-radiate less of the sun's energy, the City of Sydney aims to cool the streets down, including those without trees. It is also anticipated that lighter-coloured surfaces will reflect more light from street lamps and thereby allow lower-energy lights to be used. Light-coloured pavement is not new in Australia – many urban roads are concrete. For the trial, the City of Sydney plans to use pale-coloured aggregate in bitumen, which when laid will be ground back so the dominant colour on the road is pale.

As part of the trial, four new temperature-monitoring stations will be installed to measure the effects of the new road surfaces. With specific street data to be provided by the monitoring stations and the costs of the project yet to be quantified, the cool roads trial has the potential to provide a model for cooling our cities. Combined with increasing numbers of green roofs, 'cooler' streets may help reduce the greenhouse gas emissions of cities.

Greening the built environment

The built environment of cities – that is, the buildings and supportive infrastructures such as transport and utility networks – provide an essential basis for the majority of Australia's population to conduct their lives.

Cities are more than the concrete, tarmac, steel and bricks that make up the built environment. They include green open spaces, plants, trees and sometimes forests, and support a wide range of native and introduced animals. Some species, such as bottlebrush, currawongs and brush-tailed possums have adapted extremely well to urban environments.

Cities can support important ecological functions, such as providing habitat for biodiversity and assisting in the water cycle. However, the processes of urbanisation can also distort and displace these ecosystems.

Cities have the ability to influence local and global climates. For example, the replacement of vegetation by impervious surfaces and materials with high thermal conductivity, high heat storage capacity and low albedo (reflectivity) has led to the UHI effect (Oke 1982). This is where cities and their suburbs have significantly warmer air and surface temperatures than rural areas. Research indicates that the UHI effect and climate change are mutually compounding through increased energy use (Harris and Coutts 2011).

With population growth and urbanisation continuing to place pressure on the natural environment, there is growing recognition of the need to manage the ecology of cities to ensure they remain liveable. In this context, researchers, policy-makers, planners and resource managers are turning their attentions to greening the built environment.

In this section, 'urban greening' describes adding vegetation – including plants, trees, open green spaces and even forests – to cities at various scales, from buildings to districts and metropolitan regions. It focuses on the concept of urban forests. Case studies illustrate the unique approaches of several Australian cities to urban greening.

Benefits of urban greening

Adding natural green elements to the built environment promotes many direct and indirect benefits. These include mitigating the UHI effect, reducing air pollution and improving air quality and microclimate, and providing opportunities for carbon sequestration. Urban forests and greening provide habitat for biodiversity, support management of stormwater run-off and improve water quality.

Urban greening also provides opportunities for recreation and active lifestyles. By improving the aesthetics of the urban environment, urban greening can increase property values. The City of Melbourne has estimated the amenity value of its urban forests to be of the order of $730 million.

Fremantle green wall trials in a challenging climate

Contributed by Jana Soderland Curtin University

In 2011 a local Perth council made the construction of a green wall a condition of development for the builder of a block of units. The units would obstruct the view of an existing block of units and the council saw a green wall as a beneficial and attractive addition that would mitigate the loss of the view for the existing tenants. The developer took the council to court over this condition and had the condition removed. The defence was the lack of precedence and knowledge in Perth with this scale of green wall construction in local climatic conditions.

This case initiated the recognition of the need to trial green wall plants and systems in the challenging climatic conditions of Perth and Fremantle so the precedents and knowledge were available for future developments.

Curtin University Sustainability Policy Institute along with the City of Fremantle established a partnership to trial green walls in Fremantle. In April 2013 two sites with different green wall systems were installed in Fremantle after three months of growing off-site. They were planted with species chosen for their resilience in hot, dry conditions, comprising a combination of local plant species and exotics.

Challenging sites, both socially and climatically, were intentionally chosen. Both sites exhibit anti-social behaviour. Site A is a north-facing wall in a little used mall. The area is a sun trap in summer, with a high level of radiant heat from the paving and surrounding walls. Site B is a west-facing streetscape wall exposed to the late afternoon westerly sun and strong sea breezes.

Site A   Site B

Temperature and humidity sensors have been installed at Site A and they will provide continuous data over the year-long trial period. Sensors are also installed to gauge any difference that the plants have on the parameters being measured. Water meters at Site A are measuring water in and water out to extrapolate evapotranspiration rates. Plant growth rates will be visually assessed to determine which species thrive. Thermal imagery also will provide visual data on which plant species are providing greater cooling capacity.

Assessment of the social response to the green wall is an important component of the trials with pedestrian counts and behavioural mapping undertaken before the installation of the walls. These will be replicated at different periods throughout the year long trial. Intercept surveys will be conducted at both sites. On-site signage offers information on the project as well as a link to the website and online survey. Further information and the survey can be found at **http://sustainability.curtin.edu.au/projects**.

Case studies – urban forests

A number of Australian cities have recognised the benefits of urban greening. Technological advances (particularly in remote sensing) are being employed, allowing a more sophisticated approach to managing vegetation and urban forests. This has allowed city managers to better understand the stock of greenery across the urban landscape and changes in coverage over time. They can also identify areas able to benefit from increased levels of vegetation, and measure the effectiveness of initiatives to increase canopy coverage.

The programs outlined in this section represent a range of locally adapted approaches to shared challenges such as population growth, climate change, UHI effect and biodiversity. They also recognise the contribution of vegetation and urban forests to the liveability of cities and the wellbeing of communities.

Brisbane

Contributed by Ross Cope, Brisbane City Council

Brisbane's urban forest is diverse, unevenly distributed and multipurpose. In terms of a metropolitan area, Brisbane City Council is unique as it contains large natural areas both outside and within the urban boundaries of the city. Residents value green and open spaces, and visitors are attracted to the subtropical outdoor lifestyle that shady trees, leafy suburbs, parks and natural areas support. However, critical urban forest gaps and shade-hungry hotspots remain.

City-wide tree cover statistics

Brisbane City Council mainland area covers just over 1,300 square kilometres, 51 per cent of which is covered with tree canopy. An average of 31 per cent tree cover canopy cover in Brisbane residential suburbs provides a range of social, cultural, economic and environmental benefits and challenges. Natural areas, waterway corridors and private outer urban areas support over 2,500 flora species and 550 vertebrate fauna species. This makes Brisbane the most biologically diverse of Australia's capital cities. Brisbane City Council's natural area parks cover more than 8,000 hectares of land. In addition, Brisbane contains expansive areas of State-owned reserves, such as D'Aguilar National Park.

As shown in Figure 4-5, just over half of the city's tree cover is growing on public land and is actively managed by Council. However, Council also influences, regulates and rewards private land owner partners who support critical habitat connections, waterway catchments, and significant trees.

Figure 4-5   Brisbane tree cover by tenure, 2010
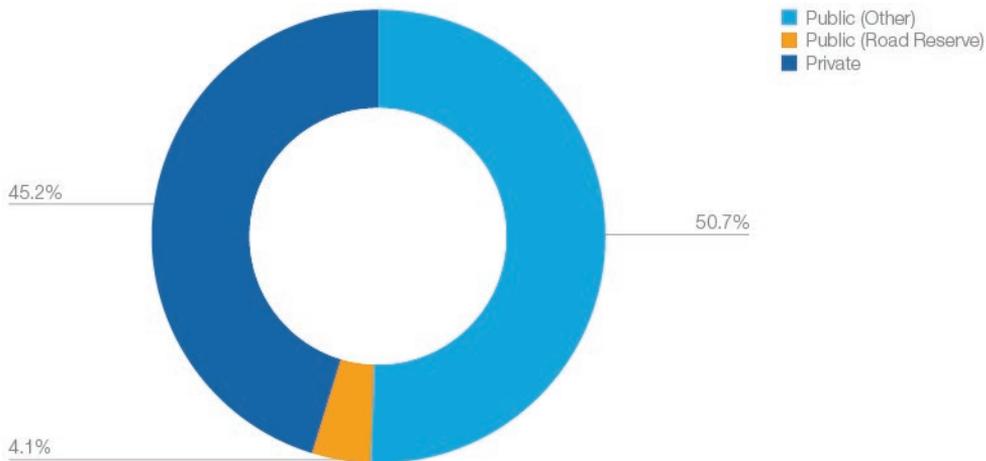
Source: City of Brisbane

Targets and goals for Brisbane's urban forest

Brisbane's urban forest planning, targets, policies and programs are focused on optimising the benefits of the extensive and diverse public and private tree cover while balancing the risks, costs and other priorities of a growing city. Targets are therefore relative to recognised values of the urban forest and not just tree canopy cover, or tree planting numbers and include:

• restoring 40 per cent of Brisbane to natural habitat by 2026

• reconnecting ecological corridors

• 50 per cent tree shade cover for residential footpaths and off-road bikeways by 2026.

In 2012, Brisbane's natural habitat cover was assessed at 34.9 per cent, greatly assisted by the Two Million Trees project, which restored almost 500 hectares of available waterway and ecological corridors, and bushland acquisition program sites. This intensive four year project was completed in 2012.

In 2010, there were an estimated 575,000 street trees of over 200 species, mostly of maturing age (72 per cent estimated less than 15 years of age). This provided an average of 35 per cent tree shade cover to footpaths supporting walking and cycling in residential suburbs. Ongoing work is focusing on partnerships with community and other Council programs and policies.

Brisbane's current urban forest programs and policies

Measurement and monitoring

Brisbane's shade cover target recognises the increasing importance of shade in a subtropical city, with climate change studies predicting an increasing number of extreme hot summer days. A direct relationship between areas of Brisbane with tree cover and cooler surface temperatures was confirmed more than 10 years ago in a University of Queensland research project. Most recently, ongoing tree cover measures use a combination of high resolution

satellite imagery and aircraft acquired imagery (LiDar (www.lidar.com.au) to help identify the city's most shade-hungry hotspots. This information is then used to inform Council's policies and actions.

i-Tree and MUSIC – measuring the value of Brisbane's urban forest

Brisbane City Council has joined with Sydney and Melbourne and professional associations to assist in quantifying the environmental values of urban tree canopy cover by building Australian i-Tree adapted software (www.i-treetools.org). Using 2010 sample street tree data and i-Tree, Brisbane's estimated 575,000 street trees are providing an estimated annual $1.65 million in benefits for air pollutant removal, carbon sequestration and rainfall interception. More recently, in those locations where neighbourhood shadeways projects and stormwater treatment priorities coincided, modelling estimated the stormwater treatment values of streetside tree pits and trenches with kerbside stormwater inlets (see www.waterbydesign.com.au/musicguide/). The modelling forecast annual reductions of 3,240 tonnes for suspended solids, six tonnes for total phosphorous, 20 tonnes for total nitrogen and 1,070 tonnes for gross pollutants.

Neighbourhood shadeways

Some of the suburbs with the most shade hungry footpaths are already targeted for increased dwelling density, given their proximity to public transport and employment centres. Within these suburbs and many others, neighbourhood shadeways projects target the most shade-hungry path used to walk or cycle to shops, school, bus and train stations for footpath and bikeway shade tree planting.

Neighbourhood shadeways projects have added 50,000 new shade trees since the program commenced in 2006. Almost half have been planted by residents at community plantings. These partnerships are encouraging stewardship of the newly planted trees and engaging residents on the many values of street trees and urban greening.

Internal partnerships

Ongoing partnerships between Neighbourhood Shadeways and Council's WaterSmart programs offer innovative ways to deliver cleaner waterways, more drought resilient street trees and cooler streetscapes. Other partnerships with Council's Active Transport programs are supporting shade tree planting to encourage recreational and commuter walking and cycling. On a summer day, surface temperatures of tree shaded pathways can be up to 7°C cooler than unshaded pathways.

Development Control – subtropical boulevards and deep planting

When planning key urban centres, developers and major transport projects are required to include subtropical boulevards along major roads. Along with these, neighbourhood plan codes require deep planting and innovation in sustainable tree growth in new medium and high density developments. The draft City Plan makes these provisions applicable city-wide.

Natural Assets Local Law

The Natural Assets Local Law (NALL) is a statutory mechanism that protects the city's natural assets on public and private property, including trees in urban areas. Interference with, damage to, or removal of NALL protected vegetation requires a permit from Council. In Brisbane's most urban areas the NALL protects Significant Landscape Trees, which are special trees or stands of trees that contribute to the landscape character of local areas.

Offset policies

The loss of tree canopy that comes with even the most sensitive of development and city infrastructure growth, requires offsetting strategies to ensure that urban tree canopy and habitat restoration targets are met. 'No net canopy area loss' policies are already in place for Council's street and park trees, and offset policies for both biodiversity and landscape losses, are incorporated into the draft City Plan. Offsets also shift the cost burden for replacement and restoration of losses to the urban forest removers rather than ratepayers.

Natural area restoration

Ongoing natural area restoration efforts in Brisbane include:

- supporting the work of 126 community conservation groups
- working with 637 private landowners to improve land management
- protecting habitat and ecological corridors identified in the draft City Plan.

Bushland acquisition

Brisbane residents and businesses contribute to protecting Brisbane's most significant natural assets through payment of the Bushland Preservation Levy in their rates account. The levy funds Council's Bushland Acquisition Program which purchases parcels of land to help protect and enhance Brisbane's natural environment. A total of 3,152 hectares of private land have been added to Council's natural area park estate since 1990.

Wildlife Conservation Partner Program

A large amount of Brisbane's wildlife habitat is located on privately owned land. Council's Wildlife Conservation Partner Program enables landowners to sign up to voluntary conservation agreements. Residents who sign up receive help and advice on revegetation, local flora and fauna species and how to conserve and restore wildlife habitat on their land. Approximately 700 agreements protecting over 2,000 hectares of ecologically important, privately-owned bushland and wetlands have been negotiated with landowners across Brisbane since 1996.

Brisbane City Council and its partners are making good progress towards urban forest enhancement targets. Ongoing community engagement, ensuring value for money, building resilience, managing threatening process and 'looking after what we've already got' requires a complementary set of strategies, innovations, and actions that are all part of Council's approach to protecting and enhancing Brisbane's urban forest.

SA urban forests – Million Trees Program

Contributed by Ross Oke, South Australia Department of Environment, Water and Natural Resources (DEWNR)

The SA urban forests – Million Trees Program is a major greening effort that targets parks and reserves throughout the entire Metropolitan Open Space System with the objective that Adelaide remains a sustainable, healthy and liveable city. The program was established in 2003 and is managed by the DEWNR with funding primarily provided by the South Australia Department of Planning, Transport and Infrastructure (DPTI).

The initial target to establish one million native plants was achieved in 2006 and the program was extended with a target of three million native plants across Adelaide by 2014. This

more ambitious target will not only produce a leafier, more liveable city; it will also reduce greenhouse gas emissions and create and conserve critical wildlife habitat. At the end of 2012 the program had established 2,550,000 plants – well on track to achieve the 2014 target (Map 4-5).

Adelaide's Metropolitan Open Space System (MOSS) consists of a network of reserves including large conservation and recreation parks, the Adelaide Park Lands, open space green belts to buffer residential development, linear parks along watercourses, the coast and bike trails and smaller local parks. A key component of MOSS is the Hills Face Zone, which provides a green backdrop to the city across the western flank of the foothills of the Mount Lofty Ranges. The Million Trees Program has been developed to enhance the MOSS with large-scale replanting of local native plants to achieve multiple outcomes. These include habitat restoration, water and air quality improvements, amenity and recreation opportunities, and carbon sequestration.

The program focuses on establishing plantings on larger reserves and local parks along streetscapes and within school grounds to beautify local environments, while providing habitat and opportunities for local communities to have greater contact with nature.

Helping create a sustainable Adelaide

Turner (2001) showed that approximately 97.3 per cent of the original vegetation of the Adelaide Plains has been cleared since European settlement. Land clearance and development has impacted significantly on native flora and fauna, with many species now locally extinct or threatened. Suitable habitat based on Adelaide's original vegetation is being reinstated to reverse this trend in species loss, and remnant vegetation is being protected and preserved.

In addition, many of Adelaide's parks and reserves have been developed with plants that are not locally native. These plants often require greater watering and management to survive in the challenging local climate. Redeveloping these amenity spaces in a more sustainable way will reduce water use. An urban forest and habitat restoration program such as the SA urban forests – Million Trees Program can allow planting projects and revegetation work to restore and enhance ecological processes and help reduce the impact that we have on our local environment.

It is estimated that the plants established by the Million Trees Program have offset greenhouse gas emissions, sequestering approximately 600,000 tonnes of CO_2 equivalents over their lifetime. Awareness of sustainability is increasing amongst the communities of Adelaide. The Million Trees Program provides many opportunities for learning and hands-on involvement through innovative activities with local and school communities.

Implementation

The activities delivered under the program are grouped under four themes: Achieving on-ground results; Working together; Learning through action; and Combining our efforts.

Achieving on-ground results

The goal is to reduce Adelaide's ecological footprint by protecting, enhancing, and re-creating urban natural habitat through strategic planting of local native species.

Monitoring is an important aspect of the program, providing information on survival rates, vegetation growth and site condition. A survival rate of approximately 80 per cent has been recorded over five years of monitoring.

Over 2,550,000 local native trees and associated understorey plants have been planted over the lifetime of the program towards a target of three million by 2014 (Map 4-5). More than 350 project sites have been activated across the Adelaide Metropolitan Area and over 1,500 hectares of land have been revegetated. These include large-scale sites and smaller sites that link remnant vegetation patches or create amenity value.

Maitland Taste Festival.
Image courtesy of Regional Development Australia

Map 4-5   South Australia urban forests – Million Trees Program planting sites, 2003–2012
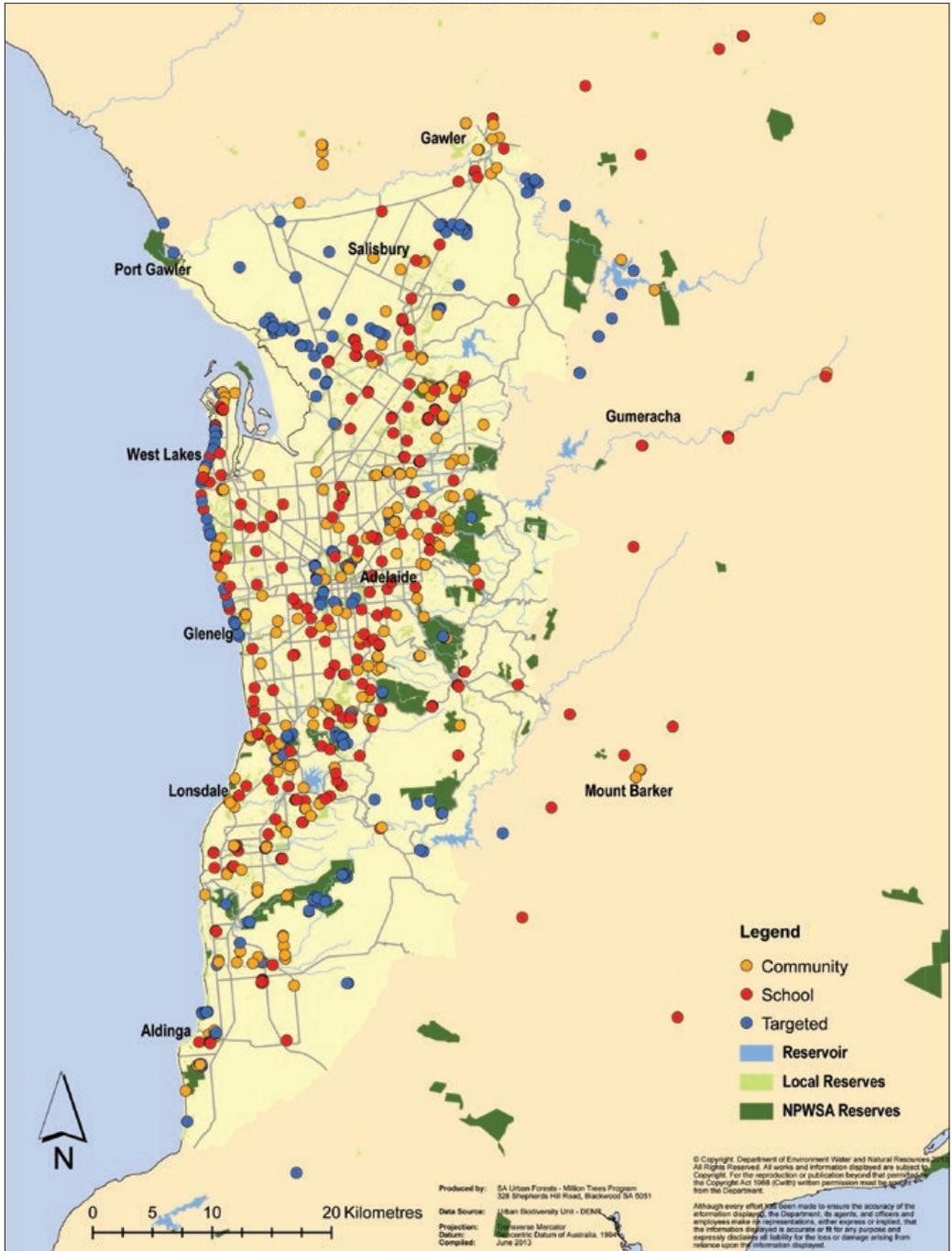
Working together

The goal is to inform, inspire and invoke the people of Adelaide to strengthen their connection with nature. This is done by promoting awareness and understanding of the regions unique flora and fauna and fostering a greater appreciation of natural biodiversity and the need to conserve it.

The program provides funding and technical support to organisations or groups that aim to revegetate open space within the Adelaide area through biodiversity plantings and amenity projects. To date over 250 projects have been created with the community and local councils. Since 2003 the program has organised over 100 community planting events, with over 5,000 children and adults attending. Over 1,000 volunteers have now signed up to the *Friends of the Urban Forest* initiative.

Learning through action

The goal is to foster a higher profile for sustainability and biodiversity in education, including school curricula, by providing opportunities for involvement in local projects. The main education initiative is Grow A Great School (GAGS), which provides teacher training, curriculum resources, activities and funding for bush gardens and 'living' outdoor classrooms on school grounds. To date over 200 schools have undertaken GAGS projects involving over 25,000 children and community members. Projects have included frog ponds, butterfly and biodiversity gardens, sitting circles and bush tucker gardens to help promote indigenous cultural awareness.

Image courtesy of Adelaide City Council

Combining our efforts

The goal is to encourage agencies at all tiers of government to work together to improve the delivery of projects and activities. A key feature of the Million Trees Program is that projects are undertaken in partnership. The program also supports a number of training programs including the Youth Conservation Corps. Projects have also been developed with local councils to provide habitat and help raise the profile of native gardens and plants within the community.

Creating a Gawler-Playford natural greenbelt

Cooperation between State and local governments is allowing a unique opportunity to restore over 200 hectares of former cropping land to open grassy woodland on the northern Adelaide Plains.

The Gawler Buffer project sites are situated within the 'green belt' that separates the council areas of Playford and Gawler. They are part of the Metropolitan Open Space System (MOSS) and are being developed in line with principles of conservation and passive recreation. The combined area of these land parcels totals 230 hectares and they contain important stands of native grassland and remnants of mallee box (*Eucalyptus porosa*) woodland.

The SA Urban Forests – Million Trees Program is working with the Department of Planning, Transport and Infrastructure (DPTI) and the two councils to transform the land into a valued open space reserve for local residents, as well as restoring the mallee box woodland using seed collected locally. Landscape restoration techniques such as native grass establishment trials and use of on-site seed orchards are being implemented. Community education on the importance of native bushland and the benefits in providing extended wildlife corridors is also a focus, with signage to be developed in the future.

These sites within the MOSS are playing a major role in reducing the physical impact of the city on the local environment and improving the quality of life for residents, visitors and future generations. Through the Million Trees Program, DPTI and Department of Environment, Water and Natural Resources (DEWNR) are working together to develop long-term approaches to habitat restoration and revegetation practices within several large-scale open space areas. This approach is allowing us to learn from each site and adapt our management to progressively reduce weeds and reintroduce local flora and fauna.

Conclusion

The SA Urban Forests – Million Trees Program is well on track to achieve the target of three million new native plants by 2014. Biologically diverse habitats are emerging from degraded agriculture land. Urban parks are supporting increasing elements of the regions natural heritage, using less water for irrigation and providing more contact with nature and therefore scope to foster a greater appreciation for nature conservation both locally and more widely across the landscape. However, in order to meet targets identified in South Australia's Strategic Plan, the 30 Year Plan for Greater Adelaide and the Adelaide and Mount Lofty Ranges Natural Resources Management Plan, revegetation across a scale of thousands of hectares is required in order to redress habitat loss and absorb carbon emissions. The SA Urban Forests – Million Trees Program represents an opportunity to build on a long-term approach to habitat restoration and forms a strong basis for continued success and sustained effort into the future.

For more information on this program see http://www.milliontrees.com.au.

Measuring Melbourne's urban forest

Contributed by Yvonne Lynch, City of Melbourne

The structure and composition of the urban forest determines the quantity and quality of the ecosystem services provided to the City of Melbourne. A better understanding of the urban forests helps management regimes and informs public policies and the community on the necessity of creating resilient cities as a response to climate change adaptation.

To achieve this understanding, the City has created a database to show how urban forests are affected by urbanisation, drought and increasing environmental demands. The use of geospatial tools for the assessment of the urban forests are useful, particularly when backed up by a tree inventory.

A snapshot of Melbourne's urban forest

Seventy-thousand public trees

Amenity value of $730 million

Twenty-two per cent canopy coverage public realm

Twenty-seven per cent loss in 10 years and 44 per cent loss in 20 years useful life expectancy

Three thousand new trees per year annual planting program

Melbourne's key urban forest targets

Five per cent species, 10 per cent genus, 20 per cent family species distribution

Forty per cent canopy coverage by 2040

Two to 4°C reduction in urban temperatures

Expansion of stormwater harvesting to secure water supply to the urban forest

i-Tree Eco Valuation for the entire forest

Methods, tools, calculations

Landsat Thematic Mapper imagery & Normalised Difference Vegetation Index (NDVI)

Thermal imagery

Urban forests and climate variability

The City of Melbourne has used medium resolution imagery to measure changes in vegetation and surface temperature for the last 25 years. Based on Landsat Thematic Mapper imagery (Satellite-based earth resources scanning) the Normalised Difference Vegetation Index (NDVI) was calculated. NVDI is an imaging tool used to determine whether land being imaged by satellite contains live vegetation. Together with land surface temperature, the NVDI was used to understand the effects of urbanisation and identify areas more vulnerable to drought.

A lack of moisture was observed to be a limiting factor for tree growth during periods of drought. Grassland areas with a lack of irrigation were observed to be more affected by lower rainfall periods, manifesting in poor vegetation health.

Thermal imagery during heat events can identify hot spots which occur across the municipality. This information guides planting in hot spots and determines which trees are not effective in addressing these hotspots. A tree inventory and removal database helped to determine the effect of drought on species survival, lifespan and growth. Analysis of tree removals and tree size enabled the recognition of species more adaptable to climate variability.

It was found more trees die in parks than in streets, with the worst-performing trees belonging to the *Magnoliaceae, Juglandaceae* and *Podocarpaceae* families. Analysis revealed that fast growing trees have a higher probability of failure in parks under conditions of low soil moisture, with evergreens and species suited to cool and temperate climates being affected by drier periods.

The analysis revealed that 60 per cent of trees in the city have a life expectancy of over 20 years. Of the trees with shorter expected lifespans, five per cent were individual trees classified as new or juvenile. The analysis showed that some of the biggest trees will be lost within the next two decades. The information obtained from the geospatial analysis was observed against the trees that were new, juveniles and semi-mature but had low life expectancy (less than five years) in order to determine the species that could be most vulnerable to heat stress and lack of water. Three species with very low Useful Life Expectancy (ULE) were found within vegetation health hot spots: *Allocasuarina, Acer* and *Eucalyptus*. The species that performed the best, as measured by their expected lifespan and size at maturity, were *Tilia, Liquidambar, Melia* and *Angophora*, while *Hymmenosporum, Celtis* and *Ulmus* species were identified as vulnerable to climatic variability.

Urban forest structure, function and its temporal change

Forest structure varies according to age, size, condition, density and distribution, all of which influence its function and quality. Vegetation structure can be analysed at the city scale or at a finer scale. For example, Landsat imagery can be used to obtain the location of vegetated areas, their connections and changes over time. This data can be used to target areas of new plantings and for landscape ecology analysis. Landsat also helps assess changes in vegetation structure over time from urbanisation, climate change or policy decisions. The NDVI can also assess carbon storage and biomass.

It has also been possible to identify with aerial photographs each tree in the municipality. Tree and building heights and mass can be measured via Google Earth. Elevation models show water flows and assess changes over time in tree resources and sizes. Aerial photographs can also be used to identify existing trees and canopy sizes; however, the process is time consuming unless using infra-red photographs.

Ecosystem services, disservices and diversity

Several ecosystems can be estimated via remote sensing, GIS and tree inventories. Carbon sequestration and storage can be derived and climate amelioration can be accounted for by quantifying the space that is shaded by trees in areas of vulnerable population or high pedestrian and cycling activity. Land use, vegetation cover, rainfall and hydrological soil data enable the estimation of existing surface runoff. Canopy cover maps can be used as input for habitat modelling, detecting areas of vegetation that are disconnected and areas that are big enough to provide habitat to a variety of species.

Tree inventory data can be used to calculate diversity and the distribution of species. This can highlight the areas of monoculture more vulnerable to climate change, pests and diseases. A complete inventory provides sufficient data to locate native species and see how they respond to climate variability when accounting for their life expectancy. Life expectancy data indicates the condition of the urban forest, allowing future losses of trees in terms of sizes, species and locations to be predicted.

Additional to benefits, environmental 'disservices' can also be identified from the tree inventory. For example, areas with high densities of allergen prone trees can be recognised. The ULE also indicates the location of trees in poor condition at risk of falling or branch dropping.

Canopy cover mapping

Urban forest management and monitoring requires precise estimates of tree canopy cover and change over time. Traditionally, canopy cover has been measured using on-screen digitisation or point density assessments of aerial photos using visual interpretation techniques. However, the vertical accuracy provided is not always sufficient to map tree canopies over time. The angle of the camera often captures trees on a slant and in city centres, tall buildings often hide trees. The City of Melbourne used LiDAR (remote sensing technology that uses a laser to analyse earth's surface) data, as it provides tree height information.

Using the LiDAR tree height data, models were prepared for 2008 and 2011 and tree canopy information was compiled for both the years. The canopies were then checked against the aerial photos. Groups of trees were subdivided to individual tree level to the extent possible. For each of these tree canopy features mean height and maximum height attributes were extracted. This could be a cost effective method for establishing tree locations in cities that have not yet collected a spatial tree inventory.

Analysis of canopy change between 2008 and 2011 showed a net loss of 20 hectares by 2011. While 34 hectares of new canopy were added in this time, a total of 54 hectares of 2008 canopy were lost, primarily due to an ageing tree population and urban development.

This project used LiDAR data to accurately map City of Melbourne's tree canopy. Previous attempts to map tree canopy using only aerial photos were found to produce inherent spatial inaccuracies between years.

Greening Sydney

Contributed by Lucy Sharman, City of Sydney

The City of Sydney recognises the importance of trees and other plants in providing significant environmental, social and economic benefits for the community. Joining the growing international recognition of the need for biodiversity, the City of Sydney has committed to becoming one of the world's leading green cities.

To achieve this, the City has developed the *Greening Sydney Plan*. The Plan acknowledges the importance of ecology and biodiversity to city living and supports the development of the *Urban Ecology Strategic Action Plan.*

Three strategic focus areas have been identified informing the objectives and targets of the Plan:

• Urban canopy – developing and protecting the city's urban forest

• Urban ecology – greening to improve habitat for biodiversity

• Community empowerment – to green and care for our urban landscape

And three delivery focus areas for achieving the Plan:

• Public domain – greening for quality streetscapes and public spaces

• New development – maximising greening opportunities

• Community greening – empowering the community to green our city.

Under the *Greening Sydney Plan*, the City will deliver some 42 programs and projects in partnership with residents, local business, developers and volunteer groups.

The City's programs have planted over 8,650 new street trees since 2005 and installed 35,000 square metres of landscaping throughout the streets since 2008.

Waterloo Community Centre, Waterloo, Sydney.
Image courtesy of City of Sydney

Major projects to be implemented under the Plan include:

- increasing the city's urban canopy by 50 per cent on current canopy rates of 15.5 per cent by 2030 to a total of 23.25 per cent
- developing an Urban Forest Strategy, adopted by council in February 2013 following community consultation
- implementing the Street Tree Master Plan
- reviewing the Register of Significant Tree and Tree Management Policy
- plantings in all available footpath locations
- investigating Water Sensitive Urban Design opportunities
- developing a green roof policy
- supporting establishment of verge and community gardens
- developing and supporting a green volunteers network.

Urban ecology

The ecological health of urban areas influences not only the diversity and abundance of plant and animal species, but also the quality of life of residents. Improved urban ecosystems have environmental and social benefits. The City of Sydney is developing an *Urban Ecology Strategic Action Plan* with five categories of general actions:

- park and streetscape maintenance
- planning controls
- staff and contractor engagement
- community engagement
- partnerships.

The plan will support priority fauna species.

Parks, trees and community gardens

The City of Sydney recognises that green spaces are one of a city's most important natural assets. They are crucial to maintaining the high quality of the public realm and achieving the *Sustainable Sydney* 2030 strategy, creating green corridors and increasing canopy cover.

The City is also upgrading a number of small parks. Since 2008, 20 small parks have been completed with several more planned. The City has contributed to the MyParx free smartphone app providing users with up-to-date information, interactive maps, and personal guided tours of local parks. Major parks, playgrounds and sports fields are featured.

The *City's Street Tree Master Plan 2011* is a blueprint for street tree plantings. The objectives are to improve and develop the number, health, longevity and form of street tree species and to enhance the distinct character of different precincts.

The Our Community Gardens Program helped implement 17 community gardens across the Local Government Area (LGA). Fourteen rain gardens were also installed (Table 4-2). Rain gardens are one of the simplest ways of treating stormwater before discharge to the main stormwater system and ultimately into waterways and bays.

Table 4-2   City of Sydney rain garden installations, 2012–13

Performance	Quarter 3 2012–13	Total to date	Target
Small park upgrades	20	20	32
Trees (streets and parks)	0	42,540	n/a
Canopy cover (on current)	15.5 per cent	15.5 per cent	23.5 per cent
Community gardens	1	17	>12
Landscaping (grass/ planting)	4,645 m²	11,314 m²	8,000 m²
Rain gardens (since 2008)	14	107	n/a

Source: City of Sydney

Green roofs and walls

The City of Sydney supports the installation of green roofs and walls through the Green Roofs and Walls Strategy. These provide multiple benefits to building owners and to the local environment. Information on the benefits of green roofs and walls is available on the City's website.

The City has a Green Roof and Walls Technical Advisory Panel made up of academics, architects, policy specialists and industry representatives. It meets monthly and provides valuable input into policy and program development.

Research was undertaken to investigate incentive programs used in other countries and to determine which were most effective and could have direct benefit for Sydney. This will help inform development of Council's policy on green roofs and walls.

A benchmarking exercise was also conducted to record the number and variety of green rooves and walls in the City and found 86,140 square metres of green rooves (Table 4-3).

Green wall at Four Seasons Hotel, The Rocks, Sydney.
Image courtesy of City of Sydney

Table 4-3   City of Sydney green rooves, 2012–13, by quarter

Performance	Q1	Q2	Q3	Q4	Total to date
Green rooves installed in the LGA	–	46	3	–	49
Green walls in the LGA	–	21	0	–	21
Total area (m²)	–	83,995	2,145	–	86,140

Source: City of Sydney

Previous State of Australian Cities reports looked at building energy rating schemes and sustainability rating tools for the built environment. The following article points out one of the complexities involved in energy efficiency and heat in residential buildings.

Achieving co-benefits of energy efficiency and heat stress mitigation

Contributed by Zhengen Ren, Xiaoming Wang and Dong Chen, CSIRO Climate Adaptation Flagship and CSIRO Ecosystem Sciences

The National Housing Energy Rating Scheme (NatHERS) is used to rate the potential thermal efficiency of Australian homes. There are currently three NatHERS software tools accredited for use: AccuRate, BERS Sustainability and FirstRate.

One of the paradoxes about designing buildings to be more energy efficient is that the increased thermal insulation and air-tightness could potentially create an overheating problem unless air conditioning is installed (Mlakar and Štrancar 2011; Ren et al. 2011; Porritt et al. 2012; Dengel and Swainson 2012).

A recent CSIRO study investigated potential heat risks in non-air-conditioned dwellings during extreme heatwaves. Using AccuRate, researchers simulated the effects of the 2009 three-day heatwave in Melbourne on a conventional single-storey, three-bedroom house. In the study, the house's floor plan was maintained, while the simulation examined various changes to improve energy efficiency such as infiltration sealing, ceiling insulation, wall insulation and window type (Table 4-4).

Figure 4-6 and Figure 4-7 compare the heat stress discomfort index (DI) (Ren et al. 2012) of the family and kitchen area of the base house to the DI of more energy-efficient house designs over the three consecutive heatwave days (28–30 January 2009). The study found that without air conditioning, occupants in the base house (1.2 star energy rating) were likely to be exposed to a high overheating risk (with the discomfort index above 28°C) when the maximum outdoor air temperature was above 43°C.

By upgrading the house to a 3.4 star energy rating – by insulating the ceiling with R6 batts, shading the windows using external 60 per cent shade cloth and sealing the windows, doors, exhaust fans and downlights – the overheating and subsequent heat stress could be significantly reduced. However, the modelling showed that this modified house, without airconditioning, would still experience a total of 30 hours of accumulated overheating (with the discomfort index above 28°C) when the maximum outdoor air temperature reached 43°C.

With even more insulation – adding R4 batts to the external wall – the simulation house was upgraded to a 5.6 star energy rating. This also slightly reduced the overheating risk and reduced the total accumulated overheating hours by around 10 per cent.

However, if further R3 insulation was added to the floor, bringing the house up to a 6.1 star energy rating, the simulation showed an increased overheating risk in the family/kitchen area and more than 10 hours with the discomfort index above 28°C for the second and third heatwave days. This is because more heat was being retained inside the building during the heatwave and could not be dissipated. A similar phenomenon occurred when the building was upgraded to 7.4 stars.

The modification of the house used in the CSIRO study is shown in Table 4-4.

Table 4-4   Modification of house from 1.2 stars to higher energy star ratings

Component	1.2 star	3.4 star	5.6 star	6.8 star	7.4 star
Windows	Aluminium standard single glazing	Aluminium standard single glazing	Aluminium standard single glazing	Timber/uPVC double glazed with 12 mm argon gap	Timber/uPVC double glazed with 12 mm argon gap
Ceiling insulation	No	R6.0	R6.0	R6.0	R6.0
External wall insulation	No	No	R4.0	R4.0	R4.0
Gap size of doors and windows	Large	Small	Small	Small	Small
Fans and downlights	No sealed	Sealed	Sealed	Sealed	Sealed
Outdoor shading	No	60% shade cloth	60% shade cloth	60% shade cloth	60% shade cloth
Floor insulation	No	No	No	No	R3.0

Figure 4-6   Heat risks of house with various energy star ratings during Melbourne heatwave, 28–30 January 2009
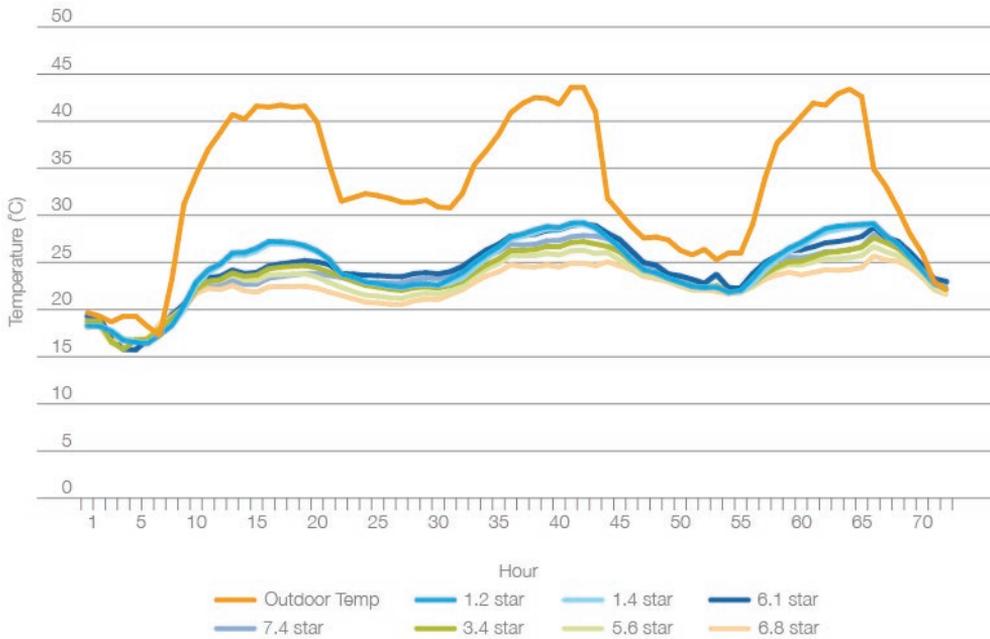
Figure 4-7   Hours of heat stress for houses with various energy star ratings at heat risk of DI≥28°C during Melbourne heatwave, 28–30 January 2009
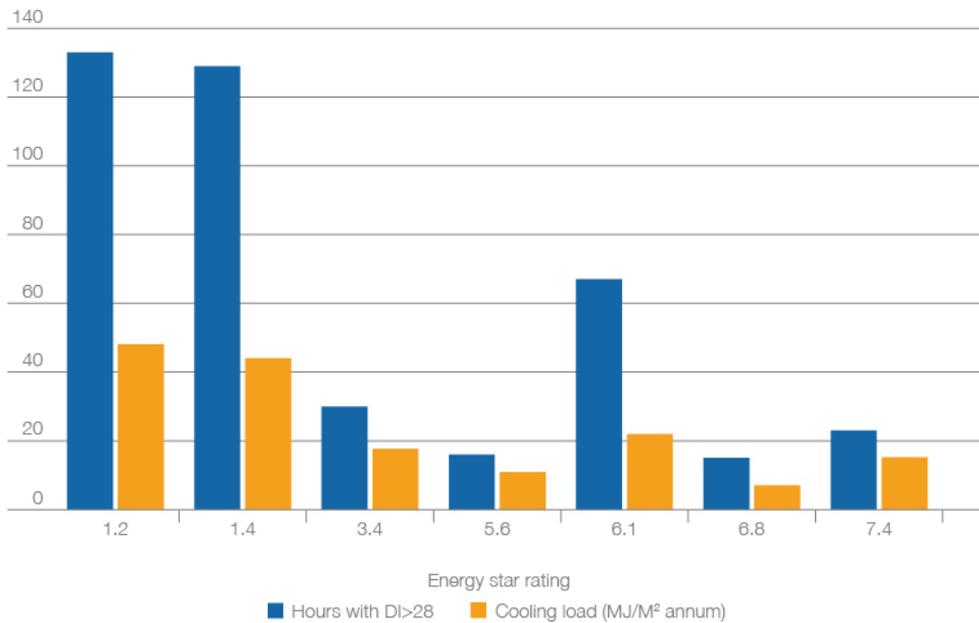
Energy efficiency

Australian residential sector energy consumption

The Australian residential sector continues to be a significant contributor to greenhouse gas emissions. Consumption levels will continue to rise due to the increasing number of houses, increasing average floor space and declining number of people per household (Department of the Environment, Water, Heritage and the Arts 2008).

To date most emission reduction programs aimed at the residential sector have focused on increasing energy efficiency within households and increasing the availability and use of energy from renewable sources. However, the savings achieved from these initiatives are being offset by the higher overall rates of energy consumption, with associated greenhouse gas emissions having implications for the future. A greater understanding of how much energy is being consumed by households will lead to more effective responses to these sustainability challenges.

Fuel consumption and mix

As shown in Figure 4-8, energy use by the Australian residential sector has accounted for between 11 and 12 per cent of Australia's total energy consumption since 2002–03. Since 2008–09, it has been steady at 12 per cent. Although the residential sector's share of energy consumption has remained steady, absolute consumption has increased from 412.5 PJ in 2002–03 to 452.1 PJ in 2010–11.

Figure 4-8   Residential energy consumption – percentage share of total energy
                  consumption, 2002–03 to 2010–11
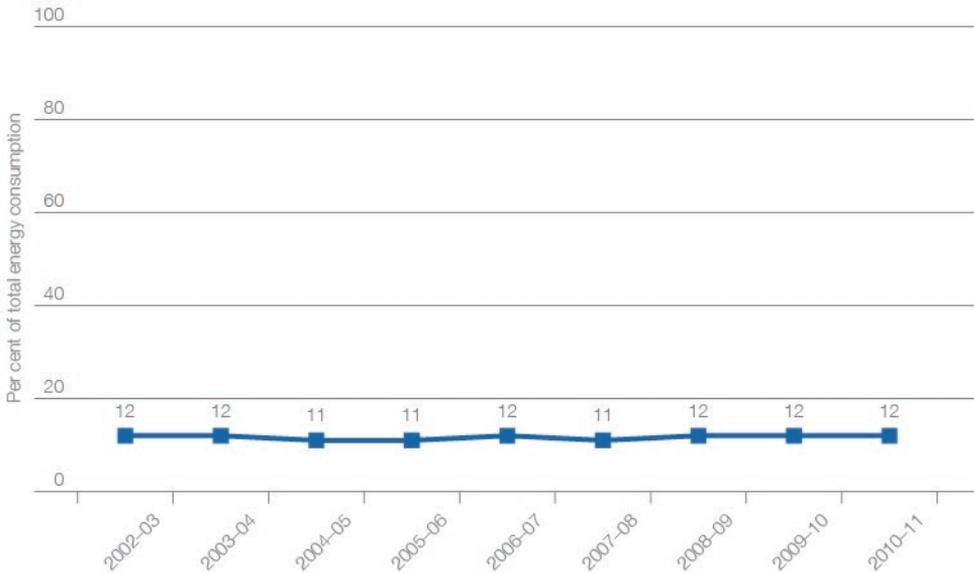
Note: BREE included the following industries in total energy consumption: agriculture; mining; food, beverages and
           textiles; wood, paper and printing; chemical; iron and steel; non-ferrous metals; other industry; construction;
           road transport; rail transport; air transport; water transport; commercial and services; residential; lubes,
           bitumen and solvents.

Source: BREE 2012

As shown in Figure 4-9 the fuels consumed by the residential sector have changed
only slightly since 2002–03. Black coal is no longer consumed in this sector. The most
consumed fuel types are electricity (49 per cent), natural gas and coal seam methane (CSM)
(33 per cent) and biomass/wood (13 per cent). Other fuel types account for less than three
per cent each within the total fuel mix. The consumption of biomass/wood has shown the
most significant change between 2002–03 and 2010–11, decreasing from 18 per cent in
2002–03 to 13 per cent in 2010–11. The change in consumption rates from 2002–03 to
2010–11 of all fuel types except biomass wood has been less than three per cent each. The
higher consumption of some fuels reflects household access to each fuel type.

Figure 4-9   Proportion of residential energy consumption Australia by fuel type, 2002–03 to 2010–11
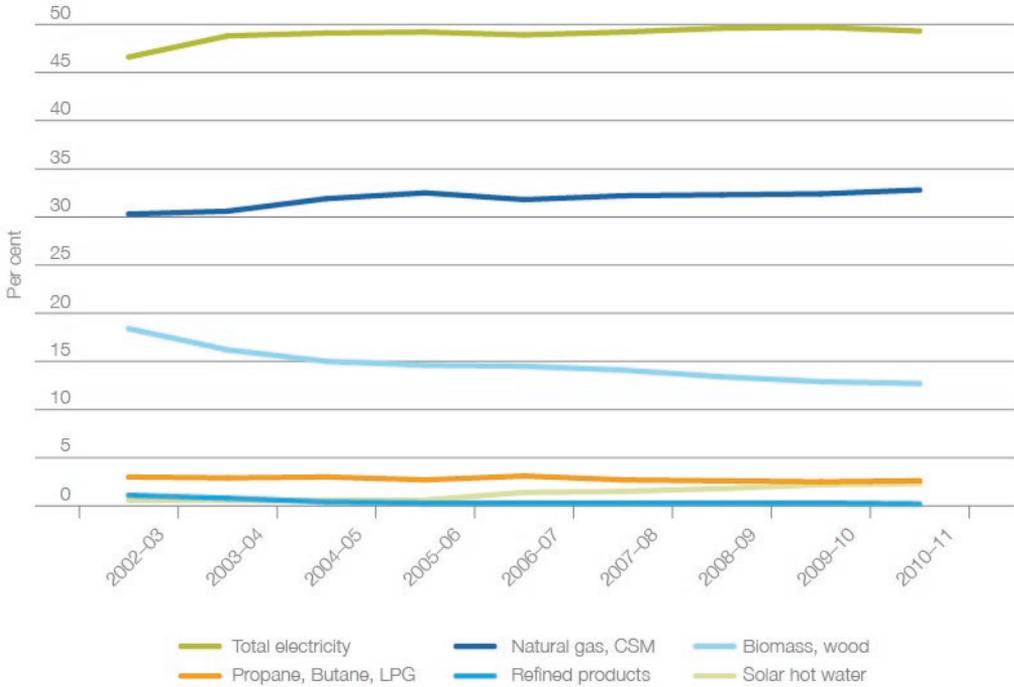
Source: BREE 2012

The Energy Use and Conservation Survey provides an insight into how households use and conserve energy (ABS 2011a). The findings are based on responses provided by 12,841 dwellings from urban, rural and remote areas in all States and Territories. As specific data is only available for State capital cities, the following discussion is restricted to these.

Electricity and mains gas were the most used energy sources by households surveyed. All households surveyed used electricity, so this is excluded from the comparison in Figure 4-10. Apart from electricity, mains gas was the most used source of energy for households in all capital cities except Hobart. The use of mains gas varies widely between cities. Usage in Perth (84 per cent) and Adelaide (75 per cent) is much higher than Sydney (48 per cent) or Hobart (six per cent). The dominant use of electricity and mains gas in capital cities is consistent with overall Australian consumption.

Figure 4-10   Proportion of energy use by household, selected capital cities, 2011
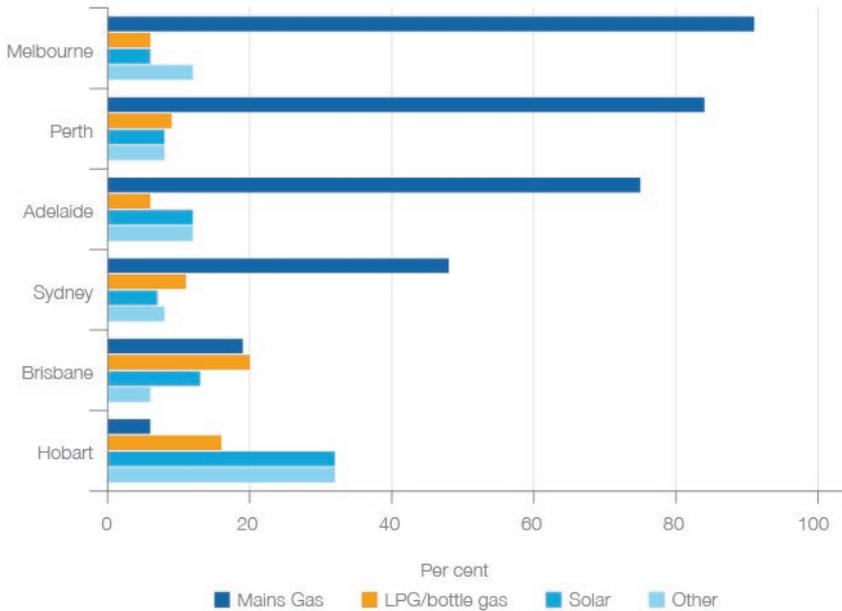
Source: ABS 2011a

Findings from the survey indicate significant changes in household energy usage patterns since 2008, as Figure 4-11 shows. Hobart has experienced a major swing (over 30 per cent) towards solar power, although this could be a reflection of the relatively small sample size. Perth, on the other hand, reported a reduction in solar power use of almost 11 per cent. Other noteworthy changes include a move in all six cities towards bottled gas.

Figure 4-11   Change in proportion of energy use by households, selected capital cities, 2008–11
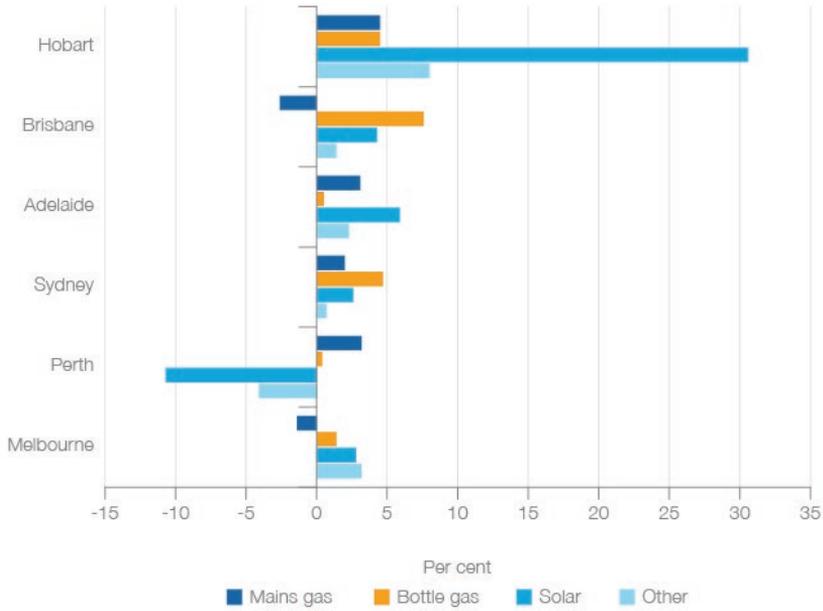
Source: ABS 2011a

Solar energy remains one of the less used sources of energy for households surveyed. Of the households that indicated they used solar energy, most used either solar electricity or solar hot water (less commonly both). As shown in Figure 4-12, in all six cities the majority of respondents indicated they used no form of solar energy. Of those who did use solar energy, solar hot water was more common in Brisbane and Perth than solar electricity. Solar electricity was more commonly used than solar hot water in the other four capitals.

Figure 4-12   Household solar energy used – proportion of households surveyed, 2011
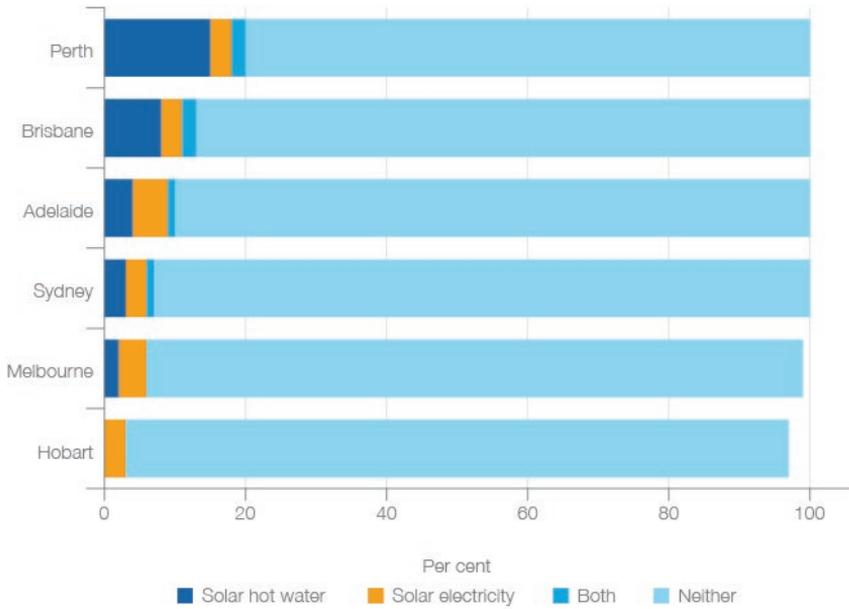
Source: ABS 2011a

Residential end use of energy

With the exception of household-related transport (discussed later in this chapter), heating and cooling together account for the largest use of energy by households. As shown in Figure 4-13, space heating and cooling and water heating account for just over 60 per cent of household energy use in South Australia. Appliance use accounts for the 40 per cent of household energy use not directed to heating and cooling. Figure 4-13 also shows that appliance use, including fridges and freezers, accounts for 23 per cent of household energy use.

Figure 4-13   How energy is used in the home (South Australia), 2012
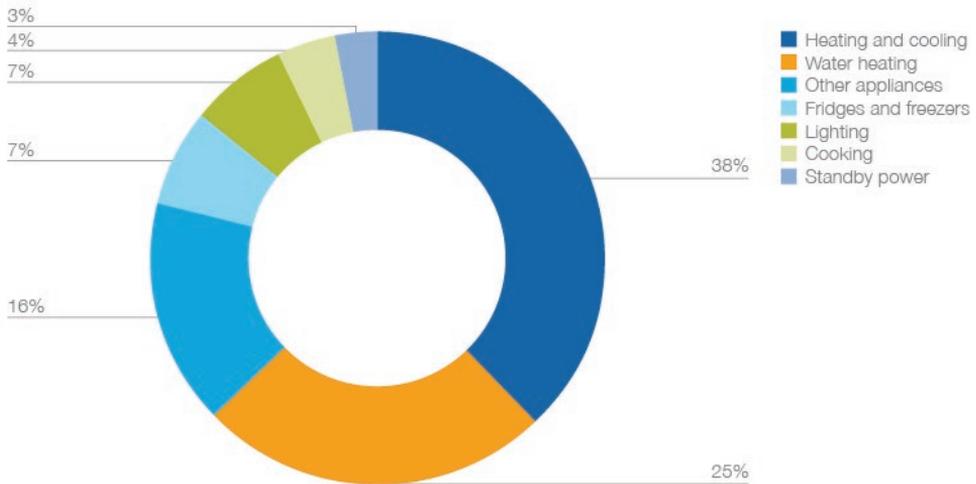
Source: South Australian Government 2013

Heating and cooling trends

Energy demand for space heating and cooling is projected to increase in the coming decades. Factors influencing increased demand include the above-average floor area of residential dwellings in Australia, the decreasing number of people per household and the increasing use of whole-house heating and cooling systems (Department of the Environment, Water, Heritage and the Arts 2008). The predominant fuel source used for heating households differs between cities. Results of the ABS survey on environmental use and energy conservation indicate that Hobart, Adelaide, Sydney and Brisbane predominately use electricity to fuel their household heating (Figure 4-14). In Melbourne and Perth the main fuel type for heating is gas. Almost 50 per cent of respondents from Brisbane indicated they did not have a heater.

Figure 4-14   Energy source for household heating, selected capital cities, 2011
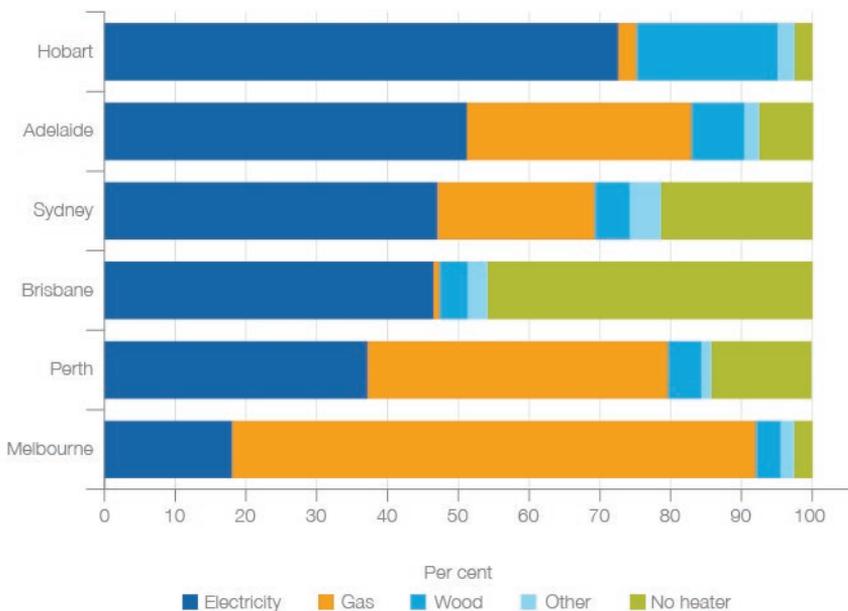
Source: ABS 2011a

Non-renewable energy sources appear to be the predominant fuel for space heating. Again as indicated by findings from the ABS survey cited above, most fuel sources used for space heating, except biomass, are non-renewable. However, biomass is the least used source of fuel for space heating – electricity and gas being the most predominant.

Air conditioner ownership and therefore usage in the residential sector has increased significantly. Based on ABS data, the Department of the Environment, Water, Heritage and Arts (2008) found that air conditioner ownership in the residential sector had almost doubled between 1994 and 2004, rising from an average of 0.395 units to 0.762 units per household, and was projected to increase even further. The study also found that the rapid growth in air conditioner ownership had effectively overshadowed any energy consumption reductions gained by improved efficiency over the same period (Department of the Environment, Water, Heritage and the Arts 2008). These findings are supported by the Energy Efficient Strategies report *Status of air conditioners in Australia* (Energy Efficient Strategies 2006).

Water heating

Non-renewable fuels are the predominant energy source used for water heating. As indicated by findings from the ABS survey on environmental issues, electricity and gas were the energy sources most used by survey respondents for heating water (Figure 4-15). Solar energy was the only renewable energy source used for residential sector water heating. Though well behind electricity and gas, solar energy use was not negligible. This could be an indication that household water heating is being fuelled by combinations of solar with gas or electric boosting (Department of the Environment, Water, Heritage and the Arts 2006).

Figure 4-15   Energy source for household water heating, selected capital cities, 2011
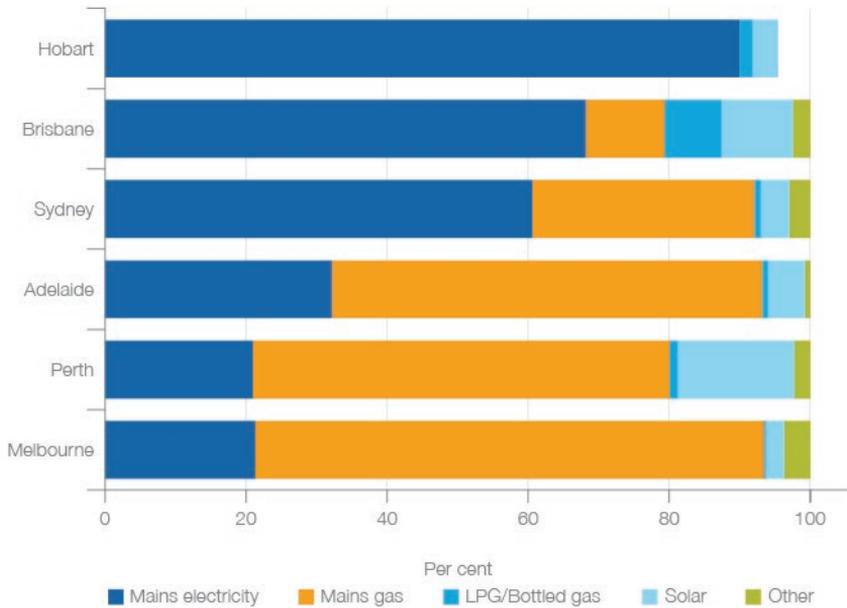
Note: Hobart figures for mains gas and other not available.
Source: ABS 2011a

Appliances

Appliance use accounts for 23 per cent of energy consumption in Australia's residential sector. Electricity is the predominant source of power used for household appliances. Findings from an ABS survey on information technology use (ABS 2011b) indicate the current mix of appliance ownership by Australian households. As shown in Figure 4-16, almost 100 per cent of respondents to the survey indicated they owned a refrigerator, television and washing machine. Efforts to reduce appliance-related energy consumption by the residential sector have focused on achieving greater product efficiency. The overall gains achieved by these efficiency initiatives have been offset by the increased number and variety of appliances in Australia.

Figure 4-16   Appliance ownership: proportion of households in Australia, 2011
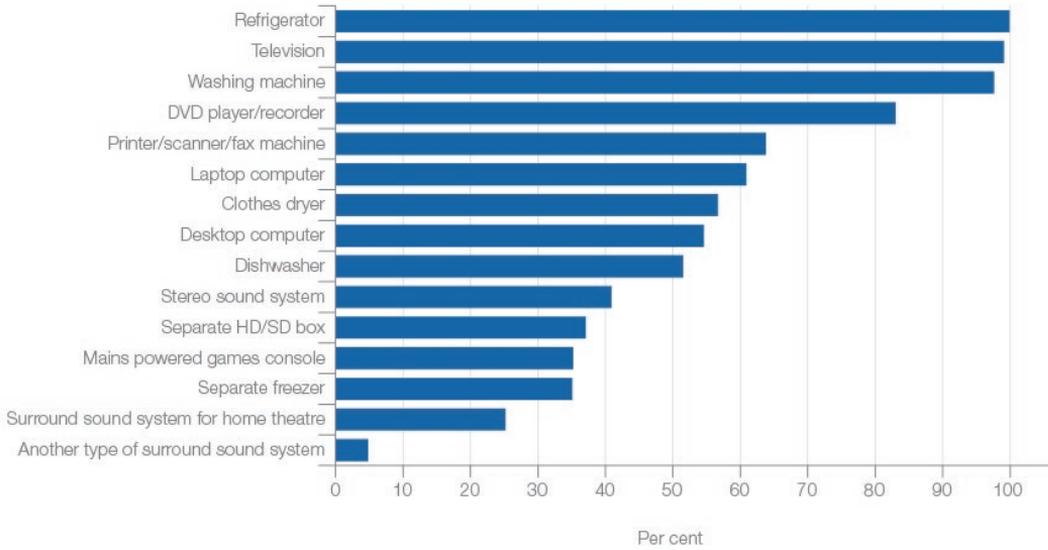
Source: ABS 2011b

The emergence of new technologies has added new types of appliances to the mix. As shown in Figure 4-17, the number of households with a personal computer increased from 44 per cent in 1998 to 78 per cent in 2008–09.

Figure 4-17   Proportion of Households with a personal computer in Australia, 1998–2009
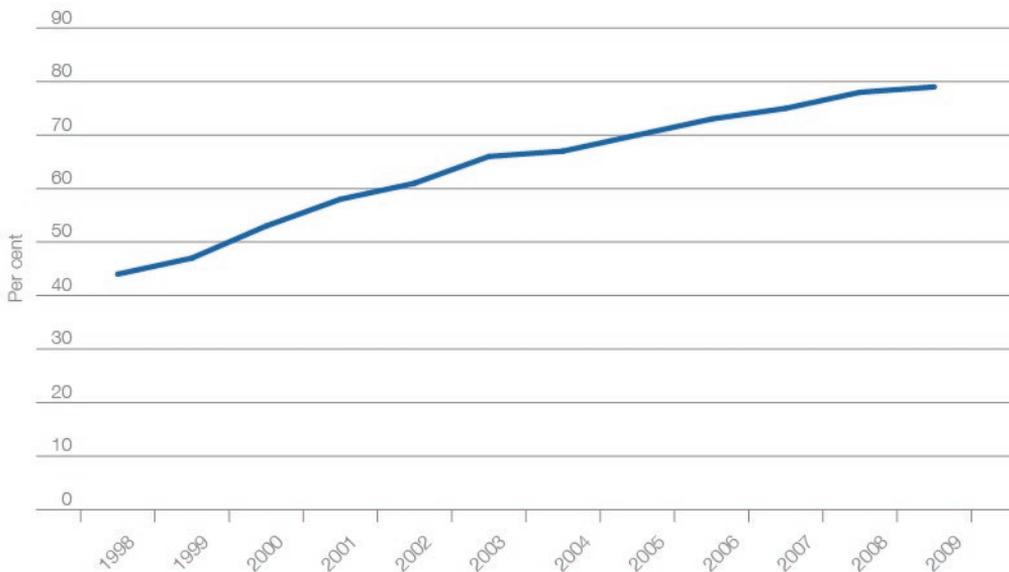
Source: ABS 2010, 2011b

Households increasingly own multiple appliances of the same type. For example, as shown in Figure 4-18, the proportion of households with one or two televisions has decreased overall since 2002 while the proportion of households with three or more televisions has increased. The increase in the number of households with one set since 2009 could be a reflection of the trend towards smaller households.

Figure 4-18   Proportion of Australian households with television sets in metropolitan markets, 2002–13
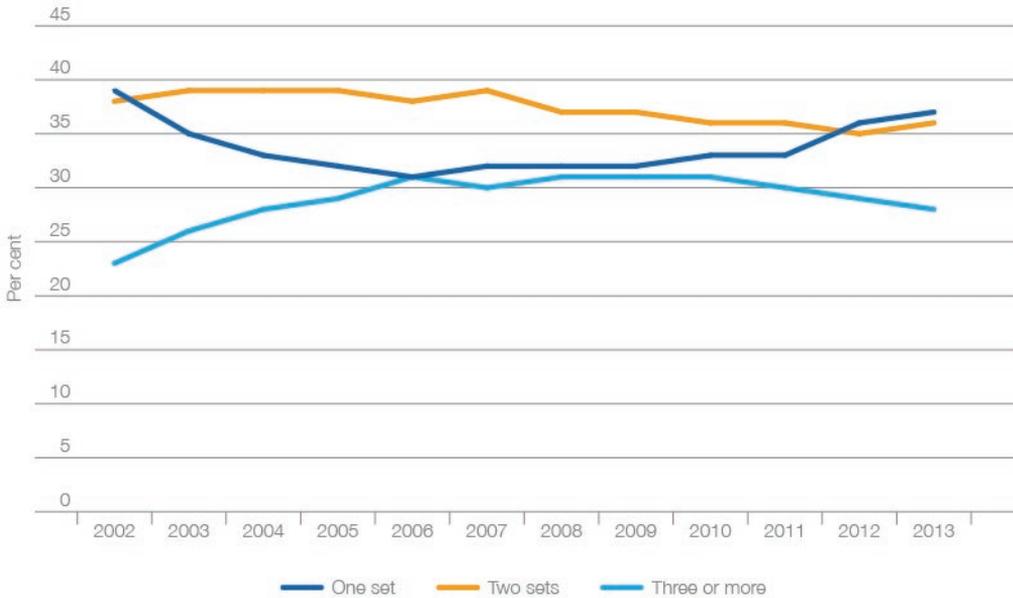
Source: Screen Australia 2013 and OzTam 2013

Lighting, cooking and standby power

Lighting, cooking and standby power (i.e. for appliances that are not being used but are not completely switched off) combined account for 14 per cent of residential sector energy consumption. Of the three, lighting makes up the most significant proportion of household energy use, at seven per cent; cooking makes up four per cent; and standby power makes up three per cent. There is little data available on standby power – a relatively recent source of household energy consumption that has emerged as technology has enabled, and even required, appliances and rechargeable devices to draw power continuously.

In an effort to reduce energy consumption and greenhouse gas emissions, since 2009 Australia has implemented a phase-out of inefficient incandescent light bulbs. While the program is expected to drive residential lighting energy consumption down in the short term, it is projected that post-2015 consumption will again be driven upwards due to increases in the number of households and the continued use of less efficient light bulbs that were not part of the phase-out (Department of the Environment, Water, Heritage and the Arts 2008).

The greatest change in residential energy consumption for cooking purposes has been a shift in the fuel type used. The emerging trend within households is to have a gas-fuelled cooktop and an electricity-fuelled oven. However, the shift in fuel preference has not led to a

decrease in overall energy consumption for cooking (Department of the Environment, Water, Heritage and the Arts 2008). Findings from an ABS survey (ABS 2011a) indicate that the use of gas as a fuel for cooktops varies between our capital cities. As shown in Figure 4-19, Melbourne, Perth and Adelaide households more commonly use gas than electricity to fuel their cooktops. In Sydney, Brisbane and Hobart, electricity is still the more common source of cooktop fuel.

Figure 4-19   Main source of energy for cooktops, 2011

Per cent
■ Electricity   ■ Gas   ■ Other
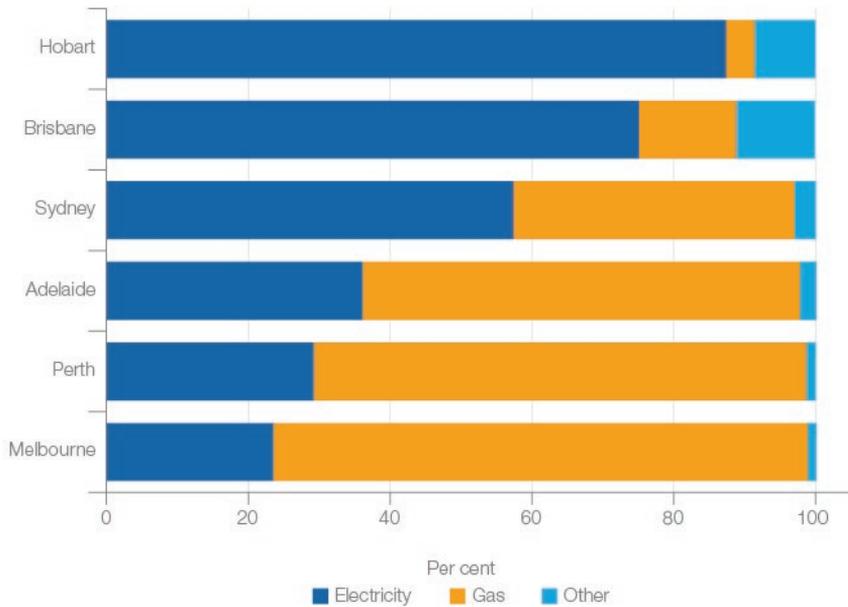
Source: ABS 2011a

Waste

The management of waste is integral to the sustainability of Australia's major cities. How well we deal with waste and emissions is crucial in minimising environmental problems such as marginalisation of land, air and water pollution, and climate change. Recent figures from the ABS show that from 1997 to 2012 waste generation in Australia increased by 145 per cent, compared to a 22 per cent rise in the population, demonstrating growing pressure on waste management systems in cities (ABS 2011c).

During 2009–10, 53.7 million tonnes of waste was generated within the Australian economy. Of the total waste generated, 25.2 million tonnes was recovered domestically, 24.9 million tonnes was disposed to landfill and 3.7 million tonnes was exported. In 2011–12 Australia exported 4.4 million tonnes of waste valued at $2,407 million or 0.8 per cent of Australia's total exports. The main waste exports are metals comprising waste and scrap of cast iron, ferrous metals, gold, copper and aluminium (82 per cent of Australia's total value of waste exports).

The construction industry generated the largest volume of waste: over 16.5 million tonnes, representing 31 per cent of the total waste generated during 2009–10. Masonry materials accounted for 37 per cent (19.8 million tonnes) of total waste generated in 2009–10. Organic

waste was the second largest waste type, representing 24 per cent (12.8 million tonnes), followed by paper and cardboard at 12 per cent (6.4 million tonnes). Of the 25.2 million tonnes of waste recovered in 2009–10, 10.9 million tonnes was masonry materials and 6.2 million tonnes was organic waste. In 2009–10, 8.9 million tonnes of masonry materials and 6.6 million tonnes of organic waste were disposed to landfill, representing 62 per cent of all waste to landfill.

In Australia's capital cities, each household is estimated to produce an average of almost 1.5 tonnes of waste each year, which makes a total of 12.4 million tonnes. Nearly half (47 per cent) of all waste from households is organic waste, and almost a quarter (23 per cent) is paper and cardboard waste.

Figure 4-20 represents the total waste generated in 2010–2011 from selected capital cities and the amount of waste recovered before going to landfill. Figure 4-20 also illustrates that Canberra and Adelaide have the highest rate of waste recovery of the capital cities measured. Eighty-five per cent of standard recyclables (paper, plastic, glass and metals) and over 90 per cent of green waste were recycled in Canberra (ACT Government 2012), while in Adelaide almost 80 per cent of all waste generated was recovered before landfill (Zero Waste SA 2013).

Figure 4-20   Waste generation and recovery in selected capital cities, 2011–12
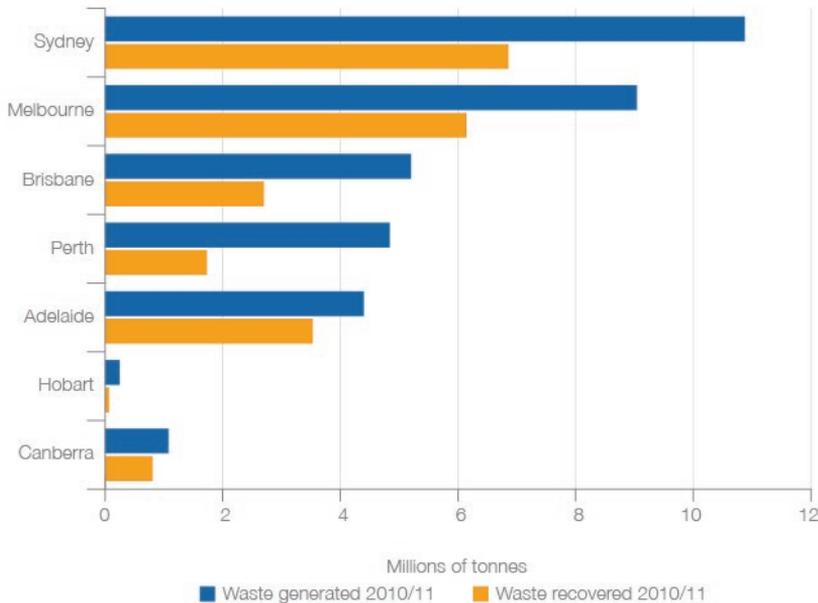
Source: NSW Department of Environment & Heritage, Victorian EPA, Zero Waste SA, WA Waste Authority, Queensland Department of Environment, Heritage & Planning, ACT Territory and Municipal Services, Tasmanian Department of Primary Industries, Parks, Water and Environment

Other cities have been increasing their rates of recycling. Perth in 2007–08 recovered 1.5 million tonnes of waste before landfill. In 2008–09 it recycled 1.58 million tonnes from a total of 4.6 million tonnes of waste generated, and in 2011–12 it recovered two million tonnes from a total of 4.7 million tonnes of waste generated – representing an increase in recovery rates from 29 per cent in 2008–09 to 43 per cent in 2011–12.

Attempts to calculate amounts of waste recovered in cities are complicated because of transfers between reporting entities and across regional boundaries. Material may be sent for recovery from one jurisdiction to another but may actually be recycled in one centralised location and, in the extreme, in another country. For example, in Brisbane less than 50 per cent of waste generated is recovered before landfill, although this could be a consequence of wastes generated in regions outside the city being transported to private landfills in Brisbane (Department of Environment and Heritage Protection 2012).

Compounding this problem is that recyclers and organic processors report at the entity level, not the facility level, so in situations where they have facilities in multiple regions and across State borders it is not possible to establish how much they recycled in a particular region. Only the total amount of waste that went to landfill can easily be calculated, although waste transfer stations such as those in Adelaide and Hobart provide facilities for resource recovery that allow information to be collected about waste (such as its source) which is invisible after the waste is consolidated and transported.

Satisfaction with waste collection

In general most Australians living in our major cities (83 per cent) were satisfied with their waste collection services in 2011–12. Figure 4-21 illustrates that households in Sydney, Melbourne, Brisbane and Adelaide have the highest satisfaction rate for waste collection activities when compared with the same services in Perth and Hobart. This can perhaps be attributed to the higher landfill levies paid in these cities for waste disposal outside the local council collection services provided to ratepayers, combined with the frequency of services to households that are not conveniently located near recycling or waste transfer facilities. Also contributing to lower satisfaction rates in Perth is the additional cost to supply green bins to households for garden waste collection.

Figure 4-21   Proportion of waste collection activities to households in capital cities and overall satisfaction, 2011–12
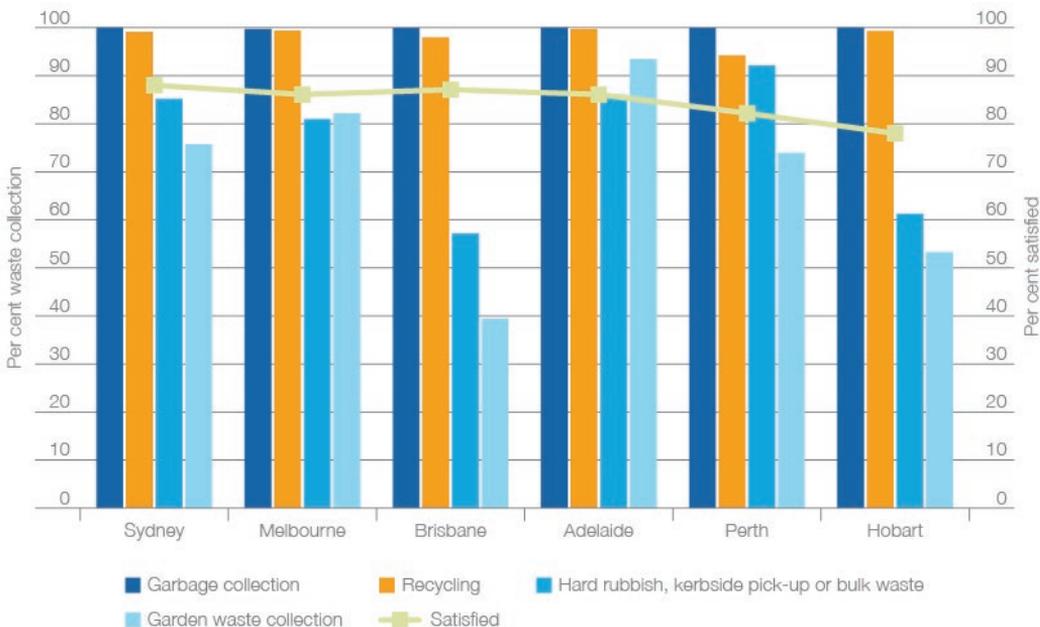
Source: ABS 2012

Organic waste and recovery

Most people tend not to think of organic waste as having an adverse impact on the environment, because it is biodegradable. However, most food waste ends up in landfill, where it creates methane – a greenhouse gas with 21 times the warming potential of carbon dioxide (Zero Waste SA). In all major cities the rate of increase in the recovery of organic materials that are diverted from urban waste streams has accelerated over the last 10 years.

Figure 4-22 represents the frequency that households compost and recycle kitchen or food waste, showing that Adelaide, Hobart and Canberra households have the highest recycling levels for major cities. The results in Adelaide and Canberra are largely driven by support from local councils and not-for-profit programs like Foodbank in Adelaide and Yellow Van Food Rescue in Canberra. These organisations collect excess food from the food and grocery industry and deliver it free of charge to community organisations. There are similar programs in Sydney and Brisbane (Oz Harvest) and in Perth (Food Rescue). These programs contribute significantly to minimising the amount of organic waste sent to landfill.

Figure 4-22   Frequency of composting or recycling kitchen or food waste, 2011–12
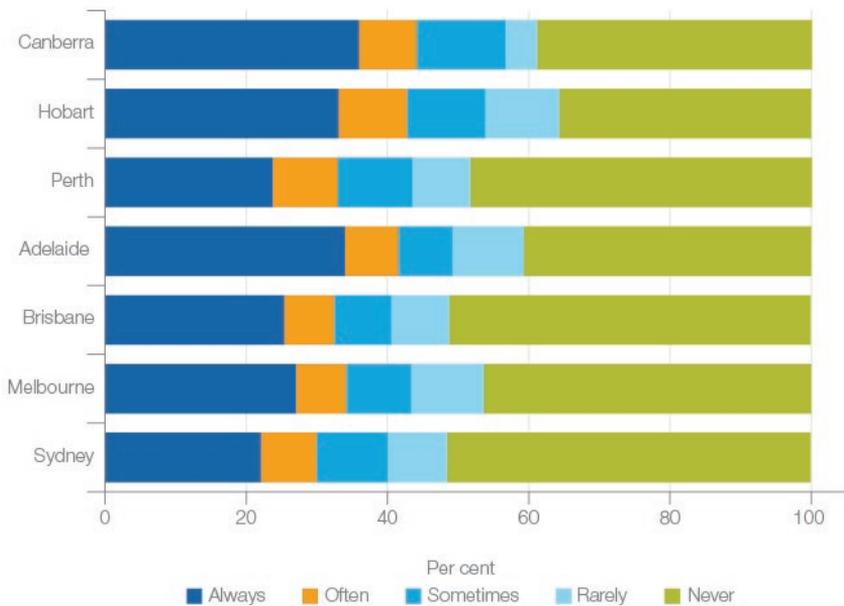
Source: ABS 2012

Figure 4-23 illustrates that the capital cities such as Adelaide, Melbourne Sydney and Hobart with local governments that offered all households a dedicated green recycling bin for garden waste and composting display higher recycling rates than cities without dedicated garden waste recycling bins.

Figure 4-23   Frequency of composting or recycling garden waste, 2011–12
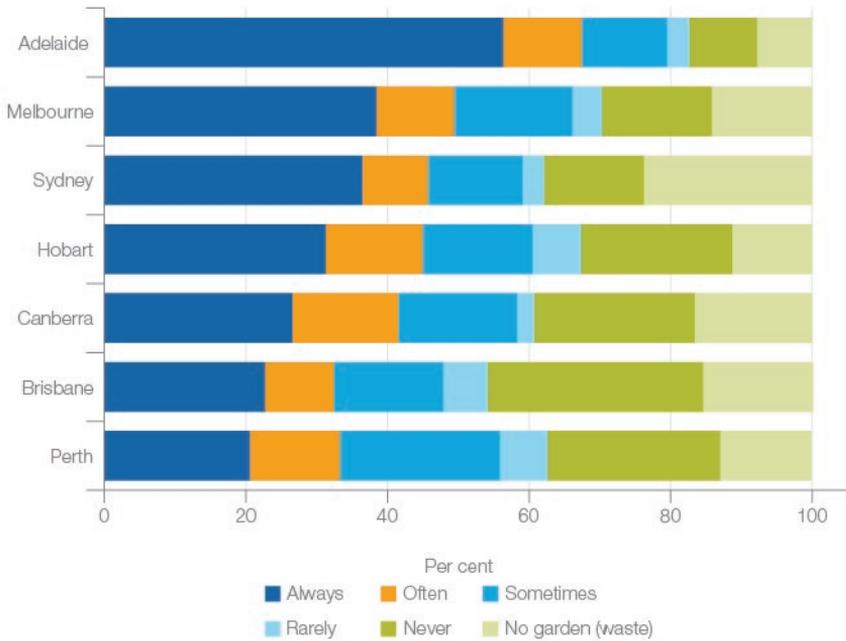
Source: ABS 2012

Zero Waste SA reports that in 2011–12, Adelaide achieved close to 60 per cent of all households composting or recycling garden waste. This result is driven largely by support from local councils that provided a dedicated green bin collection service each fortnight for garden waste that cannot be composted for household reuse. According to various government websites reporting on garden waste, Sydney's results are driven by garden organics being collected for recycling every fortnight, while in Melbourne each household (including apartments) is entitled to have two cubic metres of garden waste collected per household each month, contributing to a steady increase in recycling rates for both capital cities from previous years.

The cost of recycling garden waste outside the fortnightly council collection services in Sydney is higher compared to other major cities, due to the cost of facilities for enclosed composting systems that have been built to mediate odour in higher-density inner-city areas. (Also, a large number of households do not generate garden waste due to higher-density inner-city living). To encourage higher recovery rates for organic waste, the New South Wales Government's began the Waste Less, Recycle More strategy in February 2013. It is a $70 million organics infrastructure fund and program, with new and renovated infrastructure to process food and garden organics from households and businesses.

In Melbourne, the Conserve, Invest and Save program has improved waste infrastructure, leading to higher recovery and recycling rates and lower amounts of organics going to landfill. It follows the closure of four facilities that produced compost from garden waste due to poor environmental performance related to odour (Sustainability Victoria).

In Brisbane there were 37,976 households (Department of Environment, Heritage and Planning 2012) with dedicated green waste bins (they are optional to ratepayers) out of 457,797 households that received general waste collection, which could explain why Brisbane has a lower rate of garden recycling than Melbourne, Sydney and Adelaide.

In Perth and Canberra the rates of recycling garden waste were lower than Sydney, Melbourne, Hobart and Adelaide, presumably due to not having dedicated green bins for garden waste. In Perth, local councils have jointly formed a separate body to measure and manage waste.

E-waste

A more contemporary problem in managing waste recovery in cities is e-waste: discarded electronic products, including computers and televisions. In 2011–12, an estimated 29 million televisions and computers were discarded across Australia. Many materials in these products can be reused and recycled and some items can be refurbished for a second life. While e-waste is generated from a variety of sources such as commercial premises, government offices and educational facilities, e-waste from households is of particular concern. That is because little is known about current household disposal methods for cheap, regularly updated appliances like toasters, kettles and irons (disposal of which is thought to be growing at over three times the rate of general waste in major cities).

Recycling rates for e-waste are expected to have reached 30 per cent by June 2013 and 80 per cent by 2021–22. Driving this increase is the availability of collection and drop-off services, which are set to expand and be available in all capital cities by the end of 2013 (ABS 2013), providing a long-term solution to recycling e-waste. In Perth $1.5 million has been allocated to support e-waste recycling activities for up to three years (Western Australian Waste Authority Business Plan 2012–13).

Waste management approaches

Waste management in Australia's major cities is the responsibility of all levels of government. Local government is more actively involved in the process of disposing and recovering materials and/or paying others to dispose of or recover materials, but all levels of government are involved in developing and implementing strategies to encourage households and business to reduce waste.

At the national level the *National Waste Policy*, agreed by all Australian environment ministers in November 2009, sets Australia's waste management and resource recovery direction to 2020. State governments have waste strategies and in some cases have a dedicated government authority to implement them, such as Zero Waste SA and the Western Australian Waste Authority. Many local governments have their own strategies.

In mid-2010 a coalition of local authorities announced that Albury-Wodonga's landfill could run out of space in 20 years or less if the growth in the amount of waste it receives continues unabated. To mitigate this, local authorities launched the Halve Waste campaign with a goal of reducing landfilled waste by 50 per cent by 2014. Campaign measures include waste assessments for businesses, a schools waste education program, a home composting program with Council subsidised compost bins and training, a business waste exchange putting producers of waste in touch with potential users, a waste and recycling information

web site and waste education for the community. The success of the Halve Waste campaign can be demonstrated by the fact that in 2011 the local landfill centre received 187,066 tonnes of waste and buried 121,980 tonnes, but in the 12 months to May 2013 the centre received 170,341 tonnes and buried 103,091, an almost five per cent rise in the waste recovery rate (Albury City Council 2013).

While a considerable amount of resources has been devoted to education and communication programs to reduce waste, many jurisdictions have also sought to complement these measures with regulatory and economic instruments. In May 2009 legislation was introduced in South Australia to prevent single-use, lightweight polyethylene bags being given away or sold by retailers. Similar legislation was enacted in the Northern Territory in September 2011 and in the ACT in November 2011. In February 2012 the City of Fremantle became the first council in Australia to pass laws banning single-use plastic shopping bags. Figure 4-24 suggests that banning the use of lightweight plastic bags and implementing a levy on the use of the thicker plastic bags that customers have been offered as an alternative has had a noticeable effect. From November 2013 a similar ban will exist in Tasmania.

Figure 4-24   Frequency of reusing bags when doing the grocery shopping, 2011–12
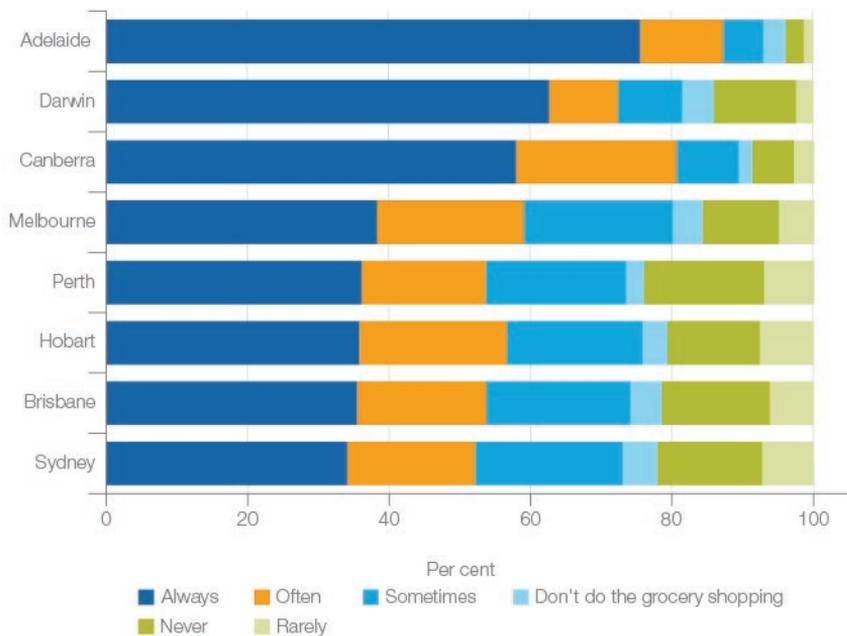
Source: ABS 2012

The other major incentive to decrease waste has been increases in private and local council landfill levies in all major cities, which may also explain why the rate of household composting and garden waste recycling proportional to population levels is increasing. Similar legislation that offers an economic incentive to consumers to increase waste recovery rates is the five cents per can refund and 10 cents per bottle refund program in South Australia, the success of which has led the Northern Territory to investigate a similar scheme.

Value of waste as a percentage of GDP

For the major cities with waste management initiatives mentioned above (including recycling building materials, collecting surplus food and recycling e-waste), the waste management industry has been valued at $9.5 billion by the ABS, with income from waste products worth over $4.5 billion annually (ABS 2013). In Victoria alone, the value of waste and recycling activity is estimated at $2.153 billion (Sustainability Victoria 2012). While the total volume of waste generated in Australia each year has been reported as growing faster than annual GDP growth, such increases are largely due to improved reporting of waste and improved recycling data. With increasing innovation in waste management and recycling, the value of the materials recovered for reuse multiplies. This will contribute to further GDP growth in major cities as new and expanded markets for recycled products and materials are realised by the market and consumers.

Transport energy efficiency

The transport sector is the largest end user of energy in Australia. Moving people and freight accounts for 38.5 per cent of final energy use (Figure 4-25). The transport sector uses 73 per cent of Australia's total liquid fuel. Road transport uses 56 per cent of Australia's total liquid fuel (Australian Energy Statistics 2012). Much of the urban research literature and many policy documents recommend increased use of mass transit systems to improve the energy efficiency of urban passenger transport. However, there is little public information comparing the efficiency of transport modes in Australia.

Figure 4-25   Australian energy use by industry, 2011
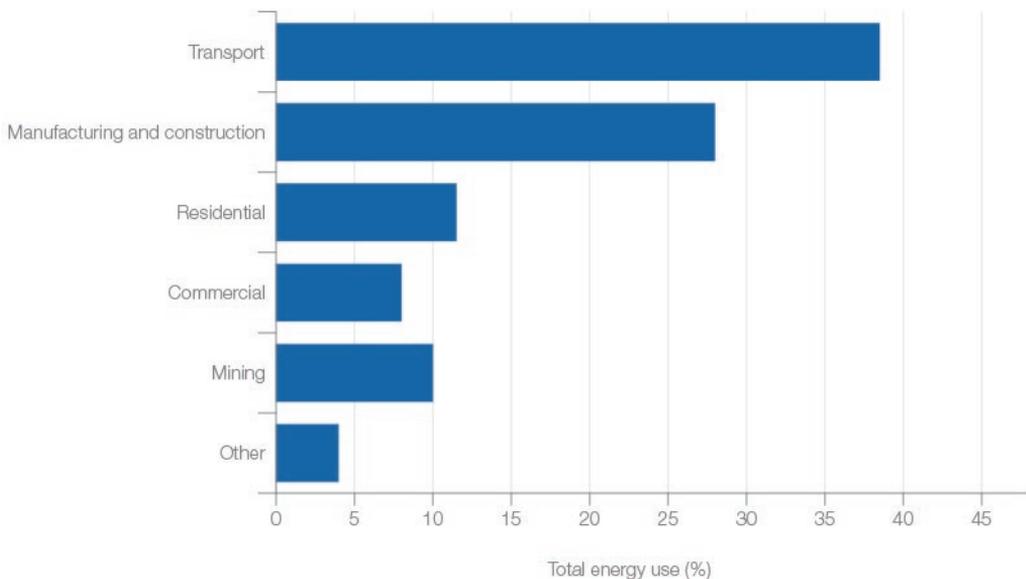
Source: Australian Energy Statistics, 2012

Measuring energy

Transport energy efficiency measurement has two components. The first is the energy use of the vehicle. Because a variety of fuels are used in transport – petrol, diesel, LPG, electricity etc. – fuel efficiency across modes is measured in joules (J). One joule is the equivalent of one watt of power radiated or dissipated for one second. Larger amounts of energy are measured in megajoules (MJ) – 10^6 joules. Very large amounts of energy are measured in petajoules (PJ) – 10^{15} joules.

The second component is vehicle occupancy rate. Vehicle energy use and occupancy rate are combined to give MJ per passenger kilometre. This is the measure used throughout the world to assess transport energy efficiency.

Light passenger vehicles

Vehicle energy use

Before 2001, advances in engine technology which improved light passenger vehicle (LPV) fuel efficiency were offset by increases in power, weight and the popularity of 4WD vehicles (BITRE 2012). These factors led to the Australian LPV fleet having almost no net gain in fuel efficiency between 1985 and 2005. This trend has now reversed, with LPVs becoming increasingly more energy efficient alongside continued trends towards Australians purchasing smaller, lighter vehicles (BITRE 2012, Moriarty and Honnery 2012).

The *State of Australian Cities 2012* reported that since 2005, per capita LPV use has had the steepest and most sustained decline since the Great Depression. Not only are people using cars less but they are also using less fuel for each kilometre travelled.

Vehicle occupancy rate

LPV occupancy rate is known relatively accurately from household travel surveys conducted by state and territory governments over many years. The overall daily average occupancy of private cars has been estimated at 1.6 passengers and between 1.1 and 1.2 passengers during the urban commuting periods (Cosgrove et al. 2012, BITRE 2012).

Urban mass transit

Australian urban mass transit systems tend to operate higher frequency and higher occupancy services predominantly into CBD locations and along other higher density transport corridors. Areas with lower residential densities (including outer metropolitan areas where it is more difficult to achieve the critical mass to operate frequent services without large subsidies) tend to have lower frequency services. Most services operate with much higher occupancy levels at certain peak periods and generally very low occupancy levels during off peak periods. The exception to this are a small number of high frequency services between major activity centres, along major corridors such as busways, and to and from university campuses, which can have consistently high patronage throughout the day.

Much of the urban research literature and many policy documents promote the increased use of mass transit systems to improve the energy efficiency of urban passenger transport; however, there is little public information on the efficiency of transport modes in Australia.

Buses

Vehicle energy use

Buses in Australian cities are primarily run on diesel fuel and are more energy efficient than previous generations. Adelaide is currently trialling hybrid diesel electric buses. It is also trialling the Tindo solar bus, the first in the world to be recharged using 100 per cent solar energy. It is funded as part of the Australian Government's Adelaide Solar City program in partnership with Adelaide City Council. The Tindo bus can travel approximately 200 kilometres between recharges under typical urban conditions (Adelaide City Council 2013).

Occupancy rates

Generally, heavier vehicles use more energy. The more energy a vehicle uses, the more critical the occupancy rate becomes in assessing MJ per passenger kilometre. However, due to the lack of penetration of swipe-on/swipe-off ticketing systems in Australian mass transit systems, this vital information is often unavailable.

A recent study by the Queensland Government found that in Brisbane 44 per cent of total bus patronage takes place on eight per cent of the bus network, utilising 19 high-frequency bus routes (of a total 230 routes in the city). The study also identified that in the wider South East Queensland region (including the major cities of Brisbane, Gold Coast and Sunshine Coast), almost 84 per cent of bus services have an average load of fewer than 14 passengers and just over half of the bus services in the region have an average load of fewer than seven passengers. Conversely a number of routes run at very high patronage levels throughout the day. These tend to be frequent services along corridors including busways (Translink 2013). This demonstrates that figures on occupancy are highly variable and averages may not hold true over a whole major city. Reflecting this variability, average occupancy rates for buses have been variously assessed as being between 3.1 and 10 passengers (Department of Sustainability, Environment, Water, Population and Communities 2008; Cosgrove et al 2012).

Dead and circuitous running

A proportion of bus journeys in major cities carry no passengers, a situation referred to as dead running. Dead running is one of the measures used to compare the efficiency of mass transit scheduling. Some degree of dead running is essential in most transport systems to allow buses (or other mass transit vehicles) to return to depots, refuel or be moved to different routes. A national industry benchmark for dead running is set at 17.4 per cent of all bus journeys (ACT Government 2012).

As shown in Figure 4-26, the Australian benchmark for dead running of bus services is exceeded in most cases. Only the operator surveyed in Melbourne was achieving a lower rate than the benchmark. System efficiencies can be implemented to decrease dead running in some circumstances. For example Canberra is attempting to reduce the amount of dead running of the city's bus network by improved scheduling and developing a new satellite depot (ACT Government 2012).

Due to the scarcity of available data, different years and geographic extents have been used to examine bus dead running. The information in Figure 4-26 should be used as an indication only. Canberra data is from the ACT Government and covers all bus trips in the city during 2010–2011. Australian benchmark data is for 2010–11 and is from the ACT Government. Sydney data is from NSW State Transit and covers 2009–10 financial year. The rest of the data is from the Securing 2026 Operational Sustainability Review prepared

for Brisbane City Council by AT Kearney and is for 2008–09. The Brisbane data covers all bus trips within Brisbane City Council. The Perth data is based on the median of two private bus operators in Midland and northern Perth. The Adelaide data is based on one operator in central and metropolitan Adelaide. The Melbourne data is based on one operator based in the south-eastern suburbs.

Figure 4-26   Proportion of buses recorded as dead-running (various years)

Bus journeys recorded as dead-running (per cent)
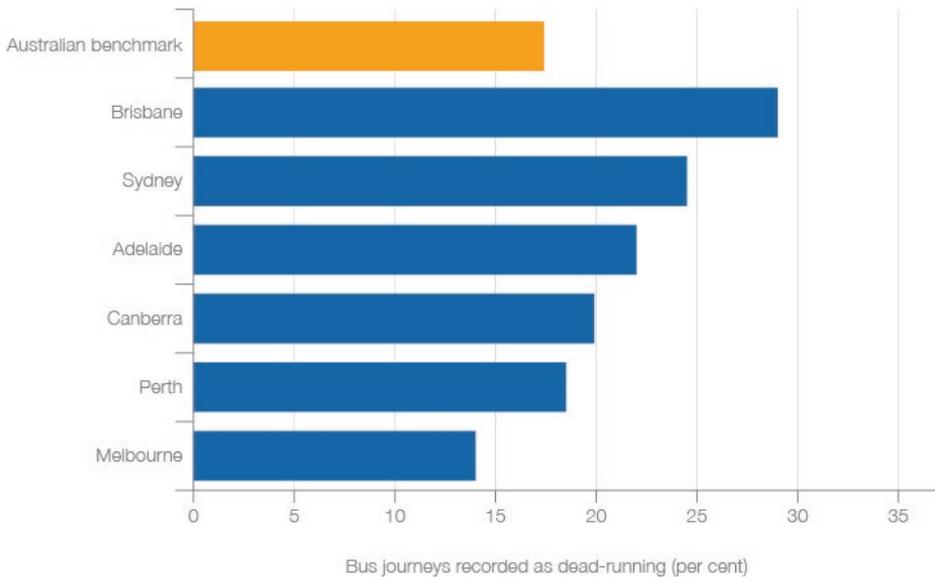
Source: ACT Government, 2012, A T Kearney 2009, NSW State Transit, 2010

Circuitous running is another issue that affects energy efficiency, as well as the overall efficiency and effectiveness of a service. This involves buses taking longer routes along suburban roads rather than arterial routes to provide a level of coverage. Although these more circuitous journeys can improve overall equity by providing at least a minimum standard of public transport availability to a larger number of residents, it is likely to provide a strong time disincentive to use the service to all but those that have no other choice to use the service (for example people without access to a car or with certain disabilities). It also affects overall network energy efficiency.

Heavy rail

Vehicle energy use

Urban passenger railway networks in major cities are predominantly electric systems with the exception of much of Adelaide's, which remains predominantly diesel powered. The electricity generation powering our urban rail systems is largely produced by non-renewable sources of energy (BREE 2012).

There is little publicly available data on train energy use in Australia to make useful comparisons. However, the use of direct current (DC) motors in the older Melbourne and Sydney heavy rail networks compared to the more efficient alternating current (AC) motors used in Brisbane, Perth and most of Europe would suggest that efficiency in Australia's two largest heavy rail networks may be below international standards (BITRE 2012).

Globally there has been a trend towards adapting existing urban mass transit systems to energy saving measures, such as retrofitting DC-powered rail networks to use AC motors, using renewable energy sources and equipping rolling stock with regenerative braking mechanisms (Thong 2012). It has also been estimated that energy savings of 10 per cent or more can be achieved by providing drivers with information on energy-efficient driving strategies (Albrecht 2011).

Dead running

Queensland Rail is the only urban rail network where dead running data is readily available. This shows that dead running equates to around 4,000 kilometres per day and 1.4 million kilometres per year (Translink 2013).

Summary of transport energy efficiency

There has been little if any independent assessment of the average occupancy rates of mass transit systems. Consequently, energy comparisons between modes must be treated with caution. Figure 4-27 and Figure 4-28 show two assessments of urban transport energy efficiency across the main transport modes. Each graph is based on different underlying occupancy assumptions. Together they show significantly different findings on vehicle fuel efficiency when different occupancy assumptions are made.

Figure 4-27 is based on an analysis by BREE (2012) using the limited and disparate data available on this subject for Australia's cities. Its analysis shows that buses are nearly twice as efficient as LPVs while trains are three times more efficient on a megajoule per passenger kilometre basis.

Bradleys Head to City, Sydney.
Image courtesy of Mosman Council

Figure 4-27   Passenger vehicle fuel efficiency in Australia, 2008–09
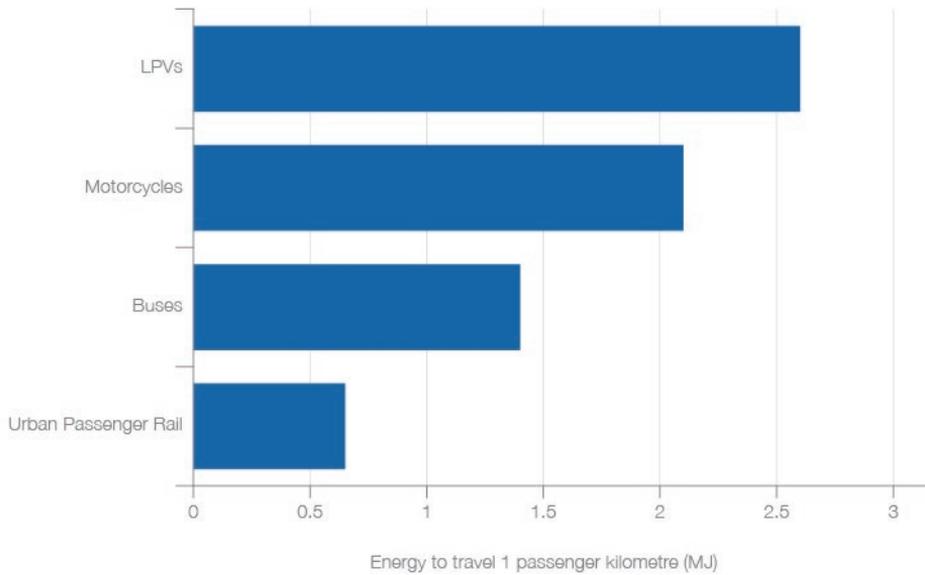
Note: Occupancy rate assumptions were not published with this data.
Source: BREE 2012

Given these figures, it is not surprising that much urban research literature and many policy documents promote the increased use of mass transit systems to improve the energy efficiency of urban passenger transport.

It is important to note however that a number of factors can significantly change the energy efficiency of different vehicle types. If policy makers increase mass transit services in a poorly planned manner, or to address policy issues other than emission reductions, such as equitable access to public transport for lower density outer suburbs, energy efficiency can suffer significantly.

The operators of mass transit systems often put significant effort into designing existing networks and systems to maximise patronage and occupancy, and minimise dead running and repositioning, and thus reduce cost. This means that new services are almost always going to operate at lower occupancy rates, with greater dead running and repositioning.

Figure 4-28 is based on a study produced by the United States Department of Energy. The figure is instructive because it uses more comprehensive data available for American cities, including mass transit occupancy rates. It shows that buses, on a per passenger kilometre basis, use considerably more energy than the average American car. Commuter trains were rated as only slightly more energy efficient per passenger kilometre than LPVs.

Figure 4-28   Energy use to travel one passenger kilometre in the United States, 2012

Energy used to travel 1 passenger kilometre in the United States (MJ)
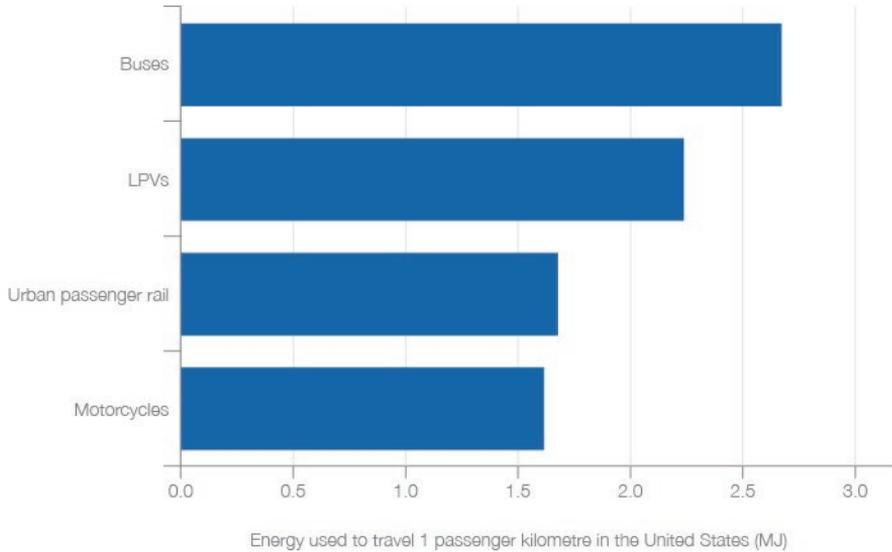
Note 1:   Figures are approximated conversions from BTU's to MJ and from miles to kilometres.
Note 2:   Data compiled from 24 US cities. LPVs includes Cars but not "Personal trucks".
Source: US Transportation Energy Data Book 2012

The differences between Figure 4-27 and Figure 4-28 (particularly in the energy efficiency of rail and buses and occupancy rates) demonstrate the importance of having comprehensive information to assess the energy efficiency of mass transit systems. Well-utilised mass transit networks are inherently more energy efficient than systems that rely solely on private vehicles (Potter 2003). However, there is also a fundamental tension between equity (providing the widest possible service coverage) and efficiency (running on heavily patronised routes) (Walker 2008).

This has led some to suggest that the key to increasing the energy efficiency of urban transport systems is to increase occupancy rates on mass transit modes by encouraging higher residential housing densities (e.g. Mees and Dodson 2011). However, as shown in the *State of Australian Cities 2012,* the link between high residential densities at journey origin and mass transit use is not strong. Rather, it is the density at journey destination that appears to be the key factor in increasing occupancy rates, in which case there would be some unavoidable trade-offs in equity to realise the potential energy efficiency of mass transit systems. Further information in this area will be important in informing public policy decisions and will be sought for future editions of State of Australian Cities reports.

Greenhouse gas emissions of transport modes

In the transport context, carbon dioxide (CO_2) emissions are usually measured in grams of CO_2 equivalent emitted per kilometre travelled. While total household emissions account for approximately 21 per cent of all emissions in Australia, transport contributes the largest proportion of average household CO_2 emissions at almost 42 per cent. As shown in Figure 4-29, private vehicle use alone accounts for 35 per cent of Australia's average household emissions, by far the largest component of the transport sector's emissions (Australian Government 2011: Clean Energy Futures 2013). This is despite average emissions of LPVs having fallen by 21 per cent in the past 11 years (see Figure 4-30) (National Transport Commission 2013).

Figure 4-29   Proportion of average household emissions including transport, 2012

Average household emissions (per cent)
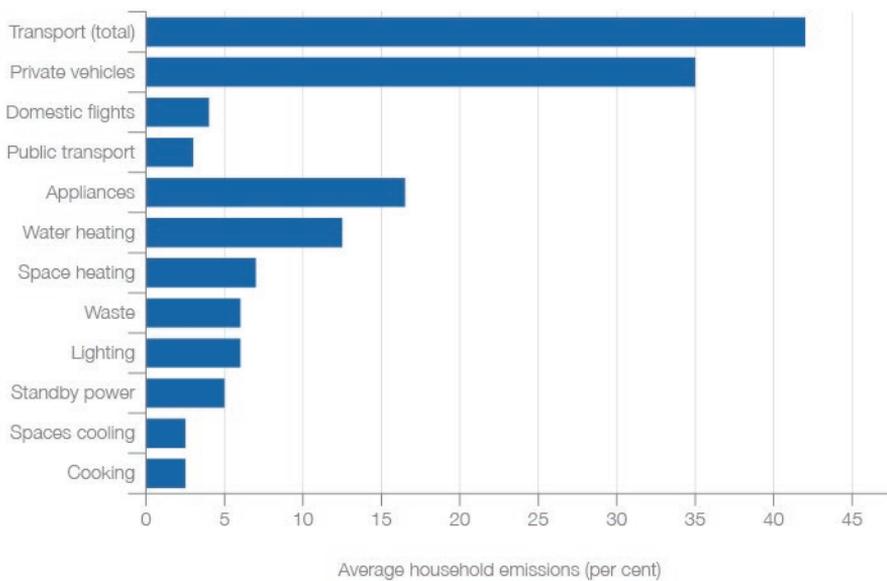
Source: Clean Energy Futures 2013

Transport produces around 15 per cent of Australia's CO_2 emissions. Of this, LPV emissions constitute 64 per cent, or 9–10 per cent of total emissions (Department of Infrastructure and Transport 2012). Since 2002 as shown in Figure 4-30, CO_2 emissions of LPVs has decreased by an average of two per cent every year (Tomlinson 2012). In 2012 the national average carbon emissions from new LPVs were 199 g/km, a reduction of 3.7 per cent from 2011 (National Transport Commission 2013). From 2015 the Australian Government will introduce mandatory carbon emission standards for LPVs which will slow the rate of increase (Department of Infrastructure and Transport 2012).

Figure 4-30   Australian new passenger (light) vehicles, average CO_2 emissions, 2002–10
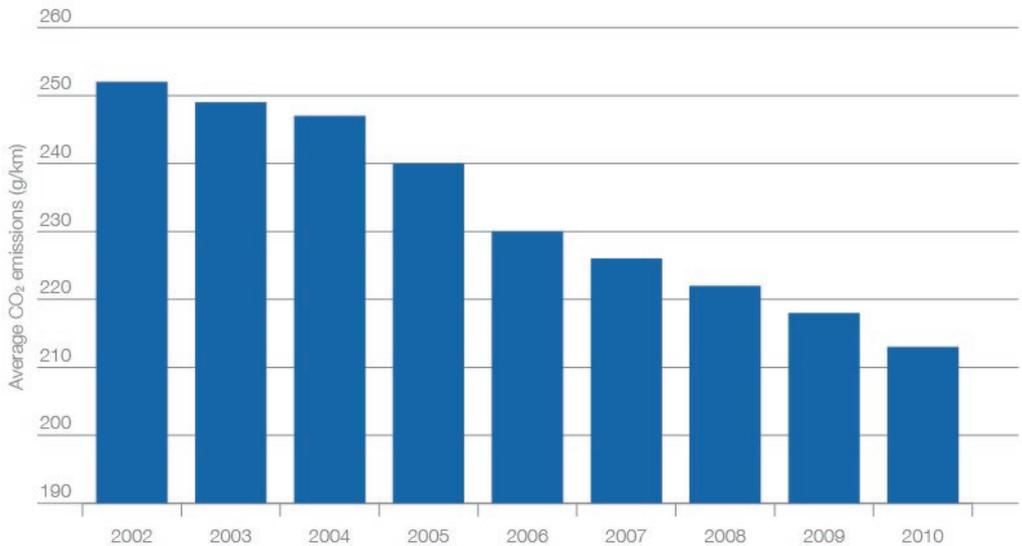
Source: National Transport Commission 2013

Despite vehicles sold in Australia in general becoming more energy efficient, Figure 4-31 shows that we remain significantly behind other countries in this regard, particularly countries in the European Union. In total new cars in Australia emit 43 per cent more CO_2 than European cars on average (*Canberra Times* 2013, National Transport Commission 2013). If Australian consumers had purchased vehicles with best-in-class emissions in 2012 (excluding electric vehicles), a 40 per cent reduction in Australia's new car CO_2 emissions could have been achieved (National Transport Commission 2013).

Figure 4-31   Average CO_2 emissions for New Passenger Vehicles, European Union and Australia, 2003–2010
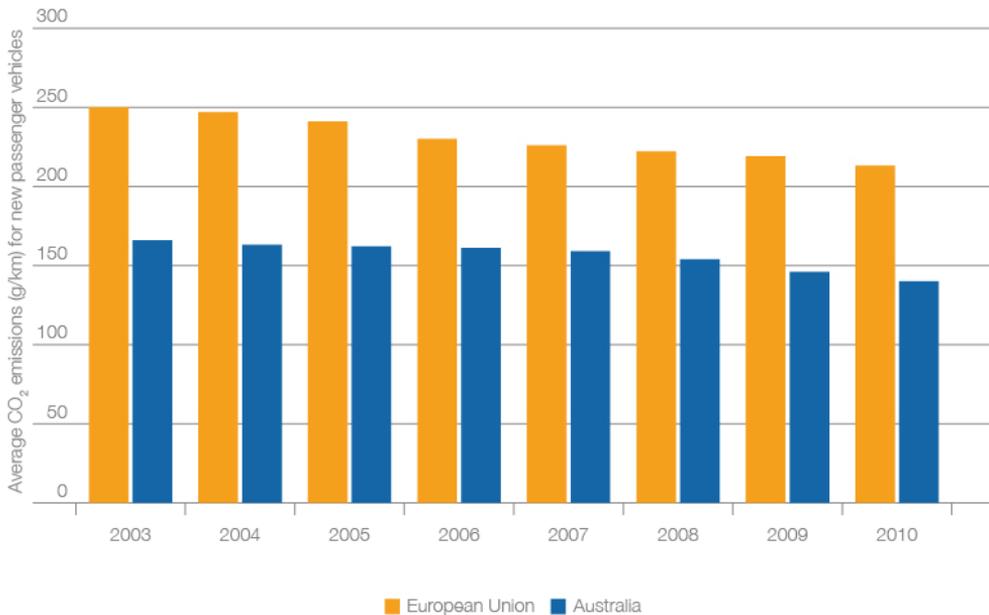
Source: National Transport Commission 2013

It is difficult to directly compare vehicle emissions between Australia, the US and Japan, as each uses different methods to measure vehicle emissions. However, Japan is broadly similar in terms of emissions to the European Union and the US is broadly similar to Australia (National Transport Commission 2013).

System efficiency takes into account factors external to vehicles and systems as a whole (e.g. a public transport system or a road network). Systems can be modified to reduce the need to travel or promote one mode of transport over another. This may involve integrating transport planning with land use planning, behavioural adjustment and pricing mechanisms.

The spatial organisation of Australian cities can have a significant effect on the carbon intensity of travel (Tomlinson 2012). For example, inner areas of cities with many public transport options have considerably lower emissions for total motorised trips than lower density outer metropolitan areas (Moriarty et al 2012).

A 2006 study which mapped the greater Melbourne region identified substantial levels of spatial variations in both transport emissions and transport energy efficiency across the city, with lower transport energy usage and lower transport emissions in areas surrounding heavy rail corridors in the middle ring and inner urban tram lines (Alford and Whiteman 2008).

It has been estimated that even with the current fuel mix for electricity generation, and based on an average occupancy of 10 people, Australia's urban mass transit systems produce on average between half and one-sixth of the carbon emissions of car travel per passenger kilometre (Cosgrove et al. 2012).

Infrastructure sustainability rating tool

The infrastructure sustainability (IS) rating tool is a comprehensive rating system for evaluating sustainability across the design, construction and operation of infrastructure. Administered by the Infrastructure Sustainability Council of Australia (**www.isca.org.au**), it provides an independent certified rating process that looks at both processes and outcomes to determine the sustainability performance of infrastructure projects and assets. The IS tool references an urban design protocol (**www.urbandesign.gov.au**) that is supported by 45 organisations Australia wide. The following three case studies are registered in the IS scheme and are co-funded by the Australian Government through the Nation Building program, Building Australia Fund and Regional Infrastructure Fund.

Gold Coast Light Rail, Queensland

The Gold Coast light rail project aims to integrate new and existing transport systems, encourage urban regeneration and higher density development along its route. Coursing through the most built up areas of Australia's fifth largest city, it will help to reduce congestion and provide multiple benefits for residents, tourists and businesses.

Consisting of 16 stations, stage one is a 13 kilometre corridor connecting the new Gold Coast University Hospital and Griffith University with the key activity centres of Southport, Surfers Paradise and Broadbeach. Stage one will open in 2014 with 14 light rail trams.

The project is expected to reduce the number of private vehicle trips by 10 per cent, saving approximately 114,000 tonnes of greenhouse gas emissions during the first decade of operation.

Working with the motto 'everyone has the ability to challenge the status quo', the project team has worked collaboratively to deliver sustainable outcomes for the project and the wider community. The communication and stakeholder team have undertaken an innovative 'Love Our City' campaign, working with local businesses and media to encourage continued shopping, dining and tourism experiences around the construction zones. A local industry participation plan has successfully sourced around 98 per cent of the workforce from within the local community.

The construction team is working closely with precincts on intersection to intersection road closures. This allows for a relatively quick 'in and out' approach to construction to minimise construction fatigue for businesses and residents. This has improved safety; and reduced material requirements, movements and reworks as excavations can remain open rather than being reinstated daily.

To date more than 260 sustainability initiatives and commitments have been identified and implemented on the project, resulting in savings in greenhouse gas emissions and materials. One of the most significant savings came through the redesign of a viaduct that runs through an existing landfill. By modifying the design from a bridge to a slab on pile structure, the volume of excavation and disposal was significantly reduced. The altered structure also reduces ongoing maintenance requirements. The greenhouse gas emissions saving was estimated to be more than 3,200 tonnes.

The integration of lighting poles with the light rail overhead line poles will eliminate 45 light poles across the alignment which will improve visual amenity, reduce material usage, and minimise maintenance.

The project is registered to be assessed for an IS rating. Stage One of the Gold Coast Light Rail is jointly funded by the Gold Coast City Council, the Queensland Government and the Australian Government through the Building Australia Fund at a total project cost of $949 million.

Gold Coast University Hospital, Parklands.
Image courtesy of GoldLinQ consortium

Great Eastern Highway upgrade, Perth Western Australia

A 4.2 kilometre section of the Great Eastern Highway was recently upgraded between Perth domestic airport and the city. The stretch of road was operating beyond capacity with a crash rate almost twice that of the state average.

It was the first project in Australia to achieve an 'As Built' rating under the IS rating scheme. The project team recognised several benefits from the rating process, including:

• continued testing of current systems and processes for sustainability, as well as helping benchmark against other best practice projects in Australia

• a sustainability audit process

• a framework for sustainability performance and reporting for the project.

Delivering the project in a sustainable manner was a primary objective for the project team, with key performance indicators tracked for recycling, energy, and water use efficiencies during construction.

More than a dozen sustainability initiatives were developed. Many of these initiatives involved reducing and recycling waste, reusing material onsite, and using recycled products:

- the use of warm mix asphalt, which required less energy than traditional hot mix asphalt, was a first for Western Australia

- use of smaller, more energy efficient cars to move around the site

- recycled asphalt pavement, utilised recycled site materials and reduced the need for virgin materials in the asphalt

- crushed comingled recycled concrete (CCRC) sub-base

- native water-wise plants were selected for the landscaping

- a detailed tree survey was carried out and the design altered to minimise the number of trees felled. At least 50 trees were retained through this process.

The project incorporated bus priority lanes at intersections, on-road cycle lanes, a continuous pedestrian footpath, and widening the highway from four to six lanes. The Australian Government provided $224 million to this $280 million project through the Nation Building Program, in partnership with the Western Australian government.

Gateway WA – Perth Airport and freight access, Western Australia

This is the largest infrastructure project ever undertaken by Main Roads WA. The Kewdale, Forrestfield and Perth Airport precinct is a critical gateway to move people and goods. The need to upgrade this precinct is driven by the proposed expansion and consolidation of airport terminals to cater for the anticipated doubling of passenger air travel; doubling in freight and container transport within the area by 2030; and ongoing traffic congestion during peak periods.

The Gateway WA project incorporates road and bridge improvements, local road modifications, facilities and connections for pedestrians and bicycles, noise walls, landscaping, innovative urban design and the use of Intelligent Transport System technology. It includes widening the Tonkin Highway to six lanes between the Great Eastern and Roe Highways, upgrades to the Leach Highway and the local road network within the Kewdale freight precinct.

The project team decided to pursue an IS rating for the following benefits:

- more robust, transparent project governance including commitments, roles and accountabilities

- integrated decision making across the project team

- continuing greater use of recycled materials in highway construction; examples include sourcing bulk fill and pavement from construction and demolition waste

- reducing consumption of water, electricity and fuel and better management of materials and waste

- greater consideration of new technologies such as electric cars for site vehicles and LED lighting

- good iconic urban design.

The Australian Government has committed up to $686 million to the project from the Regional Infrastructure Fund (RIF) and Nation Building Program. The total funding for the project from both the Australian and Western Australian governments is $1,004 million. It is expected to be completed in 2017.

Model of major intersection upgrade for Gateway WA.
Image courtesy of Main Roads WA

Conclusion

Increasing summertime heat in Australia's major cities reveals evidence of climate change. However, many of our cities are making serious efforts to increase use of green infrastructure and vegetation to ameliorate its effects. They are also showing a greater preparedness for extreme climate events such as floods and heatwaves by ensuring their emergency management plans are updated.

Electricity is still the major fuel source for space heating and cooling in most major cities; and airconditioner use and whole-of-house systems are becoming more common. Appliances, mainly powered by electricity from non-renewable energy sources, are becoming more efficient but the effect is counteracted by the growing number of appliances in use due to rising living standards, population growth and increasing numbers of one and two person households.

Australia's major cities could use transport energy more sustainably. Urban mass transit systems are inherently much more efficient than light passenger vehicles, at least when mass transit occupancy rates are high. As shown in *State of Australian Cities 2012*, heavy rail commuter lines in some cities are at capacity, but this is only at certain times of the day and on certain routes.

Australia's mass transit systems suffer from the tension between servicing the maximum number of people (equity) and maximum efficiency. The evidence is that we favour equity over efficiency; therefore the energy advantage of mass transit systems is largely lost to our major cities.

Some cities are currently more successful than others in their recycling programs and management frameworks for waste. On average, about half of household waste is organic waste. A large proportion of this is going to landfill, where it generates methane, a greenhouse gas with 21 times the warming potential of CO_2.

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The liveability of a city is judged by the health, wellbeing and the quality of life of people living within it. Although difficult to define precisely, urban liveability can be measured both subjectively for example, by asking people how they feel about their quality of life in their cities and objectively for example, by examining social and economic measures for urban populations such as income, wealth, education, health, economic and community infrastructure assets, opportunities and services.

This chapter examines objective and subjective measures that relate to liveability in Australian cities. The first section discusses how wellbeing and liveability have been measured using indexes that combine indicators together. The second section examines the concepts of inequality, equity and social inclusion/exclusion and how they affect urban liveability. Dimensions of liveability, including accessibility, housing, health, active travel and safety are then explored. The final section looks at community wellbeing and volunteering.

This year maps are used in State of Australian Cities reporting. Case studies are used in the text however the full range of maps can be viewed using the supplementary online map application.

Key findings

- Liveability indexes measure the broader aspects of cities beyond the traditional economic indexes, looking at both objective and subjective measures.

- The UN-Habitat City Prosperity Index is an important contribution to objective measurement and international comparison of cities. Melbourne ranks highly on prosperity and quality of life.

- The Australian Property Council's Liveability Index is a subjective index of 11 of Australia's major cities. The Council's 2012 rankings were unchanged from 2011 with Adelaide ranked as the nation's most liveable city.

- The median incomes of households in Australia have risen substantially in real terms, with particularly strong growth between 2003–04 and 2009–10. Growth was particularly strong for households at the top and bottom end of the scale. Income growth was widespread in a geographic sense across Perth, while more strongly concentrated on the inner parts of Melbourne and other cities.

- Unemployment in Australia has halved since the 1990s and this has been an important factor in the increase in incomes at the lower end of the scale. The fall in unemployment has been particularly marked in those areas of cities where it was previously very high.

- In the larger major cities, unemployment rises with distance from the city centre. There is also a decrease in skill levels with distance – this may be contributing to unemployment.

- Part-time employment and underemployment have also increased in the major cities, particularly among women working in retailing and hospitality.

- In Australia's larger cities, home renters predominate in the centre while outright homeowners are generally found in the middle suburbs. In the outer suburbs new homes are being purchased – this is the so-called 'mortgage belt'. On the fringes of cities there is an outer belt of home renters. This outer belt of renters appears to be little studied.

- Cities are becoming increasingly stratified by age as well as income, skills and employment. There was been a pronounced shift of persons aged over 65 away from the inner and middle parts of cities towards the outer areas between 2001 and 2011.

- Rates of walking and cycling fell throughout the 1990s before recovering in the first decade of the century. The proportion of journeys to work made by bicycle is now the highest it has been in 40 years.

City liveability indexes

Over the past two decades, there have been national and international efforts to develop new measures of progress for countries and cities that capture more than the simply economic factors of Gross Domestic Product (GDP) (OECD 2013a). As discussed in *State of Australian Cities 2012*, some indexes of liveability are produced by private corporations for specific audiences. The Economist Intelligence Unit's *Global liveability report* and the Mercer *Quality of living survey* fall into this category.

Other measures of progress are under development, both internationally and in Australia. These new measures are intended to help inform and improve government policy and decision making. The Organisation of Economic Cooperation and Development (OECD) *Better life index* (2013a) is a leading international index developed to compare countries on measures of wellbeing and quality of life. The OECD has identified 11 topics as essential to wellbeing in terms of material living conditions (housing, income, jobs) and quality of life (community, education, environment, governance, health, life satisfaction, safety and work-life balance).

For the past three years Australia has ranked first in the Better Life Index overall. Indicators similar to those used in the Better Life Index are found in two Australian reports: the Australian Bureau of Statistics (ABS) *Measures of Australia's progress* (2012a) and the *Sustainable Australia* 2013 report (National Sustainability Council 2013), both covered in *State of Australian Cities 2012.*

UN–Habitat City Prosperity Index

The City Prosperity Index was developed by the United Nations Human Settlements Program (UN–Habitat 2012) to gauge how well cities support the wellbeing of their populations. It defines prosperity more broadly than economic prosperity by introducing five other dimensions: productivity, infrastructure, quality of life, equity and environmental sustainability (see Table 5-1).

Table 5-1   UN-Habitat City Prosperity Index dimensions

Dimensions	Definitions/variables
Productivity	The productivity index is measured through the city product, which is composed of variables such as capital investment, formal/informal employment, inflation, trade, savings, export/import and household income/consumption. The city product represents the total output of goods and services (value added) produced by a city's population during a specific year.
Quality of life	This index is a combination of three sub-indices: education, health sub-index and public space.
Infrastructure development	This index combines two sub-indices: one for infrastructure proper, and another for housing.
Environmental sustainability	This index is made of three sub-indexes: air quality (PM10), CO_2 emissions and indoor pollution.
Equity and social inclusion	This index combines statistical measures of inequality of income/consumption (Gini coefficient) and inequality of access to services and infrastructure.

Source: UN-Habitat 2012

Importantly, the City Prosperity Index focuses on individual cities and therefore shows variations in economic, environmental and social outcomes between cities within the same country. It also shows variations between cities across the five dimensions. Figure 5-1 shows the scores on the City Prosperity Index, Equity Index and Quality of Life Index for the top ranked cities from a sample of 70 world cities.

Figure 5-1   UN Habitat City Prosperity Index and Equity Index, 2012
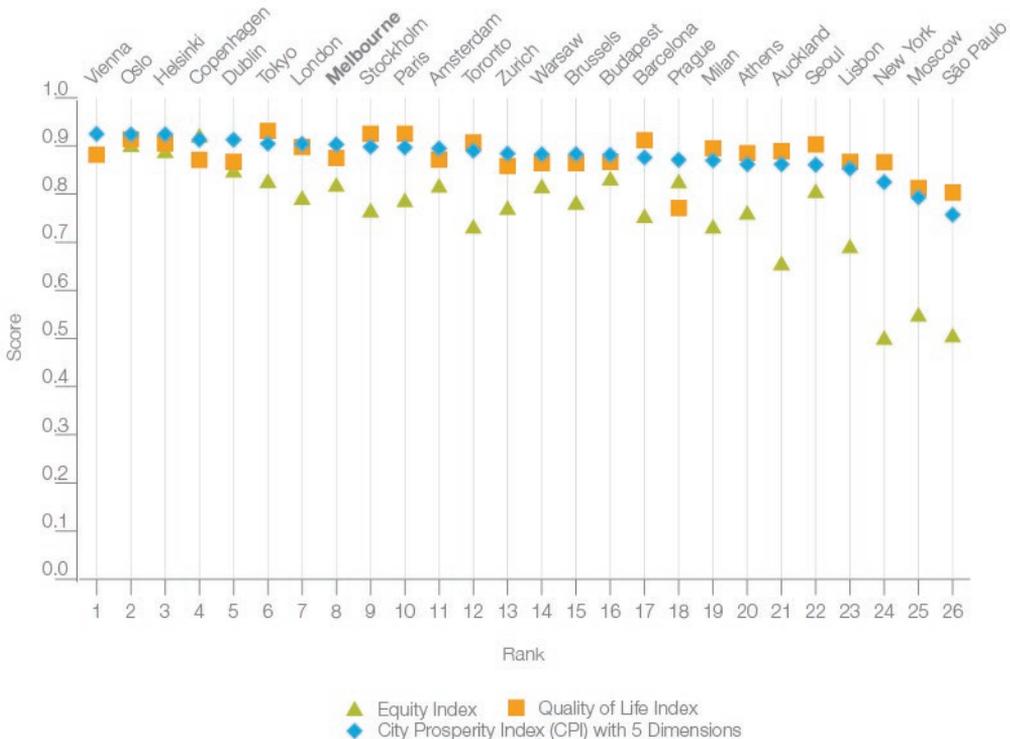
Source: UN-Habitat 2012

There is relative consistency between the scores of high-ranked cities on the combined City Prosperity Index and the Quality of Life Index but less consistency between the overall scores and the scores from the Equity Index. Melbourne was the only Australian city in the sample and was ranked eighth overall. Its Equity Index score was lower than its Quality of Life Index score. The gap between Equity Index score and Quality of Life score was larger than the gap for the top five cities but smaller than for the more highly ranked cities of London or Tokyo.

Subjective measures of wellbeing and liveability

The data used in composite indexes such as the UN–Habitat City Prosperity Index provide useful information about the status of populations (their health, education, income etc.) and provision of resources, and these are important indicators of wellbeing and liveability. However, the indexes do not provide information about people's experience of living in cities, their satisfaction with their quality of life or how liveable they perceive their cities to be (that is, subjective dimensions of wellbeing and liveability).

The OECD (2013a) recently released *Guidelines on measuring subjective well-being,* which provides a framework for internationally comparable and robust data to better measure how people evaluate and experience their lives.

Other methods can be used to find out how people rate their own wellbeing and the liveability of their cities – for example, in-depth interviews and focus groups. Ipsos Australia provides qualitative research on issues that affect quality of life in Australian cities, published as the Ipsos Mind and Mood Report, now in its 35th year. The report is based on conversations among small groups in people's homes. The following feature article gives insight into the subjective views of residents of Australia's four largest cities – Sydney, Melbourne, Brisbane and Perth (Dudley 2013).

Chowder Bay, Sydney.
Image courtesy of Mosman Council

Mind and mood report – big city living

Contributed by Ipsos

The following material about living in Australia's largest cities – Sydney, Melbourne, Brisbane and Perth – was gathered from participants in Ipsos focus group conversations between April 2011 and March 2013.

Table 5-2 shows the five most commonly expressed responses to the question: 'What would you say are the three most important issues facing your State/city/region'? The issues given for rating were health care, crime, cost of living, transport and housing. The table shows the different ratings between Sydney, regional New South Wales (NSW) and other Australian metropolitan areas and how these concerns have changed over the period from 2011 to 2013.

Table 5-2   Top issues of concern raised by IPSOS Mind and Mood participants, 2011–13

Key concerns	Sydney (per cent)	Other Australian major cities (per cent)	Regional New South Wales (per cent)
Health care	44	49	56
Crime	34	31	34
Cost of living	33	32	30
Transport	33	26	21
Housing	30	22	21

Source: Ipsos Australia 2013

The top five concerns for Sydney residents in order of importance are health care and hospitals (44 per cent) crime (including law and order, violence and antisocial behaviour) (34 per cent), the cost of living (33 per cent), transport (33 per cent) and housing (30 per cent). Transport and housing were of more concern to those in Sydney than those in the rest of NSW (33 per cent versus 21 per cent, and 30 per cent versus 21 per cent respectively), with health care a higher priority for regional residents (56 per cent versus 44 per cent). Compared to other capital cities, those living in Sydney are slightly less concerned about health care (44 per cent versus 49 per cent) but significantly more worried about transport and housing (33 per cent versus 26 per cent and 30 per cent versus 22 per cent respectively).

These general statistics give an indication of some broad issues of concern and differences between locations, but qualitative research can also show how these issues are experienced and explain what might be underlying the issues. Each of the issues is explored in more detail below.

Health care

Health care and hospitals are currently the leading issue of concern for Australians. However, Sydney residents are comparatively less concerned than those in regional NSW or in other metropolitan cities.

Stories about misdiagnosis, waiting times for hospital beds and appointments with health professionals are discussed frequently by Ipsos research participants. A lack of confidence with the public system and the knowledge that, with an ageing population, these systems will face increased pressure in the not-too-distant future leads some participants to discuss the benefits of the private health system. However, some consumers are less than impressed by the level of rebate offered on many health services.

This lack of confidence has also put discussion about preventive health strategies on their agenda. There are discussions about the need to exercise more, eat more healthily and perhaps get the occasional Botox injection to fight off the onslaught of ageing.

Crime

City dwellers report that they feel vulnerable in their own neighbourhoods as well as in the community at large. Frequent media reports of shootings, rapes and gang-related violence support this anxiety. The following comment is an example:

'What concerns me as a father of a young family is the violence. The Merrylands shootings, the Guildford shootings, the Auburn shootings. Yes we have the cops, the government, but I don't have faith in that system. The bikies, the gangs – surely they don't have that much power.'

In the same way that the Cronulla riots are the poster story for cultural conflict, the attack on Jillian Meagher in Melbourne's Brunswick has resonated strongly with Australians in many capital cities. It seemed to be emblematic of their concern about violent crime. Some women in our research reported responding to this fear by arming themselves.

While walking the streets might be fraught with danger, so could driving on them. Research participants in suburban areas report that young drivers' hooning is another reason to feel unsafe in the streets.

Cost of living

Despite the fact that Australia has a strong currency, relatively low interest rates and low unemployment figures compared with other developed nations, consumers are pessimistic about the Australian economy.

During the Global Financial Crisis (GFC), city workers worked harder and smarter to keep the ship afloat, often for no immediate reward of a pay rise or bonus. People feel they are still working long hours without additional reward and are very anxious about job security. They believe that employers are replacing full-time positions with contract roles so they can more efficiently manage their workforces in response to fluctuating market conditions. Even those in the Public Service who were previously viewed as 'untouchable' are considered to be vulnerable in the current climate.

'What we are going through in big corporates, the downsizing and restructuring, exactly the same thing is going on in government. We are all headed down the same track.'

Frequent news headlines about the latest well-known Australian manufacturer or service organisations downsizing, closing doors or moving operations offshore, together with stories of family and friends losing their jobs, have convinced Australians that changing jobs can be a risky proposition and that retrenchments are on the rise.

'There is no security in the workplace for anybody now.'

There is also a perception that the cost of groceries, petrol, utilities and other necessities are rising faster than real wages, which fuels concerns about employment.

Transport

Discussions about the difficulty of city living and commuting are a regular feature of Ipsos research participant discussions. Consumers report their frustrations about infrastructure planning, their anxiety about driving on gridlocked roads and having to board trains and buses filled to capacity during peak hours.

'It's anywhere from an hour to two hours to get to work. [My husband] leaves before 6.30am and comes home around 7pm.'

Transport infrastructure planning is not seen as keeping pace with current demand or future needs. When tollways are built, drivers complain that they can barely cope with current traffic and will soon become a 'parking lot' as usage increases. Those on the road all day in trades and service industries have to factor the dramas of travel between sites into their pricing structures and work schedules, as well as the rising price of fuel.

Interviewee 1: 'Travelling is a major factor when I quote for stuff. If I have to go somewhere for a job, that's dollars for me.'

Interviewee 2: 'If you quote for two-hour job but it takes you two hours to get there, it's really a four-hour job. And there are the tolls.'

Many see investment in rail networks to service growing outer suburbs as important, but they believe that a lack of will and funds stymie plans and frustrate commuters.

Housing

Immigration policy is a popular topic among Australians. Discussions reveal that people are torn between the benefits of population growth, namely economic prosperity, and concerns about the potential hazards of rising unemployment and cultural conflict.

Capital cities are seen as the likely destination for new immigrants; however, interviewees feel that, given that streets are already crowded, job markets are tight and housing stock is low, new immigrants could be a threat to their quality of life. Many interviewees believe that owning their own home is very important. They are concerned about whether home ownership will become a reality for them given that housing stock is falling and housing prices are rising.

Government

Australians are looking to government at all levels to focus on long-term policies to reduce commuting times, ensure good quality housing, health care and hospitals, increase employment, and implement immigration and law and order policies that ease their concerns about violent crimes on their doorstep. They want to be confident that big city living will deliver better quality of life into the future. Interviewees believe that challenges seem to be escalating and are not being tackled head on.

Qualitative research like the Ipsos *Mind and Mood* is a valuable contribution to the understanding of urban liveability and wellbeing. Its questions and research tools add to Australia's body of knowledge and help clarify and explain issues that are otherwise considered subjective.

In Australia, subjective dimensions of wellbeing are monitored in a variety of ways by State and Territory governments, local government and research groups. *Community indicators Victoria* (McCaughey Centre 2013) is a well-established community indicator framework that uses local level data and the Australian Unity Wellbeing Index monitors subjective dimensions through a national survey.

Wellbeing of Australians affected by bushfires and floods

In 2011 the Australian Centre on Quality of Life at Deakin University (Weinberg and Cummins 2012) conducted a special survey to investigate the impact of natural disasters on people who continue to live in disaster-affected areas. The survey sought to determine whether the floods in North Queensland between December 2010 and February 2011 and the fires in Victoria in the period January through February 2009 continued to affect subjective views about wellbeing of people still living in those areas. The survey involved 600 people from Victoria and 615 from Queensland and used the Personal Wellbeing index.

The survey found that people living in disaster-affected communities had an increased satisfaction with their personal safety and with their community, although their overall wellbeing remained within the normal range. The wellbeing of those who suffered home damage also remained in the normal range and their satisfaction with safety and community remained high. However, the satisfaction of people with health problems or who were concerned about security or their present level of personal success rated lower in wellbeing.

Property Council of Australia's My City Survey

Auspoll has developed subjective measures of city liveability for their *My city survey*, conducted for the Property Council of Australia (Auspoll 2013). A sample of residents in 11 different cities are surveyed about liveability in their cities and the responses to the 17 attributes included the survey are combined into an overall liveability score. The results of the survey have been reported in the last two State of Australian Cities reports.

The *My city* Liveability Index score for each Australian city in 2012 is shown in Figure 5-2. Adelaide has consistently been rated as the most liveable city, closely followed by Canberra. Both Hobart and Newcastle ranked higher in 2012 than 2011 (in third and fourth place), while Perth and Melbourne rankings have fallen slightly. Sydney and Darwin are ranked as the least liveable cities in Australia.

Figure 5-2   Property Council of Australia's My City Liveability Index, 2010–12
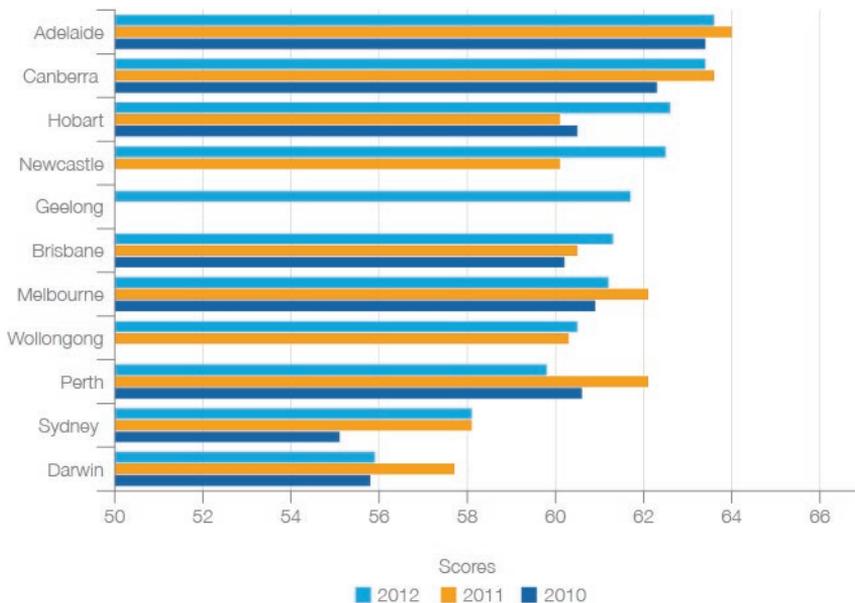
The most important of the 17 attributes that make up the liveability index were:

•   safety – it is a safe place for people and their property

•   cost of living – it is an affordable place to have a good standard of living

•   health – there are good health care services

•   employment – there are good employment and economic opportunities

•   quality of the environment – the city is clean, well maintained and unpolluted.

These rankings were similar to the findings of the Ipsos research. The only attribute in the Auspoll *My city survey 2012* whose perceived importance had declined since 2011 in all cities other than Darwin was 'having good employment and economic opportunities'. This is consistent with Ipsos' research in which concerns about employment security were set within the broader scope of an uncertain national and international economic climate.

Figure 5-3, taken from responses to the Auspoll *My city survey* 2012, shows how people rated the importance of different attributes of liveability against their personal rating of their city's performance on these attributes. The attributes that people rate as most important for liveability and those on which most cities perform well are quality of the environment, availability of good health care services, good educational facilities and presence of a wide range of outdoor recreational environments. Attributes that were considered most important but that cities did not perform as well on were safety, affordability, employment, economic opportunities and mass transit services.

Figure 5-3   Quadrant analysis – how Australians rank the importance and performance of their cities on attributes of liveability, 2012
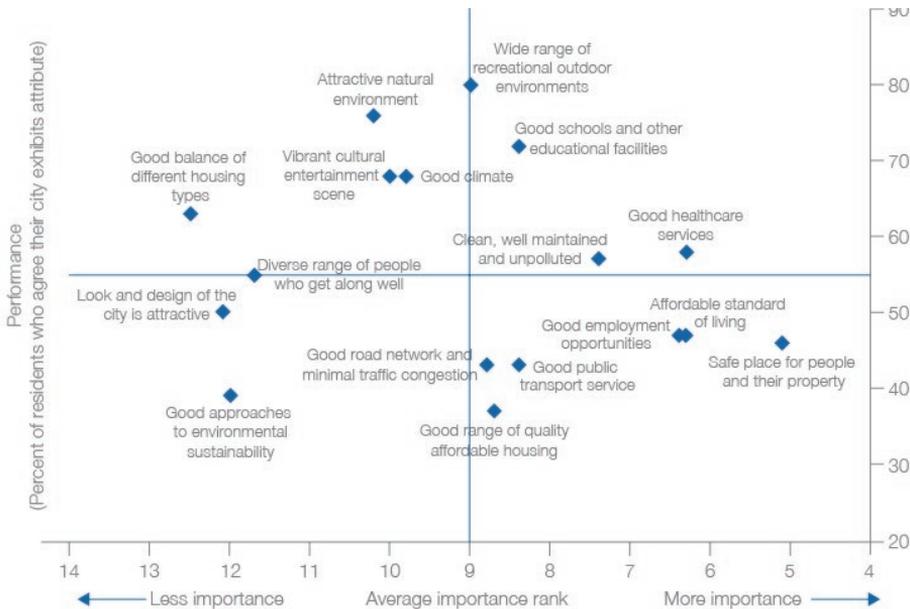
Source: Auspoll 2013

These findings are explored in more detail below.

Australian Youth Survey

Subjective views about liveability vary according to one's age, income and other social and demographic characteristics. Any attempt to measure liveability and wellbeing must take account of different ages, ethnicities, abilities and religions and localities so that they can be as accurate as possible.

An online survey of 15,351 people aged 15 to 19 years (Mission Australia 2012) found that in 2012 the top three concerns of men and women in that age group were the economy and financial matters (34 per cent and 29 per cent respectively); managing population growth (28 per cent overall) and alcohol and drugs (22 per cent overall). The top three issues in 2011 and 2010 were the environment (37 per cent); alcohol and drugs (30 per cent); and equity and discrimination issues (22 per cent). The changing sentiment among young people suggests that concerns about employment and economic opportunities, as indicated in both

the Ipsos research and My City Survey, does not necessarily hold from year to year as they might for older Australians.

Access to gainful employment and economic opportunity is nonetheless fundamental to individual wellbeing. As described in Chapter 1 of this report (Introduction), population concentration and the economic activity of cities give large numbers of people access to the economic resources and opportunities that support their quality of life. However, benefits such as access to education and employment, economic opportunity and other liveability attributes are not equally enjoyed by all city dwellers.

Income change

A recent Productivity Commission paper *Trends in the Distribution of Income in Australia* noted that between 1988–89 and 2009–10 the median incomes of households in Australia rose substantially in real terms, with particularly strong growth between 2003–04 and 2009–10. This increase has mainly been driven by growth in labour force earnings arising from employment growth; more hours worked (by part-time workers); and increased hourly wages (Greenville et al. 2013). However, the paper also notes that while income levels have increased across all income groups, the increases have been uneven: the rate of growth is higher at the 'top end' than at the 'bottom end'. Incomes for those in the middle of the distribution have also become less concentrated around the average.

For lower income households, growth has been driven by increased workforce participation and employment, whereas for higher income households it has been driven by higher wages. For middle income households both drivers are evident. Importantly, while most Australian households do not report significant 'capital and other' income, a small number do report significant income in this category. This is thought to be responsible for much of the recent increase in measured gross income inequality (Greenville et al. 2013).

Inequality refers to differences between groups of people in the amount of social and economic resources and opportunities that contribute to their quality of life and wellbeing – for example, income, wealth, education and health. Inequalities in wealth and income both within and between societies are associated with poorer population health and wellbeing (Wilkinson and Picket 2010). They are also a root cause of crime and social disorder and can lead to economic and civil instability (Stiglitz 2012). Although urbanisation can help large numbers of people gain access to economic opportunities and resources (thereby alleviating poverty), inequality can result in poverty and social disadvantage that can be highly concentrated and entrenched.

In Australia, consistent with findings at a global level, incomes in the capital cities are generally higher than in non-metropolitan areas. In 2009–10 average disposable household incomes in the capital cities in Australia were 19 per cent above those outside the capital cities. The largest disparity in mean household incomes between a capital city and the rest of the State was in Victoria, where the average household income in Melbourne was 23 per cent higher than in the rest of the State (ABS 2011a).

These changes underlie the recently observed increases in summary measures of inequality in Australia (such as the Gini Coefficient) for individual and household incomes. At the individual level, the key drivers are the widening dispersion of hourly wages of full-time employees and (to a lesser extent) the relatively stronger growth in part-time employment. At the household level, the key driver has been capital income growth among higher income

households. The impact of growing dispersion of hourly wages on the distribution of labour income has been offset by increased employment of household members and a decline in the share of jobless households.

The Productivity Commission paper also notes the substantial impact that government taxes and transfers have had on the distribution of household income. Following initial adjustments after the introduction of the GST in the early 2000s, real growth in the value of direct and indirect transfers contributed to growth in incomes for low income households, substantially reducing measured inequality.

Figure 5-4 shows the change in income in Australia's major cities between 2006 and 2011. While there has been a large variation in income growth between cities, the overall rate of growth for major cities has been reasonably strong.

Figure 5-4   Income change in Australian major cities, 2006–11
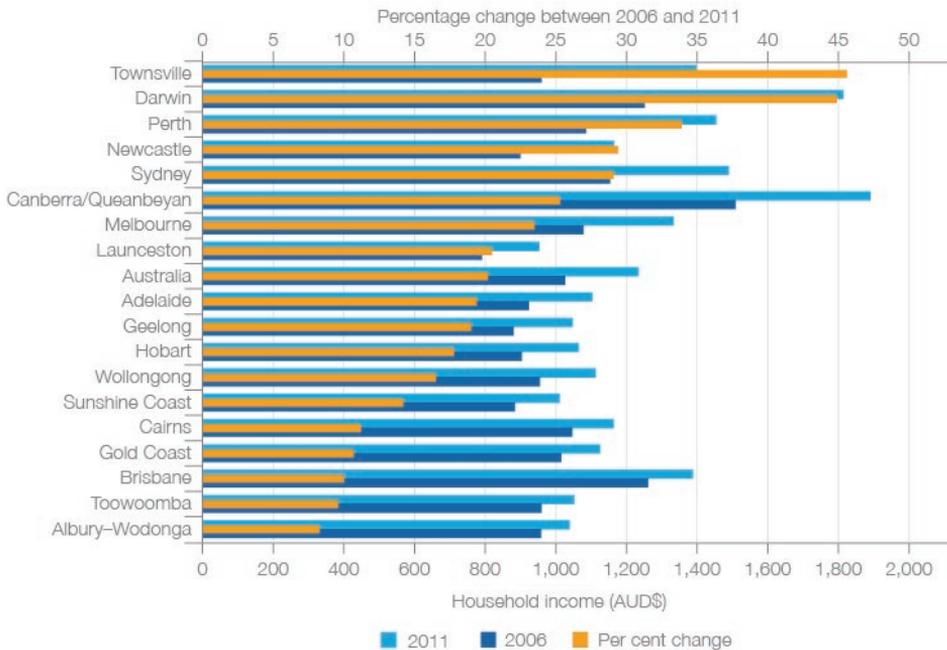
Source: ABS Census 2006, 2011

Household incomes in Perth grew 34 per cent between 2006 and 2011. The high rates of income growth in Perth shown in Map 5-1 illustrates that the benefits of the resources industry in Perth have spread relatively evenly to other areas. Another measure of the strength of Perth's income growth is that, according to the ABS's Socio-Economic Indexes for Areas (SEIFA), it is home to four of Australia's five most advantaged local government areas (LGAs) and only three LGAs are below the national average (Clarke 2013).

According to the SEIFA index, the LGAs of Darwin, Palmerston and Litchfield in the Greater Darwin area are relatively advantaged. However, they are outside the top 22 Western Australian LGAs, some of which are non-metropolitan. The ACT does not have LGAs, but ACT as a whole has by far the highest SEIFA score of any Australian state or territory. The highest scoring suburbs are Forrest and Barton.

Map 5-1   Change in average total income from all sources in Perth, 2006–11
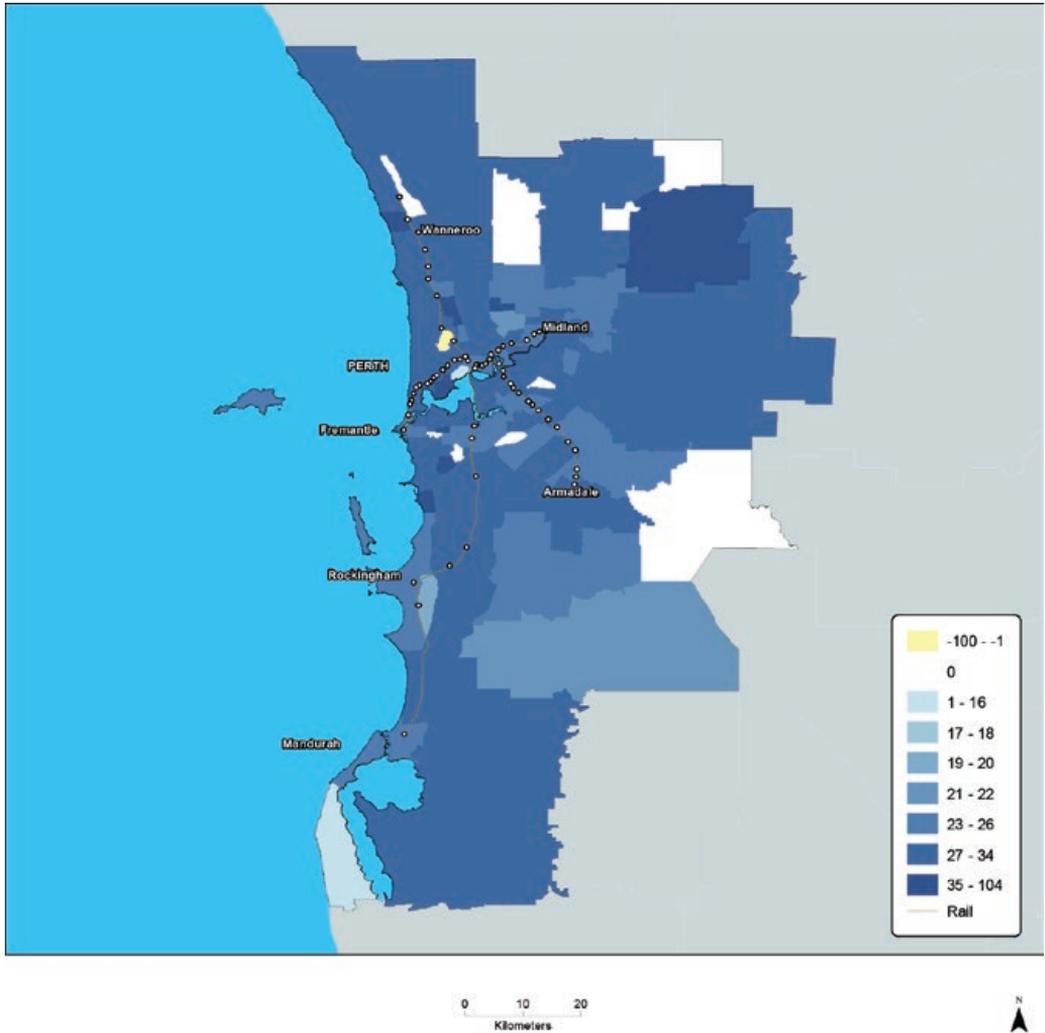
There are significant income growth differences between Perth and other major Australian cities. Income growth was relatively small in the north-east of Perth around Swan Valley, along the outer south-eastern corridor following the Armadale train line and to the east of Rockingham. These areas traditionally have lower income households and more social housing. This comparatively even income growth compared to similar sectors in other Australian cities is possibly because there are fewer jobs in Perth in the manufacturing sector. Perth's geographical isolation means that arguably it has never had the necessary conditions to develop significant manufacturing industries, other than those serving the immediate needs of its residents. Historically, it has been cheaper to import all manufactured goods from the eastern states or overseas.

The effect on incomes due to the loss of transformative jobs (manufacturing, utilities and construction) and their replacement by service employment (finance, business and research) can be seen in all of Australia's major cities and is most clearly expressed by the map of Melbourne's income growth (Map 5-2).

Map 5-2   Change in average total income from all sources in Melbourne, 2006–11
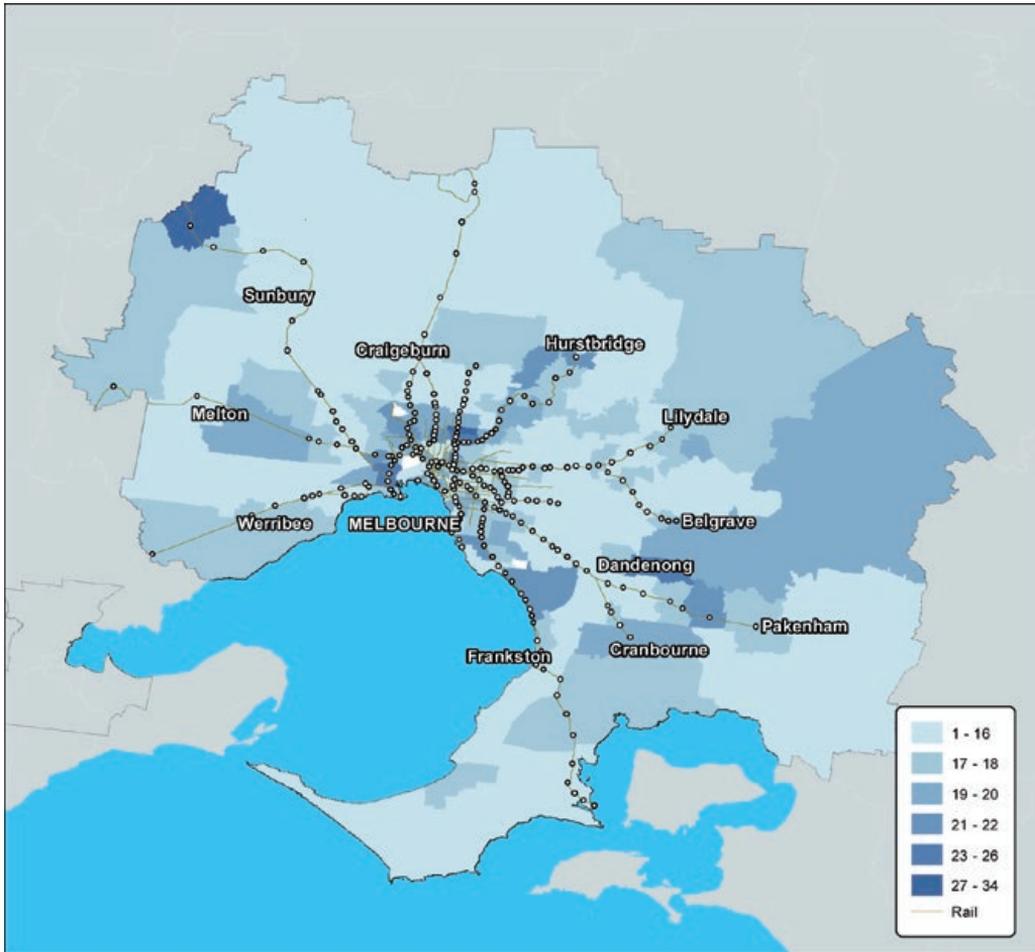
Melbourne has experienced income growth across all areas, but outside the inner ring of suburbs it has been patchy. The corridor stretching north from Williamstown on the south-western edge of the CBD to Maribyrnong and then east to Northcote has experienced significant growth. In the 1980s and 1990s these suburbs formed the backbone of Melbourne's manufacturing heartland. Like western Sydney and northern and western Adelaide, they suffered major net job losses as those industries declined. In 1996 half of the households in Northcote and Maribyrnong had incomes in the lower two-fifths of Melbourne household incomes (Atkinson 2011). Since then, there has been significant improvement in incomes in these suburbs as more people have taken advantage of their relative proximity to the CBD where there is a greater concentration of relatively higher-paid, knowledge-intensive jobs. This has seen average household income in Northcote and Maribyrnong move into Melbourne's top 25 per cent (ABS 2011a).

While the concentration of higher-paid, knowledge-intensive jobs in Melbourne's CBD and immediate surrounds has increased, the relative advantage of inner suburbs has brought with it gentrification and the associated increased price of housing has displaced many lower income households. This applies particularly to those in the private rental market and lower income earners looking to buy in inner areas (Atkinson 2011).

Unemployment

In Australia an unemployed person refers to an individual aged 15 years or over who is not employed during the reference week (one week a month over 12 months of the Labour Force Survey) and:

- has actively looked for full-time or part-time work at any time in the four weeks up to the end of the reference week and was available for work in the reference week or

- was waiting to start a new job within four weeks from the end of the reference week and could have started in the reference week if the job had been available then (ABS 2007).

Employed people are defined as individuals who work for at least one hour per week for pay, profit, commission or payment in kind, in a job or business or on a farm (comprising employees, employers and own account workers, and including family businesses).

For most of the last two decades, the unemployment rate has declined as a result of Australia's strong economic growth. In the early 1990s the national unemployment rate was above 10 per cent. By 2008 it had declined to four per cent before settling in a band between 4.9 and 5.6 per cent since the beginning of 2010 (ABS 2012d). The reduction in unemployment rates has paralleled a growth in underemployment. Before the recession in the early 1990s the unemployment rate was 5.9 per cent and the underemployment rate was 4.1 per cent. Currently the unemployment rate is 5.6 per cent, but underemployment has increased to around eight per cent in the last 12 months (ABS 2012d).

The changes in the underemployment rate can be largely attributed to the steady increase in part-time work from 15 per cent in February 1978 to 30 per cent in May 2010 (ABS 2010b). Generally, industries that have a large proportion of part-time workers have a higher rate of underemployed workers. These industries also tend to employ mostly women and younger workers (see Figure 5-5). For example, in February 2010, 57 per cent of workers in the accommodation and food services industry were working part-time and 55 per cent of workers were women. This industry had the highest proportion of underemployed workers, at 20 per cent. Retail trade, which also had a high number of part-time and female workers, had the second highest proportion of underemployed workers, at 15 per cent (ABS 2012d). Underemployment is also more common for those workers with lower levels of qualifications.

Figure 5-5   Underemployment rates in Australia, 1978–2011
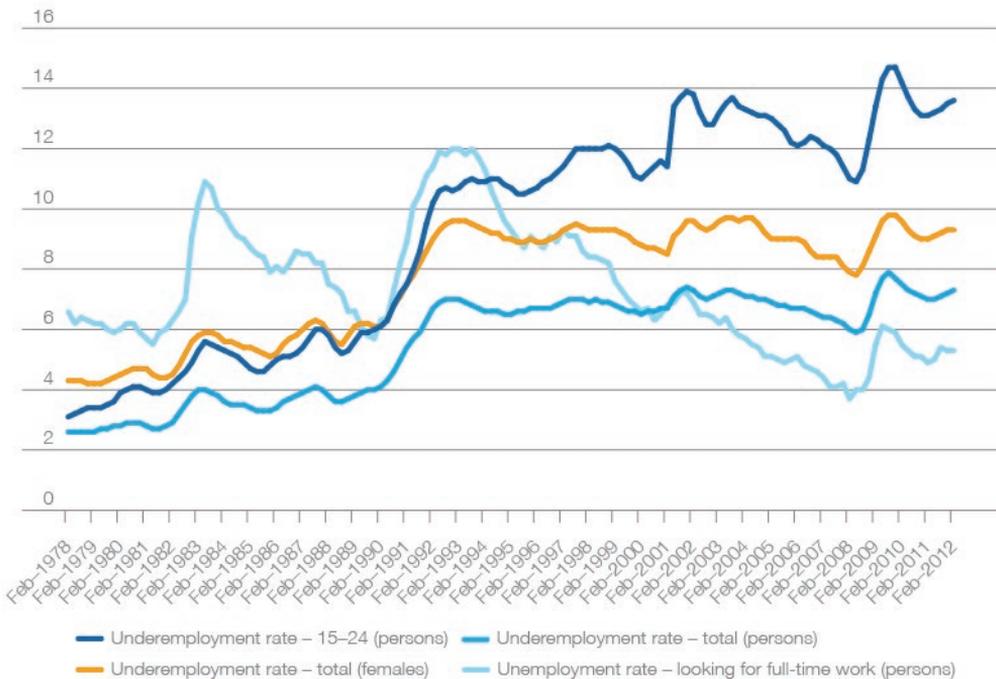
While underemployment is not as problematic to workers as unemployment, it can have long-term consequences for career progression, earning potential and retirement income. This is of particular concern as the majority of Australia's underemployed workers are women who already have lower average earnings and retirement income than men.

The Census data used for the city comparisons below does not report the levels of underemployment in the above areas but the evidence suggests it would be more evident in areas that are relatively disadvantage.

The feature of unemployment that is of most relevance to cities is the unevenness of its incidence – both spatially and socially – and the persistence of these differences over time.

In social terms, a wide range of data shows that the unemployed tend to differ from average members of the workforce in relation to their occupational position, human capital endowments, and various demographic characteristics including, gender, age, marital status and ethnicity – with some combinations of characteristics yielding dramatically increased risks of being unemployed at any point in time.

Geographically, comparably strong differences are evident both on a neighbourhood basis, within towns or cities and on a regional or sub-regional basis within countries. There also seems to be a high degree of continuity in both the social and geographic patterns, with some settlements, neighbourhoods and population groups facing recurrent risks of high unemployment (Gordon 2001).

A 2009 paper commissioned by the Australian Government's Social Inclusion Board (Vinson 2009) noted that localities with a markedly high level of disadvantage are

often characterised in terms of perceived behavioural shortcomings – such as residents' lack of commitment to improving their situation, indifferent motivation generally, unlawful conduct, and parents' inadequate attention to child rearing. Indeed, it has been argued on occasion that the dominant cause of residents' plight resides in their own behaviour. However, research that attempts to identify the foundations of locational disadvantage has come to different conclusions and these have significant impacts on liveability.

One hundred and fifty years after Mayhew (1861) mapped the spatial concentrations of illiteracy, unemployment, crime and teenage marriage in England and Wales, there is ample evidence that concentrations of geographical disadvantage of the kind he discovered continue to be a feature of Australia's social landscape. Furthermore, there is evidence (Gregory and Hunter 1995) of a growing concentration of urban poverty in Australia, one consequence of which can be a cycle of increasing disadvantage in certain locations.

A report of the Melbourne Metropolitan Board of Works (Little 1974) based on socioeconomic status found a clear concentration of social problem areas in central Melbourne and a collection of socioeconomically advantaged areas in the east and south of Melbourne. A high correlation was found between male unemployment and social dysfunction, suggesting that the former could be used as a proxy for the relative social dysfunction of an area. It has also been concluded that anything that affects the unemployment rate in a locality will influence, either directly or indirectly, the incidence of social dysfunction (Bright and Walker 1994). An Australian study of Newcastle in the 1970s (Vinson and Homel 1975) also found a high correlation between employment, education and social dysfunction.

Sydney and Hobart are used in this report to demonstrate the variance in city unemployment levels. Unemployment maps for other Australian major cities can be viewed using the supplementary online map application. They show areas characterised by lower skilled occupations, lower education levels and a higher prevalence of individuals with interrupted work histories (thus remaining susceptible to higher unemployment when growth is weaker). The maps also show areas characterised by a greater number of professional households and higher educational outcomes that experience relatively smaller shifts in the unemployment rate.

Map 5-3 shows the proportion of unemployed people in Sydney at the 2011 Census. The map shows a wide range of areas of Sydney with higher levels of unemployment. The western and south-western corridors have high concentrations and relatively small reductions in unemployment over the past decade.

Map 5-3   Proportion of persons aged 15 to 74 years unemployed in Sydney, 2011
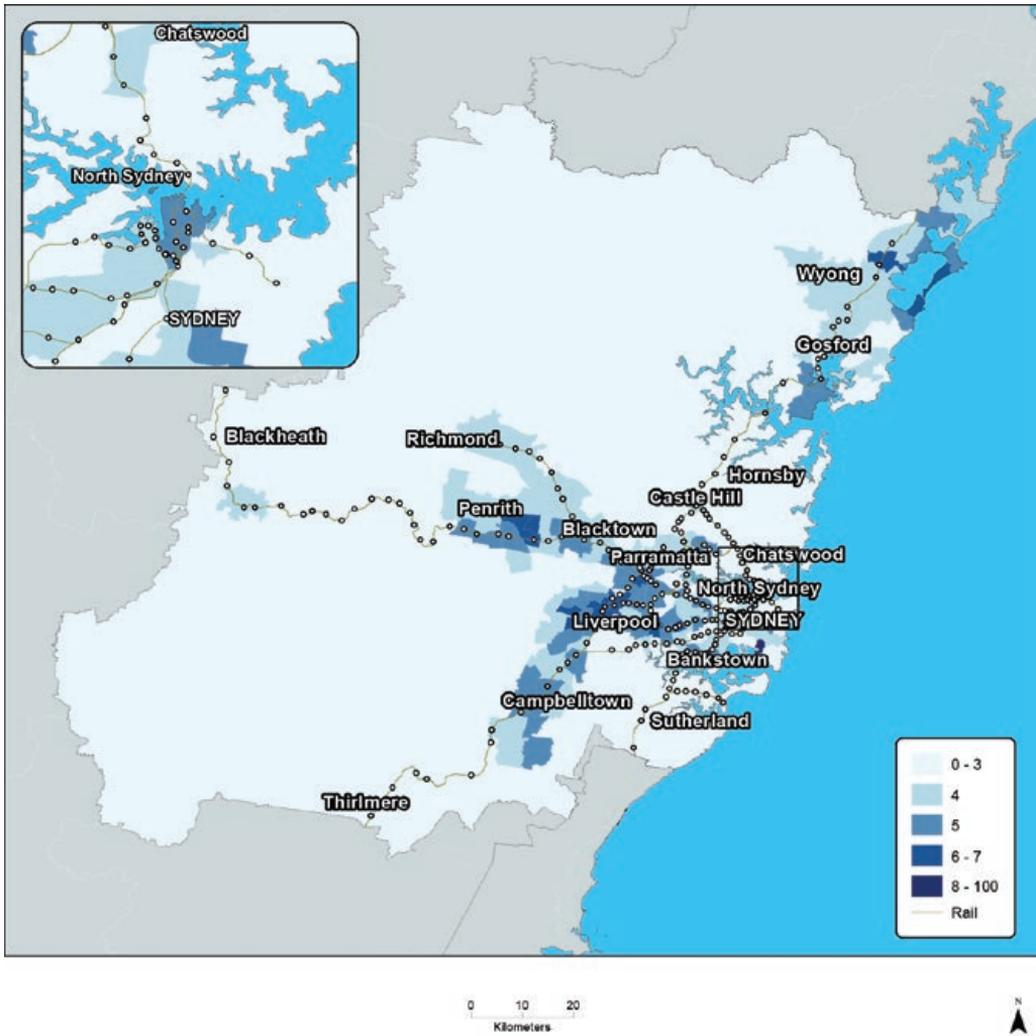
In 2001–11 Hobart's unemployment rate fell significantly from 9.2 per cent to 5.7 per cent, as shown in Map 5-4. Like Sydney, in relatively disadvantaged areas of Hobart – for example, the Bridgewater and Gagebrook Statistical Area 2 (SA2) to the north and the Rokeby and Clarendon Vale SA2 to the south-east – there were significant declines from 31.5 per cent to 14.6 per cent and from 17.4 per cent to 9.2 per cent respectively (ABS Quickstats). In the relatively affluent and centrally located Sandy Bay SA2 there was a small decrease from 6.5 to 6.2 over the same period (ABS Quickstats).

Map 5-4   Proportion of persons aged 15 to 74 years unemployed in Hobart, 2011
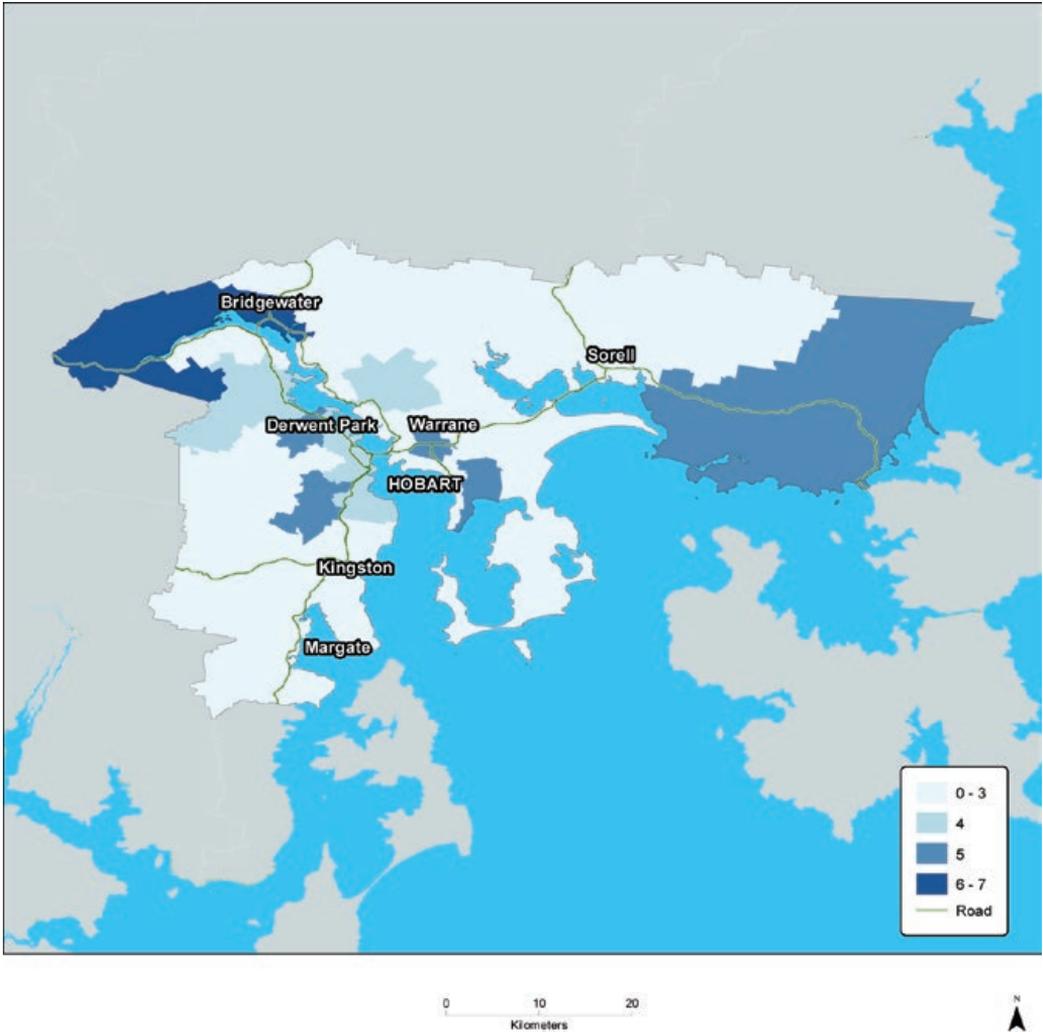
Despite positive growth in employment, Map 5-3 and Map 5-4 show areas with relatively persistent high unemployment levels. An examination of the employment and education mix of the areas mentioned above provides an insight into this issue.

Campbelltown and Liverpool both have approximately the same levels of full-time work (63 per cent) and part-time work (24 per cent) and the same number of people with tertiary education or higher (10 per cent). In both areas, people were mostly employed in clerical then administrative, technical and trades and professional occupations, which collectively make up approximately 48 per cent of the workforce.

The rate of full-time employment in North Sydney is proportionally higher at almost 72 per cent, while part-time employment is 20 per cent. A total of 25.4 per cent of people have a bachelor degree or higher and, perhaps crucially, people were most commonly employed as professionals (43.6 per cent) and managers (20.2 per cent), comprising almost 64 per cent of the workforce.

In Hobart, similar differences exist between the areas of relative advantage and those of relative disadvantage, but the quantum is greater. For example, in Bridgewater–Gagebrook less than two per cent of people have a bachelor degree or higher, compared to more than 44 per cent in the Sandy Bay SA.

A crucial similarity between the relative areas of advantage and disadvantage in the maps is their proximity to the CBD. While some areas like North Sydney and Sandy Bay have been areas of relative advantage since the 1960s, other inner city areas such as the inner west of Sydney which as recently as the 1990s were considered relatively disadvantaged with high unemployment rates, are now becoming relatively advantaged. The inner areas of many cities retain pockets of high unemployment. However, gentrification has produced notable shifts in the socio-demographic composition of centrally located neighbourhoods (disproportionate increases in professional workers, high income households, two-earner childless couples and the well-educated (Atkinson 2011). Such processes have caused unemployment rates to fall in these areas and evidence suggests unemployment rates may flatten over time as the workforce becomes more resilient to economic change.

Housing

Housing affordability

Housing affordability is a significant issue for new and existing households in Australia's major cities. Housing affordability is an individual's ability to pay for their housing. The ABS (2010a) measures housing affordability as a percentage of household spending. Affordability is low if 30 per cent or more of gross household income is spent on rent or mortgage payments. This definition is not uniform across all sectors when reporting on housing affordability.

The affordability of dwellings is influenced by a range of factors including interest rates, the price of homes and the level of household income (ABS 2010a). Also, the imputed value of higher income due to access to a wider base of well-paid jobs contributes significantly to what people can afford to pay or borrow. For renters, the affordability issue comes down to income-to-rental payment ratio, value for money, distance to employment and lifestyle preferences, each of which are largely dependent on how much renters earn, their household structure and their age.

State of Australian Cities 2012 examined housing price increases over the past two decades and the significant rises in the price of housing closer to city centres – a flow-on effect from the wider employment base and higher paying jobs becoming more concentrated in capital city CBDs. Housing markets in cities both exemplify and exacerbate socioeconomic inequalities in cities. Areas that are close to jobs, services and high amenity have higher house and land prices and attract higher income earning households. Lower income households are increasingly concentrated in locations with fewer services and less access to employment. This creates imbalances in equity and liveability.

Housing affordability in Australia's capital cities has been adversely affected by price increases, particularly over the past three decades. Given that real estate markets are affected by population growth, high levels of in-migration (people moving to the city), the growth of the mining sector and an already low supply of houses, there will continue to be strong demand for housing and, potentially, a smaller pool of affordable housing as competition becomes greater.

The 2013 Propell National Valuers' survey of the Australian housing market summarises house price data between 2012 and 2013 in capital cities (Propell National Valuers 2013). House prices in Darwin increased by 5.9 per cent to a median $579,500 between 2012 and 2013, while in Perth a 3.5 per cent increase saw the median house price rise to $470,000 over the same period. In Brisbane, growth in Queensland's mining areas is contributing to housing demand in the city. When combined with population growth, this places further pressure on house prices. Competition among buyers is high for the affordable housing that is available. The median price for a house in Brisbane rose to $428,000 in 2013.

In Sydney over the same period, house prices increased by 3.75 per cent, lifting the median price to $608,000.

Adelaide experienced a 1.9 per cent increase in house prices from 2012 to 2013, raising the median price to $411,000. In Melbourne the median house price rose 1.6 per cent to $445,000. Although this is a smaller increase than in Sydney, it will still have an effect on housing affordability.

As shown in Figure 5-4, each of these cities experienced different rates of household income growth between 2006 and 2011. Adelaide's average household income increased by almost 20 per cent, Melbourne's by about 23 per cent and Sydney's by almost 30 per cent.

Melbourne's housing affordability illustrates the significance of those households spending 30 per cent or more of their gross household income on mortgage payments (this is generally referred to as 'mortgage stress'). Real Estate Institute of Victoria's data (2013) illustrates some differences between suburbs in this regard. In the Melbourne LGA of Greater Dandenong in the south-east, 39.6 per cent of households were in mortgage stress compared with the inner east Melbourne LGA of Banyule, where 27.1 per cent of households were in mortgage stress.

Melbourne's housing affordability rates are similar to those in other capital cities in terms of the number of households experiencing mortgage stress and its unequal distribution. In addition to population and in-migration pressures, there is a growing demand for affordable housing from single-person or two-person households (the fastest-growing household types).

The lack of affordable housing choices in Australia's major cities is also likely to affect older people whose incomes often fall once they retire. Retirees who are renting may be forced to move further out to more affordable dwellings, while those looking to use the equity of their existing family home may need to downsize if they wish to move closer to the city. Increasing house prices benefit retirees who wish to move out of the city, as shown in Chapter 2 (Population and settlement).

Those on average or below average incomes who wish to buy an affordable detached dwelling may find that these dwelling have poorer access to jobs and public transport. Land and house packages on the periphery of cities can produce more affordable housing choices to ease the demand for growing families. However, they may have poor access to employment opportunities, particularly high-skill, high paid jobs. According to Rawnsley and Spiller (2012) between 1994 and 2000 the distance from the CBD to suburbs that are affordable for a household on average earnings is estimated to have increased from about 10 kilometres to about 24 kilometres. By 2009 this distance was almost 40 kilometres and there were no suburbs within 10 kilometres of the CBD that were affordable for households on an average income (Rawnsley and Spiller 2012, p. 151).

Attempts to improve housing affordability – for example, by relaxing minimum site area requirements for new dwellings and by increasing densities – have had some success. The next section examines the number of dwellings in Adelaide that are owned outright, those being purchased and those being rented. Adelaide is used as a case study because it clearly shows emerging patterns that are evident in other capital cities. While Adelaide is one of the smallest capital cities, it shares with the other capitals large journey to work distances, particularly in the south, and high concentrations of jobs in the CBD relative to the suburbs.

Dwellings owned outright

The sections below present examples of information that can be found in the *State of Australian Cities 2013* online maps for each major city. These maps can be viewed using the supplementary online map application.

Map 5-5 shows the proportion of Adelaide's dwellings owned outright by occupants. There are lower proportions of outright dwelling ownership in Adelaide's CBD and to the north of the city covering Elizabeth. The highest proportion of dwellings owned outright is on Torrens Island and Garden Island in Barker Inlet at Port Adelaide, although this is due to them being ancillary to industrial activity.

There are distinctly higher proportions of outright ownership around 10 to 20 kilometres from Adelaide CBD, notably the beachside suburbs of Brighton and West Lakes, as well as in the area running from the outer east of Adelaide down to the far south, taking in the Adelaide Hills and Mount Barker. Further south there is a significant number of large farming properties which explains the high proportion of outright ownership in that area. There is a lower proportion of home ownership in the band about five to 10 kilometres around the Adelaide CBD.

Map 5-5   Proportion of dwellings that are owned outright in Adelaide, 2011
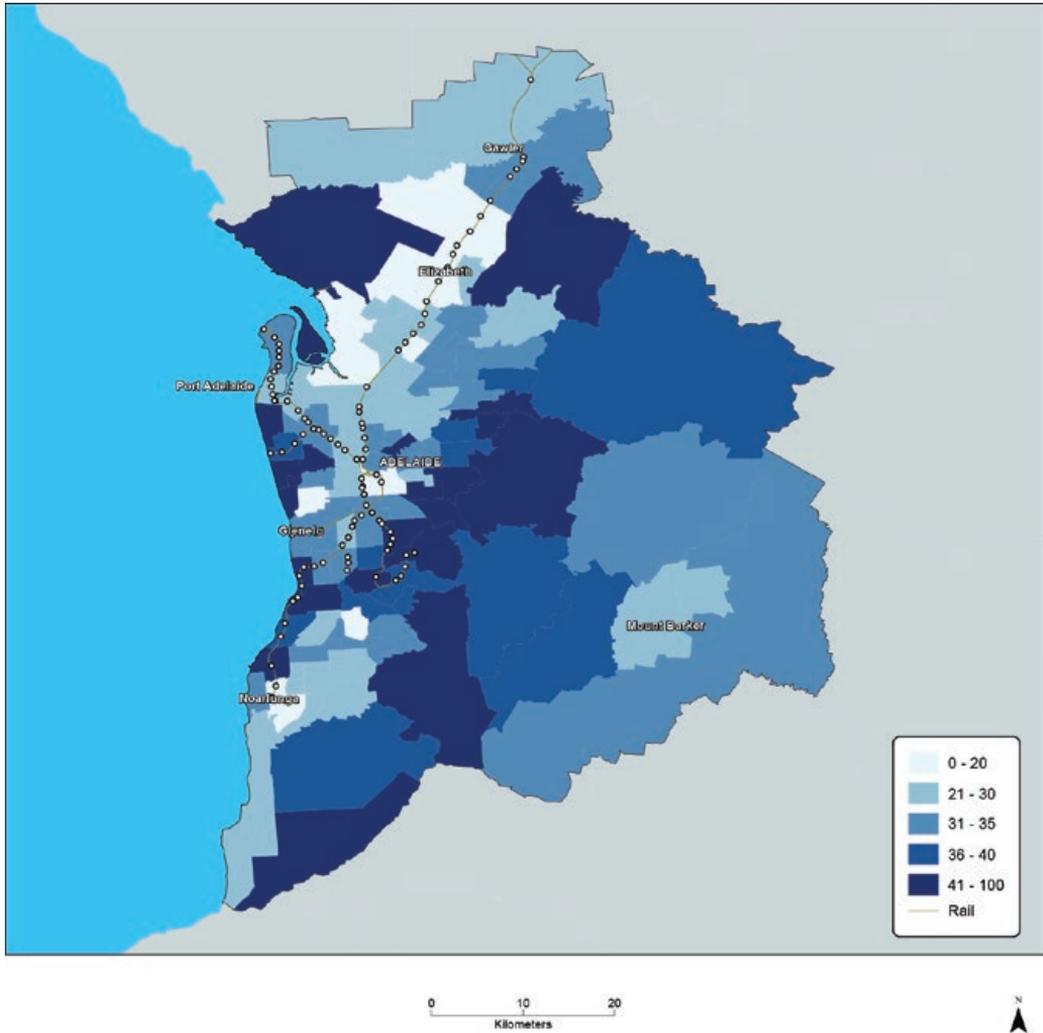
Mortgaged dwellings

The quality and location of a property are primary considerations for buyers. For example, homeowners may want to be able to walk to the shops or the nearest bus stop. They are not just buying a property, they are seeking the lifestyle that comes with it. For young professionals, direct access to the city could positively affect their work and social life. Families may prefer dwellings close to a school so that they can reduce commuting and increase family time.

Map 5-6 shows that the highest proportions of dwellings being purchased are in a wide semicircle from the north through the east to the south, ranging in distance from between 15 and 40 kilometres from the city. In the north, Mawson Lakes and Salisbury North have the greatest proportions of dwellings being purchased. The expansion of the Gawler township in the north and nearby greenfield developments at Roseworthy have resulted in an increase in the proportion of dwellings being purchased in those areas. To the south of the CBD, the

growth in the proportion of dwellings being purchased has been strong in the Mitcham LGA around the new greenfield development at Blackwood Park in the Craigburn Farm estate.

Map 5-6 shows that some areas of Adelaide have very low proportions of dwellings being purchased. Some of those areas overlap with areas with low proportions of dwellings owned outright, such as to the north of the city, around parts of Elizabeth and in the city itself. Some areas with high proportions of outright ownership, such as Glenelg, show low proportions of dwellings being purchased. In some areas on the map – for example, around Noarlunga – it can be seen that low proportions of dwellings are being purchased.

Map 5-6   Proportion of dwellings that are being purchased in Adelaide, 2011
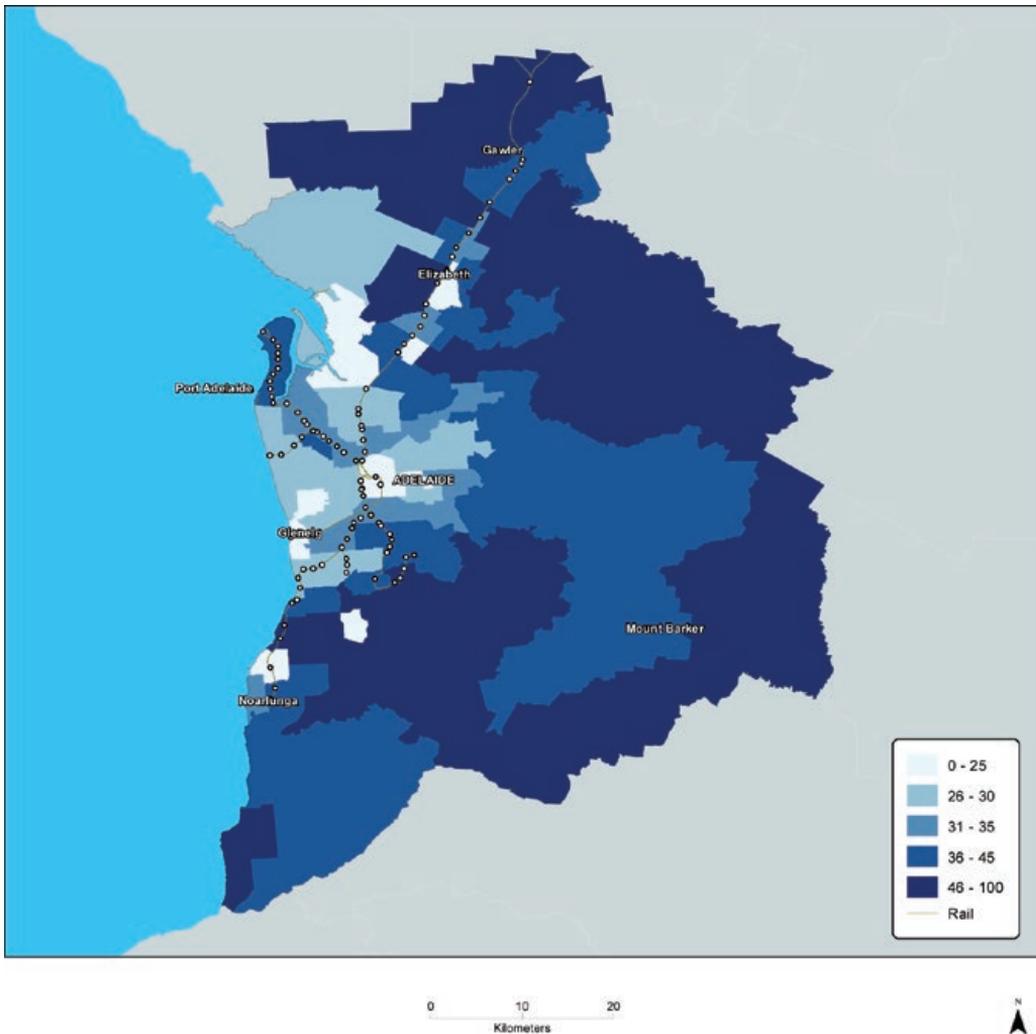
Rented dwellings

Data on rental dwellings is only available for Australia's capital cities. The number of properties in capital cities that are rented has increased for a number of reasons. The cost of living combined with rising house costs has reduced buyer activity while the increase in single-person households and the increased number of new inner city apartments, particularly in Melbourne, Sydney, Brisbane and Adelaide, have contributed to this trend. Rental vacancies may well be starting to rise, with the national vacancy rate being 0.2 per cent higher in 2013 than in 2012 (SQM Research 2013).

In the capital cities, vacancy rates currently range between less than one per cent in Perth and 2.7 per cent in Melbourne. The national average for vacancy rates is 1.9 per cent. The Real Estate Institute of Australia (REIA) collects information on the proportion of rental properties that are vacant in capital cities. It defines 'vacancy rate' as the proportion of habitable rental premises that are vacant. Melbourne was the only capital city where vacancy rates have remained static between 2012 and 2013. Hobart experienced the largest fall in vacancy rates between 2012 and 2013 of 0.3 per cent (from 2.4 per cent to 2.1 per cent). In Adelaide, the rate fell from 1.4 per cent to 1.3 per cent. There was an increase in vacancy rates in all other capitals. The biggest increase was in Canberra (0.7 per cent), followed by Darwin (0.5 per cent), Perth (0.4 per cent), Sydney (0.2 per cent) and Brisbane (0.1 per cent).

Map 5-7 shows that the proportion of Adelaide's rented dwellings are more tightly clustered around the CBD than dwellings owned outright or under purchase. The highest proportion of rented dwellings in inner Adelaide is in the inner ring LGAs of West Torrens (including the suburbs of Mile End, Thebarton and Underdale) and in the eastern LGA of Norwood, Payneham and St Peters (including the suburbs of Kent Town, Norwood, Kensington and Stepney). The two other areas of highest proportions of rented dwellings are in Elizabeth to the north and Noarlunga in the south, also areas with far fewer dwellings owned outright or being purchased.

Albury-Wodonga.
Image courtesy of Daayna Marsh

Map 5-7   Proportion of dwellings that are rented in Adelaide, 2011
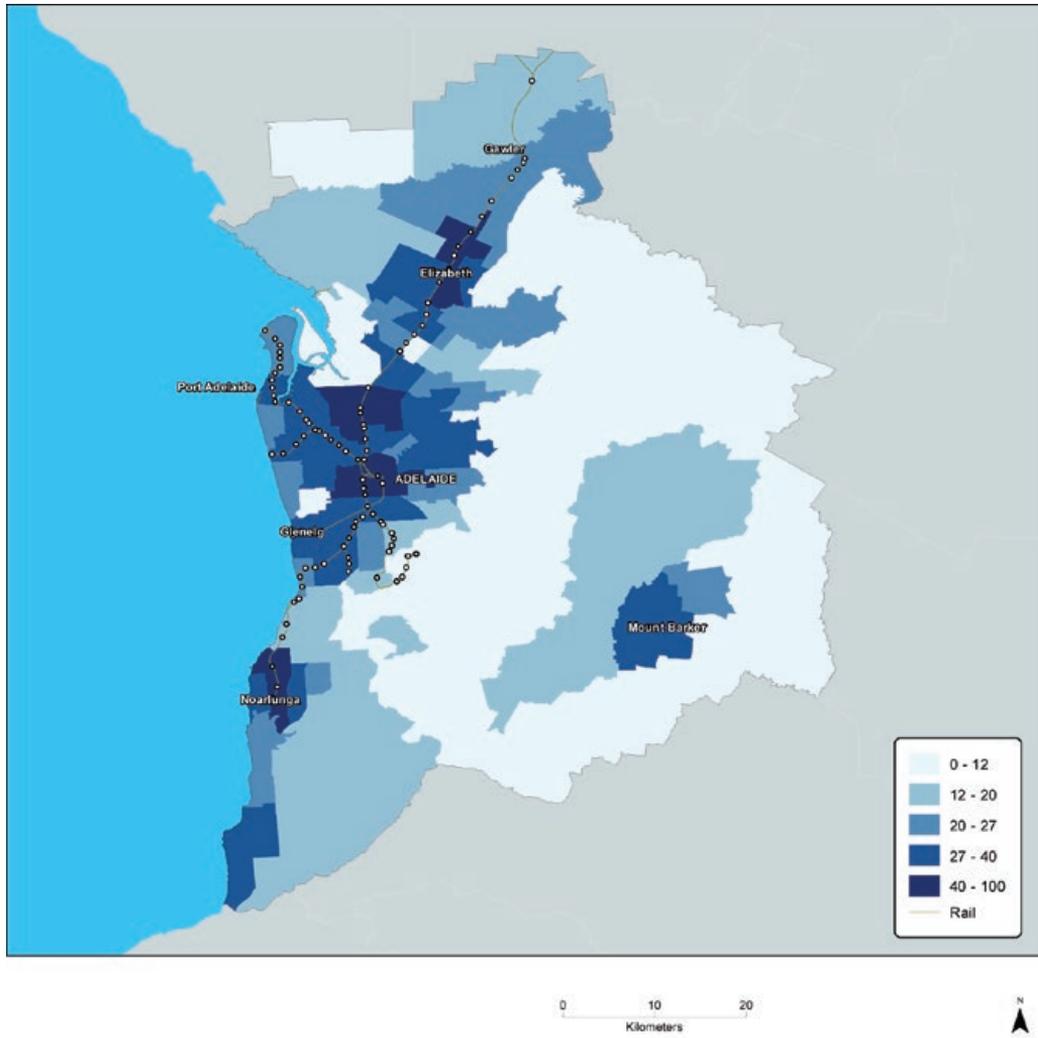
Livable Housing Australia

Livable Housing Australia (LHA) – a partnership between community and consumer groups, government and industry – promotes safer, more comfortable and more accessible homes for all Australians at all stages of life. LHA advocates the mainstream, voluntary adoption of its Livable housing design guidelines, which use three levels of performance – silver, gold and platinum – ranging from basic through to those homes that comply with 16 elements to achieve the top platinum rating. LHA's vision is for all new houses in Australia to achieve silver level certification by 2020.

The first project to be built to platinum level was Cootharinga, North Queensland's supported housing project in Townsville. Cootharinga supports and houses people with disabilities and has done so for more than 60 years. It has facilities in Townsville, Cairns, Mackay and regions in between.

The Cootharinga project's vision was for two homes, built with funding from the Commonwealth Government's Supported Accommodation Innovation Fund (SAIF), to be 'smart, green and accessible'. The houses are situated within a residential area with access to public amenities and resources. In appearance and design the houses are similar to other homes in the neighbourhood, with modifications designed to meet different needs.

Cootharinga liveable housing, Townsville.
Image courtesy of Livable Housing Australia

The pavilion design consists of two homes, both with two bedrooms, as well as a self-contained staff sleepover dwelling with a single bedroom. The need for steps and ramps has been eliminated through careful design, and equal access to all areas of the building and site has been provided. Wide doors (970 millimetres) allow for mobility. Walls are reinforced, which allows grab rails to be fitted.

Industry has embraced the guidelines as a methodology for measuring the design features of a home. Major developer Lend Lease has recognised that liveability is an important contributor to a resident's ongoing comfort and enjoyment of their home within a retirement village and is aiming to achieve the first certification for its new development in Canberra. Isabella Gardens will consist of 122 independent living villas with two- and three-bedroom options and is aiming for gold certification. Lend Lease recognises that 'liveable housing design is key to providing our customers with homes that are adaptable to their future needs'.

The designs provide continuous, step-free pathways from the front boundary to the front door. A wide, set-back driveway gives residents and their visitors space to park and open

car doors. The homes are designed for residents to age in place and are accessible for those with reduced mobility. Slip-resistant tiles in wet areas reduce the risk of falls, while switches, powerpoints, taps and doorhandles are easy to use. Single-storey designs, with wide internal doorways, corridors and spacious kitchens, laundries, bedrooms and living spaces, make the homes liveable.

For more information see **www.livablehousingaustralia.org.au**.

There is a relationship between housing tenure type, age group and the decision people make to age in place or move elsewhere (Olsberg and Winters 2005). Many older private renters in particular fear that they may be forced to move when they grow older because of financial difficulties (Olsberg and Winters 2005). Housing type can influence whether people can age in place. People living in flats, particularly public housing flats, are more likely to move into residential care when they are older (Bridge et al. 2008).

Housing and social inclusion

Housing tenure is related to social inclusion. Social exclusion arises when individuals are prevented from fully participating in society due to multiple, intersecting problems such as poor health, unemployment and inadequate education. Stone et al. (2013) investigated the nature of the housing experience among socially included and excluded households. They found that 80 per cent of those in public housing are socially excluded households. Perhaps surprisingly, roughly equal proportions of outright owners and private renters (41 and 39 per cent respectively) could be considered to be socially excluded, followed by 16 per cent of purchasing households. Factors contributing to social exclusion among outright owners were more often age and life-stage related whereas social exclusion among private renters was more likely to be associated with limited income and education levels.

The impact that housing has on social inclusion and disadvantage will vary according to household type. International literature suggests that the housing circumstances in which children are raised significantly affects their development and wellbeing and may be an important part of the transmission of intergenerational and neighbourhood disadvantage (Dockery et al. 2013). Low-income households, (including those renting) whose housing costs take up more than 30 per cent of household income are regarded as experiencing housing stress. Ongoing housing stress is strongly and significantly related to social exclusion for both purchaser owners and private renters (Stone et al. 2013). Figure 5-6 shows the proportions of low-income households in rental and mortgage stress across the capital cities. In 2011 Hobart had the highest proportion of low-income renters in rental stress but, conversely, the smallest proportion of households in mortgage stress. Sydney and Melbourne had the highest rates of mortgage stress among low income households in the capital cities.

Figure 5-6   Low-income households in housing stress in capital cities, 2011
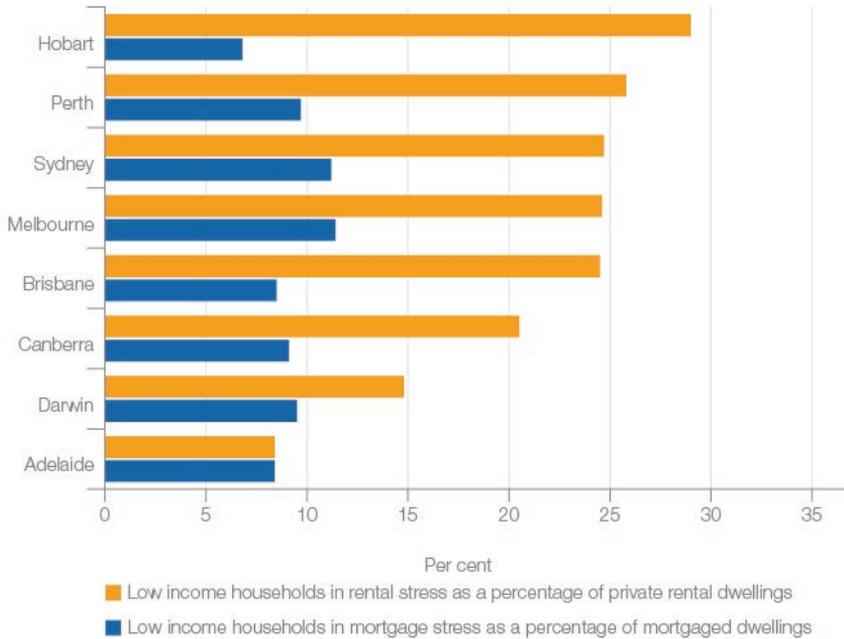
Source: PHIDU 2013a from ABS Census 2011

Homelessness

Homelessness is a complex social challenge and an extreme form of housing insecurity, social disadvantage and social exclusion.

The ABS defines a person as being homeless if they do not have suitable accommodation alternatives and their current living arrangement:

- is in a dwelling that is inadequate
- has no tenure or has initial tenure that is short and not extendable
- does not allow them to have control of, and access to, space for social relations (2012b).

Homelessness may be the cause of, or the result of, disadvantage and social exclusion. The disadvantage and social exclusion may persist even after a person is no longer homeless. The 2010 ABS General Social Survey (ABS 2011b) found that there were 2.1 million adults (13 per cent) in Australia who had experienced a period without a permanent place to live and were classified as having experienced homelessness at some time in their lives. Common reasons for homelessness included family, friend or relationship problems (50 per cent), tight housing or rental markets (23 per cent) and financial problems (22 per cent).

Homelessness is not just an individual or social issue; it also has implications for the economy. A recent national survey of 190 case-managed clients across four States found that people at risk of homelessness are heavy users of health, justice and welfare services (Zaretsky et al. 2013). They are also more likely to have children placed in out-of-home care and to be evicted from a public tenancy. Compared to the total population, the cost of health services to people experiencing homelessness was estimated to be between

$22,824 per year higher for single men and $4,254 per year higher for tenancy support clients. This represents both a cost to government and a potential cost saving to government where support is provided to prevent homelessness and its recurrence.

Although it is not possible to count the number of people who are homeless directly from a Census question, the ABS uses Census data to derive estimates. Using the ABS estimates, the COAG Reform Council found that from 2006 to 2011 the number of 'rough sleepers' fell six per cent from 7,247 to 6,813 but overall homelessness went up by 17 per cent due to increases in severe crowding (that is, usual residents of dwellings which needed four or more extra bedrooms to accommodate them adequately) and temporary accommodation (41,390 people were living in severely crowded dwellings, 9,859 more than in 2006). The COAG Reform Council notes that most of these people were in either major cities, particularly Sydney and Melbourne or remote Indigenous communities (COAG Reform Council 2013, p. 6).

The estimated numbers of homeless people in each of the major cities are shown in Figure 5-7. These numbers include people living in improvised dwellings, tents or sleeping out, people in supported accommodation for the homeless, people staying temporarily in other households, boarding houses or other temporary lodging and people living in 'severely' crowded dwellings. The estimates do not include people in other marginalised housing such as caravan parks.

Figure 5-7   Estimated number of homeless persons in major cities, 2011
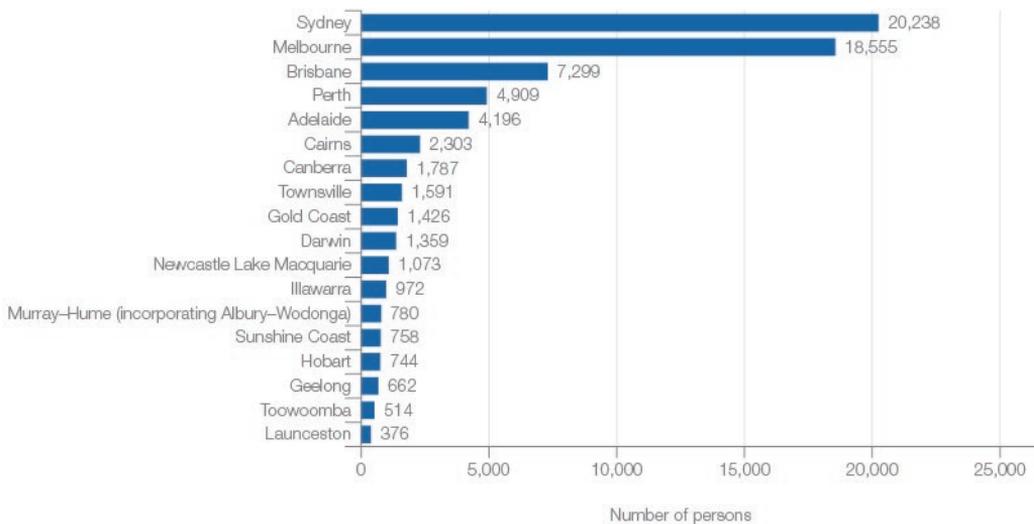
Note: Estimates relate to Greater Capital City Statistical areas (for capital cities) and Statistical Area Level 4 boundaries (for regional cities). Albury and Wodonga are represented by the larger regions of Murray Statistical Area Level 4 and Hume Statistical Area Level 4 respectively.

Source: ABS 2012b

Homelessness is largely concentrated in the capital cities, as shown in Figure 5-8. In Queensland in 2011, 43.4 per cent of the population and 70 per cent of homeless population lived in Brisbane. In Western Australia the distribution of homelessness between Perth, and the rest of the State was more even (51 per cent and 49 per cent respectively). By contrast, in the Northern Territory 91 per cent of the homeless population and people at risk of homelessness lived outside Darwin.

Figure 5-8   Distribution of homelessness between major cities and rest of State/Territory, 2011
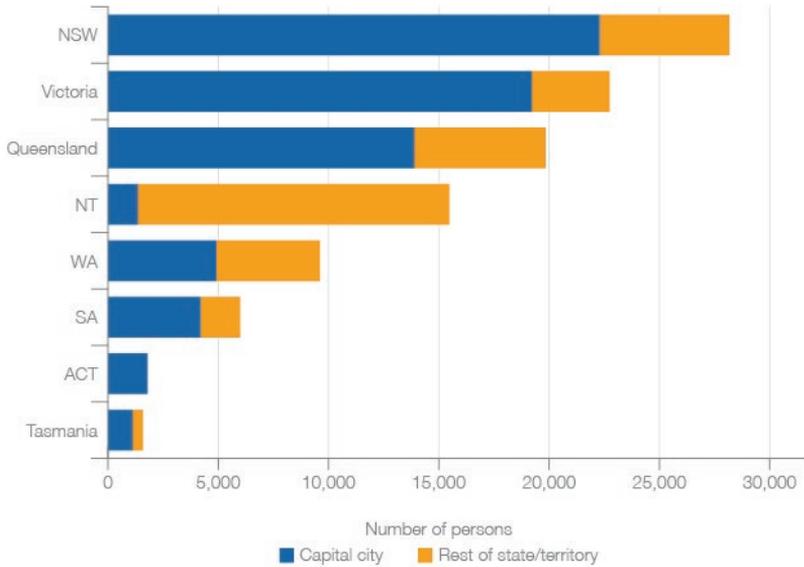
Source: ABS 2012b

In many cities, homelessness is most visible in the inner city areas. The estimates suggest that although the largest proportions of homeless people are indeed found in the inner areas, there were also substantial numbers and concentrations of homeless people in other centres within Australia's four largest cities (Table 5-3).

Table 5-3   Distribution of homelessness in Sydney, Melbourne, Brisbane and
                 Perth, 2011

Greater capital city statistical area	Statistical Area Level 4	Estimated number of homeless people	Homeless as a percentage of homeless population in selected capital cities
Sydney	City and Inner South	4,473	22.1
	Inner South West	2,253	11.1
	Parramatta	2,137	10.6
	Sydney South West	2,103	10.4
Melbourne	Inner	4,927	26.6
	South East	3,511	18.9
	West	2,782	15.0
Brisbane	Inner City	1,943	26.6
	South	1,219	18.7
	Ipswich	1,157	15.9
	Logan Beaudesert	1,066	14.6
Perth	Inner	986	20.0
	South East	1,286	26.0
	South West	1,035	21.0

Source: ABS 2012b

Towards a better understanding of homelessness: Journeys Home – a longitudinal study of factors affecting housing stability

In 2008 the Australian Government released a white paper on homelessness, The Road Home, which identified as a key concern a lack of research and data on homelessness. The Australian Government subsequently invested $11.4 million over four years towards a National Homelessness Research Agenda to develop a better understanding of all aspects of homelessness. This has recently been extended to 2013–14.

The research agenda includes the first large-scale longitudinal survey of factors affecting housing stability in Australia, known as Journeys Home, run by the Melbourne Institute of Applied Economic and Social Research at the University of Melbourne. The Journeys Home survey follows the lives of more than 1,600 Australians who are homeless or at risk of homelessness. It will provide information about the living and housing challenges that people may be facing (Chigavazira et al. 2013).

The survey and ongoing research will help to establish a big picture of the demographics of homelessness and trends in housing instability and improve understanding of what differentiates people who have been able to move out of homelessness from those who have not.

For more information see http://melbourneinstitute.com/journeys_home.

Ageing in cities

Three years ago, the first of the 'baby boomers' – those born in the two decades following World War II – turned 65. The economic and social effect of this is now starting to be felt as baby boomers start to move out of the workforce and pursue their preferences for retirement. These preferences will drive health, housing and other outcomes for the ageing population and there will be differences in the composition of ageing populations within and between major cities and regions. For example, some regional areas attract retirees and are experiencing more rapid ageing of their populations. In others, the population will age as a result of young adults leaving to seek opportunities in the major cities (Hillman 2007).

The ABS (2008) estimates that the median age of Australians will increase from 37 years in 2008 to between 42 and 45 years in 2056. The proportion of people over 65 years of age is forecast to almost double over the same period from 13 per cent to between 23 and 25 per cent.

Figure 5-9 shows projected increases in the proportion of the population aged over 65 in the capital cities over the next half century (ABS 2008). All capital cities are predicted to experience significant growth in the share of this age group, which in some cases may more than double. Of the capital cities, Hobart is forecast to move ahead of Adelaide to have the largest share of those aged 65 and over in 2056 (between 25 and 28 per cent of the city's population), and Darwin is predicted to continue to have the lowest proportion of older people (between 14 and 15 per cent).

Figure 5-9   Proportion of population aged 65 and over in capital cities, 2008 and 2056 (low and high population ageing projections)
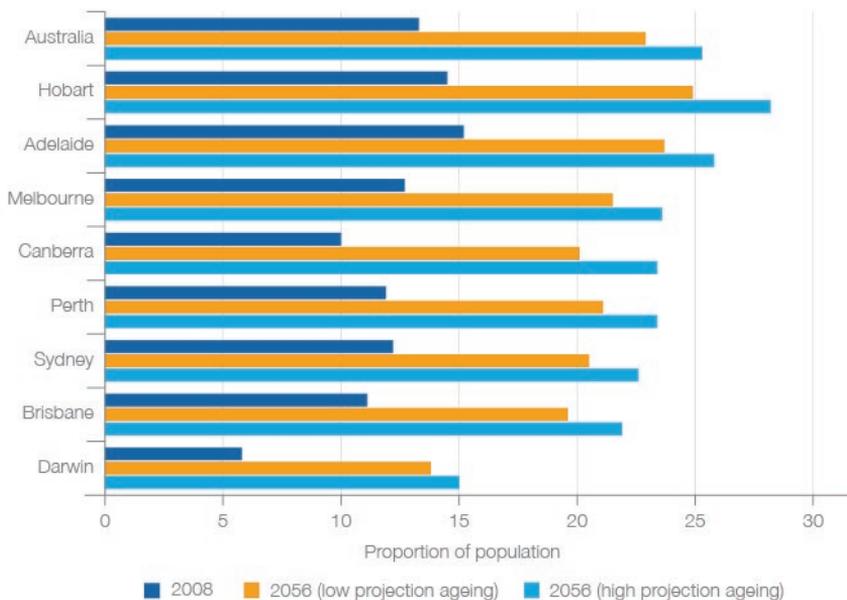
Source: ABS 2008

Older Australians generally rate themselves as having poorer health than younger people and are more likely to require health services (ABS 2012c). An ageing population will thus place growing pressures on health services and rising health care costs which the Australian Government's *2010 Intergenerational Report* predicts will account for two-thirds of the total increase in government spending by 2050 (Treasury 2010).

As the population ages, the suitability and affordability of housing for older people will become increasingly important for governments. While there are substantial economic and social benefits of older people living in their own homes into later life (Bridge et al. 2008), the degree to which 'ageing in place' is an option for older people depends on the suitability of the design features of their dwelling and the neighbourhood, as well as the availability of services. LHA's *Livable Housing Design Guidelines* is an attempt to encourage and mainstream the provision of safer, more comfortable and accessible homes for Australians at all stages of life.

Map 5-8 uses Brisbane as a case study for showing the change in proportion of those aged 65 and over in a major city between 2001 and 2011, providing an insight into urban retirement settlement patterns. It shows a pronounced movement of older people away from inner city suburbs to smaller townships in coastal and semi-rural areas. These areas, including Moreton Bay to the north, Lockyer Valley and Somerset to the west, Logan to the south and Redland to the east, may be in demand among older people because they offer cheaper housing and convenient access to the city and its health care facilities and social networks.

Map 5-8 also shows that there has been strong growth in the proportion of the population aged 65 and over in some middle suburban areas of Brisbane. This is possibly a result of baby boomers choosing to age in place in the established family home, close to health care and other services.

City Markets, Cairns.
Image courtesy of Chay Garde

Map 5-8   Change in the proportion of the population aged 65 years and over in Brisbane, 2001–11
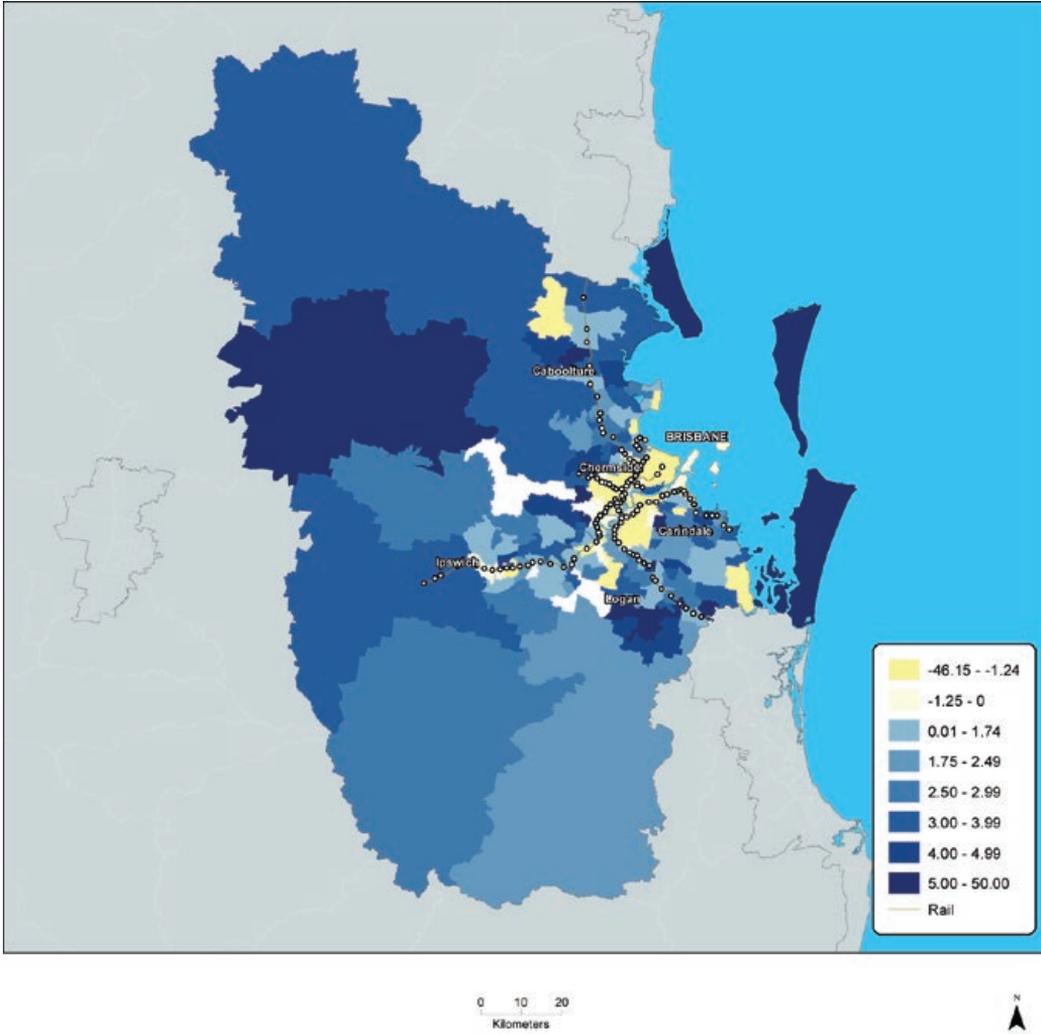
Changes in the proportion of the population aged 65 and over between 2001 and 2011 in Launceston suggest that smaller major cities are experiencing similar patterns of outward migration by older people, with retirees seeking out coastal and semi-rural areas in proximity to urban centres. Map 5-9 reveals that while the proportion of the inner city population aged 65 and over in Launceston declined during this period, regional areas along the Tamar Valley and south of the city experienced strong growth in the proportion of older people.

Map 5-9   Change in the proportion of the population aged 65 years and over in Launceston, 2001–11
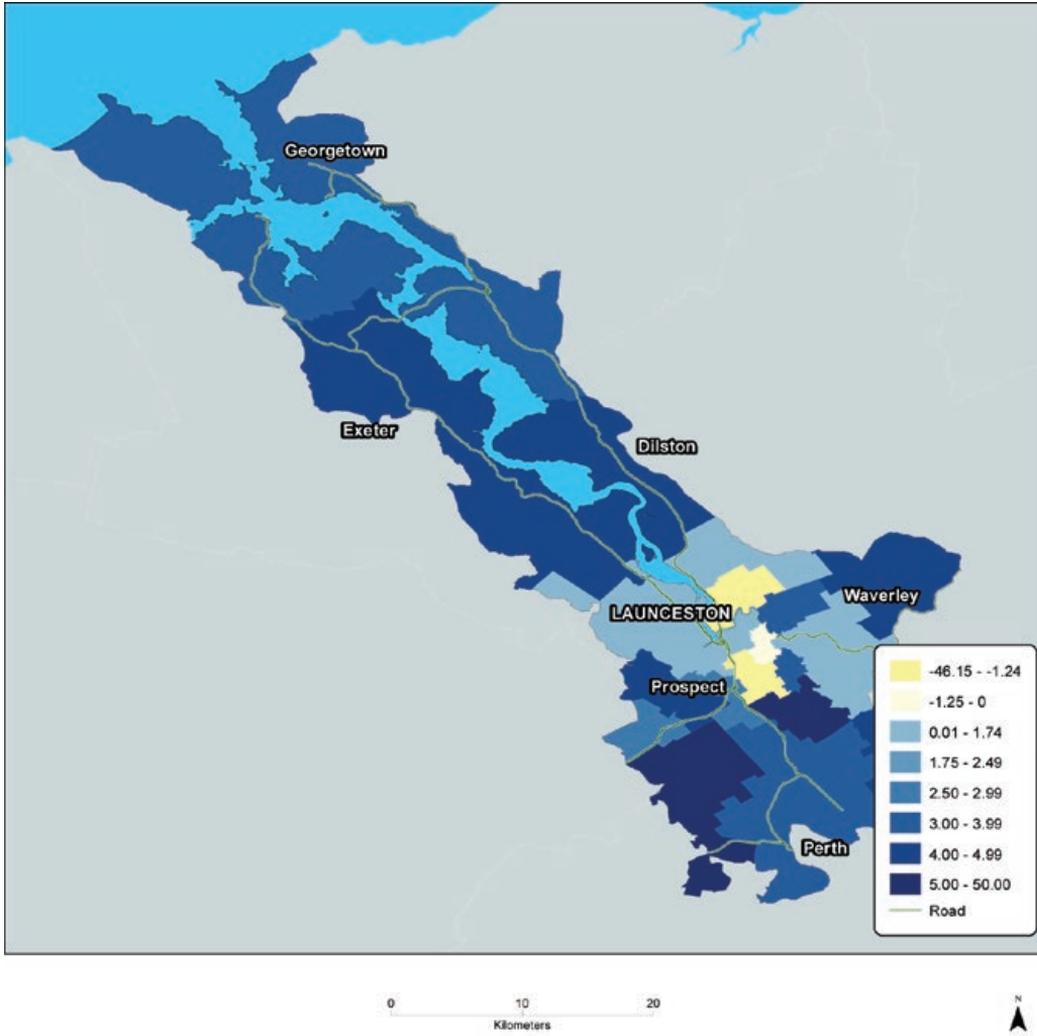
Given the health care needs of older people, outward migration of retirees from established urban areas could have substantial implications for government spending, as more resources may need to be diverted to smaller towns to meet the needs of their growing populations of older people.

Active travel

The term 'active travel' refers to walking and cycling as a means of transport. Active travel can improve liveability in cities because of there are fewer cars crowding the roads and the exercise gained brings health benefits. More people choosing to walk or cycle also improves opportunities for social interaction in cities (Giles-Corti et al. 2010).

Who walks and cycles?

For some people, walking and cycling offer sustainable alternatives to cars and mass transit for everyday journeys, particularly short trips to and from shops, schools, universities, workplaces and mass transit. Rates of active travel are influenced by a number of factors, including personal characteristics such as age, gender and location. In 2011, 5.1 per cent of all commuting trips in the major cities were undertaken by walking (3.8 per cent) or cycling (1.3 per cent), up from 4.6 per cent of trips in 2001 but down slightly from 5.2 per cent in 2006 (BITRE 2013a).

Figure 5-10 shows that walking was the dominant active travel mode for commuting trips in all major cities in 2011 (BITRE 2013a).

Convention Centre, Wavebeach, Darwin.
Image courtesy of Sara Stace

Figure 5-10   Journey to work mode share of walking and cycling, 2001, 2006 and 2011
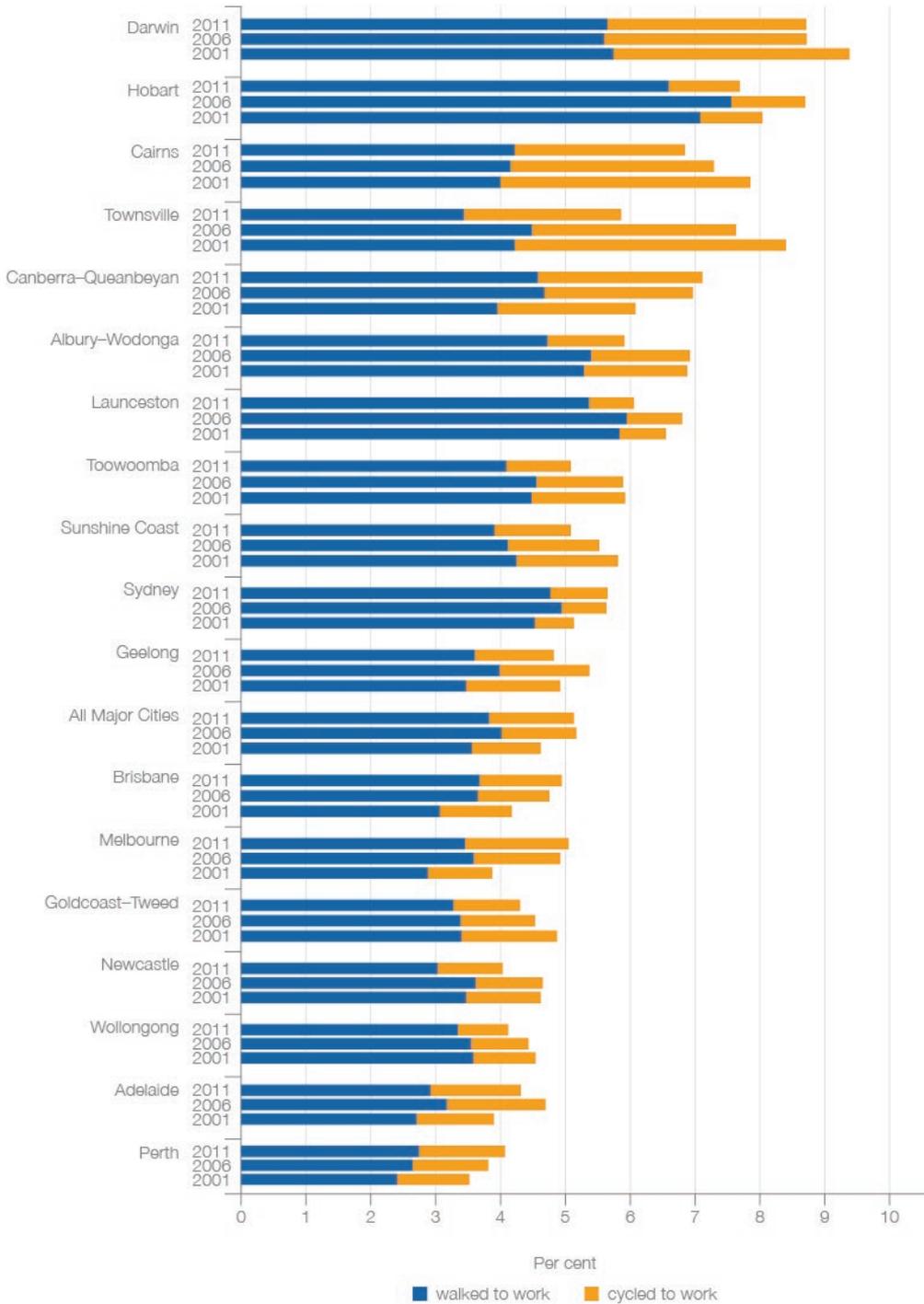
Note: For each city, the three columns represent data for 2001, 2006 and 2011.

Source: BITRE 2013a (unpublished) analysis of ABS Census of Population and Housing 2001, 2006 and 2011

The share of trips to work made on foot was highest in Hobart (6.6 per cent of all commuting trips in 2011), Darwin (5.7 per cent) and Launceston (5.4 per cent). Rates of cycling were highest in Darwin (3.1 per cent), Cairns (2.6 per cent), Canberra (2.5 per cent) and Townsville (2.4 per cent). Figure 5-10 also shows that the combined rate of walking and cycling tends to be higher in the smaller cities than in the larger ones. In the 2011 Census, the smallest capital cities – Canberra (7.1 per cent), Hobart (7.7 per cent) and Darwin (8.7 per cent) – as well as Townsville (5.9 per cent), Cairns (6.9 per cent), Launceston (6.1 per cent) and Albury-Wodonga (5.9 per cent) recorded the highest proportion of walking and cycling for journeys to work. This may reflect the fact that jobs in smaller cities are more likely to be within walking or cycling distance for a larger share of the population.

Of the five Australian cities with over a million people, only Sydney had a combined proportion of active travel to work (5.7 per cent) above the average for all 18 major cities (5.3 per cent) in the 2011 Census. Melbourne, Brisbane, Adelaide and Perth had higher rates of cycling than Sydney but much lower rates of walking.

The major cities with the highest rates of active travel for journeys to work were found in both warmer cities (Darwin, Cairns and Townsville) and cooler cities (Hobart, Canberra, Launceston and Albury-Wodonga) , showing that above-average levels of active travel can occur regardless of weather.

The capital cities recorded low increases in the overall active travel mode share between 2001 and 2011 with the exception of Hobart where active travel mode share decreased, and Darwin where there was no change. Analysis of ABS Census data by the Bureau of Infrastructure, Transport and Regional Economics found between 2001 and 2011, the six largest capital cities shared a common trend of increased active travel and mass transit use and reduced private vehicle use, while the smaller major cities all experienced reduced active travel use and (apart from Geelong) increased private vehicle use (BITRE forthcoming).

Figures 5-11 and 5-12 show the walking and cycling to work patterns in the eight capital cities since 1976. The data reveals a steady decline in rates of walking across all capital cities between 1976 and 1996, followed by increases between 1996 and 2006 and then a slight decline in the mode share of walking between 2006 and 2011. Rates of cycling across the capital cities dipped slightly between 1991 and 2001 before growing since 2001 to reach levels higher than the previous peak in 1981.

Figure 5-11   Walking trips as a proportion of all trips to work, capital cities (except Darwin), 1976–2011
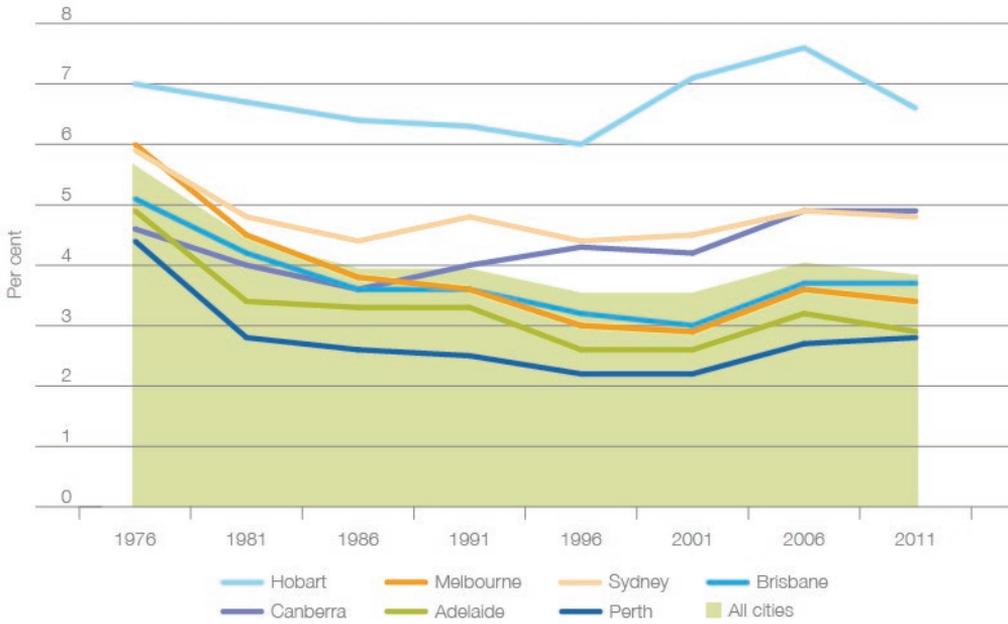
Source: Mees and Groenhart 2012

Figure 5-12   Cycling trips as a proportion of all trips to work, capital cities (except Darwin), 1976–2011
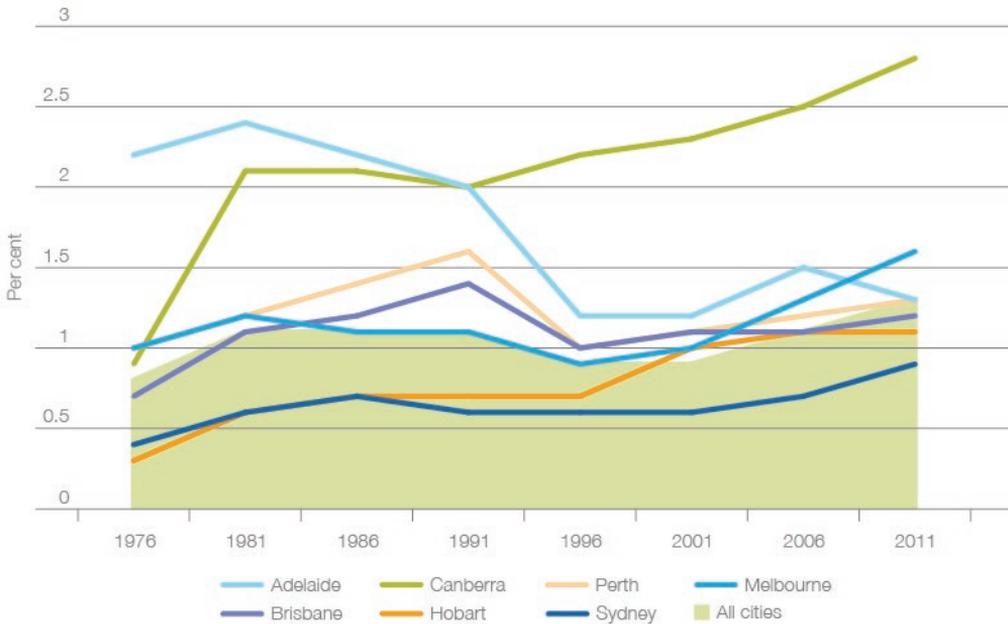
Source: Mees and Groenhart 2012

Despite the slight decline in active travel mode share for journeys to work between 2006 and 2011, the total number of these trips continued to grow. Approximately 304,000 walking and cycling trips to work were made in the major cities each day in 2006; this grew to almost 339,000 by 2011 (BITRE 2013a). The growth in the number of walking and cycling trips in the absence of growth in active travel mode share can be attributed to population growth during this period and presumably indicates growing pressure on existing pedestrian and cycling infrastructure. In Sydney, for example, a 0.1 percentage point increase in the mode share of active travel between 2006 and 2011 (from 5.6 to 5.7 per cent of all commuting trips) translated to an 11 per cent increase in the number of active travel trips to work in the same period. More than 100,000 trips to work were undertaken on foot or by bicycle in Sydney each day in 2011, up from about 90,000 in 2006.

Across all 18 major cities, the mode share of active travel increased slightly between 2001 and 2006 before declining marginally between 2006 and 2011. Between 2001 and 2011, the share of journeys to work made on foot or by bicycle in most non-capital major cities declined, with the largest falls recorded in the Queensland cities of Townsville, Toowoomba, Cairns and the Sunshine Coast. Within cities, rates of walking and cycling can vary greatly. Mees and Groenhart (2012) have suggested that the growth in rates of walking and cycling in the capital cities since the mid-1990s has been fuelled by strong population growth in inner city areas, typically characterised by good walkability and proximity to a variety of destinations including employment, schools, shops and other services.

Figures 5-13 and 5-14 show the change in walking and cycling mode share between 2001 and 2011 for Sydney, Melbourne, Brisbane and Perth by urban sector, based on distance from the city centre. In each of the cities, relatively large increases in walking and cycling mode share in inner areas were offset by marginal increases in the middle suburbs (and a small decrease in walking mode share in Sydney), while the outer suburbs experienced little change in or declining rates of walking and cycling.

Figure 5-13   Change in walking to work mode share by sector in selected major cities, 2001–11
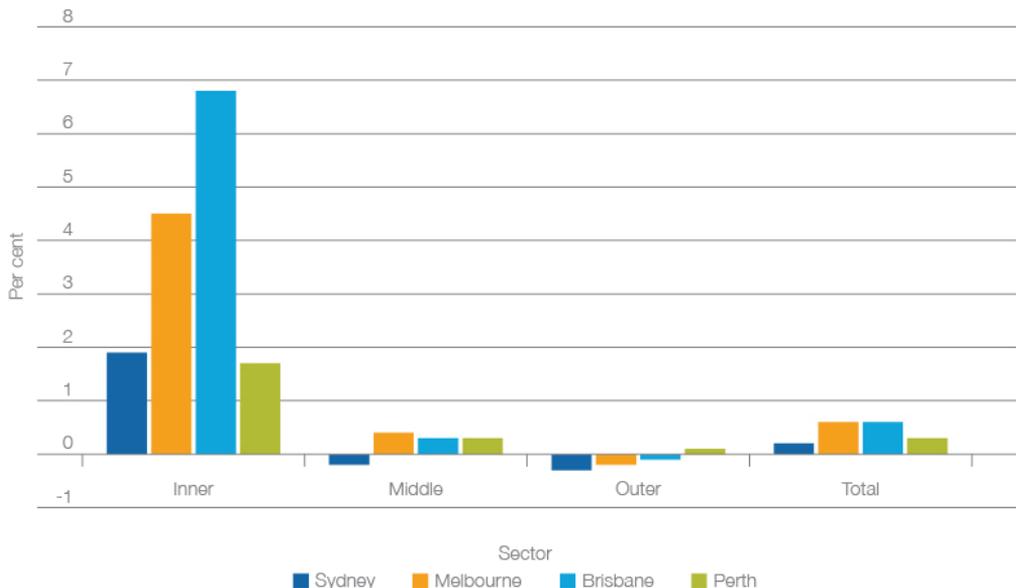
Source: BITRE 2013a analysis of ABS Census of Population and Housing 2001 and 2011

Figure 5-14   Change in cycling to work mode share by sector in selected capital
                   cities, 2001–11
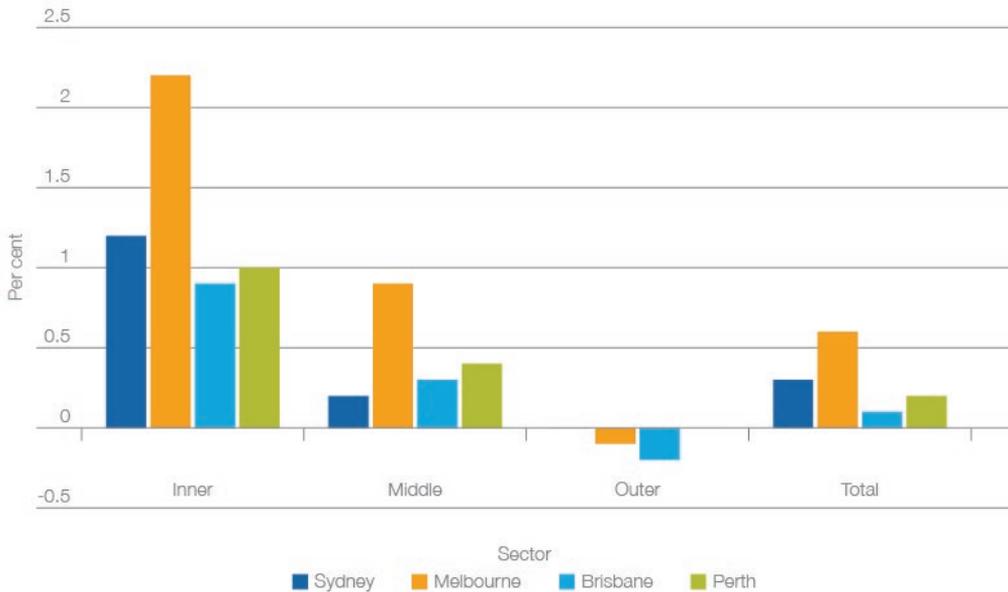
Source: BITRE 2013a analysis of ABS Census of Population and Housing 2001 and 2011

Health benefits from increasing active travel

Planning, transport and urban design policies affect active travel behaviour. They influence the location and proximity of mass transit, green space and local amenities. The design of neighbourhoods and streets can do a lot to encourage walking and cycling (NSW Centre for Epidemiology and Research 2010).

Australia's transport and health organisations have recognised that physical inactivity is a major driver of the increase in obesity (Moving People 2030 Taskforce 2013, p. 106). The rate of overweight and obese Australians has grown from 56 per cent in 1995 to 63 per cent currently. This includes three in four Australians aged between 65 and 74 (ABS 2012c).

Walking and cycling for transport purposes can provide important health benefits by building adequate levels of physical activity (Giles-Corti et al. 2010) into everyday routines. Health guidelines for Australian adults recommend a minimum of 30 minutes of moderate-intensity exercise daily to help prevent heart disease, stroke, diabetes and some cancers, as well as reduce the risk of injury and promote mental wellbeing (Department of Health and Ageing 2005). Walking trips undertaken as part of a mass transit trip – for example, walking to the local train station or bus stop – can result in significant increases in physical activity and improved health (Rissel et al. 2012).

In Australia, little research has been undertaken to understand the wider impacts, costs and benefits – such as health benefits – that could come from improving urban infrastructure to build in more walking and cycling opportunities.. The World Health Organization (WHO) has developed a possible tool to measure the health impacts of such investment, which has recently been used in Auckland, New Zealand (see feature box below).

Case study: Health economic assessment tool (HEAT) for cycling and walking

The health economic assessment tool (HEAT) is an online resource to estimate the economic savings resulting from reductions in mortality as a consequence of regular cycling and/or walking. HEAT for cycling was first launched by the World Health Organisation (WHO) in 2009, with an updated online version for walking and cycling published in 2011 (WHO 2011).

Intended for use by planners and traffic engineers at all levels of government, HEAT is based on available evidence with parameters that can be adapted to fit specific situations. The tool calculates answers to the question: 'If x people cycle or walk y distance on most days, what is the economic value of mortality rate improvements?'

HEAT can be applied in many situations, including:

• planning a new piece of cycling or walking infrastructure by modelling the impact of different levels of cycling or walking to produce a benefit–cost ratio; and

• valuing the mortality benefits from current or prospective levels of cycling or walking, such as benefits from cycling or walking to a specific workplace, across a city or in a country.

In New Zealand, HEAT has been used to evaluate the possibility of adding cycling and pedestrian facilities to the Auckland Harbour Bridge. The bridge, built in 1959, has no active travel infrastructure and may only be crossed by motor vehicles. Based on hypotheses for the number of cyclists that would use the bridge for regular commuting, HEAT calculated the mortality benefits and economic savings from the establishment of such cycling and pedestrian infrastructure. For every 1,000 adults who regularly commute by bicycle across the bridge, annual savings were estimated to be NZ$1,529,000 (WHO 2013a).

Walking for non-work journeys

ABS Census travel data currently examines walking in major cities by looking at journeys to work. However, most journeys on an average weekday are undertaken for a variety of purposes other than travelling to work or education, such as socialising, shopping or personal business. Walking accounts for a much higher share of non-work journeys than of commuting trips.

Travel surveys by some state governments, such as the annual Household Travel Survey for Sydney, provide mode share information for *all* journeys. Unfortunately, this data is not nationally consistent. On an average weekday in Sydney in 2011, there were 16.3 million journeys (NSW Bureau of Transport Statistics 2012, p. 31). Figure 5-15 shows that just one-third of weekday journeys in Sydney were for work or study or any other work-related purposes (NSW BTS 2012, p. 32).

Figure 5-15   Journeys in Sydney on an average weekday, by purpose (all transport modes), 2011
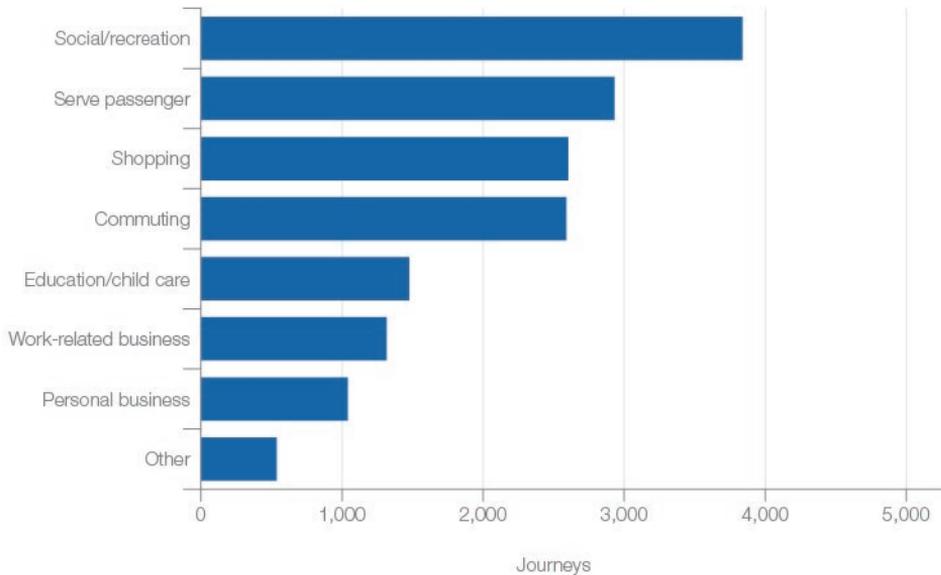
Source: NSW BTS 2012

In 2011 nearly as many journeys were made on an average weekend day in Sydney (15.2 million) as on an average weekday (16.3 million), and the number of journeys on weekends has been growing at twice the rate of weekday journeys for more than a decade (NSW BTS 2012, p. 31).

For travel purposes other than commuting, walking plays a far greater role. For example, while only six per cent of commuting journeys in Sydney are recorded as walking journeys, walking accounts for nearly 23 per cent of *all* journeys undertaken, regardless of purpose (NSW BTS 2013, p. 1). This includes 29 per cent of journeys for social/recreational purposes, 28 per cent of shopping journeys and 21 per cent of personal business journeys (NSW BTS 2012, p. 34). Within Sydney's CBD, 93 per cent of all trips – around 1.2 million trips a day – are undertaken on foot (Transport for NSW 2012, p. 37).

Most journeys involving other modes of transport also include at least one walking trip – for example, to or from a bus stop, train station or parked car. By recording only the primary mode of transport for each journey, Census data overlooks these walking trips. This shortcoming of travel data collection processes is not unique to Australia. National travel surveys in many other OECD countries also underestimate the proportion of walking in total journeys (ITF 2012, p. 19).

Case study: Brisbane City Council Active School Travel Program

Travel to school has changed markedly in Australia since the 1970s, from predominantly active modes (particularly walking) to mainly car trips (Van der Ploeg et al. 2008). Taking children to school by car can have an impact on health, levels of inactivity and independence skills, as well as contributing to congestion in peak periods. Programs to encourage walking and cycling to school often seek to address the concerns about personal and road safety held by parents.

Brisbane City Council's Active School Travel (AST) program is one such initiative that aims to change travel behaviour by increasing the number of school students who walk, cycle, carpool or use mass transit on all or part of the journey to and from school. Each year the council selects a number of primary schools for the program and helps them to develop a school travel plan to encourage children and parents to consider more active and sustainable transport modes.

The AST program began in 2004 and each year a number of initiatives are implemented to achieve a reduction in the number of car trips made to and from Brisbane schools, such as:

- Park + Stride: encourages students with no alternative but to be driven to school to walk the final part of their journey. A site is selected which is five or 10 minutes walking distance from the school and parents are encouraged to drop their children off there.

- Walking School Bus: a group of children walk to and/or from school with trained and approved walk leaders from the school community. The 'bus' walks along a set route to and/or from school, picking up or dropping off children along the way at designated stops, similar to a normal bus route.

- Bike Skills Training: training is delivered to a chosen year level in four one-hour sessions (Healthy Spaces and Places 2013).

In 2012, the AST program worked with 19 primary schools in Brisbane, resulting in an 18 per cent decrease in car trips to school and a reduction of 1.92 million vehicle kilometres travelled annually, a 14 per cent increase in students walking to school and a three per cent increase in carpooling trips (Brisbane City Council 2013, p. 4).

Increasing active travel for local trips

A recent study of more than 1,000 residents moving to new housing developments in Perth shows how planning decisions and the type of infrastructure provided can encourage greater levels of walking for transport and recreation. (Giles-Corti et al. 2013). The study pointed to the health and liveability benefits of neighbourhoods that include an integrated range of residential, commercial, cultural, institutional or industrial uses. It found that where shopping facilities, schools and health services, for example, are built within the new housing development; residents are more likely to walk.

While the link between mixed-use developments and healthy, walkable neighbourhoods is well-known, Giles-Corti et al. (2013) suggest there is a gap between the knowledge and how it is put into practice.

Road safety concerns for pedestrians and cyclists

Pedestrians and cyclists are highly vulnerable road users. Globally there are 270,000 pedestrian fatalities every year, and in 2011 the World Health Organization launched the Decade of Action for Road Safety 2011–2020 to draw attention to the needs of pedestrians (WHO 2013b).

National data on road fatalities shows that some groups such as children and older Australians are higher-risk pedestrians and cyclists than others. For example, while pedestrians made up 13 per cent of road fatalities across all age groups in 2012, 25 per cent of people over the age of 70 killed on Australian roads was a pedestrian (26 per cent). Older Australians are particularly vulnerable pedestrians, and so are children (Devlin et al. 2010). Twenty-one per cent of road fatalities involving those aged 16 and under were pedestrians (BITRE 2013b), almost certainly due to inexperience and a lack of risk perception. (Devlin et al. 2010).

While women walk more on an average weekday than men (NSW BTS 2012, p. 44), two in three pedestrians killed last year were male (BITRE 2013b, p. 11). Data from the Office of Road Safety in Western Australia shows that male pedestrian deaths in Western Australia often occur at night or on the weekend, and in many cases may be attributed to drugs or alcohol (WA Office of Road Safety 2010, p. 2).

Nine in 10 cycling fatalities in Australia in 2012 were male (BITRE 2013b, p. 11). This may partly reflect the prevalence of male cyclists with more than 75 per cent of cyclists travelling to work being male (Mees and Groenhart 2012, p. 18). ABS Census data for journeys to work shows there were 4.2 male cyclists for every female cyclist in the major cities in 2001 (Figure 5-16). By 2011 this ratio had declined to 3.3 males for every female cyclist, meaning that the proportion of female cyclist commuters had grown. Nevertheless, the cycling gender gap remains pronounced. In 2011 every major city reported at least two male cyclists for every female cyclist.

Figure 5-16   Ratio of male/female cyclists for journeys to work, 2001, 2006 and 2011
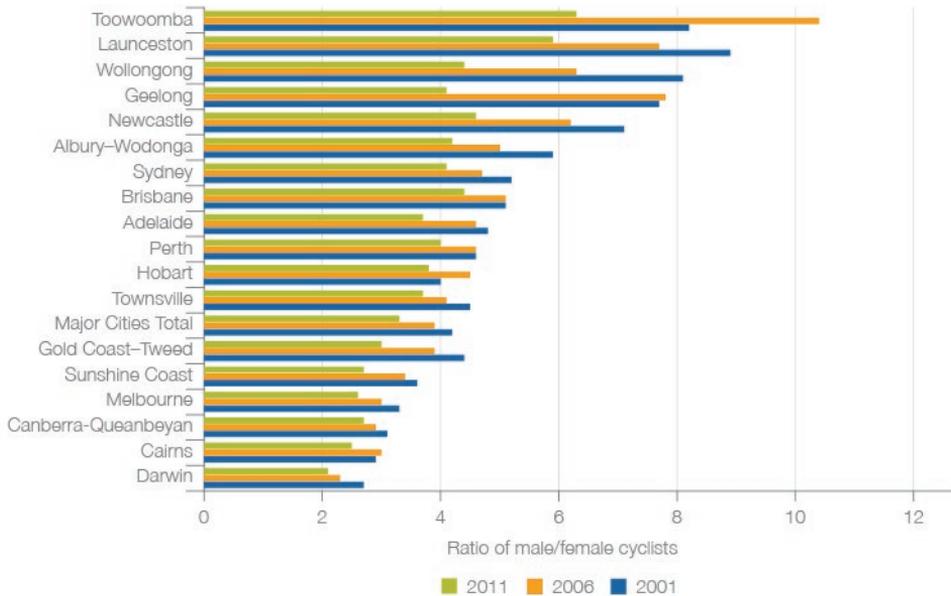
Source: BITRE 2013a (unpublished) analysis of ABS Census of Population and Housing 2001, 2006 and 2011

In a national survey of women and cycling earlier this year, the most commonly cited factors preventing women from cycling were the speed and volume of traffic (51.6 per cent of surveyed women) and aggression from other road users (45.9 per cent) (Cycling Promotion Fund and Heart Foundation 2013, p. 15). This may explain some of the imbalance in the ratio of male to female cyclists.

A recent national survey of children and cycling has revealed similar safety concerns and found that just 11 per cent of surveyed school students rode a bicycle to school (Cycling Promotion Fund and Heart Foundation 2012, p. 6). Surveyed parents reporting that personal and road safety concerns were the main reasons their children did not cycle to school (Cycling Promotion Fund and Heart Foundation 2012, p. 10).

Crime and crime prevention

While crime rates in Australia have declined in the past decade, community perceptions are known to frequently overstate actual crime levels. This can mean that people continue to feel unsafe in their community even as conditions improve (Davis and Dossetor 2010). Overcoming the inhibiting effects of fear of crime on everyday behaviour, such as while walking to or from shops, mass transit or work, requires an understanding of not only actual but also perceived crime levels.

The Australian Institute of Criminology estimates that crime costs Australia around $36 billion per year, or about four per cent of national GDP (AIC 2013a). This includes the cost of property loss, medical costs and lost output and productivity. Violent crime in Australia has been decreasing in the past decade (Figure 5-17). Sexual assault (76 per 100,000 population in 2011) and robbery (60 per 100,000) make up the vast majority of violent crimes, while rates of kidnapping/abduction (3 per 100,000) and homicide (1.1 per 100,000) are much lower.

Crime trends

Figure 5-17   Violent crime in Australia (per 100,000 population), 2000–11
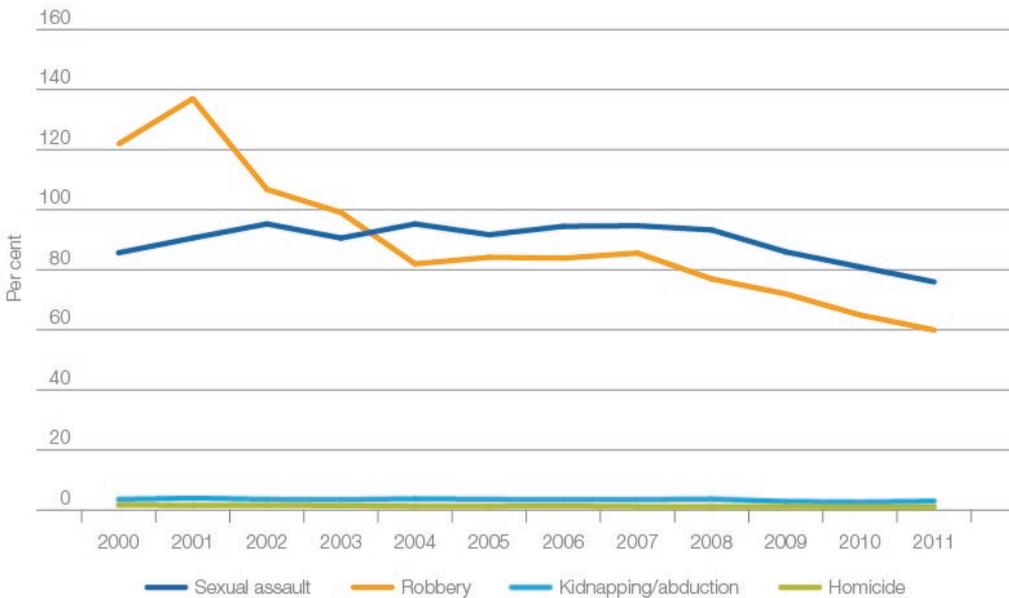
Source: AIC 2013b

Property crime (break and enter, burglary and other offences such as shoplifting and pick-pocketing) occurs at a much higher rate than violent crime, and the number of property crimes increased across all categories in 2011. Nearly half of all property crimes occur in a retail setting (31 per cent) or on the street (14 per cent) (AIC 2013b, p. 10).

Violent crimes and crimes against property in Australia occur in a variety of settings. For example, analysis of data on sexual assaults and robbery shows that nearly two in three sexual assaults in Australia in 2011 occurred in residential dwellings, whereas robberies most commonly occurred on the street or in retail premises (Figure 5-18) (AIC 2013b).

Figure 5-18   Sexual assault and robbery in Australia by location type, 2011
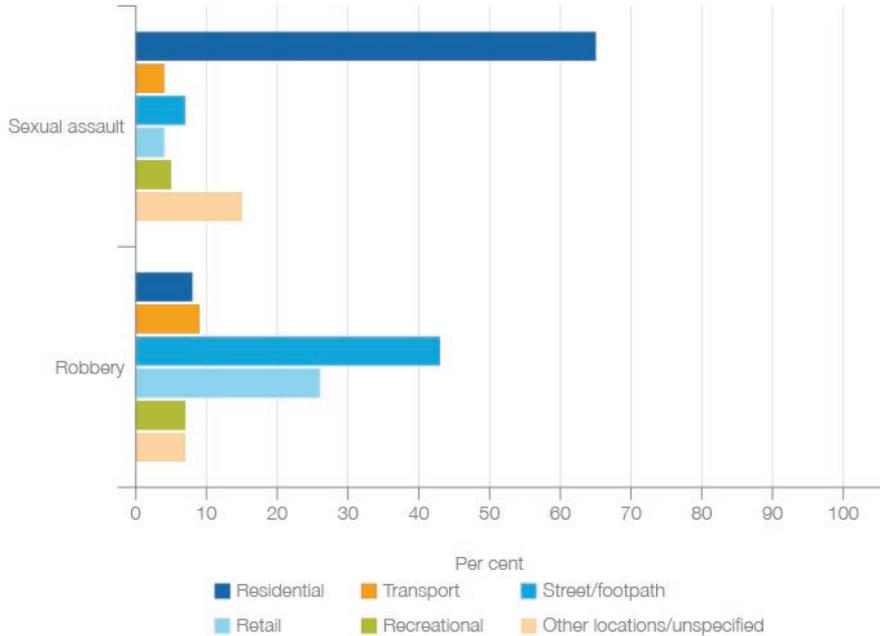
Source: AIC 2013b

Distribution of crime

Certain types of crime occur more frequently in particular locations. Better understanding of the relationship between locations and types of crime can help governments, communities and individuals reduce or overcome the fear and risk of crime. For example, crime mapping by the NSW Bureau of Crime Statistics and Research (2013) has shown that non-domestic violence related assault tends to be concentrated in 'hotspots' around retail and commercial areas, both in the central business district and suburban shopping strips. Similarly, national data indicates that three in four robberies occur in public places, particularly in retail areas, on transport or on the street. Nearly half of all property crime in Australia occurs in public spaces such as shopping areas (AIC 2013b).

Theories suggest crime rates are influenced by the permeability of street networks, with improved accessibility of a location improving its attractiveness to offenders, and by the neighbourhood density, because higher density areas offer more targets and opportunities for crime (Cozens 2011).

Crime prevention

As described earlier, crime and fear of crime can be a significant deterrent to undertaking everyday activities and has been found to affect particular groups, such as women and the aged, more profoundly (Roman and Chalfin 2008).

For example, mass transit operators can address fear of crime experienced by passengers on services and at stops and stations by implementing measures such as camera surveillance, visible staff and suitable lighting. However, journeys do not start or end upon boarding or

alighting from a bus, tram or train. Transport users may feel more vulnerable travelling to and from the stop or station to their home, the workplace, education or services. The challenges of addressing crime both in the home and on the street are explored in the following feature article.

Safety in the city for women – and everyone

Dr Carolyn Whitzman, Associate Professor in Urban Planning, University of Melbourne

The rape and murder of 29-year-old Jill Meagher in an inner northern Melbourne suburb in September 2012 sparked a new wave of concern about safety in the city for women. But what do we know about violence against women in Australian cities? Where does it occur and is it increasing? What works to prevent violence? And what can all levels of government, along with the private sector and civil society, do to prevent violence?

Assaults reported to the police have increased over the past 15 years in many Australian cities. Across the country, reported assaults increased from 114,156 in 1996 to 171,083 in 2010, while reported sexual assaults increased from 14,542 to 17,757 during the same period (AIC 2011, p. 2). What we do not know is whether *actual* violence, as measured by victimisation surveys, is increasing. In 2002–03, Australia participated in an International Violence Against Women Survey, which found that 57 per cent of women had experienced some form of physical and/or sexual violence since the age of 16. However, only 14 per cent of women who experienced violence from an intimate partner, and 16 per cent who experienced violence from someone else, had reported the most recent incidence to the police (Mouzos and Makkai 2004, p. 101). There is some anecdotal evidence that violence is being reported more often to the police. For instance, in Victoria, the annual crime rate increased in the 2011–12 financial year, the first time in 12 years that it has done so. This is attributed by Victorian police to improved policies and practices on responding to intimate partner violence, with reported family violence offences increasing by 23 per cent over the previous year (Bucci 2013). However, in the absence of regular and consistent victimisation surveys by either the Commonwealth or State governments, it is impossible to say with any certainty whether violence in cities is increasing or decreasing.

Based on both victimisation survey and police reports, however, it is possible to conclude that the majority of violence in cities does not occur 'on the street'. In 2010, 63 per cent of sexual assaults and 61 per cent of murders occurred in homes (AIC 2011, p. 8). While the location of assaults is a little more equally shared between public and private locations (45 per cent in the former, 35 per cent in the latter), there is a sharp differentiation by gender and type of assault. Women are most commonly assaulted by a male family member in the home, while men are most commonly assaulted by a male stranger in 'community' settings (AIC 2011, pp. 20–2).

A number of meta-evaluations by the International Centre for the Prevention of Crime (2008) and the World Health Organization (2004) have demonstrated proven ways that communities can help prevent violence and improve safety. These proven methods often go well beyond the 'usual suspects' of increased policing, more lighting and closed circuit television (CCTV). While CCTV, in conjunction with increased lighting, shows some promise in certain circumstances towards some crimes (for instance, reducing

theft of motor vehicles in car parks), it is expensive to set up, implement and maintain, particularly if the cameras are to be monitored by police or other security professionals (NCCPP 2011). The approach recommended by all of these meta-evaluations stresses an integrated planning approach, involving policing and justice but also health and social services, education, local businesses, social housing, and planning/design. For instance, it would do little good to improve police responses to intimate partner violence if nearby legal, counselling and social services are not improved to assist women who are being assaulted in their homes to make a choice whether they stay in their homes and seek an intervention order or leave, often with their children in tow (Whitzman 2008, p. 85).

Yet it is exactly this uncoordinated approach that is currently being followed in Melbourne and other major cities. In Wyndham, an outer suburb of Melbourne that is the fastest growing Local Government Area in Australia, reported assaults increased by 32 per cent between 2011 and 2012. Over the same period, family violence related requests to Women's Health West, the main local family violence service, increased by 40 per cent (Little 2013). Yet this service is facing severe cutbacks from the State government and waiting lists for emergency or longer-term social housing for women trying to escape violence is growing (personal communication with CEO of Women's Health West, 22 April 2013).

In order to effectively create safer cities, a broader understanding of both violence and integrated planning is necessary. Providing basic community infrastructure is the essential ingredient of effective violence prevention. Since intimate partner violence commonly begins during pregnancy, and we know that children's early years are key to adult developmental outcomes, maternal and child health workers need adequate training to detect and respond to suspected family violence. Programs in pre-schools and schools to model positive approaches to conflict and engender respectful relationships in older children and youth are a vital part of the picture. Providing educational and employment opportunities to young men aged 15 to 24 who are out of school and work (the group most 'at-risk' for crime and violence) makes cities safer, as does providing sufficient social housing and income security so that women do not have to risk homelessness in order to escape violence. Making public space safer includes not only increased 'eyes on the street' through land use mix and improving the quality of public spaces but also increasing public awareness campaigns promoting positive anti-violence messages in all public places (from train stations to the internet). The bottom line is integrated planning for both better public space design and improved and coordinated social and health service provision at the local (suburb or Local Government Area) level (Whitzman 2008).

A final essential ingredient in making cities safer is to strengthen the indicators used in monitoring and evaluating community-based strategies. As stated earlier, we as a nation do not know whether violence is increasing (which would be bad news), whether more violence is being reported to the police (which would be promising news), or whether violence is being dealt with effectively (which would be good news if it led to an outcome of reduced violence, including repeat violence). Regular victimisation surveys, either as part of state-wide population health surveys or as a national exercise, are essential, as are triangulating police, victimisation and social service data to discover whether interventions are having the desired effect.

Role of local government in crime prevention

Local governments play an important role in localised crime prevention. Not only they do they coordinate initiatives with police and community-based organisations, but they often also are responsible for managing urban design interventions that affect actual and perceived levels of crime (Morgan et al. 2012). A report published by the Australian Institute of Criminology has identified a variety of measures successfully used by local councils to curb crime and anti-social behaviour , including alcohol-related violence in entertainment precincts and licensed premises, youth violence and violence in residential neighbourhoods. Measures included community patrols, mobilisation and awareness, and application of crime prevention through environmental design (CPTED) principles such as improved street lighting (Morgan et al. 2012).

The Australian Government has funded several programs that provide assistance to localised crime prevention initiatives. For example, the National Crime Prevention Fund is a $40 million program that will support measures in high-crime areas to address societal disconnection such as youth mentoring programs and the rollout of CCTV systems in established trouble spots. The $15 million Safer Suburbs program announced in 2007 also provided funding for the installation of CCTV systems as well as improved street lighting for local communities. A further $5.42 million was committed to the program in 2010.

Volunteering

In *The Good Life* (2013), Hugh Mackay concludes that what makes for 'a good life' is not the sum of security, wealth, status, postcode, career success and levels of happiness. Rather, the good life is defined by the capacity for selflessness, the quality of relationships and a willingness to connect with others in a useful way.

One way in which people 'connect with others in a useful way' is by volunteering. Rates for volunteering were reported for the capital cities in the *State of Australian Cities 2012* report. Here this data is compared to the data for the regional major cities (Figure 5-19). In the regional major cities, rates of volunteering are highest in Launceston, Sunshine Coast and Toowoomba, and lowest in Gold Coast – Tweed, Newcastle and Albury-Wodonga. Broadly speaking, rates of volunteering are higher in smaller towns and cities than in larger ones. Volunteering is more prevalent in the regional major cities than in capitals and most prevalent in smaller communities.

Figure 5-19   Volunteers aged 15 years and over as a proportion of the total population in major regional cities, 2006 and 2011

Proportion of population (%)

■ Volunteers 2006   ■ Volunteers 2011
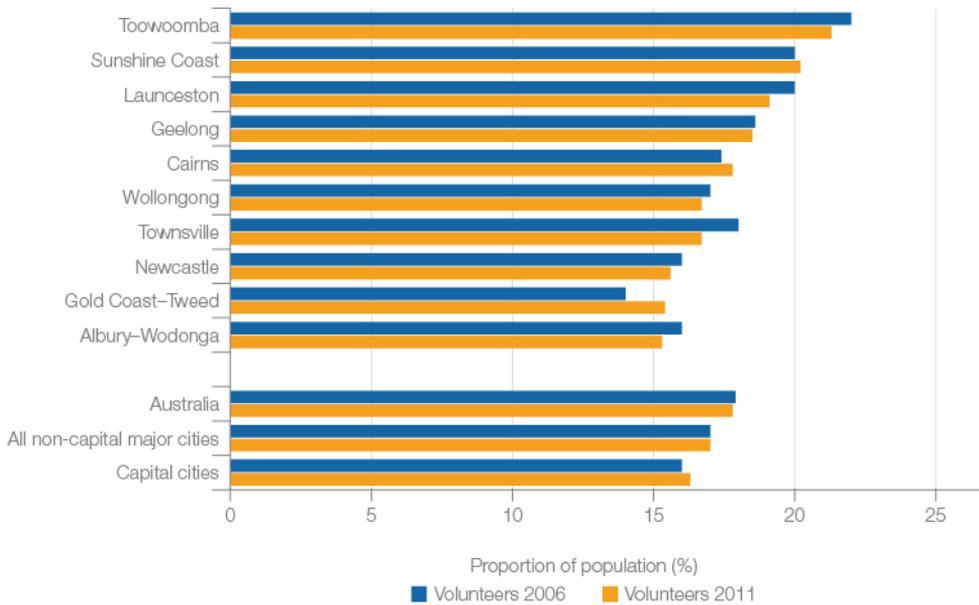
Source: PHIDU 2010, PHIDU 2013b

Celebrating the Centenary of Canberra

Contributed by Robyn Archer AO, Creative Director, Centenary of Canberra

On 12 March 1913, Prime Minister Andrew Fisher, Minister for Home Affairs King O'Malley, Governor-General Lord Denman and Lady Denman stood at the foundation stones located in the middle of a large paddock and named the new capital of a young nation. It was Lady Denman who had the honour of announcing that it would be called Canberra. Spontaneous cheers erupted, perhaps because it was a dignified and meaningful choice as opposed to some of the competition, such as 'Kangaremu', 'Shakespeare' and 'Sydbrisadho'.

On 12 March 2013 the Prime Minister, the Minister for Regional Australia and the Governor-General and her consort again took their places at the stones (now marginally relocated for the building of new Parliament House, 25 years old this year) and reflected on that moment 100 years earlier, while Chief Minister of the ACT Katy Gallaher raised a toast to Canberra. The descendants of the Governor-General, the current Lord and Lady Denman, were present, as was John Fisher, descendant of Prime Minister Fisher.

The Centenary of Canberra is being celebrated as a whole-year program, with a number of purposes in mind. First, it celebrates the noble beginnings of this still young and growing regional city and reinvokes the idealism and aspirations of that moment in history. The desire for a new capital was never just a stoush between Sydney and Melbourne; it was a deep and significant national dialogue which inspired some remarkable reflections on the hopes for this nation, and what a capital should symbolise. The optimism of the time

is reflected in the National Museum of Australia's exhibition *Glorious Days: Australia 1913*, and many of the noble sentiments and speeches can be found in Dr David Headon's book *The Symbolic Role of the National Capital.*

In the lead-up to 2013, a number of milestones were celebrated – homage to the surveyors like Scrivener, plaques placed at the border markings, a contemporary photographic competition entitled *Show Us Your Limits*, and the centenary of the ceding of land from New South Wales on 1 January 1910. Predictably, there has been a clear focus on the international competition for the capital, advertised in 1911, and the winner, announced in 1912 as Walter Burley Griffin of Chicago. While *Glorious Days* set the context, the National Archives of Australia brought out the beautiful evidence of original entries, including Marion Mahony Griffin's exquisite and rarely seen renderings in *Design 29: the Making of a Capital,* and the National Library of Australia presented *Dream of a Century: The Griffins in Australia.* The competition, a bold move announced within six months of the first major city planning summit in London in October 1910, was celebrated 100 years later with CAPITheticAL – an international design competition for a hypothetical Australian capital for the 21st century. Administered by the Australian Institute of Architects, it drew 1,200 registrations and in the end 112 entries from 27 countries. The winners were announced 14 March 2013 (you can see the results at **www.capithetical.com.au**). Responding to the competition's provocations about sustainability, the Asian century and questions about what a capital should be and what its symbolic role is, entrants took on the challenge with intelligence, sensitivity and boldness worthy of the Griffins.

The first objective was to enlighten Canberrans and everyone else (both Australians and internationals) about the history of the national capital and its noble origins. The second objective was to point out every Australian's connection to the capital. While Canberra is much more than just a host to federal government, and that was its original purpose, we are all connected precisely because of that core function. In a democracy that retains compulsory voting, we are obliged every few years to vote for those who will come to Canberra and determine how the country is run; it is an important responsibility for those who enjoy the benefits of a free country. The significance of this does not elude the 160,000-plus year six schoolchildren who visit their capital every year under the Pacer program or those 'new' Australians who have risked all to be part of this democracy. They find the national monuments appropriately iconic.

The 'Australian story' is told best, at any time, in any year, in Canberra. The capital is unique amongst Australian cities in that its national cultural institutions hold in trust for the Australian people our finest treasures. Access to the National Library of Australia (which holds every book published in Australia), the National Museum of Australia, the Australian War Memorial, the National Australian Archives, the Mint, the Museum of Australian Democracy, Parliament House, the National Gallery of Australia, the National Portrait Gallery and the Australian Botanic Gardens, as well as Geology Australia and the developing Rock Garden on the shores of Lake Burley Griffin, allows us to understand how Australia has evolved from pre-history to the present. In addition, the visionary new National Arboretum Canberra, Questacon and its new Technology Learning Centre, CSIRO Discovery, and the Australian Institute of Sport all contribute to our scientific knowledge. With these treasures in mind, there is a kind of obligation for *all* Australians to tap into their capital, by physical presence or digital interaction, which goes beyond any motive of local tourism.

And then there is a matter of local pride. Most Canberrans appear to be fed up with the jokes that are made about their home. Alongside the loftier aspirations of the Centenary to invite Australians to re-imagine their capital are simpler matters of local pride. A rich cultural, sporting and ideas calendar has produced a bounce in the capital. Canberra's first international cricket match was held under beautifully designed new lights at Manuka oval. The Australian Women's Golf Open was held for the first time at Royal Canberra. Sold-out theatre seasons presented great dance and theatre from every state and territory. At the actual birthday's Parties at the Shops, when residents created and participated in local walk-to celebrations across the ACT, village life was recognised and enjoyed.

In the lead-up to the Centenary Year, the ACT Government conducted a healthy series of conversations about the future of Canberra. Citizens participated wholeheartedly and contributed to forward-thinking ideas about the value of things like a light-rail system, the need to address issues of ageing and sustainability, the need for greater density in the centre and the desire for that density to be well designed. The Centenary Year will see any number of new pieces of infrastructure and development realised or begun: these include the National Arboretum Canberra, the restoration of Constitution Avenue, the completion of the new Canberra Airport, the 8-star rated Nishi apartments, complete with 8-screen Palace cinema, bicycle shop and commissioned public art, the Boundless all-abilities Children's Playground, the Red Centre Garden at the Australian Botanic Gardens, Questacon's new Technology and Learning Centre and the gradual development of the Kingston Foreshore and arts precinct.

2013 is a bumper year for Canberra as a home to 370,000 Australians; in its physical and symbolic national role of hosting Federal Government; and, on behalf of all Australians, holding and safeguarding their national treasures. You get the feeling that the Centenary Year is just a harbinger of many good things to come in this unique 21st century Australian regional city.

Conclusion

There is ample evidence that Australian cities have many of the attributes of liveability, though there are specific areas where there is scope for improvement. Housing and labour markets strongly influence patterns of socio-economic advantage and disadvantage and exacerbate income and wealth inequality. However, the spatial distribution of, and access to, resources and opportunities that support health and wellbeing (like education, green space and cultural and recreational facilities) can help moderate rising urban inequality. And it is this rising inequality that poses the greatest challenges to the long-term liveability of our cities.

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Governance

Chapter 6

Governance refers to the political and legal structures and mechanisms used to manage and coordinate our urban systems. It also refers to how these interrelate with key stakeholders, how resources are allocated and how outcomes are achieved.

This chapter briefly describes the governance arrangements that cover major Australian cities. It provides updates on changes that have occurred since the 2012 report, and highlights progress on the Commonwealth's implementation of the national urban policy and the COAG cities agenda.

Key findings

- A Transport and Infrastructure Senior Officials Committee Cities Group has been established to progress intergovernmental collaboration on cities through the Standing Council on Transport and Infrastructure.

- In response to the Australian Government's *Walking, Riding and Access to Public Transport—Draft report for discussion,* nearly 200 public submissions were received.

- The 2013–14 Commonwealth Budget included funding for the second phase of the Nation Building Program (NB2) of $24 billion across 5 years to 2017–18. Thirty-five NB2 projects across Australia's major cities have subsequently been announced.

- Following the release in April 2012 of a discussion paper by the Business Council of Australia, the Australian Government has requested that the Productivity Commission undertake a study to benchmark Australia's major project development assessment processes against international best practice.

National Urban Policy implementation

In May, 2011 the Australian Government released *Our Cities, Our Future – a national urban policy for a productive, sustainable and liveable future.*

The National Urban Policy is supported by a set of initiatives that contribute to delivering on its productivity, sustainability and liveability goals set out in the National Urban Policy Summary Action Plan (Chapter 7).

The Action Plan includes initiatives to be implemented over the short, medium and long term to 2020 across portfolios. A report on the progress of these initiatives is included in Appendix B.

Intergovernmental cities agenda

Following COAG's decision on 13 April 2012 that continued intergovernmental collaboration on cities issues be taken forward by SCOTI, a Transport and Infrastructure Senior Officials Committee Cities Group was established to progress this work. A cities work plan was subsequently approved by SCOTI in November 2012, including deliverables such as improving national information on cities, sharing best practice in strategic planning systems and improving the understanding of – and engagement with – other intergovernmental work affecting cities.

Senior officials also monitor the activities of other Standing Councils that may be of relevance to SCOTI, and work to ensure that, where relevant, other SCOTI activities are cognisant of strategic planning issues and systems in the urban context.

Active travel

In October 2012, the Minister for Infrastructure and Transport released *Walking, Riding and Access to Public Transport—Draft report for discussion.*

The draft report explores how the Australian Government can work with other governments, business and the community to encourage and support walking and riding as part of the transport systems in Australia's cities and towns.

The report noted that as part of a broader system of planning, land use and transportation networks, increased mode share of walking, riding and public transport can contribute towards:

- increased capacity in the transport network;
- improved public health and reduced healthcare costs;
- improved community wellbeing and social cohesiveness; and
- reduced environmental impacts.

The Draft Report was open for consultation until February 2013 and 188 submissions were received – 99 from organizations, and 89 from individuals. Of these submissions, 183 have been published on the Department's website. Five submissions were withheld from publication, at the authors' request.

One hundred and eighty eight submissions were received – 99 from organizations, and 89 from individuals. Of these submissions, 183 have been published on the Department's website (five were withheld on request).

Key themes from submissions received on the draft report include:

- considering active travel modes as mainstream transport solutions, eligible for mainstream infrastructure funding;
- establishing a clear hierarchy of responsibility for active travel across spheres of government;
- planning for active travel by focusing development around activity centres to reduce travel distances and engaging pedestrian and cyclist advocacy groups in the planning processes;

- building convenient, comfortable and segregated pedestrian and bike paths as part of regional active travel networks; and

- encouraging shift in travel behaviour to active modes through prioritising pedestrians and cyclists in the road user hierarchy and reducing incentives to drive in built up areas.

Nation Building Program

The Nation Building Program is the Government's signature land transport infrastructure investment program. The current Nation Building Program, which runs from 2008–09 through to 2013–14, will deliver approximately $36 billion of land transport infrastructure, ranging from major road and rail construction projects through to many smaller-scale local road projects.

In the 2013–14 Budget it was announced that the second phase of the Nation Building Program (NB2) would include $24 billion across five years to 2017–18 and will focus on four themes:

- Moving Freight;

- Connecting People;

- Safety; and

- Innovation.

A list of new projects to be funded from the next phase of the Nation Building Program was announced. Projects in major cities include:

Sydney

- Port Botany Upgrades Program and rail line upgrade

- F3 Productivity Package

- Sydney Motorways Program – M4 and M5 extension

- Sydney Motorways Program – F3 to M2

Wollongong

- Mt Ousley Upgrades

Melbourne

- Managed Motorways – High Street to Warrigal Road

- Managed Motorways – Warrigal Road to Clyde Road

- Melbourne Metro

- M80

- Princes Highway West

Brisbane

- Gateway Upgrade North
- Brisbane Cross River Rail
- Ipswich Motorway – Rocklea to Darra
- Bruce Highway: Managed Motorways – Gateway Motorway to Caboolture

Cairns

- Bruce Highway: Cairns Southern Access Corridor – Robert Road to Foster Road

Townsville

- Bruce Highway: South of Home Hill to North of Ingham

Sunshine Coast

- Bruce Highway: Caloundra Road to Sunshine Motorway

Adelaide

- Managed Motorways – South Eastern Freeway
- South Road Upgrade
- Tonsley Park Public Transport Project

Hobart

- Midland Highway: Bridgewater Bridge
- Freight Rail Revitalisation
- Brooker Highway – Elwick-Goodwood and Howard Roads
- Huon Highway/Summerleas Road Intersection Upgrade
- Domain Highway Planning

Launceston

- Midland Highway: Launceston Bypass Planning
- Midland Highway: Duplication Perth to Breadalbane

Perth

- Swan Valley Bypass
- Great Northern Highway – Muchea to Wubin
- Leach Highway (High Street)
- Perth Public Transport Package
- Tonkin Highway – grade separations

Darwin

- Tiger Brennan Drive Duplication

Canberra

- Ramp Metering
- Majura Parkway (which has been previously announced and is underway)

The Program will also provide the Australian Rail Track Corporation (ARTC) with funding for Phase 1 of the Advanced Train Management System which allows trains to travel closer together and improves coordination when passing.

Further details of these projects can be found on the Department's website http://www.nationbuildingprogram.gov.au/funding/projects/newprojects.aspx.

The Budget also provided an additional $3 million per year for the next four years to Infrastructure Australia to enable project and legal expertise to assess and monitor the progress of infrastructure projects.

Productivity Commission – major project development assessment processes

The Australian Government has requested that the Productivity Commission undertake a study to benchmark Australia's major project development assessment processes against international best practice.

The study will consider the extent to which major project development assessment processes across all levels of government affect the costs incurred by business, deliver good regulatory outcomes for the public and provide transparency and certainty to promote business investment.

The genesis of the study is a discussion paper by the Business Council of Australia (BCA), released in April 2012, which noted that inefficient and duplicative regulatory arrangements for major project development assessment approvals (DAA) processes are imposing unnecessary costs, and called for the Commission to benchmark Australia's major project DAA processes against international best practice.

Specifically, the Commission has been asked to:

- examine the regulatory objectives and key features of Australia's major project development assessment processes at all levels of government, including the interactions between levels of government, the role of facilitation, the capacities and resources of the institutions involved and significant variations between jurisdictions
- examine the regulatory objectives and key features of comparable international systems with respect to major project development assessment processes
- identify critical elements of development assessment processes and compare these to assess the extent to which different decision-making approaches in Australian jurisdictions and alternative investment destinations overseas have a material impact on costs, timeliness, transparency, certainty and regulatory outcomes

- examine the strategic planning context for major project approvals in Australia and in comparable international systems

- identify best practice and against this benchmark evaluate jurisdictional approaches, such as one-stop shops and statutory timeframes, to make recommendations to improve Australia's processes, both within and between jurisdictions, by reducing duplication, removing unnecessary complexity and regulation, and eliminating unnecessary costs or unnecessarily lengthy timeframes for approvals processes

- assess mechanisms for 'scaling' regulatory requirements relative to project size and the expected benefits against the potential environmental, social, economic and other impacts

- compare the efficiency and effectiveness with which Australian approvals processes achieve the protection of social, economic, heritage, cultural and environmental assets compared with comparable international systems.

The Commission will consult with all relevant state, territory and Commonwealth government agencies and other key stakeholders. For more information go to http://www.pc.gov.au/projects/study/major-projects.

Stakeholder reports on cities

The following reports have been provided by jurisdictions and relevant agencies.

Moving Australia 2030

The report *Moving Australia 2030: A Transport Plan for a Productive and Active Australia* was launched in early 2013 by the Moving People 2030 Taskforce (the Taskforce) which is drawn from a broad cross section of organisations with an active involvement in Australia's transport systems.

The report suggests that establishing a national framework that more closely integrates transport and land use planning, will be a key to ensuring better infrastructure funding decisions are made. It also states that increased investment in how we move people should not be seen as competing against other portfolio areas such as health, environment or social welfare, but needs to be presented in terms of providing a net benefit from the positive outcomes generated by getting our transport systems right.

In recognition of the challenging fiscal environment, the report while noting the need for increased investment, also points to possible savings that can be generated by government through greater efficiency from existing infrastructure and its uses.

In regards to governance arrangements the report urges the Commonwealth to continue its coordinating role in cities, but recommends a whole of government approach to the establishment of the framework.

The report sets four tangible targets. These are that by 2030:

- public transport, walking and cycling will account for 30 per cent, or more, of all passenger trips in our capital cities;

- secondly, that carbon emissions from the passenger road transport sector be at least 50 per cent below 2000 levels;

- that fuel consumed by the road transport sector be 30 per cent less than currently forecasted; and finally,

- that there be a variety of transport modes convenient and accessible to all Australians.

To achieve these goals the report outlines a range of strategies which include:

- Innovative approaches to tackling congestion including; staggering school hours, flexible work hours for and diversified employment bases for all government employees, fare pricing incentives and increased frequency and span of operating hours for public transport services.

- Ensuring that the majority of infill development occurs around high capacity, high frequency transport corridors and prioritise federal and state funding programs for identified corridors.

- Agree on a mechanism to conduct congestion charging trials in capital and major cities and undertake comprehensive community education and information programs about congestion charging.

- Identify minimum service and coverage levels for passenger and active transport networks in regional centres.

- Assist State and Local Governments to improve structure and concept planning for new land development areas to reflect best practice in integrated land use and transport planning.

- Incorporate health benefit factors in cost benefit frameworks for all federally funded transport projects and fund and expand initiatives that incorporate healthy and sustainable outcomes in urban planning.

- Implement measures that incentivise car sharing programs and teleworking.

Metropolitan planning in States and Territories

New South Wales

New South Wales (NSW) is characterised by a relatively high number of local authorities (152), rather than larger regional governments. In parts of the State cooperative regional governance structures have emerged with shires and cities forming regional cooperative organisations called Regional Organisations of Councils. For example, the Western Sydney Regional Organisation of Councils (WSROC) represents 10 councils across Western Sydney. The NSW Government is currently undertaking a review of local government, looking at ways to strengthen its effectiveness into the future. This includes suggestions for improving the fiscal responsibility and financial sustainability of councils, the services and infrastructure that are critical and options for new structures and boundaries in local government.

A system of subregional planning, which applies in the Sydney metropolitan area, allows groups of councils to undertake long-term cooperative strategic planning, negotiating housing and employment distribution across boundaries in collaboration with the State government. The subregional boundaries are currently under review as part of the preparation

of a new Metropolitan Strategy. The proposed new planning system includes a greater role for subregional planning as a means of effecting land use change and setting development parameters.

The New South Wales Government has overall responsibility for long-term policy priorities and for delivering investment consistent with its policy objectives. Decision-making at the State or city level provides for the strategic planning framework, long-term directions, high-level investment strategies and coordination of service and infrastructure delivery. These directions and strategies are embodied in the draft Metropolitan Strategy for Sydney to 2031, the NSW Long Term Transport Master Plan and the State Infrastructure Strategy. At a municipal level, councils are responsible for local strategic and statutory planning, in alignment with overall metropolitan and subregional strategies, and for delivery of local infrastructure and other services.

The New South Wales Government has a Metropolitan Development Program which seeks to monitor and prioritise land release and associated infrastructure delivery in metropolitan Sydney and the Central Coast. Similar programs operate elsewhere, such as the Lower Hunter and the Illawarra. As well as coordinating greenfield planning, these programs coordinate forecasts and planning for housing growth in infill areas.

The Government has an Employment Lands Development Program, which aims to monitor take-up and manage the supply of employment land and the coordination of associated infrastructure in metropolitan Sydney and the Central Coast.

NSW 2021: A Plan to Make NSW Number One provides a 10-year delivery plan for aligning policy and implementation efforts of State government agencies across all portfolios. Metropolitan and regional planning strategies must contribute to the delivery of the specific objectives and targets set out in NSW 2021.

The NSW Government is currently undertaking a comprehensive review of the planning system and a White Paper was released in April 2013. The main transformative features and benefits of the new planning system are:

- Community participation – all sections of the community will have a legal right to be involved early in the key decisions that will shape the future of our cities, towns and neighbourhoods through the creation of a Community Participation Charter enshrined in law.

- Provision of Infrastructure – infrastructure will be planned and delivered alongside growth as well as a more certain and consistent way of funding infrastructure.

- Strategic planning – Strategic plans will be prepared using up to date evidence and research and developed early in the process with the community, to guide the best places for growth and identify the areas to be protected from development.

- Cultural change – working together to enable good outcomes while building expertise, leadership and engagement skills in the planning workforce.

- Streamlined assessment – making the assessment of proposals faster and simpler by removing duplication but with no less rigour.

- Better and safer buildings – a more robust, consistent and transparent building regulation and certification system which will increase confidence in the quality and safety of buildings and provide better direction and support to the NSW building sector.

Metropolitan planning

Sydney has long benefited from having a metropolitan strategic plan. The first major strategic plan, the *County of Cumberland Plan*, was prepared in 1948. Since then, major strategic plans have been prepared in 1968, 1988, 1995, 2005 and 2010.

A new *Metropolitan Strategy for Sydney to 2031* is currently being prepared to align with NSW 2021 as well as new transport and infrastructure priorities. A Draft Strategy was released for community comment in March 2013 and is planned to be finalised by the end of 2013.

The *NSW Long Term Transport Master Plan* is a comprehensive and integrated strategy for all modes of transport across NSW. It addresses key challenges that face the State around population growth, job creation and the need for a freight and public transport network that maximises the benefits to the economy.

The State government has prepared a long-term *State Infrastructure Strategy* which provides a clearer and more certain 'pipeline' of infrastructure projects over the next 20 years, supporting state objectives for economic and productivity growth. Infrastructure NSW (INSW) presented its independent report for consideration and the Government presented agreed infrastructure priorities that are aligned with other metropolitan and regional strategic objectives.

These three plans have been prepared through close partnership with government agencies and stakeholders. They aim to carefully manage the expansion of residential and commercial development across Sydney and NSW to ensure cities, towns, suburbs and neighbourhoods retain their amenity and liveability.

A key aspect of planning in NSW that links land use and transport is the active development of the transport system in a way that supports the hierarchy of metropolitan, strategic and regional centres.

Regional planning

Planning strategies exist for the other major New South Wales cities including:

- Newcastle – through the Lower Hunter Regional Strategy
- Wollongong – through the Illawarra Regional Strategy
- Tweed Heads – through the Far North Coast Regional Strategy
- Queanbeyan – through the Sydney-Canberra Corridor Regional Strategy
- Albury – through the Draft Murray Regional Strategy

These and other Regional Strategies are key policy documents scheduled to be reviewed every five years. More regular review (every four years) is proposed in the planning reforms. A current systematic review is underway. A Discussion Paper for the Lower Hunter has been released. Illawarra and Far North Coast are planned for 2013.

Following the completion of the Long Term Transport Master Plan work has commenced on detailed Regional Transport Plans. These will be linked to Regional Strategies, supporting new development in areas with existing or planned transport capacity, identifying important future corridors and protecting existing corridors from incompatible adjacent development.

NSW strategic planning documents articulate long-term approaches for urban development, infrastructure planning and environmental protection. They are currently given statutory weight under Section 117 of the *Environmental Planning and Assessment Act 1979* (New South Wales), to ensure implementation through local land use plans. The proposed planning reforms include a stronger role for strategic planning by giving statutory recognition to strategic plans at the regional, subregional and local levels. The reforms also propose to strengthen governance structures at the state and regional level to ensure strategic plans are implemented.

Victoria

Victoria's strategic approach to land use and transport planning sits within the government's broader strategic and policy framework. All departments and agencies must take this into account in their budget, asset and service planning.

The Victorian Government has an overall leadership role in establishing long-term policy priorities and in delivering investment consistent with its policy objectives. It works in partnership with local government and other stakeholders in planning for Melbourne and Victoria. Decision-making at the State or city level provides for the strategic planning framework, long-term directions, high level investment strategies and coordination of service and infrastructure delivery.

Local councils are responsible for municipal-level strategic and statutory planning within the overall metropolitan or regional context, and for delivery of a range of local infrastructure and other services. During the 1990s structural reforms were undertaken in Victoria to make local government and urban planning and development frameworks more efficient and responsive to changing market needs. This included reducing the number of councils from 219 to 79, to achieve better economies of scale in public administration. At the same time, councils were encouraged to take responsibility for local economic development.

More recently, the Victorian Government established the Growth Areas Authority (GAA) to integrate planning (including land use and infrastructure) for growth areas in the metropolitan region (Casey-Cardinia, Hume, Melton-Caroline Springs, Whittlesea and Wyndham). The authority works with local councils and other stakeholders to facilitate development consistent with the integrated plans that have been developed.

Strong population growth in provincial Victoria is set to continue, most being concentrated around regional cities, coastal areas and places within commuting distance of Melbourne. As a result, strategic planning for Melbourne is complemented by planning within regional Victoria. *Victoria in Future* (VIF) is the official government projections covering population, age structure and the number of households for all local government areas and statistical local areas across the State. It is used for strategic and service planning and has been published regularly since 1995.

The *Urban Development Program* (UDP) further contributes to Victoria's approach to urban planning. The UDP is reviewed annually and is in its seventh year. Its primary objective is to provide accurate and up-to-date information to local councils, infrastructure and service providers and developers to help ensure an ongoing provision of land and supporting infrastructure for future residential and industrial requirements.

Metropolitan planning

Melbourne has undertaken metropolitan strategic planning since 1927 when the Metropolitan Town Planning Commission was established. Planning strategies for Melbourne have been produced from time to time, notably through the first comprehensive planning scheme for the metropolitan area in 1954. In 1971 the principles of growth corridors, green wedges and containing outward growth were introduced and in 1983, new district centre zones were created to encourage office development in 14 centres and restrict it elsewhere. In 1995 much of metropolitan wide planning direction and controls were devolved to local government.

A new Metropolitan Planning Strategy is being prepared to ensure the valued aspects of Melbourne are protected while allowing for future needs.

A Ministerial Advisory Committee has been established to guide the development of the metropolitan planning strategy. A metropolitan planning authority will be established to drive the delivery of the metropolitan planning strategy.

The Metropolitan Planning Strategy will include links with Regional Growth Plans and together these plans will provide a long-term vision for Victoria – including housing choice, transport accessibility, economic growth, environmental protection, infrastructure, community facilities and services.

Regional planning

Regional growth plans are being developed to provide broad direction for land use and development across regional Victoria. They will also provide more detailed planning frameworks for key regional centres. Eight regional growth plans will be completed by late 2013. They are:

- Central Highlands
- Gippsland
- Great South Coast
- Hume
- Loddon Mallee North
- Loddon Mallee South
- Wimmera Southern Mallee
- G21 – Geelong Region Alliance (has completed its Regional Growth Plan and it is available on the G21 website. All G21 councils have approved this plan).

Legislative framework

The *Planning and Environment Act 1987* (Vic) provides the legislative authority for the Victoria Planning Provisions (including a State Planning Policy Framework and Local Planning Policy Frameworks tailored to each municipality). This policy framework establishes the requirements for assessing development proposals against policy objectives. The practical application of the planning system is supported by performance monitoring and through the progressive rollout of electronic data systems, including online planning scheme maps and electronic development assessment.

The *Planning and Environment Act 1987*, the State Planning Policy Framework and other related provisions are under review to simplify current laws, remove redundant provisions, and strengthen certainty and timeliness.

Victoria has progressively modernised its transport legislation. The *Transport Integration Act 2010*, the new principal transport statute, sets out a vision, objectives and principles for transport, making it clear that the transport system needs to be integrated and sustainable. The Act requires transport agencies and other key decision makers to have regard to broader social, economic and environmental considerations. It covers the whole transport portfolio and requires all transport agencies to work towards a common goal of providing an integrated transport system. The Act seeks to integrate land use and transport planning and decision-making by extending the framework to land-use agencies whose decisions can significantly affect transport, including the government's planning functions, municipal councils, the GAA and Parks Victoria.

Queensland

At the State level the roles and functions of metropolitan planning and infrastructure planning are integrated across government by the Department of State Development, Infrastructure and Planning. The department oversees whole-of-government urban and regional planning.

The Queensland Government is responsible for State planning policies and regional plans. Local government planning schemes direct building and development in each local government area, but must integrate state interests. They are periodically reviewed and approved by the Deputy Premier and Minister for State Development, Infrastructure and Planning and must align with the strategic policies set out in regional plans and the State planning policy.

Queensland has regional planning committees to oversee development and implementation of regional plans. They are statutory groups made by the Deputy Premier and Minister for State Development, Infrastructure and Planning and typically comprise relevant State agencies, councils and community members.

Other forums provide the state and local governments with strategic policy advice. In South East Queensland the SEQ Council of Mayors is a cooperative group of mayors that examines strategic issues affecting the region.

Local area plans are prepared primarily by local governments and give more detail about desirable types of development in particular neighbourhoods. Local area plans are incorporated into the local government planning scheme. They must be approved by the Deputy Premier and Minister for State Development, Infrastructure and Planning and align with the State's strategic policies.

Local governments manage the vast majority of development assessments and mostly determine development applications. Assessment of development applications that are either referred to the state for assessment against state interests, or where the assessment is undertaken by the state as the assessment manager, is undertaken by the State Assessment and Referral Agency (SARA) located within the Department of State Development, Infrastructure and Planning. SARA coordinates advice across state agencies and provides a single response to the assessment manager or applicant.

The Queensland Government has prepared a single State planning policy that consolidates the State interests previously articulated in several state planning policies, and incorporated newly identified interests to provide a comprehensive and integrated document detailing the strategic policy and principles to guide plan making and, where necessary, development decision-making at the state, regional and local levels.

Metropolitan planning

The *Sustainable Planning Act 2009* is the foundation of Queensland's planning and development assessment system. It sets out the laws and the tools to manage land use planning and provides a logical sequence of planning from the state, to regional, council, neighbourhood, street and site level. Strategic components of the system include Regional Plans and the State Planning Policy.

The State Planning Policy articulates the state's position across all matters of state interest, and can apply across the State or in specified areas. Regional Plans are used to articulate the Queensland Government's broad intent for development in particular regions. They shape cities by setting growth boundaries, identifying areas for urban development and outlining how development should occur in a particular region.

A number of regional plans are in existence across Queensland, which provide high level policy direction that extend over a number of local council areas. The South East Queensland Regional Plan was first established in 1998 and became a statutory planning tool endorsed by Cabinet in 2005. It has been reviewed periodically, most recently in 2009 (SEQ Regional Plan 2009–2031). The next review is scheduled to commence in late 2013. The plan encompasses the greater Brisbane area and the major urban centres of Ipswich, Gold Coast, Sunshine Coast, Logan and Toowoomba.

The regional plans inform the preparation and implementation of local-level planning. For Queensland's capital city itself, the Brisbane City Plan 2000 directs all building and development in the Brisbane City Council area. This plan was reviewed and approved by the Planning Minister. Brisbane City Plan 2000 is currently under review by Brisbane City Council with anticipated completion in late 2013.

Western Australia

The Western Australian planning system is characterised by the central role exercised by the Western Australian Planning Commission (WAPC), a statutory authority reporting to the Minister for Planning. The WAPC is serviced by planning committees and is supported by the Department of Planning which provides professional and technical expertise, administrative services and other resources, and implements WAPC decisions.

The WAPC has State-wide responsibilities for urban, rural and regional land-use planning and land development matters. It responds to the strategic direction of government and is responsible for the strategic planning of the State. Environmental assessment, where required, is carried out by the Environmental Protection Authority, established under separate legislation.

The Western Australian planning system is partially funded through a land tax known as the Metropolitan Region Improvement Tax. This provides a fund for strategic land purchases

such as acquiring land for future urban transport corridors, and to assist with the costs of implementing the Metropolitan Region Scheme.

Metropolitan planning

The *Planning and Development Act 2005* (Western Australia) provides a statutory framework for the preparation and amendment of State planning policies (SPPs), region schemes, local planning schemes, subdivision and development control, and a State planning strategy, as a basis for coordinating and promoting land use planning, transport planning and land development in a sustainable manner, and for the guidance of public authorities and local governments.

The WAPC prepared the State Planning Framework (SPP 1) to guide its strategic direction. It unites existing State and regional policies within one document and sets out key principles for the environment, community, economy, infrastructure and regional development, to guide future planning decisions and also provides a range of strategies and actions which support these principles. An example is *Directions 2031* which forms a key part of the Framework and aims to guide planning and infrastructure provision to manage population growth within the Perth and Peel regions to 2031 and beyond.

Western Australia has a long tradition of metropolitan-wide planning starting with the adoption of the Stephenson-Hepburn plan in 1955 through to *Directions 2031* published by the WAPC in 2010.

Directions 2031 has set a target for a 50 per cent improvement on the existing rate of infill development, and of greenfield dwelling densities. The WAPC publishes an annual *Urban Growth Monitor* (UGM) which identifies land zoned for urban development and evaluates growth trends covering more than 110,000 hectares of urban land across the Perth metropolitan, Peel and Greater Bunbury regions. The UGM identifies historic trends of development and monitors density planned for and achieved in new developments. The UGM tracks progress towards achieving the Directions 2031 strategic vision, such as urban zoned land supply, subdivision approvals, stock of vacant subdivided lots, rates of infill and trends in residential density.

The UGM is produced as part of the Urban Development Program (UDP) which monitors and coordinates land supply, development and infrastructure to deliver a more effective use of land, better staging of development and prioritisation of infrastructure spending. The program includes a series of annual publications covering historical information, assessments of demand drivers and forecasts of land supply in the short, medium and long term. *The Perth and Peel Development Outlook 2011–12* forms a major part of the UDP's role in monitoring urban growth, providing a detailed overview of urban development patterns across the Perth and Peel metropolitan area. UDP publications and online applications also describe the 'land supply pipeline', identifying and reporting on the key stages of the land supply process to provide a comprehensive assessment of land, lot and dwelling supply across Western Australia.

Responsibility for oversight of significant urban and regional land and housing development has been assigned to the Department of Planning through the Lead Agency Framework. The Lead Agency Framework, implemented in October 2009, nominates a State government agency to help proponents through approvals processes.

Four agencies are responsible for delivery of urban developments against milestones, namely the Department of Planning, LandCorp, the Office of Strategic Projects and the Metropolitan Redevelopment Authority which commenced operation on 1 January 2012 and replaces and combines the responsibilities of the former separate Armadale, East Perth, Midland and Subiaco Redevelopment Authorities.

In July 2011, the Western Australian Ministers for Planning and Environment and the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities agreed to undertake a Strategic Assessment of the Perth and Peel regions of Western Australia which will assess the impact of the future urban development proposed under Directions 2031. The Strategic Assessment provides the opportunity to avoid, mitigate and offset the environmental impacts of future development at a strategic scale and consequently achieve long term environmental and conservation outcomes. It is envisaged that as an outcome of this process, a long term and strategic response to environmental matters will be embedded into the planning framework. Western Australia is taking a collaborative whole-of-government approach to the assessment involving all of the relevant portfolios, namely environment, planning, water, minerals and petroleum under the leadership of the Premier's department. This collaboration at both the state and Commonwealth levels will result in the removal of the current duplication by streamlining the approval processes and reducing the red tape leading to reduced need for project by project assessment, deliver an effective long term and strategic response to key environmental issues in the Perth and Peel region, provide greater certainty to industry as to which areas can be developed and what the obligations will be in terms of mitigation including environmental offsets and provide greater certainty in terms of long term land supply to meet the needs of a city of 3.5 million.

South Australia

The South Australian Government is pursuing a policy agenda spearheaded by a focus upon a collaborative, whole-of-government approach through a series of strategic priorities. In relation to land use planning, the Department of Planning, Transport and Infrastructure (DPTI) is the lead state government agency. DPTI determines the South Australian planning policy framework, which embodies the government's vision for future development, the South Australian Planning Strategy.

The metropolitan and regional volumes comprising the SA Planning Strategy are a series of strategic land use plans prepared for specific geographic areas of the state. The volumes represent a whole-of-government approach to the future development of each region to promote social, economic and environmental outcomes tailored to the unique characteristics of each region. The metropolitan volume of the Planning Strategy was released in 2010, named the 30-Year Plan for Greater Adelaide.

Pursuant to the Development Act, Strategic Directions Reports are prepared for local government areas every five years, which are designed to set an agenda for upcoming amendments to local Development Plans – changes that must be consistent with the strategic priorities outlined in the relevant volume of the Planning Strategy.

The Development Policy Advisory Committee (DPAC) and the Environment, Resources and Development Committee (ERDC) are statutory bodies of advice and review established to provide feedback and guidance to the Planning Minister and Cabinet on a range of development matters, including the provision of advice on amendments to the Development

Act, Regulations, The Planning Strategy, local development plans and on other matters of state planning policy.

The State Government collaborates with local government on planning policy matters through regional organisations of councils established by the South Australian Local Government Association. The regional organisations meet on a regular basis, with key representatives of state government agencies present to maintain cooperation and promote the effective coordination of service delivery. Local governments determine development applications, with certain requirements in place for the use of independent development assessment panels or the state government Development Assessment Commission where matters of increased complexity are considered.

Clear processes of appeal and review of planning and development decisions are well established in South Australia. The Environment, Resources and Development (ERD) Court has jurisdiction over most development application matters resulting from appeals to planning decisions issued by a planning authority. The ERD Court also provides for a pre-trial conference model which has been successful in substantially reducing the number of appeals escalating to a formal hearing.

The South Australian Expert Panel on Planning Reform (EPPR) was established in early 2013 by the Minister for Planning. The EPPR consists of five industry professionals with a broad range of expertise tasked with delivering recommendations to the Minister on potential improvements to South Australia's land use planning and development system. An EPPR reference group has been established and will shortly consider a broader engagement strategy. The EPPR will deliver final report and recommendations to the Minister in December 2014.

Metropolitan planning

The Adelaide metropolitan area, together with the surrounding hills, coast and hinterland are contained in a single volume of the Planning Strategy – the 30-Year Plan for Greater Adelaide. Released in 2010, the 30-Year Plan envisages an urban form designed to cater to the medium to long term needs of the city and its surrounds in the context of changing environment, economic and social needs.

The 30-Year Plan seeks to promote several key planning directions for the future development of Greater Adelaide. These directions include the containment of urban sprawl, the enabling of mixed use and higher density development in favourable areas, the delineation of corridors and employment lands, the protection of heritage and the adaptation and resilience to climate change. Targets contained within the 30-Year Plan for Greater Adelaide are closely monitored, with system performance reported on annually via a 'report card' format.

Guided by the objectives of the 30-Year Plan, local development plans have undergone amendments using the suite of policy tools available in the South Australian Planning Policy Library. Certain areas of the city such as the inner metropolitan rim and the north-west transit corridor are also undergoing a structure planning process to plan for future infrastructure and development investment. The State Government has also recognised the importance of the internationally renowned Barossa and McLaren Vale areas by enacting legislation designed to protect those areas from urban encroachment and to maintain productive capacity.

The City of Adelaide is the primary focus of cultural, institutional and economic activity in South Australia and the state government has worked towards gaining further investment

through its *Creating a Vibrant City* strategic priority. This agenda currently incorporates a targeted program of direct precinct activation and a suite of tailored pre-lodgement advice, case management services and expert urban design review for all significant inner city development proposals.

Regional planning

Each of the regional areas of South Australia are covered by a volume of the Planning Strategy, which incorporates the Far North, Eyre and Western, Mid North and Yorke Peninsula, Kangaroo Island, Murray and Mallee and the Limestone Coast. The plans are reviewed every five years, with present plans under review including Kangaroo Island and the Mid North and Yorke Peninsula.

Planning staff from DPTI regularly engage with and travel to regional councils across the state, providing a direct dialogue between levels of government on local planning and development issues.

The regional planning team supports councils in the development of planning policy, including the preparation of structure plans and Development Plan Amendments. Several regional councils are currently in the process of undertaking structure plans, which are designed to be used as long term strategic planning tools for major towns and urban areas.

Tasmania

Governance arrangements for regional and city planning in Tasmania embrace both cooperative and statutory approaches.

The Tasmanian Government, in partnership with the State's three regional local government organisations (Cradle Coast Authority, Northern Tasmanian Development and the Southern Tasmanian Councils Authority) and their respective member councils, established regional planning steering committees to implement significant planning reforms through the Regional Planning Initiative.

The three regional planning committees comprise local and State government representatives and operate under Memoranda of Understanding with resourcing provided by both Government and councils.

To date, the cooperative partnership has delivered:

- Three regional land use strategies (RLUS) that integrate city and urban development strategies
- A single statewide planning scheme template and three supporting regional model planning scheme templates
- Statewide planning provisions

New interim planning schemes, consistent with the regional land use strategies and planning scheme templates, are being finalised to replace all existing schemes across the State.

The statutory approach involved amendments to the *Land Use Planning and Approvals Act 1993* authorising the Planning Minister to:

- Declare a region and a Regional Land Use Strategies

- Monitor and review a Regional Land Use Strategy

- Require councils, as local planning authorities, to ensure their new interim schemes comply with the relevant Regional Land Use Strategy and be consistent with planning scheme templates and planning directives.

The Government also amended the *Tasmanian Planning Commission Act 1997* to provide the Commission with broader responsibilities, as the independent, peak planning authority, to work with regional planning committees and councils to complete the roll out of new, consistent and contemporary planning schemes and ongoing planning reform.

Metropolitan planning

The Planning Minister requested the Commission to manage implementation of the COAG Capital Cities Planning Systems Agreement, the COAG Reform Council's compliance review and, more recently, the national Cities Work Plan.

A capital city steering committee of metropolitan council representatives from the southern regional planning committee and state agency representatives was formed to coordinate State agency and local government strategies for the Greater Hobart Plan. Relevant components of the final capital city plan will be incorporated with the Southern Tasmania Regional Land Use Strategy and other economic development, infrastructure and service implementation plans and programs.

The Launceston City Council has also received Commonwealth funding and State assistance to produce a Greater Launceston Plan. The final plan will be integrated with the Northern Regional Land Use Strategy and other relevant implementation plans and programs.

The final element of the Regional Planning Initiative is to resolve a city-region governance structure and system for ongoing regional and metropolitan planning. Detailed consultations have been held with the regions and councils on possible governance models. Further stakeholder consultations are planned prior to a report being presented to the Planning Minister and Government to formalise an ongoing city-region planning structure and system for Tasmania.

Northern Territory

The Northern Territory Government, through the Minister for Lands, Planning and the Environment, is responsible for administering the *Planning Act (NT)*.

A single statutory planning document, the Northern Territory Planning Scheme, applies to the whole of the Northern Territory. It contains planning principles which are the Government's commitment to outcomes for land-use planning and development control. The scheme also contains framework drawings and area plans which further detail the principles and objectives to guide development of major urban and regional centres such as Darwin and Alice Springs.

In late 2012, the Northern Territory Government amended the *Planning Act* to establish the Northern Territory Planning Commission. The Commission will guide the Northern Territory's long-term growth, and to provide confidence and certainty for industry and community.

The functions of the Commission are to prepare integrated strategic land use plans for regions, towns and centres; and to prepare guidelines and assessment criteria for inclusion in the NT Planning Scheme. A secondary role of the Commission will be to provide advice to the Minister on significant developments.

The Development Consent Authority, rather than local councils, is responsible for determining development applications in accordance with the Northern Territory Planning Scheme.

Membership of the Development Consent Authority includes two representatives of local councils. Councils are also joint partners with the Northern Territory Government in developing visions and providing comments on changes to the Northern Territory Planning Scheme.

Metropolitan planning

The Northern Territory Government has developed a range of integrated and co-ordinated strategic plans for the growth of the Territory and is developing others.

The 10-year Infrastructure, Roads and Transport strategies were released in February 2012. One of the first tasks of the Northern Territory Planning Commission is to finalise the strategic land use plan for the Greater Darwin Region. The plan will include a review of the *Darwin Regional Land Use Structure Plan 1990* and build on the discussion paper titled *"Planning for Greater Darwin – A Dynamic Harbour City"* and the draft *Greater Darwin Plan* that was publicly exhibited in early 2012.

Australian Capital Territory

Land planning and administration in the Australian Capital Territory (ACT) is based on a leasehold system. This system was adopted to ensure that government could realise the planning outcomes for the new capital city without the limitations associated with land in private ownership. It also sought to ensure that some of the profits from land development would be returned back to the community to contribute to the continued development of the capital.

The Commonwealth Government maintains an interest in the overall planning of the National Capital to safeguard aspects of "national significance". The *National Capital Plan* is the overarching statutory plan that sets out broad land use policy within the ACT. The National Capital Authority is the Commonwealth Agency charged with administering the *National Capital Plan* and has the planning responsibility for all 'designated' land including leased land administered by the Territory.

The ACT Government has both State and local government functions. It has principal responsibility for the management of Canberra, including the provision of civil and community infrastructure, the protection of the environment and the administration, development and management of both rural and urban land.

Planning policy advice is given to the ACT Government through the Environment and Sustainable Development Directorate, which also has independent statutory approval powers for applications, through the Chief Planning Executive. The Minister for the Environment

and Sustainable Development reserves 'call-in' powers for development applications under certain circumstances.

The Environment and Sustainable Development portfolio also contains the Conservator for the Environment, the Territory's heritage functions, building industry regulation and compliance.

The *Planning and Land Management Act 1988 (Cth)* sets out the broad interrelationships between the ACT Government and the Australian Government in planning and managing Canberra. This Act establishes the significance of the National Capital Plan and that the urban planning and development of Canberra, in the broadest sense, must not be inconsistent with the National Capital Plan. The ACT's *Planning and Development Act 2007* provides for the Territory Plan, which is the ACT Goverment's statutory planning document. Planning responsibility is divided between the Australian and ACT Governments but urban management functions are almost solely the responsibility of the ACT. A variety of formal and informal processes are in place to coordinate and manage this division in Territory/ Commonwealth interests.

The Canberra-Queanbeyan statistical district also contains the City of Queanbeyan (located within New South Wales). In May 2012, the ACT was made a member of the South East Regional Organisation of Councils (SEROC) in recognition of the significant dependencies between the ACT and its surrounding region. The ACT Government also liaises directly with the NSW Government and adjoining local government areas through various forums and through the NSW Cross Border Commissioner. The ACT Government works with the NSW Government on regional planning.

A Directors-General Land Supply Committee has been established to support the delivery of the Government's land supply program. The committee oversees the coordination of infrastructure and environmental approvals. This Committee reports to the Urban Development Committee, a sub-committee of the ACT Cabinet.

Metropolitan planning

The Canberra Plan is the ACT Government's highest order strategic plan. It identifies the objectives and outcomes for the social, cultural, economic and environmental development of the ACT. In 2004 the Canberra Spatial Plan (and companion Sustainable Transport Plan) was adopted as the ACT Government's strategic land use plan. The *Planning and Development Act 2007* made this a notifiable instrument and nominated these plans as the "transitional Planning Strategy". This Act also called for the Executive of Government to consider the requirement to review the ACT Planning Strategy every five years.

In line with this, the ACT Government commenced this review as part of the Sustainable Future Program. The ACT Government also conducted a broad public consultation program *'Time to Talk: Canberra 2030'.* The results of both programs informed the development of new *ACT Planning Strategy,* released by the ACT Government in August 2012. The *ACT Planning Strategy* along with *Transport for Canberra* and *Weathering the Change Action Plan 2* will guide the sustainable, integrated land use and transport planning, and policies for Canberra. In essence they will give spatial effect to the social and economic strategic plans. These documents are broadly consistent with the *Metropolitan Structure Plan* contained within the *National Capital Plan* and also inform further refinement of the *Territory Plan.*

Chapter 6 references

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Launceston.
Image courtesy of John Hardman

Appendix A:
National Urban Policy Implementation Plan

Introduction

In May 2011, the Australian Government released *Our Cities, Our Future – a national urban policy for a productive, sustainable and liveable future* (the National Urban Policy).

The National Urban Policy is supported by a set of initiatives that contribute to delivering on its productivity, sustainability and liveability goals set out in the National Urban Policy Summary Action Plan (Chapter 7).

The Action Plan includes initiatives to be implemented over the short, medium and long term across portfolios, and this component of the Governance chapter reports on the progress of these initiatives.

Initiatives completed prior to the 2012 report have not been included in this year's report.

Productivity

1. Improve labour and capital productivity by:

- Aligning workforce availability and capacity to meet labour force demand
- Supporting education, research and innovation

Initiatives	Aims	Timeframe	Progress
Sustainable Population Strategy (SEWPaC)	Outline the government's framework for a Sustainable Australia as a nation of sustainable communities that have the services; job and education opportunities; affordable housing; amenity; and natural environment that make them places where people want to work, live and build a future.	2011–14	The *Sustainable Population Strategy* (SPS) was released in May 2011 as a high-level policy framework that outlines the breadth of programs, policies and reforms operating across government to deliver on the aims and objectives of the SPS. Delivery on a number of specific initiatives is summarised later in this report.
Trade Training Centres in Schools $2.5 billion (DEEWR)	Give young Australians greater training opportunities and help address skills shortages.	2008–18	The first funding round of the program opened in March 2008. As of 24 May 2013: • $1.2 billion has been approved to fund more than 370 projects, benefiting more than 1070 schools; • 268 Trade Training Centres are already built (benefiting more than 765 schools). The latest funding of $400m announced in October 2012 under Round Five will bring the total current investment in trade training infrastructure in Australian secondary schools to more than $1.6 billion since 2008.
Education Investment Fund (EIF) $4.15 billion (DIICCSRTE)	Build a modern, productive, internationally competitive Australian economy by supporting world-leading, strategically-focused infrastructure investments to transform Australian tertiary education and research.	2008–	Since 2008, four competitive EIF funding rounds have been conducted. In the 2011–2012 Budget, $500 million was announced for a Regional Priorities Round of EIF. A two-stage application process was conducted. To date 9 higher education sector projects and 1 VET sector project have been announced. Further announcements in the TAFE sector are pending.

Initiatives	Aims	Timeframe	Progress
Powering Ideas – supporting industrial transformation by helping workers and entrepreneurs move into higher, value-added activities (DIICCSRTE)	Improve productivity and elevate levels of value-added industrial output through investing in innovative infrastructure; reforming university funding; investing in science and research infrastructure; boosting investment with a focus on excellence and transparency; increasing support for postgraduate research students; and improving innovation skills and workplace capabilities, particularly management and leadership skills.	2008–13	A range of initiatives have been put in place to deliver on Powering Ideas, including the R&D Tax Incentive, Commercialisation Australia, Super Science initiatives, the Clean Technology Program and Enterprise Connect. The government is also carrying out a Review of Venture Capital and Entrepreneurial Skills in Australia to establish what future actions might be required in this area to help build early stage Australian companies with high growth potential. Under *A Plan for Australian Jobs* the Government will invest $504.5 million between 2012–13 and 2016–17 in the Industry Innovation Precincts Program. Precincts will be industry-led, national networks which will boost the capability and capacity of Australian firms so they can win more business abroad and take advantage of growing demand internationally. Led and run by industry, Precincts are designed to be highly flexible and responsive, so that they can propel innovation, boost productivity and increase growth. Precincts will offer the Growth Opportunities and Leadership Development (GOLD) service to small to medium enterprises (SME) assessed as having high growth potential. GOLD is designed to provide high potential SMEs with a single point of access to a range of advanced business support services. The first two precincts (in the manufacturing and food sectors) will be operational from mid-2013. The remaining Precincts will be selected through a competitive selection process in 2013, with Stage 1 of the process closing to applicants on 5 June.
The $45 million Suburban Jobs program to distribute jobs and economic opportunity into suburban areas, reducing travel demand, congestion and providing diversified economic activity (SEWPaC)	The Suburban Jobs Program aims to support local and state governments to plan for and provide enduring employment opportunities in the growing outer suburbs of our major capital cities.	2012–14	The University of Western Sydney, the City of Playford and the Melton City Council were announced in 2012 as the successful Suburban Jobs Program applicants by the Minister for Sustainability, Environment, Water, Population and Communities. Funding agreements are now in place with each proponent and projects are underway. The University of Western Sydney will receive $13.5 million to support the $29.5 million Werrington Park Corporate Centre in Penrith. The centre will create a focal point for new employment in the region and trigger the longer term development of a comprehensive business park. The City of Playford will receive $11.3 million for the $16.6 million Stretton Centre, an employment research and development facility to be located within the Playford Alive project area. Melton City Council will receive $14.6 million towards the establishment of the $21 million Western Business Accelerator and Centre for Excellence which will be built in the Toolern Precinct, located in Melbourne's west.

Initiatives	Aims	Timeframe	Progress
Work with industry and others to promote opportunities for the development of specialised clusters of economic activity with high potential for interactive innovation (DIICCSRTE)	Improve integration between the Australian Government and industry on the integration of skills, innovation, creativity and infrastructure.	2008–	The Enterprise Connect *Innovative Regions Centre* drives regional capability by supporting business clusters and networks, helping them to identify local strengths and resources (including those in local universities, training institutions and large firms) and capitalising on these combined resources to access larger markets outside their regions. Industry Innovation Precincts (see above in 1.5) will improve collaboration by bringing together value chains in a sector or industry. Importantly, although each Precinct will be headquartered in a specific location, they will focus nationally to better coordinate existing services, leverage Australia's research capacity and provide new tools and services to improve the productivity and capability of firms especially SMEs.
Produce spatial reports on land use and infrastructure (DIT)	Improve understanding of the economic and social dynamics of cities to underpin evidence-informed urban policy.	2011–13	A suite of maps that spatially represent a range of indicators in Australia's major cities have been prepared to complement the 2013 State of Australian Cities Report.
Seek COAG support to augment planning system reforms to include city-wide economic strategies and spatially-based productivity and innovation policies (DIT)	Create efficient planning systems that drive multifactor productivity improvements.	2011–13	The Transport and Infrastructure Senior Officials Committee (TISOC) established a Cities Group in 2012 to progress the COAG cities agenda through the Standing Council on Transport and Infrastructure (SCOTI). The TISOC Cities Group will work to deliver on the SCOTI objective to achieve a co-ordinated and integrated national transport and infrastructure system that is efficient, safe, sustainable, accessible and competitive. The Cities Work Plan was approved by SCOTI in November 2012, and includes key deliverables such as improving national information on cities, sharing best practice in strategic planning systems and improving the understanding of, and engagement with, other intergovernmental work affecting cities.

2. Integrate land use and infrastructure by:

• Integrating planning of land use, social and economic infrastructure

• Investing in urban passenger transport

• Protecting corridors, sites and buffers

Initiatives	Aims	Timeframe	Progress
$36 billion investment in land transport infrastructure (DIT)	Support land transport infrastructure in Australia.	2009–14	Delivery of a number of specific initiatives is summarised later in this report.
Passenger rail projects in each of the mainland capital cities (DIT)	Improve metropolitan rail networks in six of Australia's major cities: Sydney, Melbourne, Brisbane, Perth, Adelaide and the Gold Coast.	2009–19	Parramatta to Epping Rail Link – yet to commence. The funding commitment for the Parramatta to Epping Rail Link is available from 2019–20. Noarlunga to Seaford – underway. Construction was completed in 2012. Electrified services are expected to commence late 2013. Gawler Line – track and station works completed, with discussion ongoing on the future electrification. Perth CityLink – underway. Rail infrastructure is being installed in the Fremantle tunnel. Moreton Bay Rail – underway. Construction is complete and open to traffic on the new road over rail bridge at Kinsellas Road. The tenders for the Design and Construct Contract for the project closed on 3 May 2013 with the contract expected to be awarded late July 2013. Project to be completed in 2016. Regional Rail Link – under construction. Works have commenced on all major work packages. The project is expected to be complete in 2016. Gold Coast Rapid Transit – underway. Major construction works have commenced. Project to be completed in 2014.

Initiatives	Aims	Timeframe	Progress
Implement recommendations of the Aviation White Paper (DIT)	Give industry the certainty and incentives to plan and invest for the long term, strengthening safety and security and addressing the needs of travellers, airport users and communities affected by aviation activity.	2011–	Airports are now required to establish a Community Aviation Consultation Group (CACG) to provide for exchange of information with local communities on issues (such as aircraft noise) which affect airports' relations with their neighbours. Major capital city airports (Brisbane, Sydney, Melbourne, Hobart, Adelaide, Perth, Darwin and Canberra) will be required to establish Planning Coordination Forums (PCFs) with planning authorities to better coordinate planning at and around the airports. Each airport will be required to notify the community of all building applications at the airport, regardless of their scale or significance, by publishing them on the airport website. The Government will establish a panel of Expert Advisers to allow it to quickly access expert technical advice on planning issues related to the airports.
Moorebank Project Office established to develop an intermodal terminal on Commonwealth-owned land (DIT)	Conduct a feasibility study on the potential development of an intermodal freight terminal at Moorebank in south-western Sydney, and subject to outcomes proceed to implementation.	2012–17	In April 2012 the Australian Government, following consideration of a Detailed Business Case, committed to the implementation of an Intermodal Terminal at Moorebank in South West Sydney. As part of this decision the Moorebank Intermodal Company (MIC) was established in December 2012 to oversee the open and competitive tender process for development of the terminal by the private sector. MIC has recently concluded a Registration of Interest process for the tender and is expected to commence public consultation on its Environmental Impact Statement in the second half of 2013.
Funded Integrated Design Strategy trial in Adelaide to promote best practice (DRALGAS)	Deliver integrated design strategy for Adelaide city and surrounds.	2010–13	Implemented.

Initiatives	Aims	Timeframe	Progress
Joint Study on Aviation Capacity in the Sydney Region (DIT)	Report on short-term and long-term aviation infrastructure and supporting surface transport requirements of the Sydney region.	2012–	In response to the *Joint Study on aviation capacity in the Sydney region* released in March 2012, the Australian Government appointed technical experts to undertake a scoping study into Wilton's suitability as a second Sydney airport and to explore the use of RAAF Base Richmond for limited civil operations. This culminated in *A Study of Wilton and RAAF Base Richmond for civil aviation operations* being released on 10 May 2013. This further work identified the engineering and environmental challenges, social and economic (including employment) effects of an airport development at Wilton or RAAF Base Richmond. It concluded that the development of an airport at Wilton is possible, but would involve environmental and engineering challenges. Additionally RAAF Base Richmond presented opportunities for limited civilian operations but would not remove the need for a greenfield site. The Minister announced that the Government will: • conduct geotechnical analysis of the Wilton site to determine the impact mining subsidence could have on an airport development; and • commence discussions to explore the possibility of opening up RAAF Base Richmond to civil aviation. Work to determine the scope of the geotechnical analysis has commenced. A working group will be established with the Department of Defence, and the Department of Finance and Deregulation, to advance the RAAF Base Richmond aspects.

Initiatives	Aims	Timeframe	Progress
Implement recommendations of the *National Ports Strategy* and *National Land Freight Strategy* around corridor and site protection, and incorporate with COAG capital city planning systems reforms (DIT)	Address issues such as best use of infrastructure; integration of port, freight and land use planning; capacity for growth; and responsiveness of infrastructure to demand. Best practice long term integrated planning and management of infrastructure corridors. Improve the efficiency of freight movements across infrastructure networks, through long term planning, infrastructure investment, greater access, investment and charging for heavy vehicles; better regulation; better data to understand the freight task; and building community support.	2011–14	The *National Ports Strategy* was endorsed by COAG in July 2012 and the implementation is being managed by Infrastructure Australia and the National Transport Commission. The initial phase of implementation has focussed on encouraging jurisdictions to establish long term ports plans, supported by accurate forecasting and analysis. The *National Land Freight Strategy* was released by the Standing Committee on Infrastructure and Transport on 10 May 2013, and implementation is addressing, amongst other actions: • Identification of the existing and yet-to-be built roads, rail lines, intermodals, ports and airports which will link together to form a workable, truly national freight network. • Protection of the network's land corridors from urban encroachment, • Ensuring that any long term capital works program prioritises projects of greatest strategic importance. • Reform of the transport industry regulations, ultimately to replace the existing different state based arrangements with one set of nationwide laws. • Putting in place national regulators for maritime safety, rail safety and heavy vehicles.
Progress the recommendations of the high speed rail feasibility study (DIT)	Assess feasibility of a high speed rail network on the east coast of Australia.	2011–14	The Minister launched the report from phase 2 of the study on 11 April 2013 and invited comment and feedback on the report, via the Department's website, until 30 June 2013. The Minister also announced the formation of an HSR Advisory Group and a Ministerial Group. In addition, he tasked the Department with consulting with local government, community groups, and Regional Development Australia committees along the preferred route as well as industry organisations, both domestically and internationally.

Initiatives	Aims	Timeframe	Progress
Apply the principles and objectives of the National Urban Policy to Nation Building 2 Program (DIT)	Ensure that the Nation Building 2 aligns with and supports national city reform agenda.	2012–	Nation Building 2 framework announced as part of the 2012–13 budget has incorporated reference to delivering on National Urban Policy goals and objectives. Major projects receiving funding under Nation Building 2 were announced as part of the 2013–14 budget.
Require, as a condition of funding for Nation Building 2, that each capital city to have in place by 2014 a freight strategy consistent with the *National Ports Strategy* and *National Land Freight Strategy* (DIT)	Ensure that Nation Building 2 aligns with and supports the national ports and freight reform agenda.	2011–	Underway.

3.   Improve the efficiency of urban infrastructure by:

- Maximising returns on new and existing infrastructure
- Taking into account operational and maintenance costs of infrastructure and assets
- Improving the use of smart infrastructure
- Enhancing connectivity through the National Broadband Network

Initiatives	Aims	Timeframe	Progress
Infrastructure Australia's Reform and Investment framework (IA)	Identify reforms and investments that are vital to ensure that Australia's economic infrastructure continues to support and drive the nation's economic, social and environmental success.	2008–	The 2013 Report to COAG includes the latest updates to the infrastructure National Priority List.
National Broadband Network (DBCDE & NBN Co)	A new forward-looking national high-speed communications network, based around fibre infrastructure, to improve broadband access, competition and productivity, and able to support, amongst other things, smart infrastructure, teleworking and flexible work arrangements.	2009–17	The National Broadband Network (NBN) will provide access to high speed broadband to 100 per cent of Australian premises. It will connect 93 per cent of homes, schools and businesses to a high speed fibre network capable of providing broadband speeds of up to one gigabit per second (Gbps). Seven per cent of premises will be served by a combination of next generation fixed wireless and satellite technologies providing peak speeds of up to 25 megabits per second (Mbps). The Government has established NBN Co Limited (NBN Co) to design, build and operate the NBN. At 31 March 2013 there were 363,360 premises in the overall coverage footprint, of which 68,200 premises in brownfield areas and approximately 28,000 premises in new developments were passed by the NBN fibre network. The 363,360 also comprises 17,300 premises covered by the NBN fixed wireless network and 250,000 premises by the NBN satellite service. Overall, at the end of March 2013, there were more than 48,000 premises across the fibre, satellite and fixed wireless footprints with an active NBN service. On 5 May 2013, NBN Co released its updated three year national fibre rollout plan. The 2013–16 plan lists 4.8 million homes and businesses, for which construction on the fibre network will commence, or be completed, by mid-2016.

Initiatives	Aims	Timeframe	Progress
Extensive studies on projects dealing with urban congestion in Sydney, Melbourne, Perth and Brisbane (DIT)	Look at population growth, jobs growth and commuting patterns to gain a better understanding of underlying dynamics of transport demand in major cities.	2010–13	BITRE has published reports on Perth, Melbourne, Sydney and South East Queensland in a series of investigations into spatial changes in population, employment and commuting in our largest cities. A comparative report is underway. These reports explore the extent to which spatial development and commuting patterns in our largest cities have been reshaped in the directions envisaged in their respective metropolitan plans.
National Managed Motorways Program covering Sydney, Adelaide, Melbourne, Brisbane and Perth (DIT)	Retrofit smart technology to improve traffic flows along congested motorways and outer city roads.	2011–15	Australian Government funding has been approved for projects on the M4 in Sydney and the West Gate Freeway in Melbourne.
Provide an additional $3 million per annum to Infrastructure Australia to boost its strategic capacity and deepen the National Priority List (DIT & IA)	Support ongoing provision of infrastructure reform and expenditure advice to the Australian Government.	2010–	Additional funds were provided to Infrastructure Australia in the 2011–12 Budget.
Consider establishing a private sector working group to develop strategies to further private and superannuation sector investment in nationally significant infrastructure (IA)	Increase private investment in infrastructure projects.	2011–14	The Infrastructure Finance Working Group was established in 2011 and its report *Infrastructure Finance and Funding Reform* released in June 2012. Relevant agencies are identifying options for implementation of its recommendations.
Continue to encourage best practice delivery of public private partnerships (PPPs) by the states and territories in infrastructure procurement where these provide value for money (IA)	Apply IA best practice PPP Guidelines in jurisdictions.	2011–14	The National PPP Working Group is developing options for refinement of National PPP Guidelines on discount rate methodology.

Initiatives	Aims	Timeframe	Progress
Implement governance reforms to enhance transparency in infrastructure planning, including a National Construction Schedule and post-build evaluation framework (DIT)	Create a comprehensive schedule that details all large economic and social infrastructure projects to create greater certainty for industry and increased competition.	2012–	The National Infrastructure and Construction Schedule (NICS) was delivered with the support and input of States and Territories in 2012 and is ongoing.
Implement a new tax incentive linked to the National Priority List to encourage private sector investment in priority infrastructure (IA)	Establish special tax provisions to improve certainty for private sector investment in nationally significant projects.	2011–14	Infrastructure Australia has provided guidance on implementation of the proposed incentive.

Sustainability

4. Protect and sustain our natural and built environments by:

- Protecting and enhancing natural ecosystems
- Supporting sustainable development and refurbishment of our built environment

Initiatives	Aims	Timeframe	Progress
Working with the community, Governments and industry to manage our natural resources through the *Caring for our Country* Program (SEWPaC)	Achieve an environment that is healthy, better protected, well-managed, resilient and provides essential ecosystem services in a changing climate.	First Phase 2008–13 Second Phase 2013–18	The first phase of the program invested over $2 billion across six priority areas including Coastal environments and critical aquatic habitats and Community skills, knowledge and engagement. The *Caring for our Country 2008–13 Achievements Report* is scheduled for release by June 2013. The Australian Government is providing over $2 billion to continue Caring for our Country from 2013–14 to 2017–18. The second phase of Caring for our Country will be delivered through two streams: Sustainable Environment and Sustainable Agriculture. Of particular relevance to urban areas, under the Sustainable Environment stream Caring for our Country will invest in actions that by 2018 will: • better protect and conserve nationally and internationally significant ecosystems, species, ecological communities and landscapes; and • build community capacity and connection with the environment, including through activities that re-establish urban bushland, areas of Indigenous significance and the health of urban waterways. Urban waterways and coastal environments have been targeted for investment through the 2013–14 Target Area Grants component of Caring for our Country.
Protect internationally significant species and areas through the application of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (SEWPaC)	Increase environment and heritage protection and biodiversity conservation.	1999–	Amendments to the EPBC Act to implement the government response to the report of independent review of EPBC Act are planned to be introduced in the next session of the Parliament.

Initiatives	Aims	Timeframe	Progress
Improving the efficiency of new buildings and major renovations through the *Building Code of Australia and Building Energy Efficiency Disclosure Act* (DIICCSRTE)	Subject to a positive cost benefit analysis, improve the energy efficiency of Australian buildings.	2010–12	The *Building Code of Australia* was amended in 2010 to increase the energy efficiency standard for residential buildings from five to six stars and to incorporate new standards for hot water systems and lighting. The standards for non-residential buildings were also increased. The *Building Energy Efficiency Disclosure Act 2010* came into effect in November 2010 and full disclosure has been mandatory under the Act since November 2011. More than 1200 Building Energy Efficiency Certificates have been issued and there are around 750 buildings with current BEECs. These buildings account for around 10 million square metres of office space and can be viewed publicly at www.cbd.gov.au. There are now almost 250 accredited assessors Australia-wide.
Invest $29.2 million in the initiative (SEWPaC)	Support better sustainability planning in regions that are experiencing high growth.	2011–14	This national program involves regional sustainability planning and strategic assessments in the Lower Hunter and Perth and Peel regions. The Australian Government is also working with the Queensland Government on the Great Barrier Reef comprehensive strategic assessment and sustainable development plan. Additional regions may be announced as the program progresses. In each region, the Australian Government is commissioning research projects and acquiring data to support these strategic approaches. Grants may also be available to selected local governments in regional sustainability planning regions.
Invest an additional $8m over two years for community based heritage projects to manage and conserve important heritage places, including provision to assist in the recovery from natural disasters such as floods, fire and storms. The program will include the existing National Historic Sites program. (SEWPaC)	Better protection and conservation measures of Australia's most significant historic national heritage; honour eminent Australians who have made a significant contribution to our nation; assist communities to tell their heritage stories; and enhance community engagement in heritage through celebrations and events.	2011– 14	Your Community Heritage was announced by Minister Burke in May 2011. Your Community Heritage is a new approach to supporting and protecting Australia's heritage that will enable local communities around Australia to celebrate their local heritage. 235 projects received funding in 2011–12 under Your Community Heritage. An additional 235 projects received funding in the 2012/13 round of Your Community Heritage.

5. Reduce greenhouse gas emissions and improve air quality by:

- Supporting low emission technologies
- Putting a price on carbon and facilitating regulatory reform

Initiatives	Aims	Timeframe	Progress
Implement pricing and energy efficiency mechanisms for cost effective greenhouse gas emission reductions (DIICCSRTE)	Use a market-based tool to drive economy-wide greenhouse gas reductions, energy efficiency and investment in renewable energy sources.	2011–13	The carbon pricing mechanism has been legislated and commenced on 1 July 2012. After an initial fixed-price period, a full emissions trading will commence from 2015.
Support research and development of low emissions technologies, including Solar Cities, Smart Grid technology (DIICCSRTE)	Enhance the efficiency of the nation's power grid and reduce household energy bills through increased use of solar energy; exert downward pressure on electricity prices by deferring electricity infrastructure upgrades; and increase the uptake of solar energy.	2011–14	The *Solar Cities Program* is a $94m commitment to trial a range of energy efficiency initiatives across seven consortia throughout Australia. The program is due to finish on 30 June 2013 and during the final 12 months the Department will be analysing the energy data collected in conjunction with the CSIRO who are the senior research partner. In October 2012, the Solar Cities Program hosted a conference at the Brisbane Convention Centre, *Solar Cities Australia 2012*, on the results identified thus far in the program. Energy efficiency trials conducted include the use of solar PV, white roofs, home energy assessments, in-home-displays, smart meters and peak demand pricing trials.
Green Vehicle Guide website and mandatory fuel consumption labelling (DIT)	Enable consumers to continue to compare the relative environmental performance of new vehicles to improve the environmental performance of vehicles.	2013–	The *Green Vehicle Guide* was launched in 2004 and the requirement to affix a fuel consumption label to new vehicles was introduced in 2008. Both measures provide information about fuel consumption and CO_2 emissions of new vehicles. Having access to information about the environmental performance of new cars allows consumers to make better informed choices when purchasing new vehicles. The Government is currently considering a revised approach to further enhance use of the Guide.
Air pollution standards for light and heavy vehicles in Australia (DIT)	Reduce adverse health impacts of pollution from light and heavy vehicles.	2011–	The government has a long-standing policy of introducing increasingly stringent air pollution standards for light and heavy vehicles, in line with developments in technology and international standards. In 2011, the Government announced a move to more stringent standards (Euro 5) to reduce air pollution from light vehicles. The regulation applies from 1 November 2013 for new models and from 1 November 2016 for all models.

Initiatives	Aims	Timeframe	Progress
Continue to support research and development of low emissions technology (DIICCSRTE)	Ensure that innovative emission-reducing technologies are widely adopted by the Australian automotive industry.	2011–14	The government has a number of initiatives in place to support the development of low emissions technology across industry, including the R&D Tax Incentive and the Clean Technology Innovation Program (CTINNP). The CTINNP was launched in July 2012 to support applied R&D, proof of concept and early stage commercialisation activities to develop new clean technologies and associated services that reduce greenhouse gas emissions. Applications can be submitted at any time. Since its establishment in 2008 the *New Car Plan for a Greener Future* has supported the development of low-emissions technologies including the production of proof-of-concept electric Holden Commodores, more efficient vehicle batteries and fuel-efficient direct injection engines. Co-investment under the *New Car Plan* resulted in the development of the four-cylinder, turbo-charged EcoBoost engine by Ford, the local manufacture of the Hybrid Camry by Toyota, and the production of the fuel-efficient Cruze small car by Holden. In November 2011, the government announced that it will provide $26 million to the Automotive Australia 2020 Cooperation Research Centre (CRC). Guided by the *AA2020 Automotive Technology Roadmap,* released in August 2010, the CRC will develop and commercialise low emission automotive technologies.
Introduce mandatory CO_2 emissions standards for light vehicles (DIT)	Reduce the carbon emissions from light vehicles in Australia.	2010–15	The Department of Infrastructure and Transport is in the process of developing CO_2 emissions standards for light vehicles. This work includes extensive consultation with stakeholders.
Monitor progress towards achieving 20 per cent renewable energy by 2020 (DIICCSRTE)	Increase investment in and contribution of renewable energy resources.	2010–20	In 2009, the Government expanded the Renewable Energy Target (RET) which will ensure 20 per cent of Australia's electricity comes from renewable sources by 2020. The RET Scheme legislation specifies the amount of renewable energy to be generated by renewable energy power stations, for every year up to 2030. Since 2001 the annual targets have been met. The Climate Change Authority is currently undertaking an independent statutory review of the RET Scheme. Among other things, this is looking at how Australia is tracking towards the 2020 target.

6. Manage our resources sustainably by:

- Reducing resource consumption and waste
- Improving water, energy and food security

Initiatives	Aims	Timeframe	Progress
Implement the *Water for the Future* program and COAG urban water reforms (SEWPaC)	To increase urban and rural water use efficiency.	2010–	Water efficiency and security in many cities and towns has improved, with Australian Government funding of over $2.4 billion in research and infrastructure investments, including water recycling, stormwater harvesting and desalination projects.
Implement the *National Waste Policy: Less waste, more resources,* to set the direction of the nation's waste management and resource recovery (SEWPaC)	National coordinated action to reduce waste.	2010–	The *National Waste Policy Implementation Report 2011* was released in June 2012. The results showcase the clear benefits of a collaborative approach across government and industry. Highlights include: • The *Product Stewardship Act 2011* came into effect on 8 August 2011, delivering on a key commitment by the Australian Government under Strategy 1 of the National Waste Policy. • The Product Stewardship (Televisions and Computers) Regulations 2011 commenced on 8 November 2011. The *National Waste Policy Implementation Report 2012* is expected to be released in late 2013.
Further strengthen the role of Infrastructure Australia (IA) in undertaking benefit-cost analysis of proposals for infrastructure funding that includes consideration of better use of water and energy in infrastructure (IA)	Broaden use of cost-benefit analysis that incorporates externalities.	2011–14	Under the 2011–12 Budget, Infrastructure Australia's funding was increased by nearly 40 per cent to $36 million over four years. In June 2013 Infrastructure Australia reported to COAG on its *National Infrastructure Plan,* which discusses benefit-cost analysis in IA's Reform and Investment Framewoek.

7. Increase resilience to climate change, emergency events and natural hazards by:

- Mitigating risks and adapting to change
- Incorporating climate change risks into infrastructure siting, design, construction and operation

Initiatives	Aims	Timeframe	Progress
Australian Climate Change Science Program (ACCSP) (DIICCSRTE)	To improve our understanding of the causes, nature, timing and consequences of climate change so that industry, community and government decisions can be better informed.	1989–13	The ACCSP has been running continuously since 1989. Research outcomes are published in peer-reviewed journals and contribute to reports such as the *Intergovernmental Panel on Climate Change Fifth Assessment Report* (due 2013–14). Information about the ACCSP, including annual reports of research conducted, is provided on the DCCEE and CSIRO websites.
National Strategy for Disaster Resilience (AG)	To provide high-level direction and guidance on how to achieve disaster resilient communities across Australia. The strategy includes steps to identify: • responsible land use planning to reduce the likelihood of hazards impacting communities; and. • building standards to mitigate the likelihood of loss of life, as well as damage to and/or destruction of property and infrastructure.	2011–	In November 2012 the Standing Council on Police and Emergency Management noted the report on the status of jurisdictional commitment to the Enhancing Disaster Resilience in the Built Environment Roadmap to improve the consideration of natural disaster hazards in land use planning and building code regulation. The Roadmap sets out a range of immediate and medium term activities to enhance disaster resilience in the built environment and identifies seven key areas for improvement: integrated legislation; process enhancements; comprehensive data and mapping; collaborative vendor disclosure; governance partnerships; lifelong education and training; and inter-jurisdictional collaboration. Ministers tasked the Australia-New Zealand Emergency Management Committee to report at the end of 2013 on implementation of the Roadmap.
Work with states and territories to develop guidance, including spatial mapping, to help reduce exposure of urban assets and infrastructure to climate change risks (DIICCSRTE)	Develop nationally consistent approaches to data management and risk assessment methodologies, for consideration through COAG.	2011–14	On 16 November 2012 the Select Council on Climate Change agreed a coastal adaptation work plan that includes developing a coastal climate change knowledge strategy by 31 May 2013. The Adaptation Working Group is currently developing advice for the Select Council on Climate Change on which of the remaining national adaptation priorities require work plans.
Strengthen the role for Infrastructure Australia in undertaking assessments of infrastructure to consider whether proposals adequately deal with risk of climate change impacts (IA)	Improve standard of major infrastructure proposals submitted to IA to address climate change adaptation and mitigation.	2011–14	Infrastructure Australia is consulting with the Australian Green Infrastructure Council and reviewing whether their Infrastructure Sustainability assessment tool and/or ratings could be adopted for the purposes of project assessments.

Liveability

8. Facilitate the supply of appropriate mixed income housing by:

- Encouraging a range of housing types to suit diverse household needs across metropolitan areas

- Facilitating suitable accommodation for older people:

Initiatives	Aims	Timeframe	Progress
Social Housing Initiative (SHI) to build 19,700 new social housing dwellings and repair or upgrade 80,000 homes $5.6 billion (FaHCSIA)	Assess SHI dwellings for their proximity to services and amenities that are relevant to tenants' needs, such as transport, schools, shops, health services and employment opportunities. Assess dwellings for environmental sustainability. Reduce concentrations of disadvantage by creating mixed communities to improve social inclusion.	2008–2013	At the end of March 2013, 99 per cent of new social housing dwellings had been completed. The remainder of the program is due for completion by the end of 2013. Repairs and maintenance were undertaken on over 80,000 existing social housing dwellings. Over 12,000 of these would have been uninhabitable without this work. All repairs and maintenance projects were completed by June 2011.
National Affordable Housing Agreement (NAHA) $6.2 billion (FaHCSIA)	Give all Australians access to affordable, safe and sustainable housing that contributes to social and economic participation.	2009–2014	The NAHA provides the framework for the Commonwealth and states and territories to work together to improve housing affordability and homelessness outcomes for Australians. *The NAHA Performance Report: 2010–11* was released in June 2012.
National Disability Strategy to meet the diverse needs of people with disability and their carers (FaHCSIA)	Guide government activity to improve outcomes for people with disability, their families and their carers.	2011–21	The *National Disability Strategy 2010–2020* was formally endorsed by COAG on 13 February 2011 and launched by the Australian Government on 18 March 2011. During the first year of the Strategy, the Australian Government worked in conjunction with state and territory governments to prepare a national action framework for implementing and evaluating the Strategy, in close consultation with key stakeholders. The Standing Council on Community and Disability Services presented the *National Disability Strategy 2010–2020: Report to the Council of Australian Governments 2012* to COAG on 15 January 2013. The report incorporates the first of three implementation plans.

Initiatives	Aims	Timeframe	Progress
National Partnership Agreement on Homelessness (NPAH) $1.1 billion, together with the states and territories (FaHCSIA)	Provide new and better integrated accommodation and support services for homeless people.	2009–2013	Over 65,000 support periods and 71,000 client assistances were provided to those who were homeless or at risk of homelessness in 2011–12. At 31 March 2013, 549 new dwellings across Australia for individuals and families experiencing homelessness had been completed under the *A Place to Call Home* initiative of the NPAH.
National Partnership Agreement on Social Housing $400 million (FaHCSIA)	Build new social housing dwellings. Adherence to universal design standards is encouraged as one of five additional criteria for proposed social housing projects.	2008–2013	Under the *National Partnership Agreement on Social Housing*, over 1900 new social housing dwellings will be built. At the end of May 2012, over 97 per cent of dwellings had been completed. The remainder of the program is due for completion by the end of 2013.
Ensure Australian Government social housing outlays are consistent with objectives of the National Urban Policy, with a focus on supplying a mix of appropriate, adaptable housing located close to city centres and public transport (FaHCSIA)	Align housing infrastructure outlays with National Urban Policy.	2011–14	Stage 2 of the Social Housing Initiative set baselines for the distance of dwellings from services and transport. Over 12,000 dwellings had to be less than 1 kilometre from the nearest business district and over 6,000 had to be within 200 metres of transport. To date these baselines are being met.
Examine opportunities for reform through the COAG Housing Supply and Affordability Reform agenda (Treasury)	Examine the housing supply pipeline and government policies that may act as barriers to supply or that stimulate demand for housing, in particular focussing on land supply, infrastructure cost recovery, and land-use planning and approval processes.	2010–12	COAG agreed to the recommendations of the Housing Supply and Affordability Reform (HSAR) Working Party. The HSAR report was published on the COAG website on 30 August 2012. All jurisdictions are committed to implementing the HSAR recommendations and reporting back to COAG on their progress through the Select Council on Housing and Homelessness.

Initiatives	Aims	Timeframe	Progress
Ensure housing assistance is adequate, targets those in need and supports participation incentives (FaHCSIA)	Provide adequate housing assistance.	2011–14	Commonwealth Rent Assistance (CRA) is a non-taxable income supplement added to the pension, allowance or benefit of eligible income support customers who rent in the private rental market. CRA is paid to 1.2 million people at a cost of $3.35 billion per annum and significantly reduces rental stress (defined as paying more than 30 per cent of income) for income support recipients in the private rental market. For instance the proportion of families with children in rental stress falls from more than a half (55 per cent) to one third (33 per cent) after receiving Rent Assistance. CRA is increased twice each year in March and September, in line with movements in the Consumer Price Index, which includes rental costs.
Ensure that social housing programs support the age-friendly objectives of the National Urban Policy, including progressively increasing the supply of adaptable housing that is built to universal design standards to ensure access for the elderly and people with disabilities (FaHCSIA)	Support the delivery of high-quality accessible dwellings.	2011–14	Stage 2 of the Social Housing Initiative set baselines for dwellings meeting minimum universal design elements to make properties more accessible to people who are ageing or live with disability. These baselines are being met, with over 15,500 dwellings meeting universal design principles.
Encourage ageing in place, including through adaptable and accessible housing requirements; encourage socially inclusive housing that is integrated with surrounding community facilities (DoHA)	Support the incorporation of planning for aged care residences and facilities throughout the urban planning process, giving immediate priority to aged care developments being integrated into urban areas. Revise planning process for future urban planning to include assessments for a full continuum of housing for ageing Australians.	2011–14 For inclusion in 2012 Aged Care Approvals Round	Over the next 10 years the government will significantly increase the number of aged care services across Australia, by providing more than 65,200 new residential aged care places by 2021–22, on top of the 191,500 residential places currently available. New aged care places, as they become available, are all allocated through the competitive process called the Aged Care Approvals Round (ACAR). This competitive process takes into account local aged care needs in a given region and will see significant numbers of new residential aged care services being made available for older Australians over the coming decade.
Examine the extent to which the housing market is meeting demand for a range of housing types that suit diverse household needs (Treasury)	Identify and analyse the balance between housing demand and supply, and the implications for housing affordability.	2008–	The National Housing Supply Council's annual State of Supply Reports aggregates and assesses information from all levels of government and the private sector on the supply and demand for housing. The NHSC's *State of Supply Report 2011* report was released in late 2011. It was followed by the *Housing Supply and Affordability Key Indicators* report in June 2012 and the *Housing Supply and Affordability Issues 2012–13 report* in March 2013.

9.   Support affordable living choices by:

- Facilitating compact mixed use development in appropriate locations
- Supporting equitable distribution of employment, facilities and services

Initiatives	Aims	Timeframe	Progress
National Rental Affordability Scheme (NRAS) (FaHCSIA)	Increase the supply of new affordable rental housing, reduce rental costs for low and moderate income households and encourage large-scale investment and innovative delivery of affordable housing.	2008–	New dwellings continue to be delivered into the program. As at 31 March 2013, around 13,000 NRAS dwellings were tenanted or available for rent. A further 26,000 are due to be delivered by June 2016. On 18 April 2013, the Australian Government called for applications for incentives to deliver approximately 1,000 new dwellings by 30 June 2014, through a Shovel Ready Round. A further call for applications, Round 5, for incentives to deliver approximately 10,000 new dwellings in 2015–16 was made on 7 May 2013. Participation in the program by not-for-profit and for-profit organisations remains strong and stakeholders are keenly anticipating the allocation of remaining NRAS incentives, of which there are around 10,000.
Liveable Cities program $20 million (DIT)	Improve the capacity of the 18 capital and major regional cities to undertake strategic planning. Support the development of demonstration projects that facilitate urban renewal and strategic urban development and encourage partnerships between all levels of government to foster innovative solutions.	2012–14	In April 2012 the Minister for Infrastructure and Transport approved funding for 25 projects – 18 planning and design and seven demonstration projects. Agreements are being put in place with successful proponents, with most projects now well underway.
Consider best use of Commonwealth-owned land to support the supply of housing; improve community amenity and jobs creation though Commonwealth Property Disposals Policy (CPDP) (Finance)	Demonstrate best practice in disposal of Commonwealth-owned land and assets to support objectives and criteria of National Urban Policy and COAG city reforms.	2014–17	The Australian Government undertakes an annual Land Audit of Commonwealth Properties which aims to identify surplus Commonwealth land available for disposal under the CPDP. Since 2007, the Australian Government has agreed to 65 Commonwealth land transactions totalling an estimated area of 8,254.512 hectares. Several of these transactions have resulted in an increase in the supply of housing, including a range of different dwelling types and affordable housing; community amenity; and job creation.

10. Improve accessibility and reduce dependence on private motor vehicles by:

- Improving transport options through active and public transport
- Reducing travel demand

Initiatives	Aims	Timeframe	Progress
National Cycling Strategy (DIT)	Double the number of cyclists between 2011–16.	2011–16	The 2013 National Cycling Participation Survey found that 16.6 per cent of the population or more than 3.8 million Australians ride a bicycle in a typical week.
Monitor and report on progress towards achieving national cycling target to double number of cyclists by 2016 (DIT)	Ensure that policy and associated actions are evaluated and effective in progressively meeting targets.	2011–16	The Australian Bicycle Council is preparing a benchmark report on 2013 cycling participation from a survey of 10,000 households around Australia. The survey will be repeated in 2015 to track progress against the target. A 2012 implementation report has also been prepared and will be published in October 2013.
Incorporate active travel into the Department of Infrastructure and Transport portfolio (DIT)	Ensure that infrastructure needs of pedestrians and cyclists are mainstream departmental activities.	2011–17	*Walking, Riding and Access to Public Transport: Draft report for discussion* was released for public comment on 29 October 2012. Consultation closed in February 2013 and 190 submissions were received.
Work with state and territory governments to improve accessibility and mobility in cities, including more compact and mixed-use development, improved public transport and active transport options, and more efficient use of infrastructure assets (DIT)	Enable more efficient movement of people and goods.	2011–17	The Transport and Infrastructure Senior Officials Committee (TISOC) Cities Group has been established to deliver on the Standing Council on Transport and Infrastructure's objective to achieve a co-ordinated and integrated national transport and infrastructure system that is efficient, safe, sustainable, accessible and competitive. The Cities Work Plan was approved by SCOTI in November 2012.
Implement urban-related recommendations from the Tax Summit, including the National Urban Transport Infrastructure Strategy which builds on recommendations on transport privcing arising from the Henry Tax Review (DIT)	More efficient use of land transport infrastructure, and reduction of transport-related emissions and pollution.	2011–14	Infrastructure Australia continues to promote the implementation of transport-related tax reforms, particularly those that would replace taxation measures with user charging.

11. Support community wellbeing by:

- Providing access to social and economic opportunity
- Improving the quality of the public domain
- Improving public health outcomes

Initiatives	Aims	Timeframe	Progress
Australian National Preventive Health Agency (ANPHA) established (DoHA)	Promote and guide the development, application, integration and review of public, organisational and community-based prevention and health promotion policies.	2011–16	ANPHA, as an inter-jurisdictional agency, was established on 1 January 2011 to meet the challenges of obesity (including physical inactivity), harmful alcohol consumption and tobacco. ANPHA is working with the Infrastructure and Transport portfolio to consider the relationship between health and the built environment.
National Compact with the Third Sector – a high-level, aspiration-based agreement (PM&C)	Strengthen the not-for-profit sector to provide support for people in need. Set out how government and the sector want to work together in new and better ways to improve the lives of Australians.	2010–	Appointed National Compact Advocates in all Commonwealth Departments to ensure that the National Compact is embedded in the decision making processes of Government. Established the Office for the Not For Profit (NFP) Sector within the Department of Prime Minister and Cabinet and the NFP Sector Reform Council to make sure the NFP sector was able to provide input into policy development. Reduced red tape for the NFP sector through: - Establishing the Australian Charities and Not-for-profits Commission (ACNC), which initially centralises regulation and reporting at the Commonwealth level for registered charities, currently spread out across multiple agencies. - Updating the Commonwealth Grant Guidelines which among other things states that Commonwealth Departments must not request information provided to the ACNC by a registered charity and must instead obtain this information from the ACNC. - The development of a low-risk grant agreement template which is currently being trialled in most Commonwealth Departments. Passed Freedom to Advocate legislation which prohibits and invalidates clauses in Commonwealth agreements with the NFP sector that restrict or prevent NFP entities from advocating on Commonwealth law, policy or actions.

Initiatives	Aims	Timeframe	Progress
Develop an Australian Urban Design Protocol and support best practice with industry practitioners (DIT)	Strengthen and support COAG city planning reform criterion 8: 'To encourage best practice urban design and architecture'.	2011–12	*Creating Places for People* was launched in November 2011. It is a collaborative commitment to best practice urban design in Australia. The protocol provides broad principles for urban design that take into account the unique characteristics of a location and people's enjoyment, experience and health, and encourages excellence and collaboration in the design and custodianship of urban places.
National Partnership Agreement on Preventative Health (NPAPH), including the Healthy Communities initiative (DoHA)	Directly fund local governments to deliver programs and activities that seek to reduce the prevalence of obesity and lifestyle-related chronic disease.	To 2014	The Healthy Communities initiative provides 92 grants to Local Government Areas across Australia to implement a range of healthy lifestyle programs and activities with a particular focus on adults predominantly not in the paid workforce. Grants have been rolled out across three phases and all projects have now commenced. Healthy Communities is supported by six funded National Program Grants to expand the delivery of proven and effective healthy lifestyle programs in every state and territory and develop a Healthy Communities Quality Framework, which includes, for example, consideration of physical environments that encourage exercise as part of normal daily activities.

Governance

12. Improve the planning and management of our cities by:

- Facilitating a whole-of-governments approach and commitment to cities and regions

- Integrating planning systems, infrastructure delivery and management

- Encouraging best practice governance and applying the principle of subsidiarity

Initiatives	Aims	Timeframe	Progress
Ensure that Commonwealth policies, investment and other activities across government: • meet the principles and objectives of the National Urban Policy and COAG reforms • co-ordinate across Australian Government agencies • co-operate and partner with state and local governments, businesses and the community (DIT)	Demonstrate best practice in Australian Government policies, activities, assets and investments towards meeting the objectives of the National Urban Policy and COAG city reforms.	2011–14	The Department of Infrastructure and Transport is closely engaged with a wide range of stakeholders from across governments, business and the community to achieve the principles and objectives of the National Urban Policy. To assist in meeting the principles and objectives of the National Urban Policy, the Department has also convened: • the Commonwealth Group on Cities – chaired by the Secretary of the Department, to help achieve coordination across Commonwealth agencies • the TISOC Cities Group to encourage governments to continue to share examples of best practice in strategic city planning to support ongoing national improvement in line with the recommendations of the COAG Reform Council's *Review of capital city strategic planning systems* • the Urban Policy Forum to maintain constructive engagement with stakeholders that are not formally linked into COAG, including representatives from business and the community.
Seek support of states and local governments, through COAG, to expand the use of national criteria for capital city strategic planning systems to planning of regional major cities (DIT)	Implement best practice strategic planning to benefit all major cities.	2011–14	The Transport and Infrastructure Senior Officials Committee (TISOC) has established the TISOC Cities Group to progress the COAG cities agenda through the Standing Council on Transport and Infrastructure (SCOTI). Membership includes representatives from all Australian states and territories and the Australian Local Government Association. The Liveable Cities Program has supported a number of regional cities to improve their strategic planning in accordance with the COAG criteria.

13. Streamline administrative processes by:

- Improving the effectiveness and efficiency of approval processes for development
- Encouraging participation and engagement with stakeholders

Initiatives	Aims	Timeframe	Progress
Ministerial council on infrastructure and transport to include planning ministers (DIT)	Integrate infrastructure and planning reforms and actions.	2011–	The Standing Council on Transport and Infrastructure (SCOTI) (formerly known as the Australian Transport Council) was established in September 2011 and brings together Commonwealth, state, and territory (and New Zealand) ministers with responsibility for transport, planning and infrastructure issues, as well as the Australian Local Government Association.
Urban Policy Forum established to advise on National Urban Policy implementation (DIT)	To maintain constructive engagement with stakeholders that are not formally linked into COAG, including representatives from business and the community.	2011–	The Urban Policy Forum was launched by the Hon Anthony Albanese MP, Minister for Infrastructure and Transport on 20 Jan 2012, and meets twice yearly with sub-committees established as needed.
Support local government to undertake reforms to streamline administration and development approvals, and implement strategic spatial planning, in accordance with the National Urban Policy goals and objectives (DRALGAS)	Support the creation of robust local government with adequate capabilities in the areas of financial management and strategic and spatial planning to enable them to make strong contributions to the objectives of the National Urban Policy.	2011–14	The Australian Local Government Association is a member of the Transport and Infrastructure Senior Officials Committee (TISOC) cities group.
Monitor progress towards implementation of the National Urban Policy goals and objectives, and report on actions and outcomes (DIT)	Deliver on National Urban Policy goals and objectives through an effective package of actions.	2011–17	The Governance chapter of the State of Australian Cities 2012 report illustrates how the Australian Government is aligning its cities-related policies and programs with the National Urban Policy.

14. Evaluate progress against performance by:

• Reporting, analysis and research

Initiatives	Aims	Timeframe	Progress
Build on *State of Australian Cities 2010* by publishing annual updates to track progress in achieving objectives (DIT)	Provide information on cities to guide community discussion and policy development and allow users to measure the effectiveness of the National Urban Policy and associated actions.	2011–	The second State of Australian Cities report was released in October 2011 and the third report was released in December 2012. The three reports have been collectively downloaded 3 million times.
Include research on urban systems, environments and communities in the National Research Priorities (NRPs) (DIICCSRTE)	Recognise and support urban research as a national research priority.	2011–	The Cooperative Research Centre (CRC) for Water Sensitive Cities and the CRC for Low Carbon Living were announced in November 2011. The CRC for Water Sensitive Cities was granted $30 million and will deliver the socio-technical urban water management solutions, education and training programs, and industry engagement required to make Australian towns and cities water sensitive. The CRC for Low Carbon Living secured $28 million in funding and will provide government and industry with social, technological and policy tools to overcome identified market barriers preventing adoption of cost effective low carbon products and services, while maintaining industry competitiveness and improving quality of life. The Australian Research Committee (ARCom) has developed strategic research priorities to drive investment in areas that are of immediate and critical importance to Australia and its place in the world. These priorities will replace the National Research Priorities. The priorities will complement the broad base of support for research provided by the Australian Government and will foster a more coordinated and strategic approach within the identified areas. The priorities are expected to be released by the Government shortly.
$10.1 million for a new *Measuring Sustainability Program* to establish a National Sustainability Council and a set of sustainability indicators to highlight key trends and emerging sustainability issues for policy and decision makers and communities (SEWPaC)	Better information to inform policy and decision-making	2011–	In October 2012 the Australian Government announced the establishment of a set of national sustainability indicators covering social, environmental and social domains. At the same time the government established the National Sustainability Council as an independent source of information on sustainability issues – including public reports against the indicators every two years. The Council released its first report in May 2013.

Abbreviations and acronyms

ABS	Australian Bureau of Statistics
AC	Alternating Current
ACCC	Australian Competition and Consumer Commission
ACT	Australian Capital Territory
APS	Advanced Producer Services
ARTC	Australian Rail Track Corporation
ASCED	Australian Standard Classification of Education
BITRE	Bureau of Infrastructure, Transport and Regional Economics
BOBO	"Bourgeoisie-Bohemian"
BOM	Bureau of Meteorology
BREE	Bureau of Resources and Energy Economics
BTS	Bureau of Transport Statistics
CBD	Central Business District
CCRC	Comingled Recycled Concrete
CCTV	Closed Circuit Television
CO_2	Carbon Dioxide
COAG	Council of Australian Governments
CPTED	Crime Prevention Through Environmental Design
CRC	Cooperative Research Centre
CRC	Council of Australian Governments Reform Council
DBCDE	Department of Broadband, Communications and the Digital Economy
DC	Direct Current
DCCEE	Department of Climate Change and Energy Efficiency
DEEWR	Department of Education, Employment and Workplace Relations
DIDO	Drive In Drive Out
DIISRTE	Department of Innovation, Industry, Science and Research
DIT	Department of Infrastructure and Transport
DRALGAs	Department of Regional Australia, Local Government, Arts and Sport
EHF	Excess Heat Factor
EIU	The Economist Intelligence Unit
EJD	Effective Job Density
ELICOS	English Language Intensive Courses for Overseas Students
ERP	Estimated Residential Population
FaHCSIA	Department of Families, Housing, Community Services and Indigenous Affairs
FIFO	Fly In Fly Out

GAA	Growth Areas Authority
GCCSA	Greater Capital City Statistical Area
GCI	Global Competitive Index
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GloMo	Global Mobility Index
GMI	Global Migration Index
GPs	General Practitioners
GRP	Gross Regional Product
GST	General Sales Tax
GVA	Gross Value Added
HEAT	Health Economic Assessment Tool
HPI	Happy Planet Index
IA	Infrastructure Australia
IFWG	Infrastructure Finance Working Group
IFWG	Infrastructure Finance Working Group
INSW	Infrastructure New South Wales
IS	Infrastructure Sustainability
ISS	International Student Survey
J	Joules
LGA	Local government area
LHA	Livable Housing Australia
LHD	Livable Housing Design
LPV	Light Passenger Vehicle
MCU	Major Cities Unit
MJ	Mega Joules
NABERS	National Australian Built Environment Rating System
NatHERS	National Housing Energy Rating Scheme
NATSEM	National Centre for Social and Economic Modelling
NATSEM	National Centre for Social and Economic Modelling
NB2	Nation Building 2
NBN	National Broadband Network
NCCARF	National Climate Change Adaptation Research Facility
NDVI	Normalised Vegetation Index
NGAA	National Growth Areas Alliance
NHSC	National Housing Supply Council
NIM	Net Internal Migration

NOM	Net Overseas Migration
NPAH	National Partnership Agreement on Homelessness
NSW	New South Wales
NTC	National Transport Commission
NTE	Night Time Economy
OECD	Organisation of Economic Cooperation and Development
PCA	Property Council of Australia
PHIDU	Public Health Information Development Unit
PJ	Peta Joules
pkm	passenger kilometres
PTW	Powered two wheelers
RBA	Reserve Bank of Australia
REIT	Real Estate Investment Trust
RIF	Regional Infrastructure Fund
RMIT	Royal Melbourne Institute of Technology
SAIF	Supported Accommodation Innovation Fund
SARA	State Assessment and Referral Agency
SCOTI	Council of Australian Governments Standing Council on Transport and Infrastructure
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SLA	Statistical Local Area
TAFE	Technical And Further Education
TEUs	Twenty-foot Equivalent Units
UDP	Urban Development Program
UHI	Urban Heat Island
ULE	Useful Life Expectancy
VET	Vocational Education and Training
VIF	Victoria In Future
WHO	World Health Organization
WSEA	Western Sydney Employment Area
WSROC	Western Sydney Regional Organisation of Councils