



Australian Government

Department of Infrastructure and Transport  
Major Cities Unit

# State of **Australian** Cities 2011







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## Acknowledgements

The Department of Infrastructure and Transport wishes to acknowledge the valuable input, advice and data received during the production of this document. This includes from State, Territory and Local Governments, other Australian Government agencies, research institutions and business organisations.

With thanks for the photographs provided by the following individuals and organisations:

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All other images were provided in order of appearance courtesy of the City Councils of Palmerston, Townsville, Perth, Serpentine-Jarrah, Launceston, Geelong, Cairns, Brisbane, Whittlesea and Hobart.

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ISBN 978-1-921769-50-4

December 2011 / INFRA1267

This publication is available in hard copy or PDF format from the Major Cities Unit website at <http://www.majorcities.gov.au>. If you require part or all of this publication in a different format, please contact the Major Cities Unit.

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### Published by

Major Cities Unit, Department of Infrastructure and Transport

GPO Box 594, Canberra ACT 2601, Australia

Telephone (international) +61 2 6274 7000

Fax +61 2 6274 7727

Email: [ourcities@infrastructure.gov.au](mailto:ourcities@infrastructure.gov.au)

Internet: <http://www.majorcities.gov.au>

Printed by Union Offset Printers



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## Abbreviations and acronyms

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
BITRE	Bureau of Infrastructure, Transport and Regional Economics
CBD	Central Business District
COAG	Council of Australian Governments
CPI	Consumer Price Index
CSIRO	Commonwealth Science and Industry Research Organisation
DCCEE	Department of Climate Change and Energy Efficiency
DEEWR	Department of Education, Employment and Workplace Relations
DSEWPac	Department of Sustainability, Environment, Water, Population and Communities
EIU	The Economist Intelligence Unit
GDP	Gross Domestic Product
GVA	Gross value added
LGA	Local government area
NATSEM	National Centre for Social and Economic Modelling
NHSC	National Housing Supply Council
OECD	Organisation of Economic Cooperation and Development
PCA	Property Council of Australia
PHIDU	Public Health Information Development Unit
pkm	passenger kilometres
PM <sub>10</sub>	particulate matter (air pollution indicator)
PwC	PricewaterhouseCoopers
SD	Statistical division
SES	Socioeconomic status
SLA	Statistical local area
S Dist	Statistical district
SSD	Statistical subdivision
vkt	Vehicle kilometres travelled



# Foreword



We have learned to survive in our cities, now we must learn how to live.

These are the words of Gil Penalosa, who is responsible for the transformation of his own city, Bogotá, and several others around the world. His words lie at the heart of the Federal Government's *National Urban Policy*, which sets out to make our own Australian cities more productive, sustainable and liveable.

All spheres of government know that if we are to succeed as a nation, our cities must serve us better: Congestion, sprawl, housing affordability and growing pressure on our water, waste and energy services are just some of the problems facing those of us living in one of Australia's 18 major cities. Understanding how to address those problems is the challenge and that is why this publication – *State of Australian Cities 2011* – is so valuable.

Not only does it build on the knowledge contained in the first report published last year, it also brings together a raft of new data that compares our cities with each other and similar cities internationally. *State of Australian Cities 2011* provides an evidence base for the national urban policy released earlier this year – *Our Cities, Our Future* – which sets out concrete steps to make our cities better places to live and work.

From 1 January 2012, all of Australia's capital cities will have in place planning systems to guide their futures and it is these plans that will inform the Federal Government's infrastructure funding. In this way, our essential social and economic infrastructure will all be funded in a coordinated way that best serves the needs and priorities of the nation.

Let me thank the many officers in my department and stakeholders around the country who have worked so hard to produce this report. With it, and its predecessor, we have the foundations of a solid compendium of knowledge to inform our future decisions and help build Australian cities in which we can truly live.

ANTHONY ALBANESE

Minister for Infrastructure and Transport





# Executive Summary

The Australian Government's *State of Australian Cities 2011* fulfils a commitment to publish a yearly report on the progress of the cities towards improved productivity, sustainability and liveability. The report builds on the information presented in *State of Australian Cities 2010*, which provided a comprehensive snapshot of Australian cities, which was largely based on the Australian Bureau of Statistics (ABS) 2006 Census of Population and Housing.

This 2011 report provides further detail on some of the issues discussed in the first report, drawing on data from the 2006 Census or, where available, more recent or new data and research from the ABS and other sources to illustrate patterns of growth and change and the current and emerging challenges that are confronting major cities.

The purpose of the report is to inform policy and investment decisions that have a direct impact on urban communities; to record the trends in urban development; and to educate the wider community about the factors that are shaping, not only the way cities are planned and built, but also the Australian urban way of life.

The key findings from each chapter are:

## Population

- Australia's population has grown by three million in the past decade. The contribution of international migration to this growth has varied over time and has declined in 2010 to 52 per cent, down from a peak in 2008 of 67.6 per cent.
- The overwhelming majority of migrants settle initially in capital cities, particularly Sydney and Melbourne. They are generally highly mobile in the years immediately after arrival and more likely to move interstate than the general population. Within five years their movement patterns are similar to internal migration trends of the general population.
- International migrants are settling in Sydney at a slightly higher rate than Sydney residents are leaving.
- Melbourne is also a destination for many international migrants but the city is losing fewer internal migrants and consequently is growing more rapidly than Sydney.
- The destination for many internal migrants exiting Sydney and Melbourne was Perth and Brisbane and surrounding regions. Alongside the established trend of older Australians moving away from cities, a similar trend is evident among younger Australians and higher-skilled people moving to near-city and coastal regional areas, with housing affordability and less congestion reported as possible reasons.

- The central local government areas of Perth, Melbourne and Sydney all experienced rapid growth as the CBD and surrounding areas were redeveloped with higher-density housing. This trend was most pronounced in the City of Sydney, which added 52,530 residents and was a significant share of Sydney's population growth (11.7 per cent) in the period 2001 to 2010.
- The outer suburbs of capital cities continue to accommodate much of the population growth. However, Sydney has a much higher proportion of infill developments than other capital cities.

## Productivity

- Productivity growth has slowed and then declined since 1998. The major cities account for 80 per cent of the nation's economic activity.
- Agglomeration (the concentration of certain activities within one area) is a key driver of productivity in the larger capital cities and is strongly associated with employment density.
- While there has been an increased concentration of jobs in urban cores, a trend to a polycentric structure is also evident with a large proportion (50 to 70 per cent) of new jobs located in the outer suburbs in Sydney, Melbourne and Perth.
- Employed residents of Sydney took 35 minutes on average for the journey to work in 2006, which was longer than the average time taken by Melbourne residents (31 minutes) or Perth residents (26 minutes). Commuting times have changed little for a decade.
- Public transport trips in the eight capital cities have increased by 14.7 per cent from 2004 to 2008 and the public transport mode share increased from 9.3 per cent to 10.6 per cent over the same period, well above the population growth rate and higher than many comparable cities internationally.
- In depth analysis of 2001 and 2006 Census journey to work data for Sydney, Melbourne and Perth shows that urban commuting patterns became increasingly complex, with strong growth in outward and cross-suburban commutes. Commuters mainly used public transport to reach inner city jobs. Around 60 per cent of commuter travel by public transport in each city was to a workplace located in the central local government area, whereas public transport mode share to outer suburban jobs was five per cent or less. During the same period commuters' active travel (walking and cycling) mode share rose in all three cities.
- Australia's labour force participation rate is relatively high by international standards and has been mainly driven by increased participation of women in paid employment. Rates are significantly higher in capital than non-capital cities.
- Unemployment levels varied across major cities from a low of two per cent to a high of nine per cent.
- Industry structure in cities is highly variable suggesting that each city plays a unique role in the nation's economic system.
- The finance and insurance sector is continuing to grow in its dominant position in terms of Gross Domestic Product (GDP) and gross value added.

- Traditional industries such as manufacturing have declined as a proportion of GDP. Despite this decline, these industries are still major employers in cities and continue to make up a significant proportion of the gross value added of Australia's economy.
- Mining has now overtaken manufacturing as the industry contributing the second highest proportion of gross value added due to a significant recent increase in the terms of trade.
- There has been a significant increase in Australia's investment in infrastructure in the past decade.

## Sustainability

- Since 2006, Australians have been consuming less energy per capita, particularly that generated by coal, recovering more waste from landfill per capita, producing less household waste, consuming less water and have cleaner air in their cities than they have done previously.
- Water restrictions were eased in south-eastern Australia after increased rainfall in late 2010 and early 2011. There has been significant investment in new infrastructure that will mean urban water supply is less dependent on rainfall. The main use of water in Australian cities continues to be in the residential sector.
- Air quality in Australia's major cities is now generally high by international standards and is expected to improve further as a result of improvements to motor vehicle technology and as older vehicles are replaced. Regional cities in south-eastern Australia generally have slightly poorer air quality ratings for particulate matter than other major cities due mainly to bushfire smoke and dust storms. Regional cities' air quality in southern Australia tends to be affected more by wood heaters and hazard reduction burns, and inland cities by agricultural activities. Many of these high particulate readings are transitory in nature.
- In terms of fatalities, heatwaves are the largest threat to Australian cities from natural disasters. The record breaking heatwaves in January 2009 severely tested the resilience of Adelaide and Melbourne in particular. In reports on the heatwave, South Australian and Victorian authorities have highlighted the need for more heatwave-resilient urban systems.
- The summer of 2010-11 brought with it extreme weather events. Northern parts of Australia were hit by cyclones and extensive parts of eastern Australia and mid Western Australia were subjected to severe flooding. Bushfires affected Western Australia.
- About 85 per cent of Australians live within 50 kilometres of the coast. More than 700,000 dwellings are within three kilometres of the coast and less than six metres above existing sea level. Projected impacts of climate change show that a significant number of residential buildings may be at risk of inundation and damage from a sea level rise of 1.1 metre (high end scenario for 2100). Projections also show an increased frequency of extreme weather events with associated storm surges and coastal erosion, and an increased risk of damage to property and infrastructure from inundation and erosion.
- Energy consumption across Australia is dominated by electricity generation, transport, and manufacturing sectors which together used more than 75 per cent of the energy consumed in 2009-10.

- About 70 per cent of energy is consumed indirectly in products and services used. For example, the energy embodied in the construction of a building is many times greater than the energy used within that building in a year.
- In 2009–10 Canberra and Adelaide recorded the highest rates of waste recycled (70 per cent). Perth had the lowest rate at 40.6 per cent, but recorded an increase of 18 per cent over 2008–09 figures. Landfill levies continued to be imposed in most major Australian cities to encourage increased recycling. Brisbane will be subject to a levy from the end of 2011. Where data is available, it shows major cities are producing less household waste per capita. Recycling rates in the construction and demolition stream are increasing in most jurisdictions. Increasing recycling rates for the commercial and industrial waste stream, and for municipal solid waste pose challenges such as the lack or expense of technologies able to adequately manage 'wet' or putrescible waste.

## Liveability

- Australia's largest cities are in the top 10 of most global liveability rankings and have retained or improved their position.
- Melbourne is ranked the most liveable city in the world by one international standard but Adelaide is the most liveable city in Australia as rated by its residents.
- Capital cities were rated highly by a survey of more than 4,000 residents for recreational opportunities, outdoor and natural environments and for variety of cultural, entertainment and educational facilities. They rated poorly on roads and traffic congestion, public transport services, environmental sustainability and climate change, and providing quality affordable housing (Property Council of Australia (PCA) 2011).
- The cost of greenfield developments is significantly lower than infill developments in all capitals except Sydney where cost of land and associated infrastructure charges on greenfield developments push their price higher than some infill.
- Australia has had one of the largest increases in real house prices among Organisation for Economic Cooperation and Development (OECD) countries, particularly since 2000. Price growth rates have been similar between capital cities and the rest of Australia.
- Household size continues to decrease as couple families with children continue to decline as a proportion of household mix.
- A relatively high proportion of Sydney households live in units and other medium/high density dwellings compared with other capital cities, particularly Melbourne. Families with children overwhelmingly occupy separate houses.
- Income inequality remains an area where Australian cities are not performing as strongly as many other OECD countries.
- People living in the major cities are generally less likely to die from preventable causes than people in country areas, regardless of socioeconomic levels.
- Although a substantial gap remains between Indigenous and non-Indigenous Australians, in many wellbeing indicators there has been a positive trend in the long term unemployment rate in major cities for Indigenous 18-64-year-olds, which has decreased from 57 per cent in 1994, to 25 per cent in 2008.

## Governance

- Revisions to ministerial council arrangements under COAG have seen the establishment of a new Standing Committee on Transport and Infrastructure. This Committee will progress the agenda of the former Australian Transport Council and COAG Infrastructure Working Group. It will also have long-term involvement in the implementation of the *National Urban Policy* and COAG cities reform agenda.
- The Productivity Commission has pointed to the need for improved governance arrangements to achieve greater efficiency and effectiveness of cities.
- The governance structure of Australia's major cities differs between States and Territories, and between capital and regional cities within them. There is evidence to support significant integration of the different levels of major city planning, infrastructure provision and management, particularly in capital cities.





# Introduction

## Chapter I

The Australian Government's *State of Australian Cities 2010* report was the first comprehensive snapshot of Australian cities, bringing together existing data and research to inform development of a national urban policy.

On 18 May 2011 the Australian Government released *Our Cities Our Future - a national urban policy for a productive, sustainable and liveable future* (Department of Infrastructure and Transport 2011). The *National Urban Policy* sets out the Australian Government's goals and objectives for our cities in the decades ahead (see Appendix A). It recognises the critical roles of State, Territory and Local governments, the private sector and individuals in planning, managing and investing in cities. It also recognises that the Australian Government makes decisions that affect urban Australia.

### Purpose of the report

The *State of Australian Cities 2011* report aims to inform policy makers, industry and the community about how Australian cities are progressing in terms of productivity, sustainability and liveability. In turn, the data contained in this report will help underpin policy, planning and investment decisions and provide a framework for ongoing monitoring.

### What's new in 2011?

*State of Australian Cities 2010* was largely based on the Australian Bureau of Statistics (ABS) national 2006 Census of Population and Housing and described the main issues affecting cities with populations of 100,000 or more.

This 2011 report supplements the 2010 report updating progress on indicators where data is collected annually. This report also examines in more detail some of the issues described in the 2010 report such as population growth, migration between cities and commuting flows within the largest capital cities.

New research, especially where indicators are under development, is highlighted. Articles on specific issues contribute to a deeper understanding of how our urban systems function.



## Structure of the 2011 report

This report follows the model of the 2010 report but with international comparisons integrated within theme chapters rather than in a separate chapter. Chapter 2 details change in urban population and settlement. Indicators relating to productivity, sustainability and liveability are discussed in Chapters 3, 4 and 5. Social inclusion is discussed in Chapter 5 on liveability, as it is closely related to health and wellbeing. The report concludes with a discussion of governance in Chapter 6.

The remainder of this introductory chapter outlines how the major cities are defined and concludes with a brief discussion of the indicators and data used in this report.

## Defining our major cities

*State of Australian Cities 2010* used the 2006 Census of Population and Housing as a baseline to define major cities as ones with a population of more than 100,000 residents. Applying this definition, there were 17 major cities in Australia in 2006.

The Albury–Wodonga statistical district reached an estimated resident population of 101,516 in 2007, taking the number of major cities now to 18.

## Geographical boundaries

As cities' populations grow and change so too does their geographical expanse. Gauging the extent of cities—where they begin and end—is imprecise.

Boundaries based on ABS Australian Standard Geographical Classification have been used because they have the advantage of being readily available and systematic. The 2010 report used two sets of boundaries for the major cities:

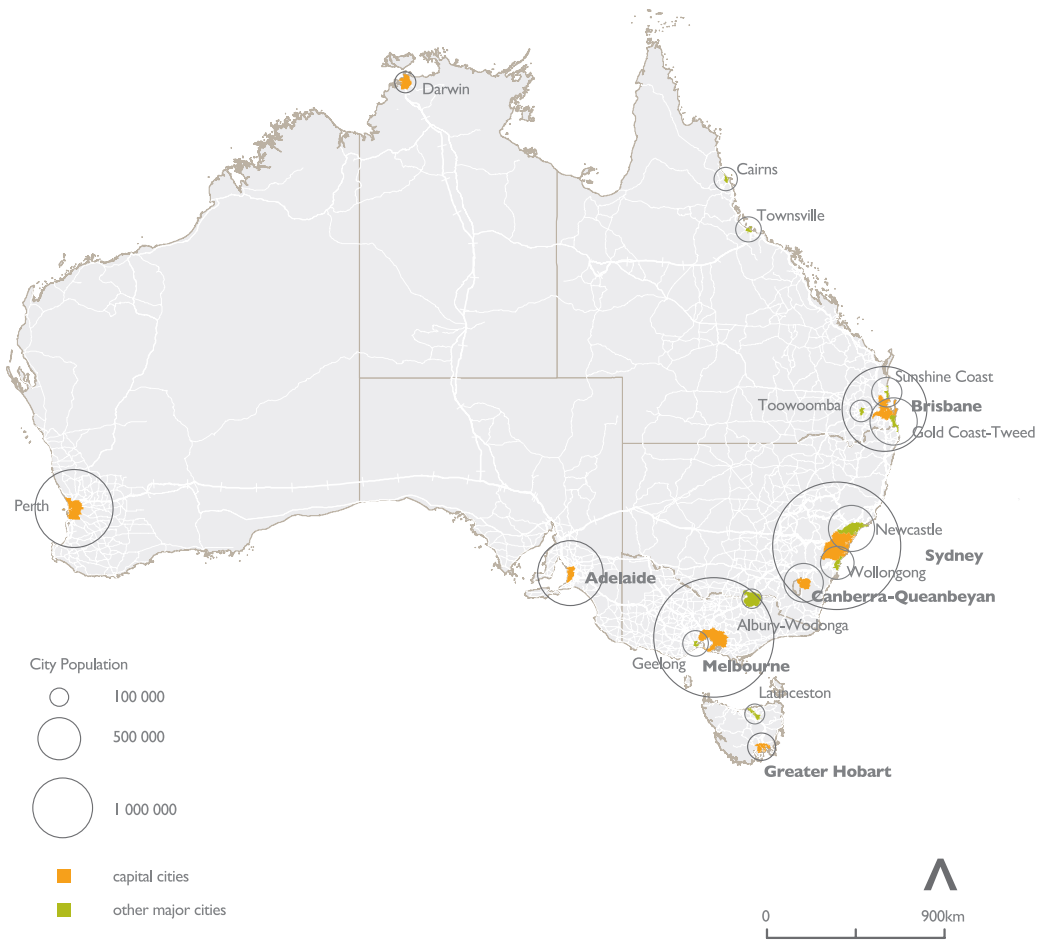
- statistical divisions (SD) for capital cities; and
- statistical districts (SDist) for non-capital cities.

To maintain consistency, these two statistical groupings have been retained in this 2011 report. Where specified, the Statistical District of Canberra-Queanbeyan is used in this report to better reflect the national capital region. Where possible, data is presented to show the variations that occur within cities at smaller geographical scales, mainly by:

- statistical sub-divisions (SSD), which group a number of adjacent local government areas into a broadly defined sub-metropolitan region; and
- statistical local areas, (SLA) which are based on local government area boundaries.

The location and relative size of Australia's major cities are shown in the following map (Figure 1.1).

Figure 1.1      Australia’s major cities, 2011



## Emerging major cities

Population projections prepared by the ABS for the Department of Health and Ageing in 2008 indicate that in addition to the current 18 major cities, six rapidly growing regional centres are likely to have a population of more than 100,000 by 2027. As shown in Table 1.1, these 'emerging cities' are Mandurah and Bunbury in Western Australia, Bendigo and Ballarat in Victoria and Mackay and Hervey Bay in Queensland.

**Table 1.1 Emerging major cities based on projected populations, 2007 to 2027**

Growing Regional Centres	2007 Population	2010 Estimated Population	2027 Projected Population	Year in which population is projected to exceed 100 000
Mandurah, Western Australia	74 419	85 814	119 679	2018
Mackay, Queensland	79 153	85 700	118 652	2018
Bendigo, Victoria	86 330	91 713	111 585	2018
Ballarat, Victoria	89 703	96 097	111 449	2017
Bunbury, Western Australia	60 509	68 248	103 651	2026
Hervey Bay, Queensland	53 365	60 807	103 628	2026

Source: Department of Health and Ageing 2008

## Cities within cities

Within the statistical divisions of the largest capital cities there are a number of local government areas which have populations in excess of 100,000 people. Some, like Parramatta in Sydney, also have a densely developed central business district (CBD) and provide a wide range of commercial and employment opportunities, services, cultural and recreational facilities. These local government areas are not separately identified as major cities at this time because much of their economic infrastructure, like transport, energy and water, is shared with the wider metropolitan region.

## Measuring progress in our major cities

There are many national and international projects to improve monitoring and reporting of progress on economic, environmental and social indicators. Two important initiatives underway in Australia include the update of the Australian Bureau of Statistics *Measures of Australia's Progress* (ABS 2011) and the Australian Government's *Measuring Sustainability Program* (DSEWPoC 2011). Future *State of Australian Cities* reports may incorporate some of the indicators identified in these two initiatives.

The indicators included in this report are mostly the same as those used in 2010. Many of the indicators cannot be updated annually, such as those based on Census data, which are collected every five years. A more comprehensive review of the trends for our major cities will be produced as 2011 Census data becomes available.

## Chapter I References

Department of Health and Ageing 2008, Customised projections prepared for the Australian Government Department of Health and Ageing by the Australian Bureau of Statistics, Commonwealth of Australia, Canberra.

Australian Bureau of Statistics (ABS) 2010, *Measures of Australia's Progress*, cat. no. 1370.0, Canberra.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2011, *Sustainable Australia – Sustainable Communities: A Sustainable Population Strategy for Australia*, Commonwealth of Australia, Canberra.

Department of Infrastructure and Transport 2011, *Our Cities, our future: a national urban policy for a more productive, sustainable and liveable future*, Commonwealth of Australia, Canberra.



# Population and settlement

## Chapter 2

Australia's major cities continue to experience strong population growth. Of the 2,915,607 people added to the population between 2001 and 2010, major cities absorbed 81 per cent (ABS 2011a). This growth has been the result of significant migration from other countries as well as from natural increase. In some cities growth has been largely a product of internal migration of Australia's resident population, which is one of the world's most mobile.

### Summary indicators

Dimension	Indicators
Population	Population growth 2001 to 2010 Components of population growth Internal migration and population distribution Population projections for major regional cities
Demographic change	Projected population age profiles to 2027
Household composition	Projected number of persons in household type 2006 to 2031
Housing diversity	Average number of bedrooms per dwelling and number of persons per household 1994-95 to 2007-08
Urban settlement	Population density Proportion of population living at various distances from the CBD
Dwelling stock	Building approvals by dwelling type 2010-11

### Key findings

- Australia's population has grown by three million in the past decade. The contribution of international migration to this growth has varied over time and has declined in 2010 to 52 per cent, down from a peak in 2008 of 67.6 per cent.
- The overwhelming majority of migrants settle initially in capital cities, particularly Sydney and Melbourne. They are generally highly mobile in the years immediately after arrival and more likely to move interstate than the general population. Within five years their movement patterns are similar to internal migration trends of the general population.
- International migrants are settling in Sydney at a slightly higher rate than Sydney residents are leaving.
- Melbourne is also a destination for many international migrants but the city is losing fewer internal migrants and consequently is growing more rapidly than Sydney.

- The destination for many internal migrants exiting Sydney and Melbourne was Perth and Brisbane and surrounding regions. Alongside the established trend of older Australians moving away from cities, a similar trend is evident among younger Australians and higher-skilled people moving to near-city and coastal regional areas, with housing affordability and less congestion reported as possible reasons.
- The central local government areas of Perth, Melbourne and Sydney all experienced rapid growth as the CBD and surrounding areas were redeveloped with higher-density housing. This trend was most pronounced in the City of Sydney, which added 52,530 residents and was a significant share of Sydney's population growth (11.7 per cent) in the period 2001 to 2010.
- The outer suburbs of capital cities continue to accommodate much of the population growth. However, Sydney has a much higher proportion of infill developments than other capital cities.

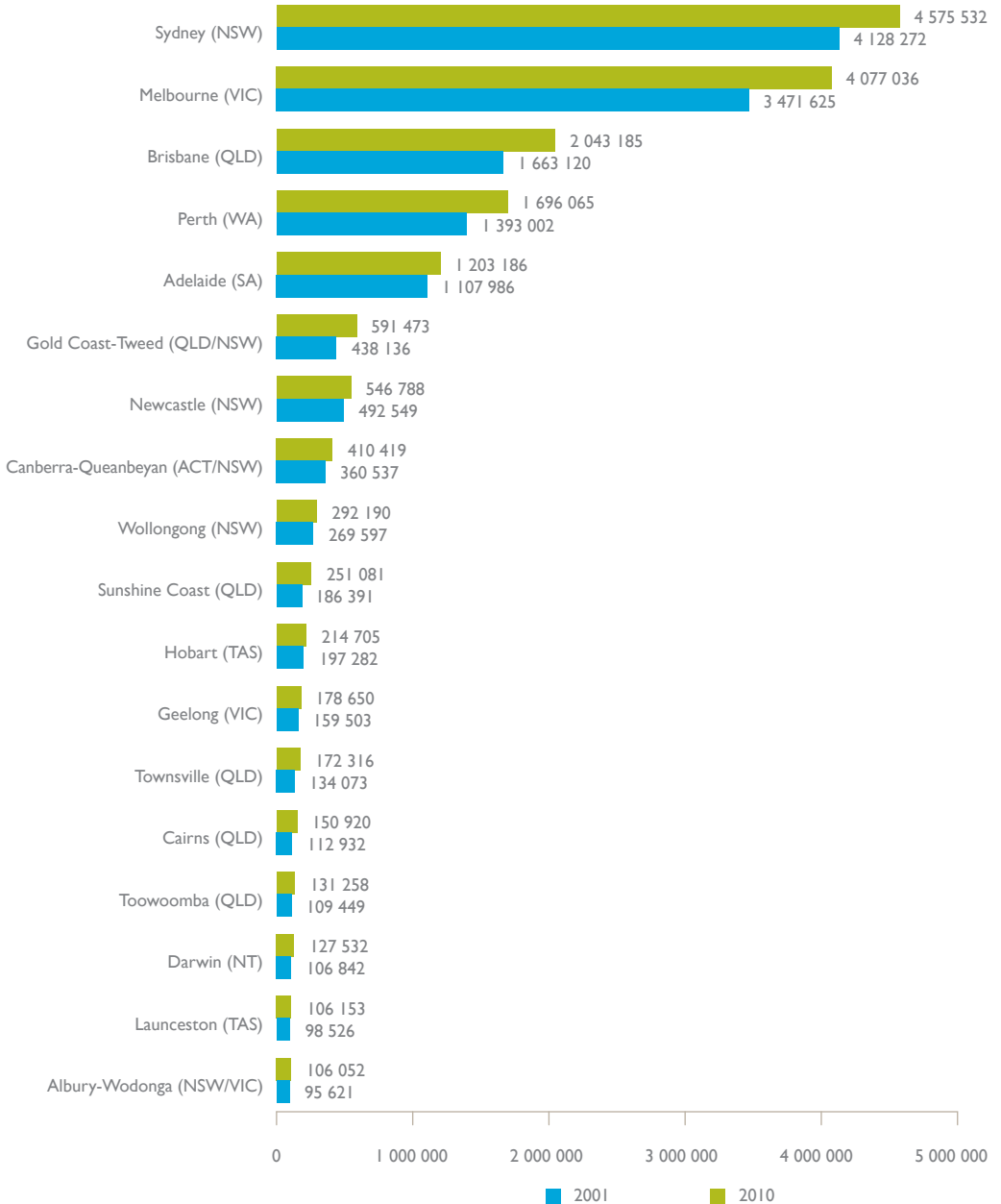
## Population growth

Between 2001 and December 2010 Australia's population grew by 2,915,607 people (ABS 2011a), with 81 per cent of this growth occurring in the 18 major cities. The distribution of this growth, both in numbers and in the rate of growth, varied considerably between the cities (Figure 2.1).

The biggest absolute increase was in Melbourne where the population grew by 605,411. The four largest capital cities, Sydney, Melbourne, Brisbane and Perth together accounted for almost 60 per cent of the national population growth from 2001 to 2010, despite substantial migration from these cities to other cities and regions (Hugo and Harris 2011).



Figure 2.1 Population in major cities, 2001 and 2010



Source: ABS 2011a

## Components of population growth

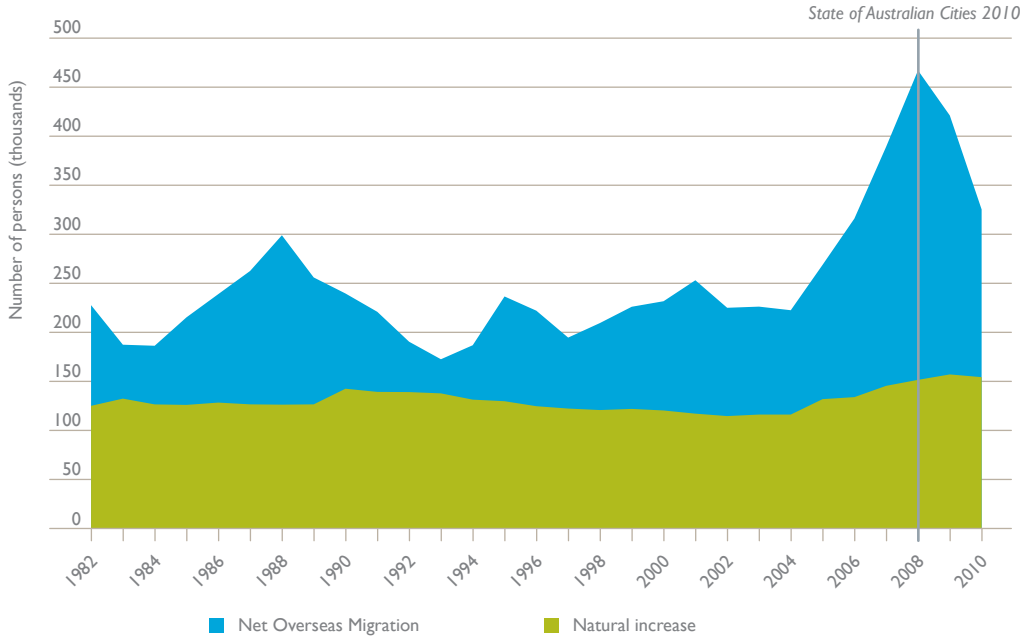
The three main components of population growth in cities are: net overseas migration, natural increase (births less deaths) and internal migration (population movement between locations). This report update adds to the data on overseas migration and explores internal migration in more detail, drawing on two recent reports: *Spatial trends in Australian population growth and movement* by the Bureau of Infrastructure, Transport and Regional Economics (BITRE 2011a), and *Population Distribution Effects of Migration in Australia* (Hugo and Harris 2011) published by the University of Adelaide for the Department of Immigration and Citizenship.

### Net overseas migration

As noted in *State of Australian Cities 2010*, the majority of population growth since 2001 was attributable to net overseas migration. Over the post-war period net overseas migration has been responsible for about half of Australia's population growth. It has also been a primary source of urban growth with the vast majority of migrants, particularly those from non-English speaking countries, settling in our major cities.

There has been considerable fluctuation over time in growth from overseas migration (BITRE 2011a). In 2008, net overseas migration accounted for more than two thirds (67.6 per cent) of population growth for the year, whereas in 2010 the contribution had dropped to close to half (52.6 per cent) as shown in Figure 2.2.

It should be noted, however, ABS changed the definition when calculating net overseas migration, from September 2006 onwards, to include those persons who stay in the country for 12 months in a 16-month period. The spike in Net Overseas Migration in about 2008 was largely attributable to a strong increase in arrivals of long-term temporary residents (in particular international students) without a corresponding increase in departures. The change in methodology and definition used by the ABS had a small impact on the data.

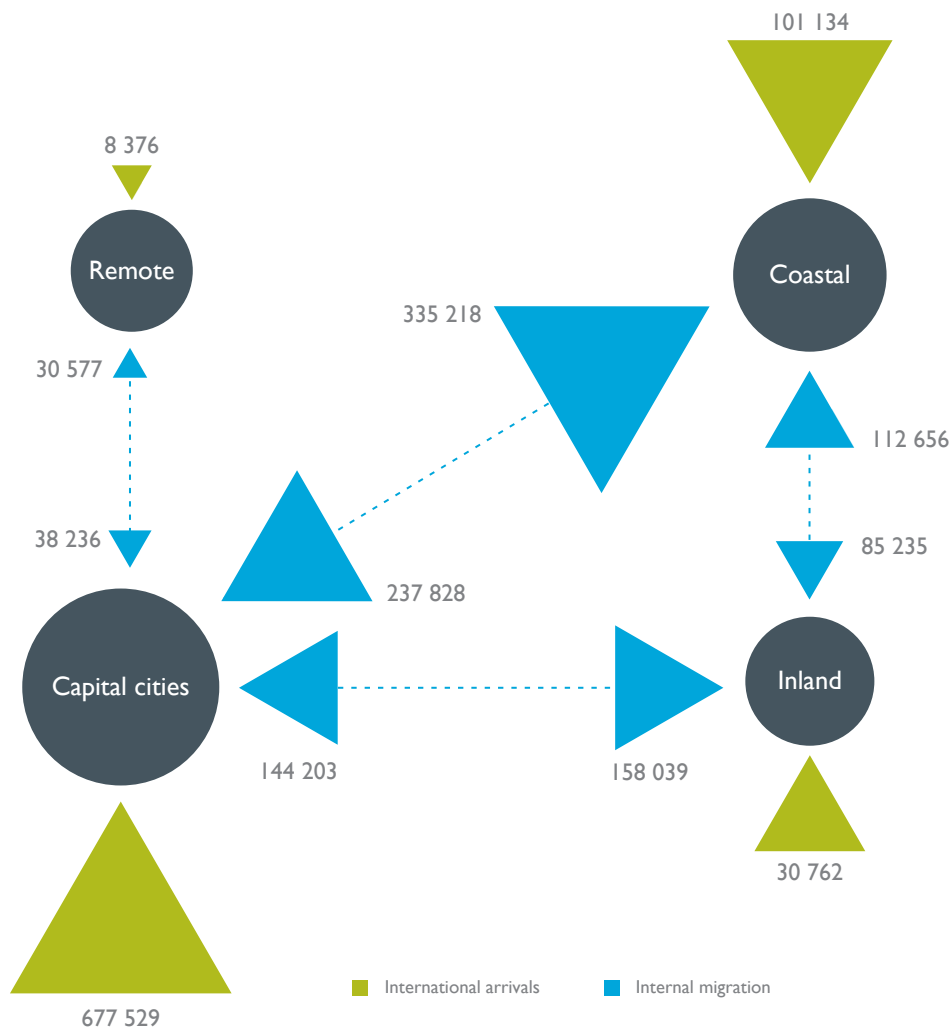
**Figure 2.2** Components of Australian population growth, 1982 to 2010

Source: ABS 2010a

### *Internal migration*

Australia has a highly mobile population. More than 40 per cent of the population had a different permanent address at the 2006 census to the one they had five years previously, with 1.69 million people shifting between statistical divisions, and 747,000 people moving interstate (Hugo and Harris 2011). Figure 2.3 shows the overall picture of international and internal migration flows for Australia over this period.

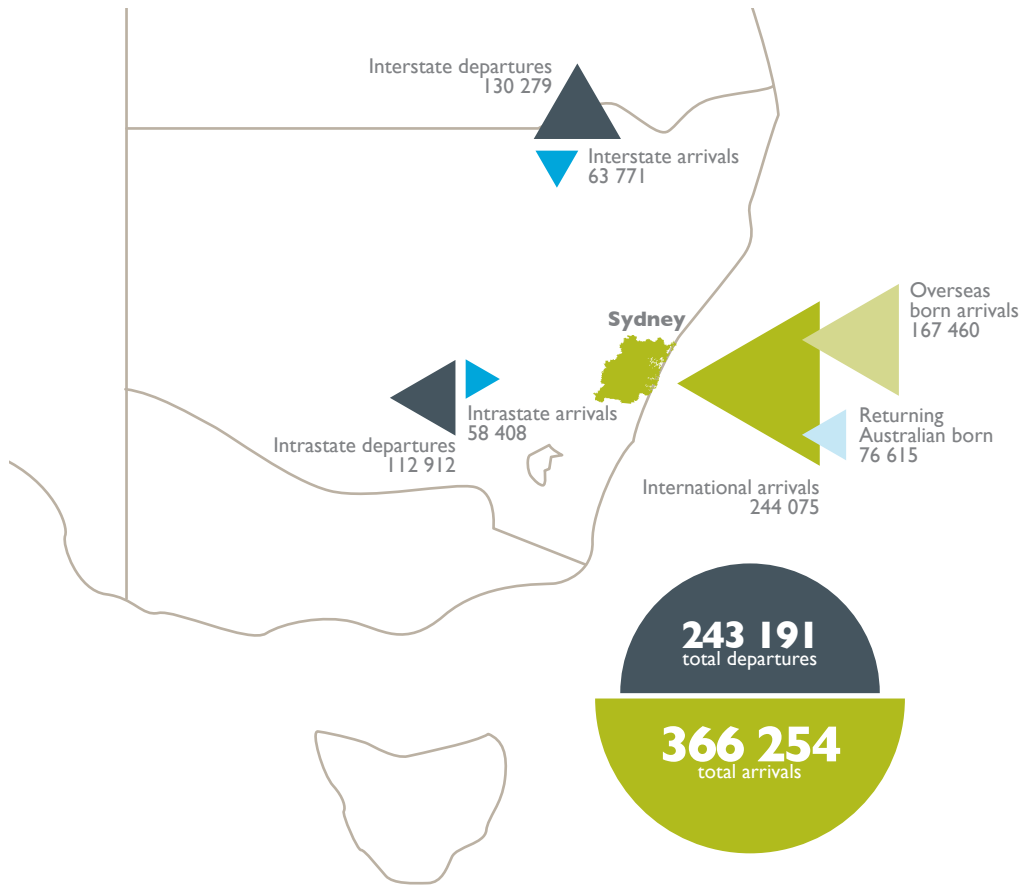
Figure 2.3      The pattern of total internal and international migration, Australia 2001-2006



Source: BITRE 2011a

There has also been substantial internal migration from capital cities to non-capital cities and regional areas (Hugo and Harris 2011). Census data from 2001 and 2006 shows that five of the eight capital cities experienced net internal migration losses. Sydney recorded the largest loss of 121,000 people. This was more than compensated for by international migration as shown in Figure 2.4. By comparison the losses in the other capital city statistical divisions were much smaller – 19,000 in Melbourne, 9,600 in Adelaide, 2,000 in Darwin and 460 in Canberra.

Figure 2.4 Migration profile of Sydney, between 2001 and 2006

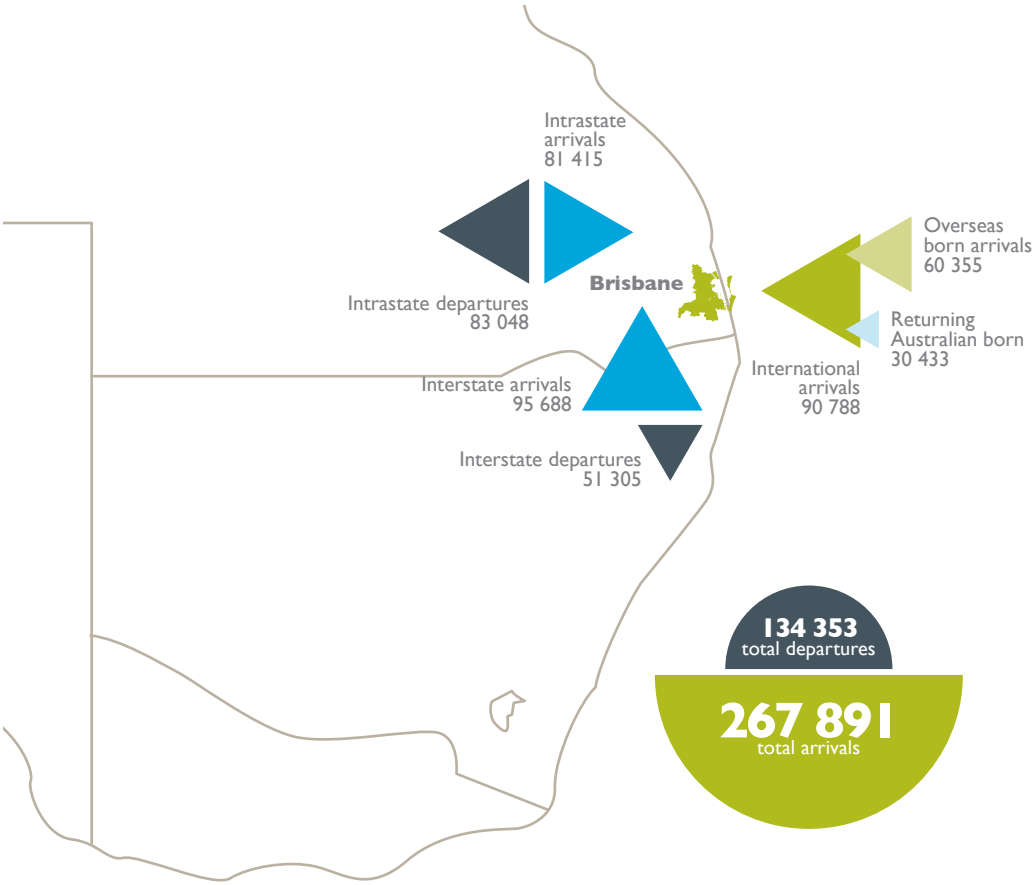


Source: Adapted from Hugo and Harris 2011

The reasons for people leaving Sydney are complex. High property prices and congestion are reported as likely major causes for the net migration loss, (Hugo and Harris, 2011), yet these issues are not experienced by Sydney alone. Melbourne, Brisbane and Perth experienced considerable housing affordability constraints and all figured prominently in recent years in 'most expensive places to live' lists (refer to Chapter 5).

There is considerable variance in the internal migration patterns experienced by large Australian cities. For example, Brisbane had the largest net internal migration, where arrivals exceeded losses by 42,750 people. Figure 2.5 explains the full migration profile for Brisbane. Smaller net internal migration gains occurred in Perth (3,300 people) and Hobart (2,400 people).

Figure 2.5 Migration profile for Brisbane, between 2001 and 2006



Source: Adapted from Hugo and Harris 2011

The general trend of migration to coastal and nearby areas, first observed in the 1970s, continues to escalate with significant net migration gains being recorded. This trend is particularly apparent in the South East Queensland area, with Brisbane, Gold Coast, Sunshine Coast, and Wide Bay–Burnett the top four destinations for Australians, receiving more than twice as many net internal migrants than the next six.

There is evidence (Hugo and Harris, 2011) that recent migrants, those arriving between 1996 and 2001, were most mobile during their first months and years in Australia, with 44,240 recent migrants moving over the 2001–06 period. After this, they then tended to follow similar internal migration patterns to the general population.

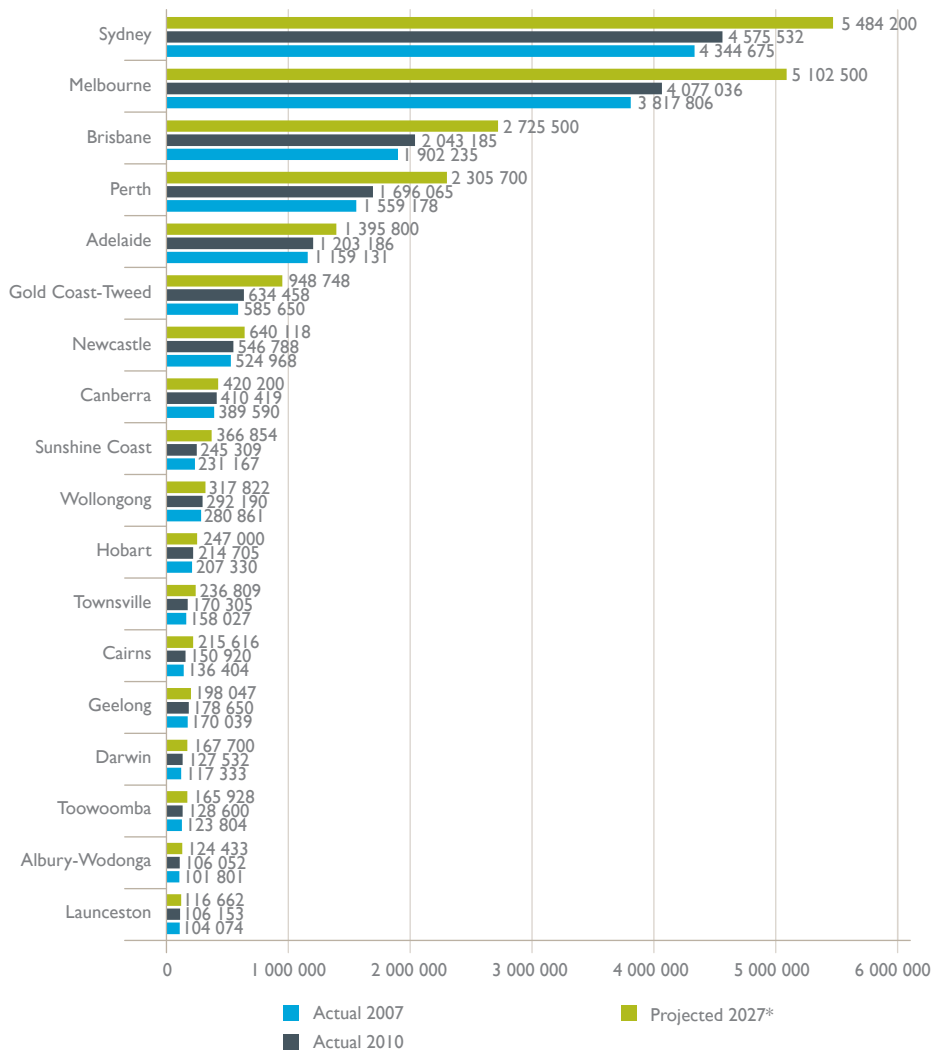
Sydney experienced a significantly higher net migration loss than other centres of 4,642 recent migrants between the 2001 and 2006 Census. Where recent migrants differ from the rest of the population is that they are more likely to move to other cities interstate, than to nearby city or coastal areas.

## Population Projections

*State of Australian Cities 2010* provided a summary of existing national population projections for capital cities. This report provides projections and analyses for all 18 major cities.

In 2007, the Australian Bureau of Statistics undertook unofficial population projections to the year 2027. These projections are presented alongside actual estimated resident populations in 2007 and 2010 for major cities in Figure 2.6.

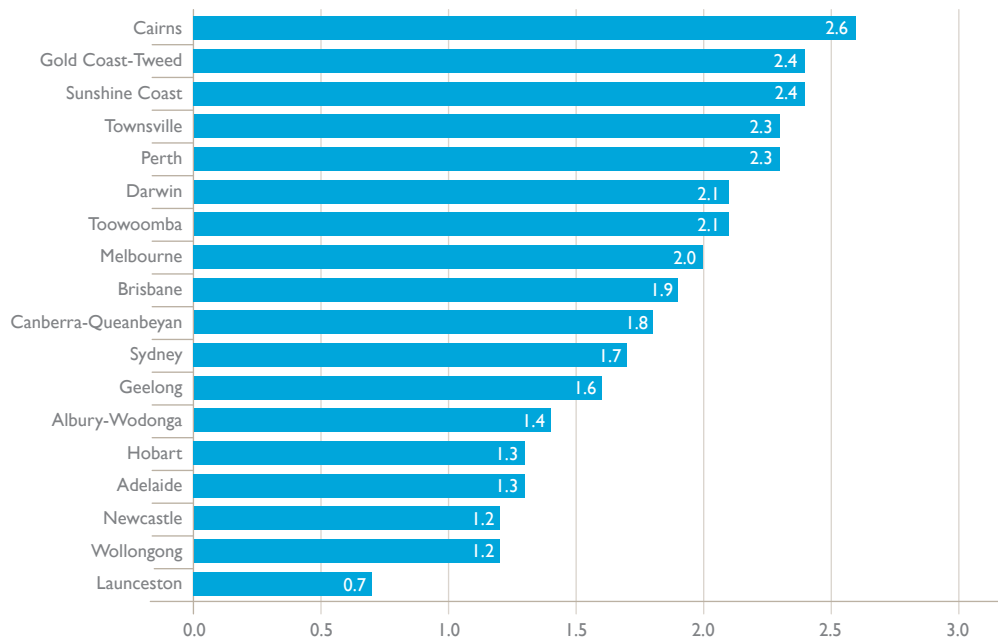
**Figure 2.6** Major cities population projections to 2027 and estimated residential populations in 2007 and 2010



Source: BITRE analysis of ABS 2011a and population projections prepared by ABS for the Department of Health and Ageing, 2008

Some cities with smaller populations are experiencing higher percentage growth than the larger capitals. Figure 2.7 demonstrates that between 2009 and 2010, Cairns experienced the highest percentage growth of the major cities at 2.6 per cent. Launceston experienced the lowest percentage growth over the same period.

Figure 2.7 City population growth 2009-2010



Source: Regional Population Growth, Australia, 2009-10 (cat. no. 3218.0)

## Demographic change

Australian cities will face significant intergenerational challenges resulting from the ageing of the population. Currently the most significant component of government spending relates to social security and welfare, with around one-third going to the aged, families with children, the sick and disabled, veterans, carers and income support payments. (2011-12 Budget Papers). Treasury projections show that the number of traditional working age people to support each retiree is expected to fall from five people today to 2.7 people in 2049-50. In 1970, there were 7.5 working age people for each person aged over 65 years (The Treasury, 2010). As a consequence, there will be relatively fewer people of working age to support an increasing number of older Australians.



## Population ageing

*State of Australian Cities 2010* highlighted the fact that population ageing is occurring at different rates in different cities. This update uses population projections to explore how these differences are expected to play out in the cities of Wollongong, Albury-Wodonga and the Gold Coast–Tweed.

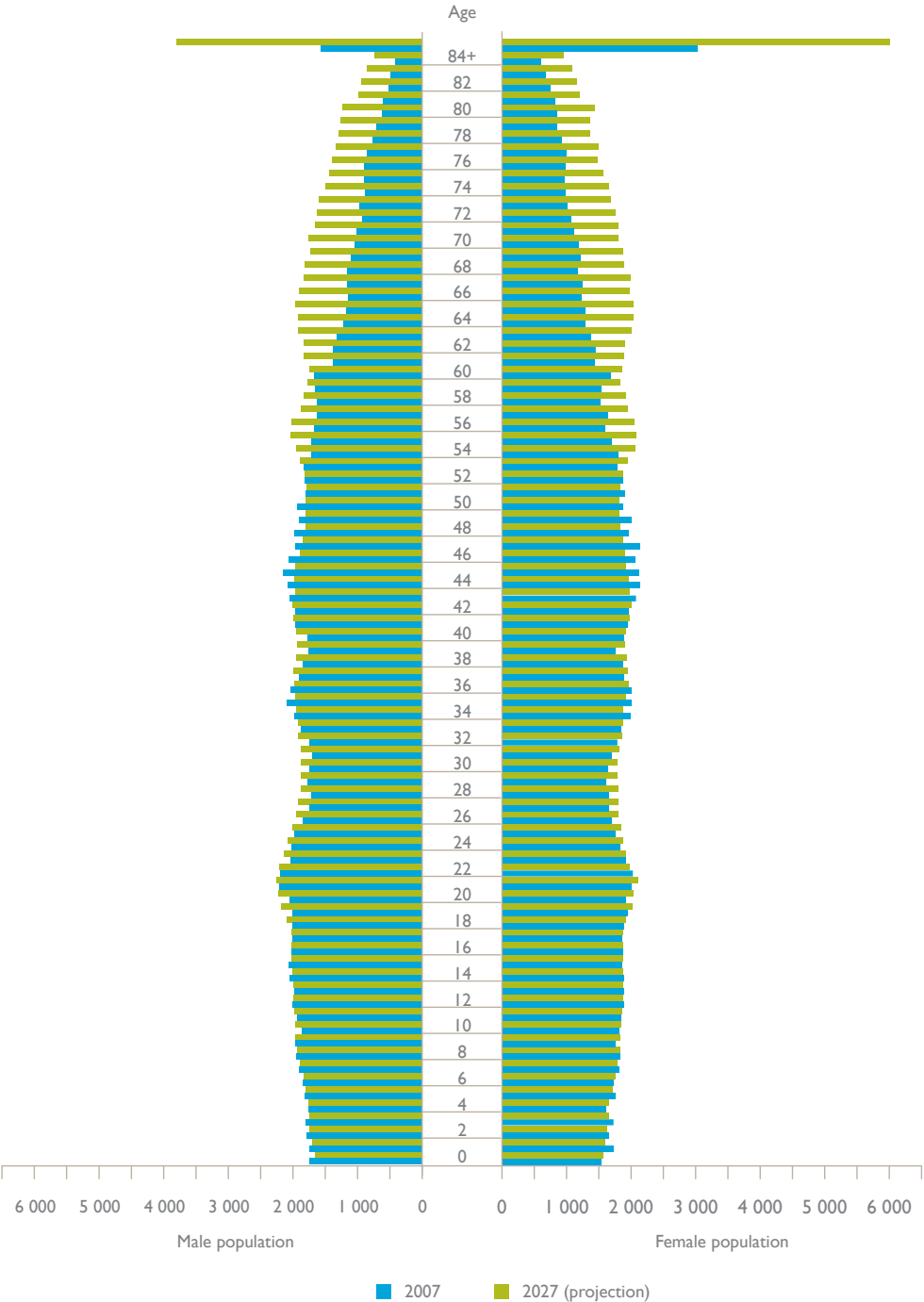
A decline in traditional manufacturing and blue-collar industries in Wollongong over the last 25 years has seen the region experience consistently higher unemployment rates than the New South Wales average (ABS 2007). A dip in the 23 to 36-year-old cohort shown in Figure 2.8 indicates that many younger people are leaving the region to seek employment opportunities elsewhere. The decline in the 23 to 36-year-old cohort is also reflected in the projected decline in young children who will be living in the city by 2027. The outflow of young people in a population that experienced rapid post-war growth and a corresponding decline in the birth rate has meant that 16 per cent of Wollongong's population is now over 65 years old, in contrast to the New South Wales average of 14.1 per cent (ABS 2011).

The age profile of Albury-Wodonga has a similar hollowing out of the 23 to 36-year-old cohort. As Figure 2.9 shows, Albury-Wodonga will have a more even spread of population by 2027 than in 2007. Despite this, the city will still have a substantial increase in the population aged over 52 years by 2027.

The reason for this is that while Albury-Wodonga has a comparatively higher unemployment rate of 6.9 per cent compared to the national average of 5.3 per cent (DEEWR 2011), the city has a relatively even spread of employment opportunities across the industry sectors of retail, construction, property and business services, health and community services and education. This means that it attracts people from surrounding areas where agriculture is the major, and declining, source of employment. Importantly, there is also a relatively even proportion of people employed as professionals, tradespeople, managers and clerical and service workers in the city, suggesting that there are a range of career paths for younger people who choose to stay in the city. There are also a range of tertiary education opportunities in Albury-Wodonga. This may account for the projections showing little decline in the population aged 16 to 22 years, the age at which many people, particularly women, leave regional centres to seek tertiary education and employment opportunities in larger cities.

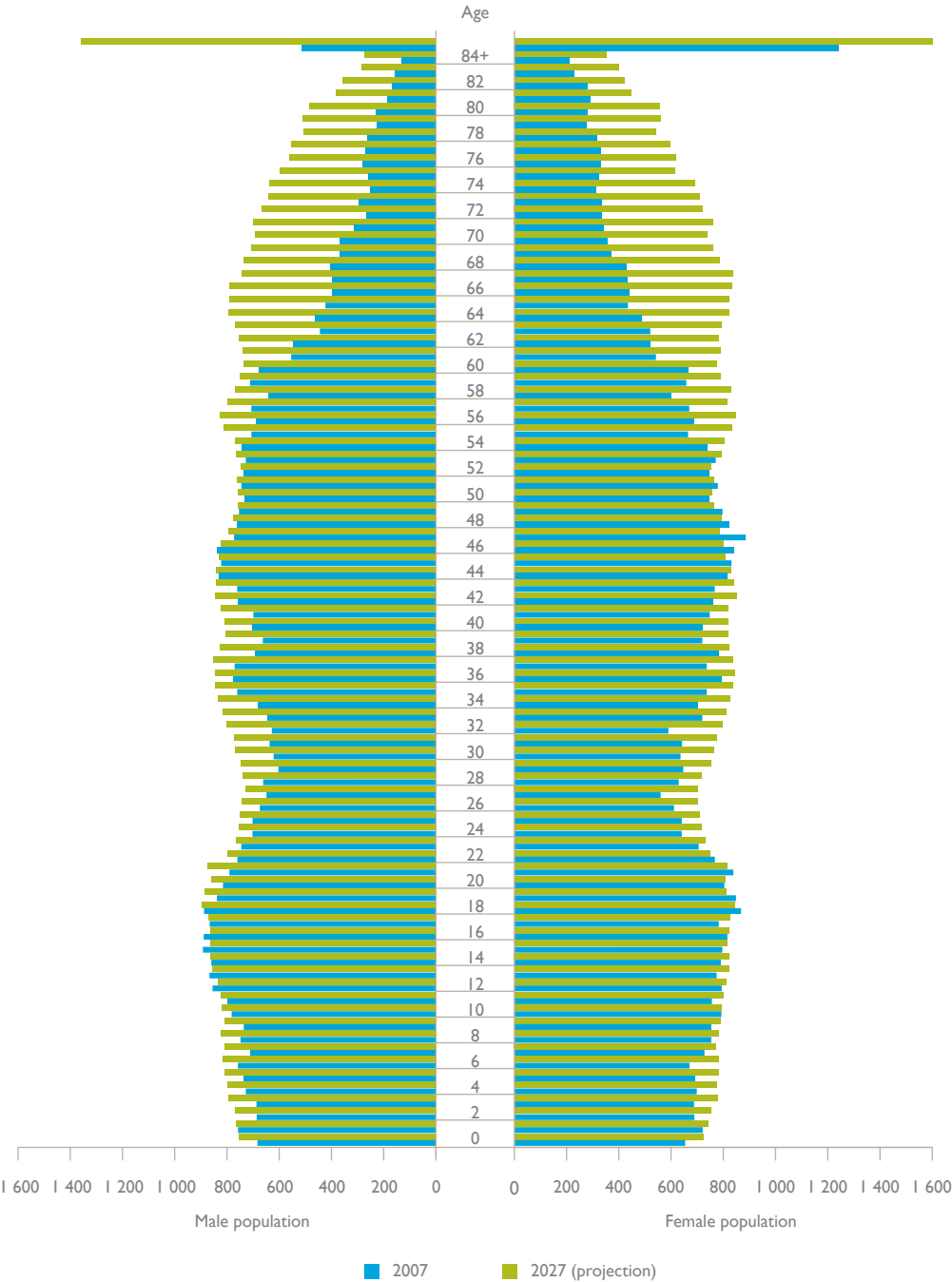
In contrast to Wollongong and Albury-Wodonga, the age profile of the Gold Coast–Tweed largely mirrors the Australian average. Despite a popular misconception that the Gold Coast–Tweed area is predominantly a place where people retire to, Figure 2.10 shows that there is only a slightly higher proportion of people above 60 years of age. People across all age groups have been moving to the Gold Coast–Tweed. The population shift to the area is reflected in a relatively even spread in the age profile. Substantial future population increase is projected to occur across all age groups with a slightly higher proportion of children.

Figure 2.8 Wollongong age profile 2007 and projected population 2027



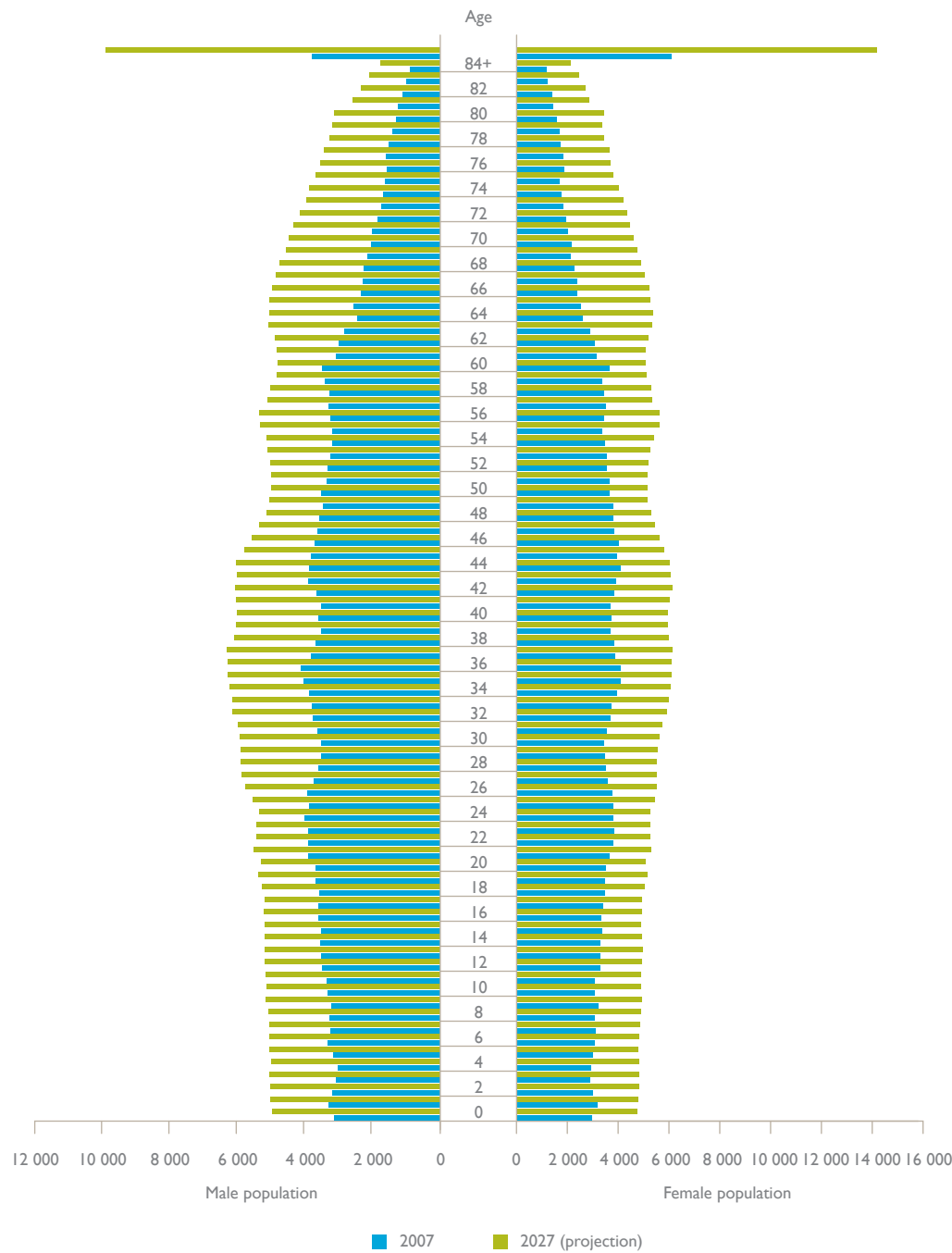
Source: Regional Population Growth, Australia for 2007 and 2027 (preliminary figures); \*Population projections prepared by ABS for the Department of Health and Ageing (2009).

Figure 2.9      Albury-Wodonga age profile 2007 and projected population 2027



Source: Regional Population Growth, Australia for 2007 and 2027 (preliminary figures); \*Population projections prepared by ABS for the Department of Health and Ageing (2009).

Figure 2.10 Gold Coast–Tweed age profile 2007 and projected population 2027

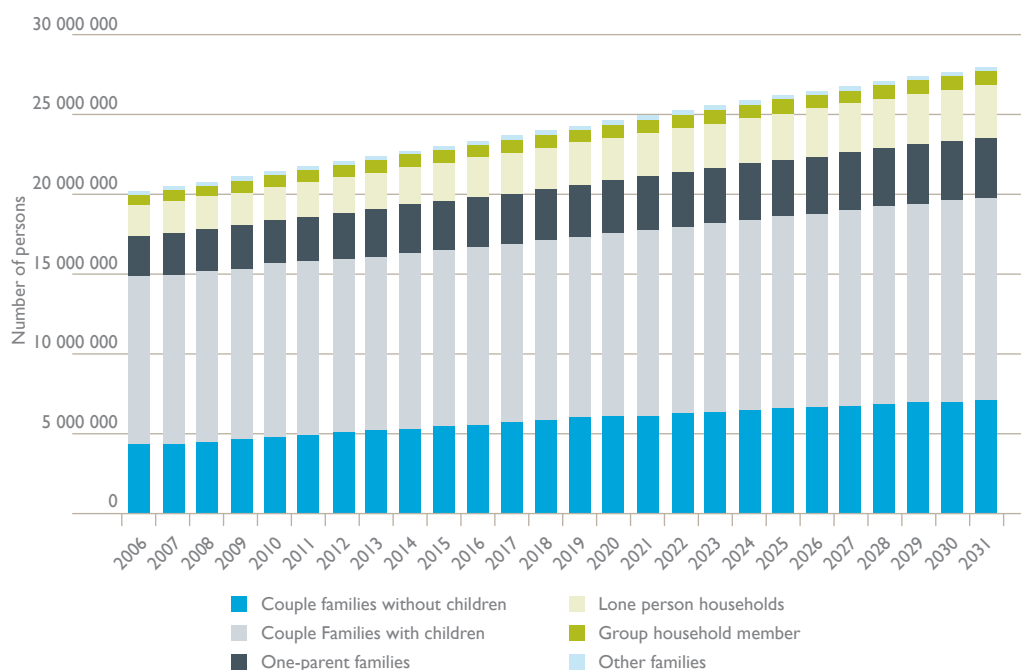


Source: Regional Population Growth, Australia for 2007 and 2027 (preliminary figures); \*Population projections prepared by ABS for the Department of Health and Ageing (2009).

## Household and family projections

The Australian Bureau of Statistics recently updated its household and family projections based on the 2006 Census (ABS 2010). Using the same 'medium growth' scenario as applied in *State of Australian Cities 2010*, the household projections show that the fastest growing type is the lone person household. In 2006 the proportion of lone person households in Australia was 24 per cent and is projected to grow to 28 per cent by 2031. This equates to an increase of 1,359,255 lone person households from 1,860,042 in 2006 to 3,219,297 in 2031, shown in Figure 2.11. The increase in the number of lone person households will be highest in the largest capitals, Sydney and Melbourne, but the rate of growth will be equally as high in Perth and Brisbane, as illustrated in Figure 2.12.

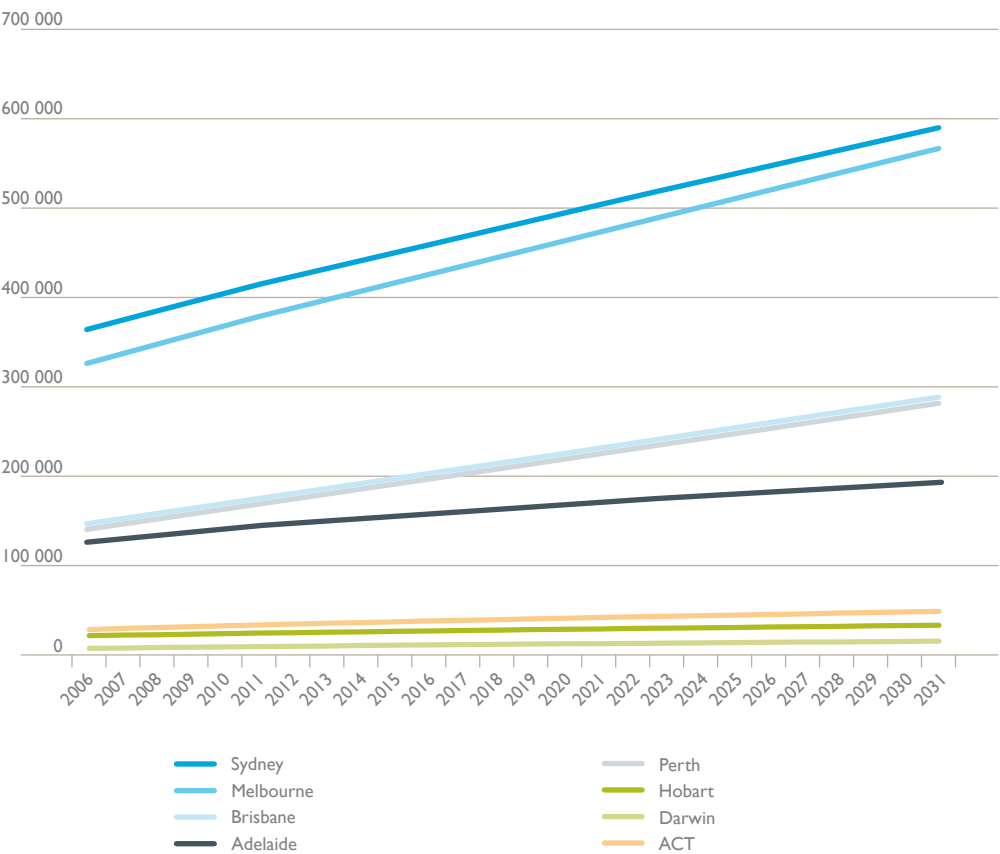
**Figure 2.11** Projected number of persons by household type, Australia 2006 to 2031



Note: ABS Household and Family projections are based on Series B 'medium growth' population projections, 2006 to 2101 cat. no. 3222.0.

Source: ABS 2010

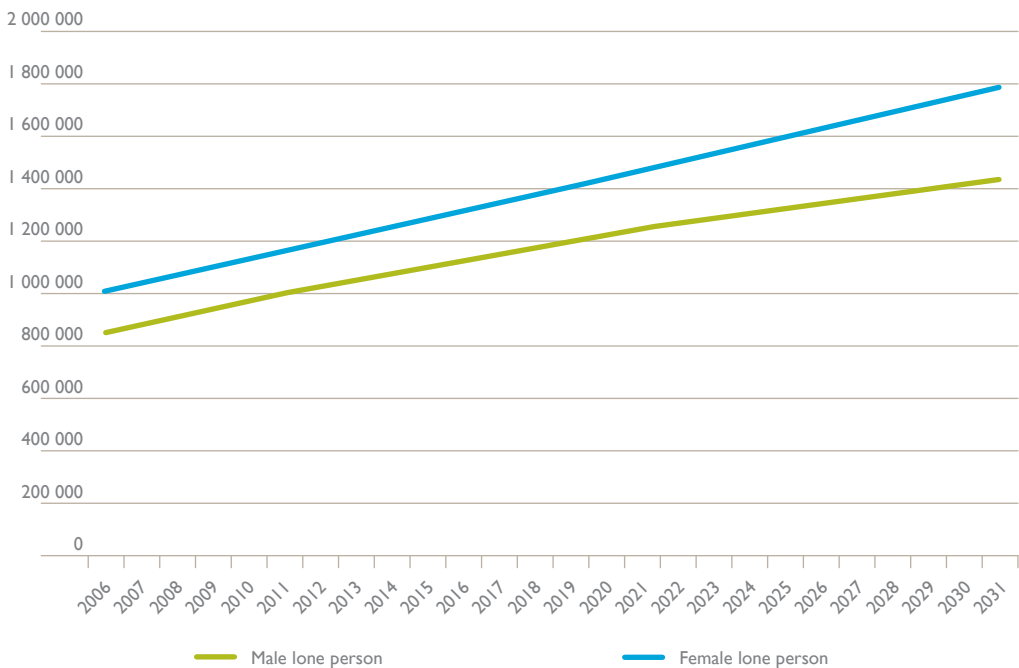
Figure 2.12      Projected number of lone person households for capital cities,  
2006 to 2031



Source: ABS 2010b

There is a noticeable difference between the proportions of women and men in lone person households. In 2006 the gender ratio (number of men to 100 women) in lone person households was 79.4. With life expectancy being higher for women than men, the gender difference in lone person households is projected to increase, with a projected gender ratio of 77.4 in 2030, as shown in Figure 2.13.

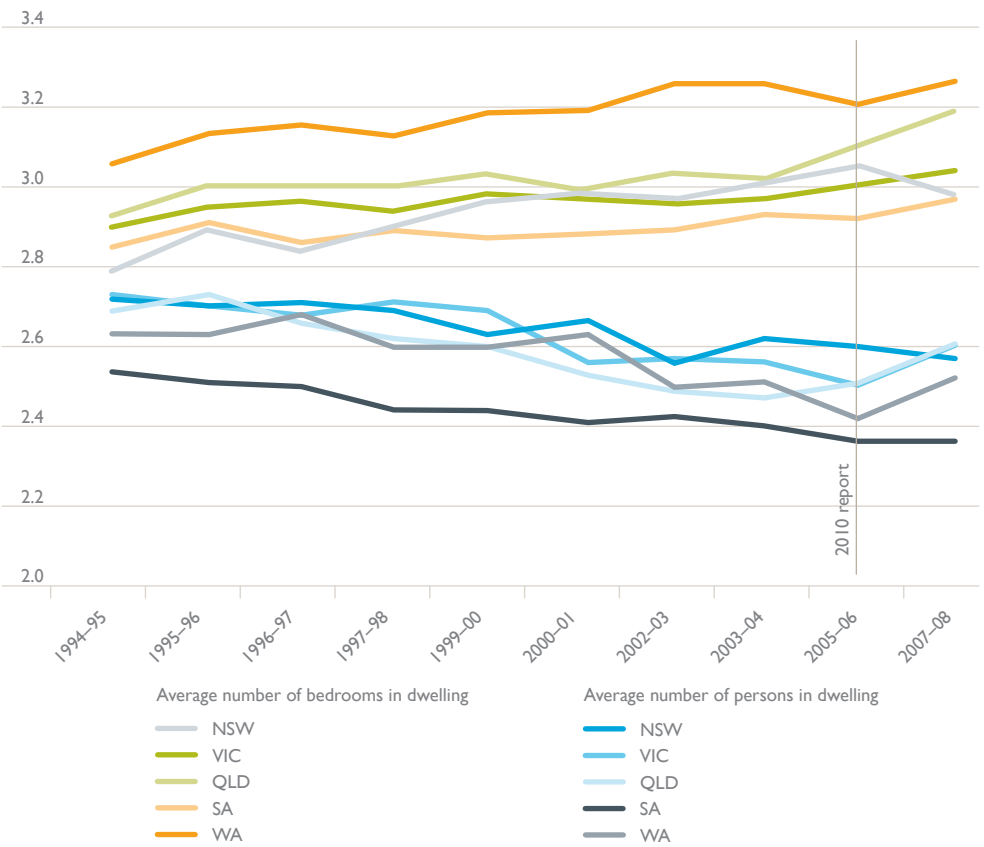
**Figure 2.13** Lone person households by gender, Australia, 2006 to 2031



Source: ABS 2010b

With changing household sizes and living arrangements, the general trend of increasing number of bedrooms per dwelling and decreasing number of persons per household has recently become more complex. Figure 2.14 shows the average number of bedrooms per dwelling and number of persons per household for five States, 1994–95 to 2007–08. Only South Australia has continued this previous trend in the period 2005–06 and 2007–08. In New South Wales, contrary to the trend in other States, the average number of bedrooms per dwelling has declined in line with the decline in the average number of persons per household. In Victoria, Queensland and Western Australia, however, there has been a further increase in dwelling size and an increase in the number of persons per household.

**Figure 2.14**      **Average number of bedrooms per dwelling and number of persons per household for five States, 1994–95 to 2007–08**



Source: BITRE analysis of ABS 2007 Housing Occupancy and Costs, Australia, 2005-06 cat. no. 4130.0.55.001 and ABS 2010 Australian Social Trends, December 2010 Data Cube – Housing cat. no. 4102.0, table 2 Housing, State Summary.



## Urban settlement

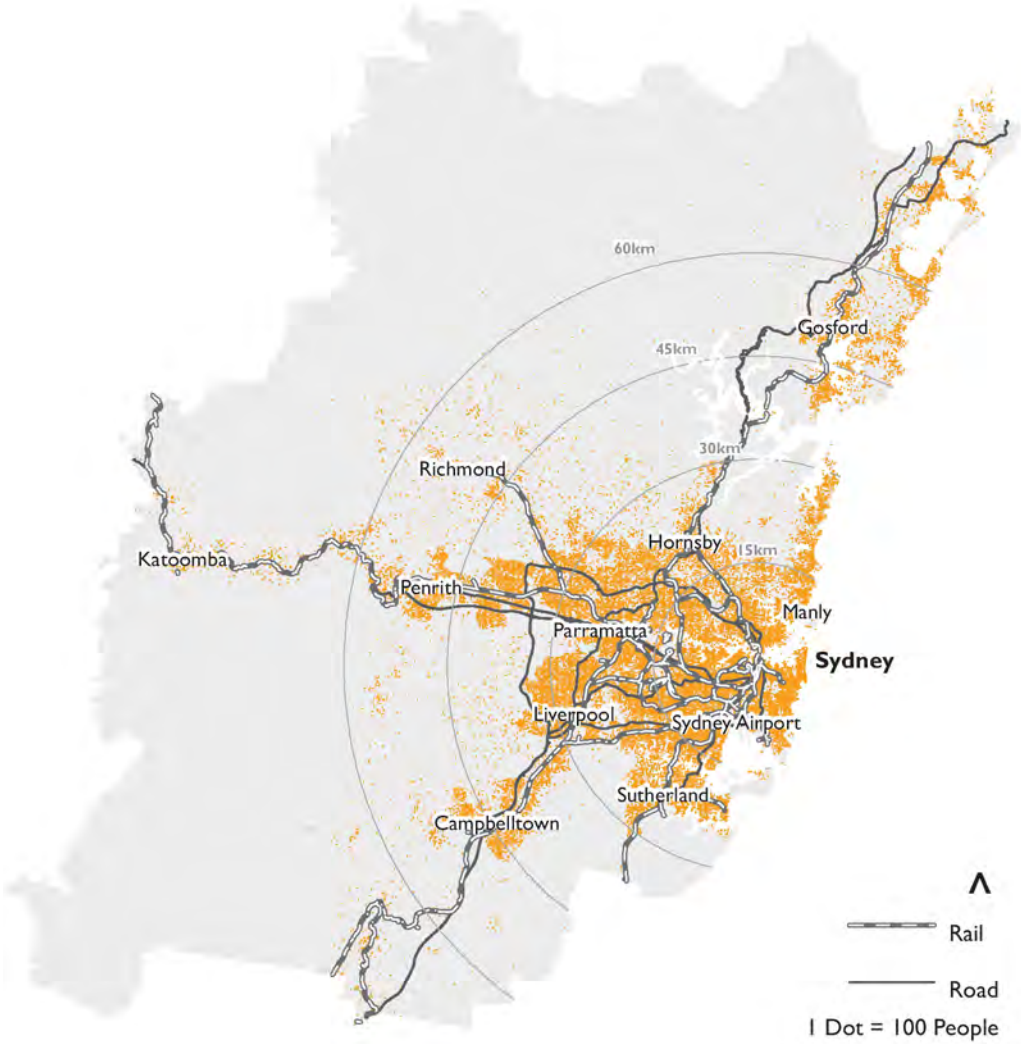
*State of Australian Cities 2010* outlined the role that capital cities play in Australia's urban settlement pattern. The economic and social influence of our capital cities over State activities and regional centres has been very pronounced over time (BITRE 2011a). Large urban conurbations have formed around capital cities and primarily stretch along our coastlines. This update further explores Australia's emerging urban regions, and provides more detail on the settlement patterns of the conurbations of Sydney, Melbourne, South East Queensland and Perth.

Many regional cities and the areas between them are integrated and interdependent with capital cities, sharing labour markets and transport networks and increasingly functioning as a single unit.

Outer urban growth and encroachment into adjacent regions has also spurred the growth of peri-urban townships. The peri-urban regions within easy commuting distance of major cities enjoy the benefits of the greater quality and range of services often available in metropolitan areas combined with a country lifestyle (BITRE 2011a).

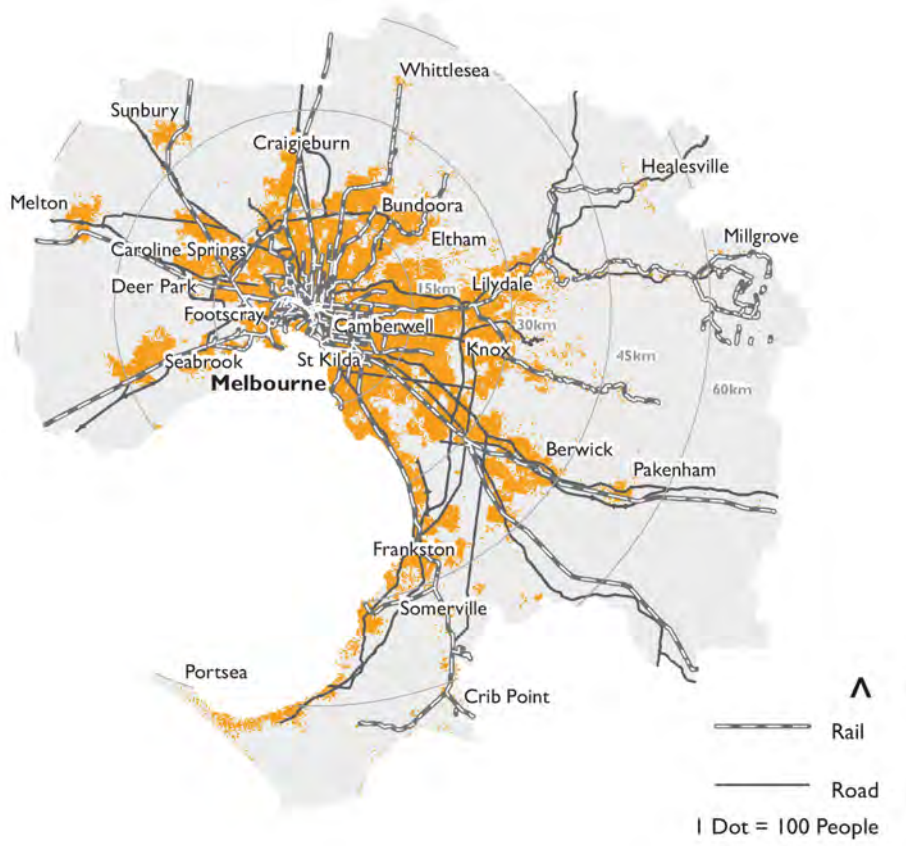
At the same time, the process termed 'peri-urbanisation' is occurring in the capital cities. This is where urban expansion on the outer fringe extends into neighbouring regions. These peri-urban areas can reach outwards to 150 kilometres from the capital city central business district (Buxton *et al* 2006), as shown in Figure 2.15 to Figure 2.23.

Figure 2.15 Sydney population density, 2006



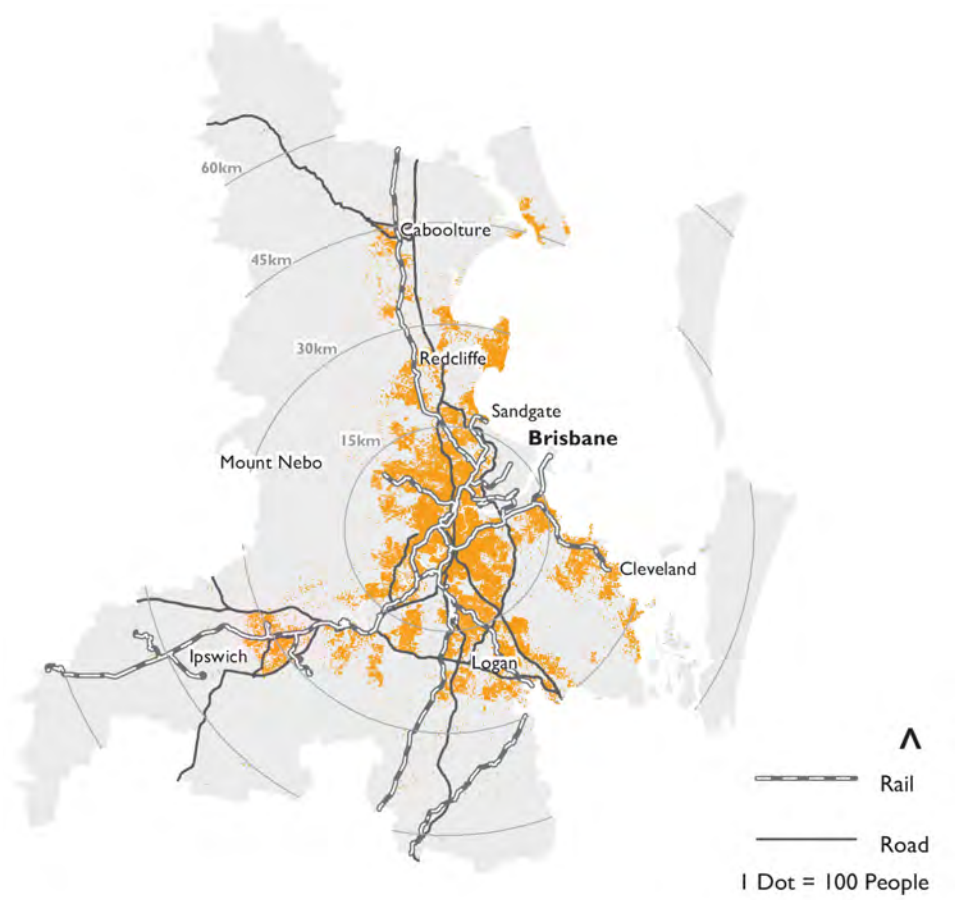
Source: Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

Figure 2.16 Melbourne population density, 2006



Source: Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

Figure 2.17 Brisbane population density, 2006



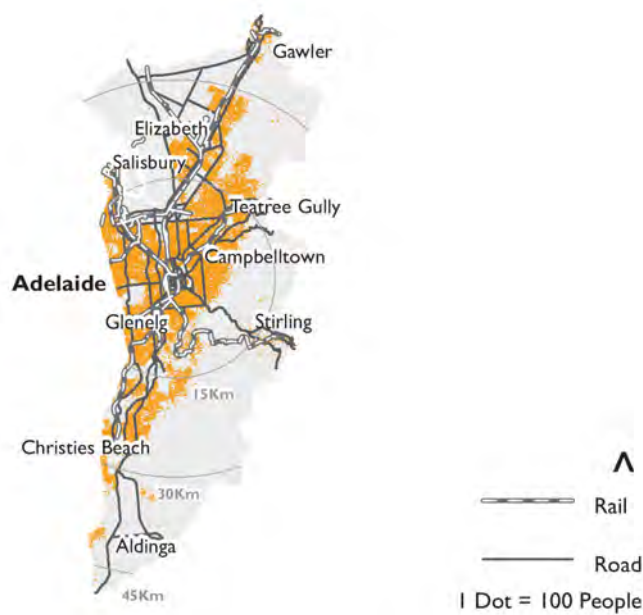
Source: Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

Figure 2.18      Perth population density, 2006



Source: Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

Figure 2.19 Adelaide population density, 2006



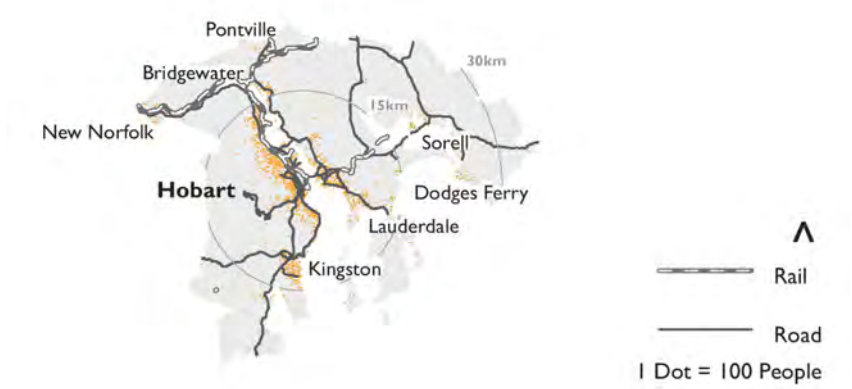
Source: Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

Figure 2.20 Canberra-Queanbeyan population density, 2006



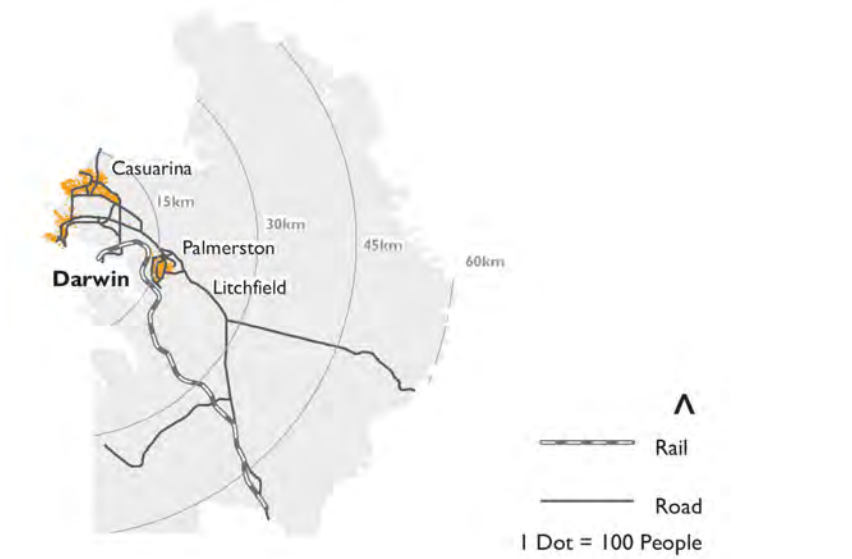
Source: Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

Figure 2.21      Hobart population density, 2006



Source: Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

Figure 2.22      Darwin population density, 2006

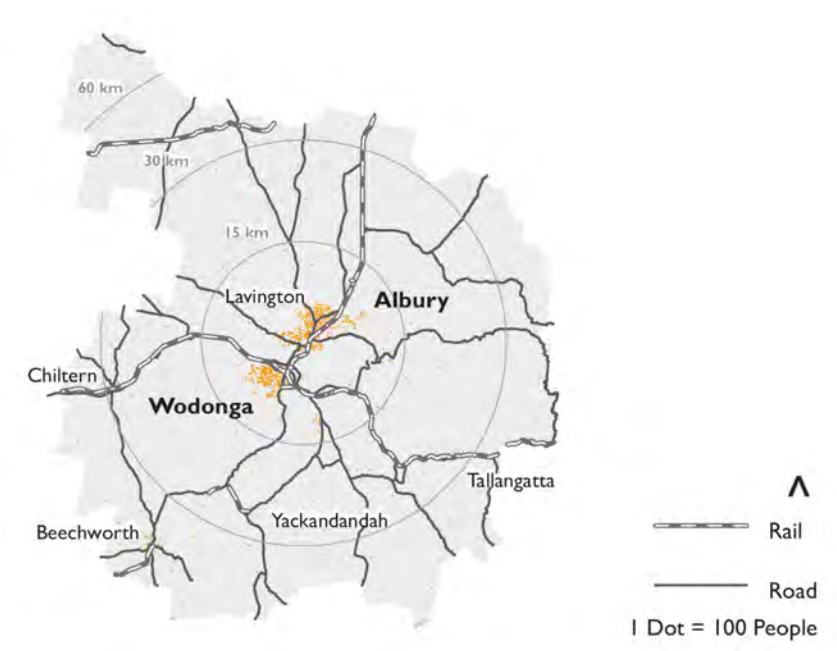


Source: Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

## Urbanisation in regional areas

Urbanisation processes are particularly concentrated in our coastal areas, where the majority of regional cities are located. There is continuing strong population growth in these coastal cities but also around other major centres along the coast and in large inland regional centres. Figure 2.23 illustrates the extent of this urbanisation in 2006 for the city of Albury-Wodonga. The population growth in these non-metropolitan areas between 1997 and 2009 was almost two million people (Gurran *et al* 2011).

**Figure 2.23** Albury Wodonga population density, 2006



Source: Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

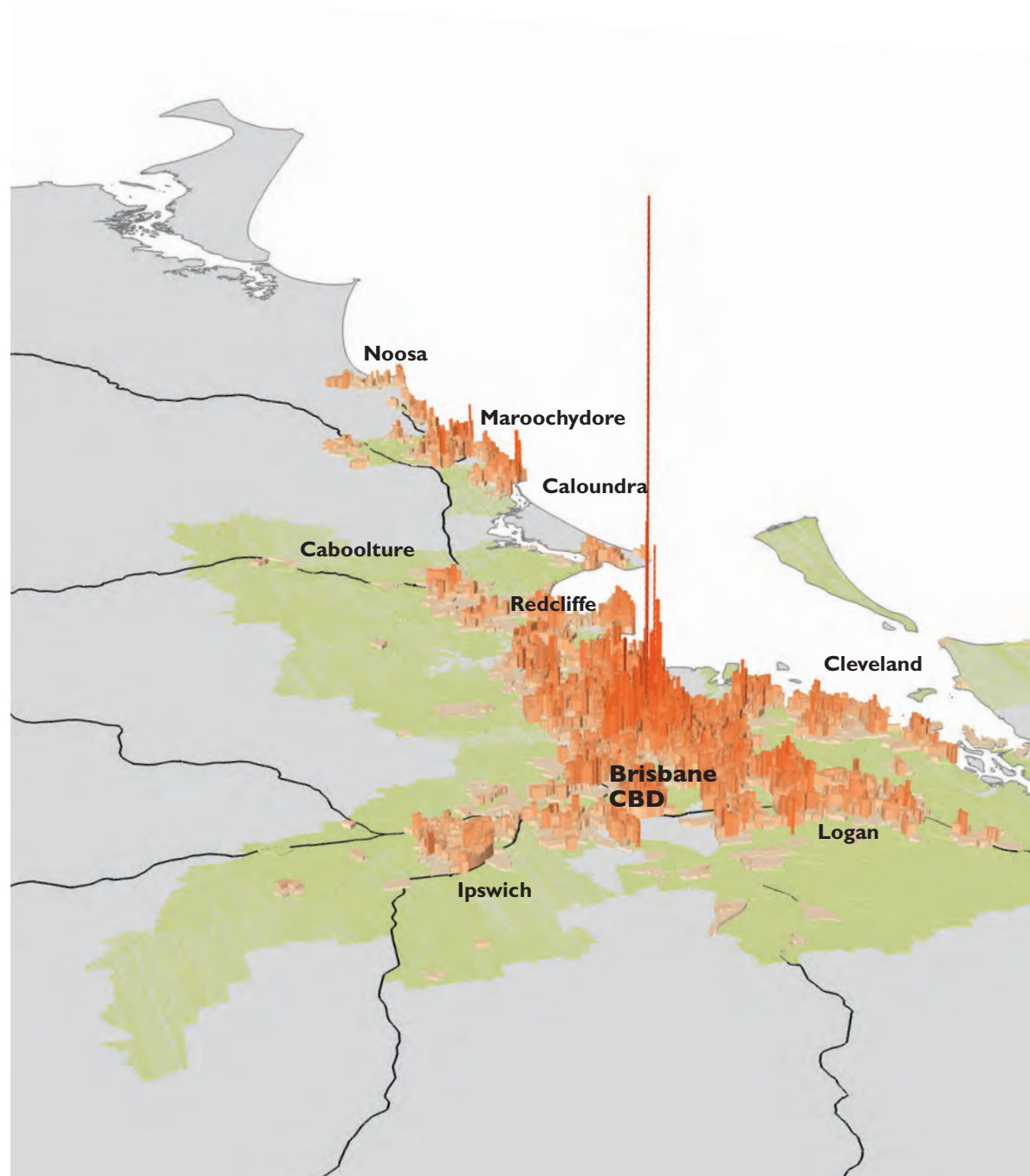
The urbanisation pressures emanating from our capital cities, and between and around our regional cities, have implications for natural resource and infrastructure management and land use planning. For example, 25 per cent of Australia's agricultural production occurs in the peri-urban areas. This poses problems for maintaining traditional farming in areas where land prices have risen because of demand for larger blocks on the urban periphery (Houston 2005).





Townsville, Queensland

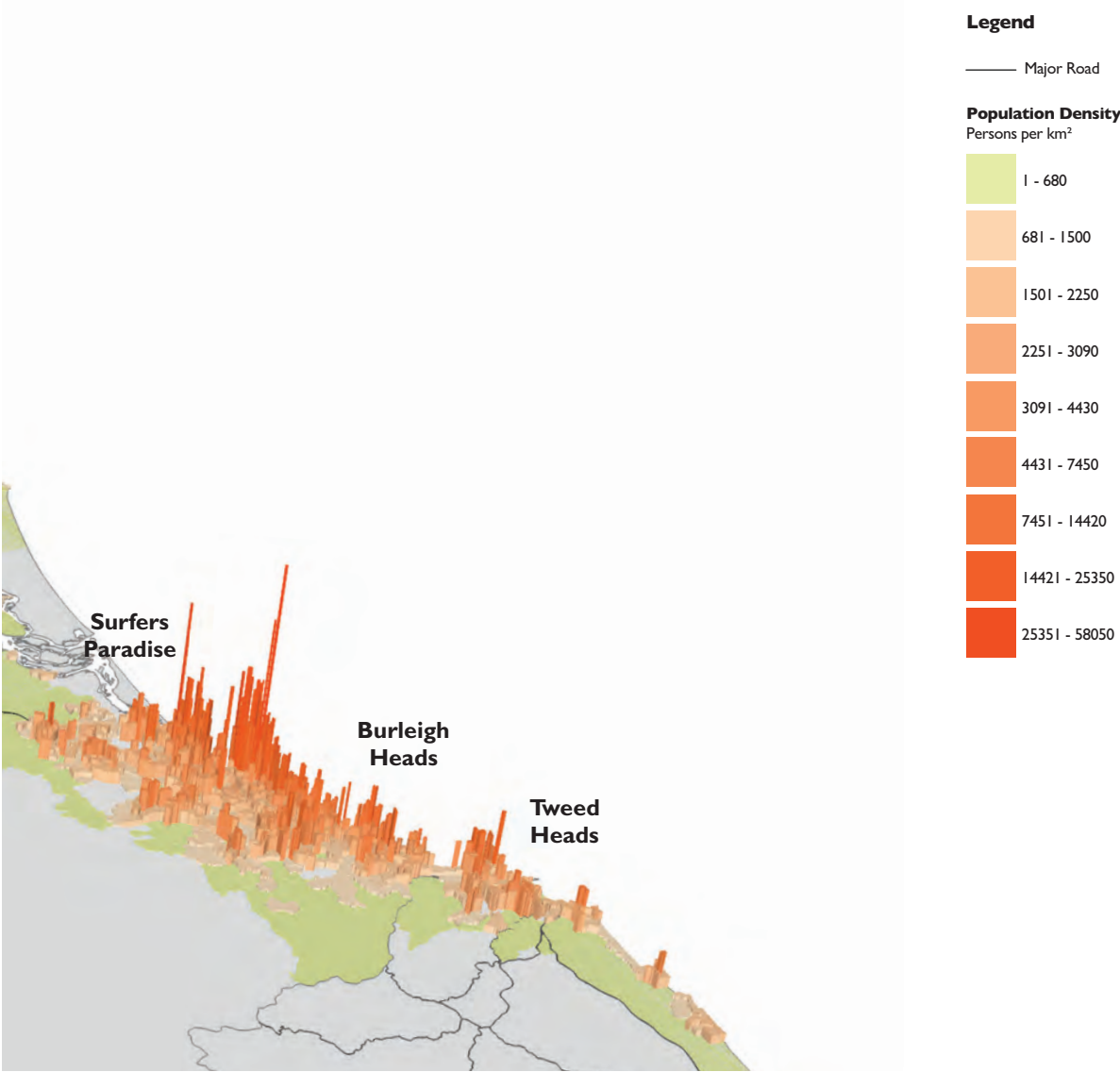
Figure 2.24      Population densities of South East Queensland, 2006



Note:      The density is expressed as persons per kilometre but does not indicate the total number of persons in the district. Each district has approximately the same number of persons in it, about 200 people per collection district. The densities are corrected to account for open spaces within districts

Source:      Department of Infrastructure and Transport 2011 analysis of ABS 2006 Census

The mapping of population densities around Greater Brisbane (Figure 2.24) as an example, illustrates the extent of peri-urbanisation along the coast. This has resulted in a relatively low density metropolitan region with the exception of the area around Brisbane’s central business district and Surfers Paradise. The height of each spike in the figure represents the population density of an individual ABS collection district.



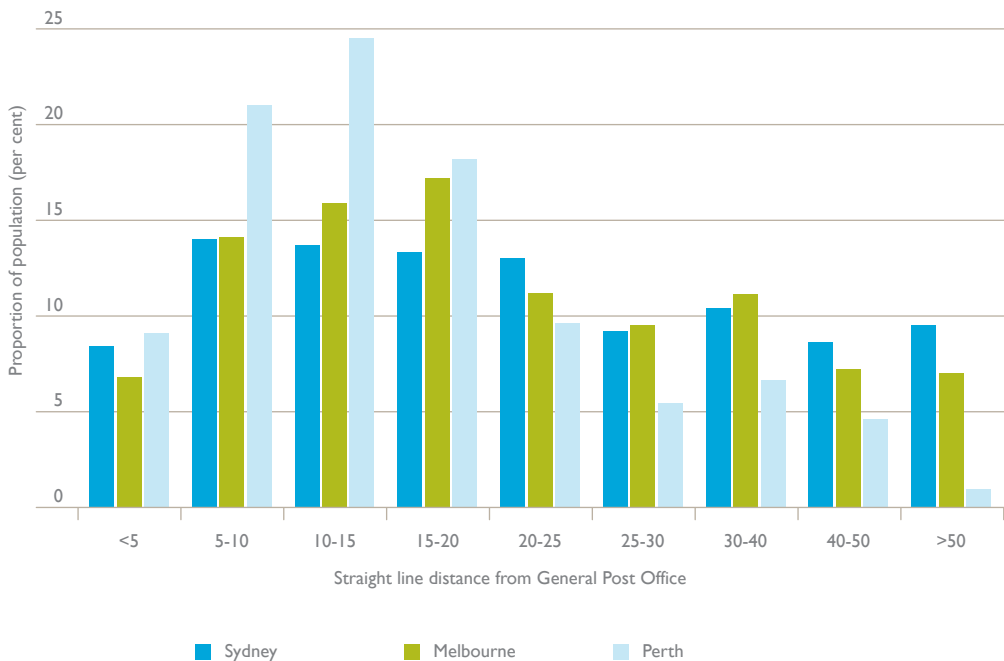
## Spatial patterns of population in Sydney, Melbourne and Perth

Urban settlement patterns in the larger cities in the past two decades have become more diverse than in the post-war growth period last century, reflecting changing economic, demographic, social and cultural trends. This has had an influence on housing preferences, as described in Chapter 5 on liveability (Kelly *et al* 2011).

Analysis of population growth in three capital cities, Perth, Melbourne and Sydney, (BITRE 2010, 2011b and 2011c) shows both outer urban expansion and resurgent growth in inner areas.

Compared with the other cities, Melbourne has a smaller share of its population living within five kilometres of the Central Business District (CBD), while Sydney has a greater share living more than 40 kilometres away. Reflecting Perth's smaller population base, 73 per cent of residents live within 20 kilometres of the CBD, compared with about half of Sydney and Melbourne residents (Figure 2.25).

**Figure 2.25** Proportion of population living at various distances from CBD, 2006



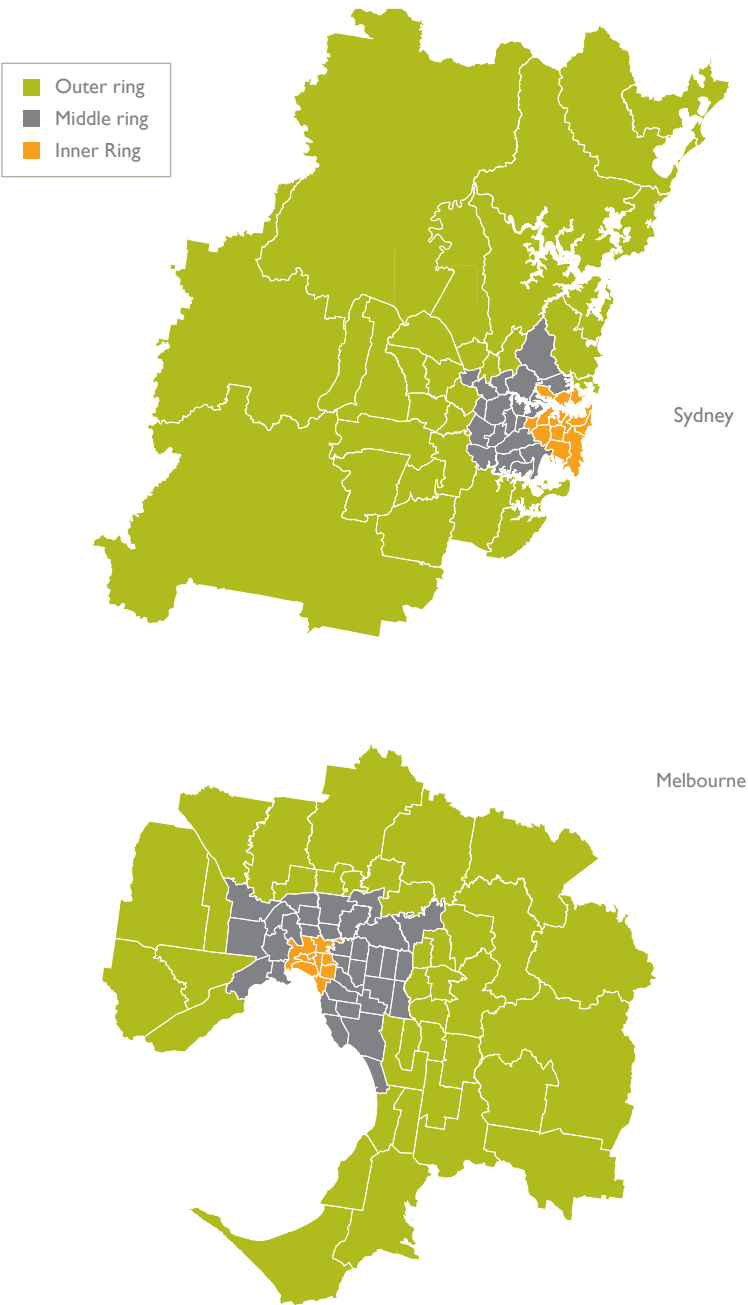
Source: BITRE analysis of 2006 ABS Census of Population and Housing place of enumeration data for CDs.

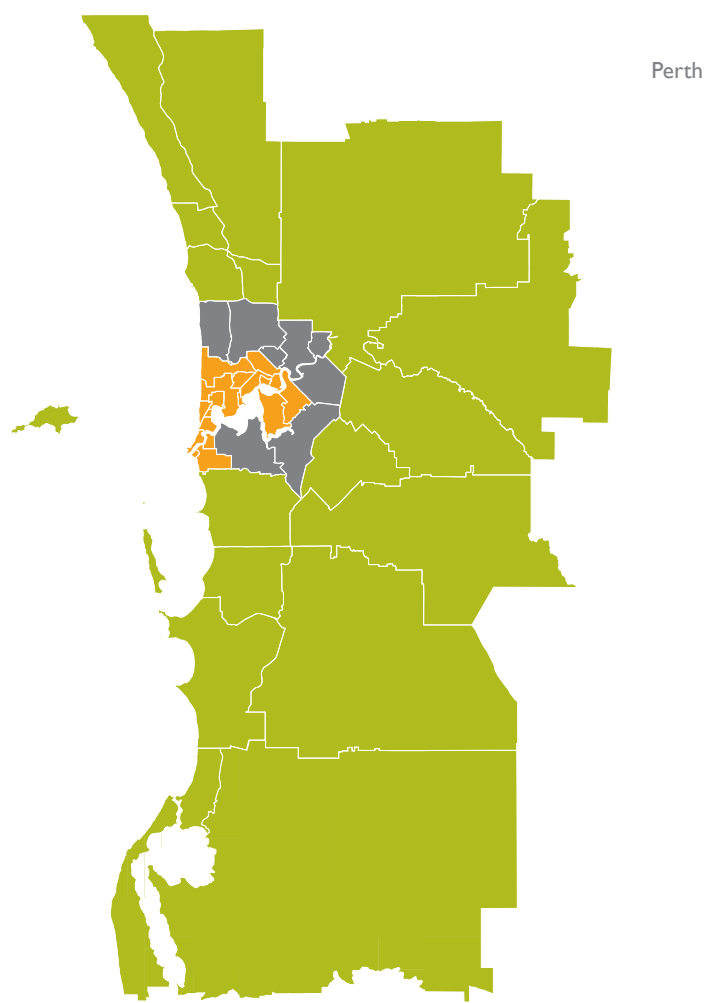
To better understand the distribution of resident population and jobs, each city has been divided into 'inner', 'middle' and 'outer' areas based on State government classifications, except for Melbourne, where the classification was based on ABS statistical subdivisions.

The classification that forms the ring structure of the cities generally reflects the history of residential development in the city and is illustrated in Figures 2.26 and 2.27.

Between 2001 and 2010, Melbourne added more than 600,000 new residents, compared with roughly 450,000 in Sydney and 300,000 in Perth. While Melbourne added the most people, Perth had a higher population growth rate (2.2 per cent) than Melbourne (1.8 per cent) and double that of Sydney (1.1 per cent).

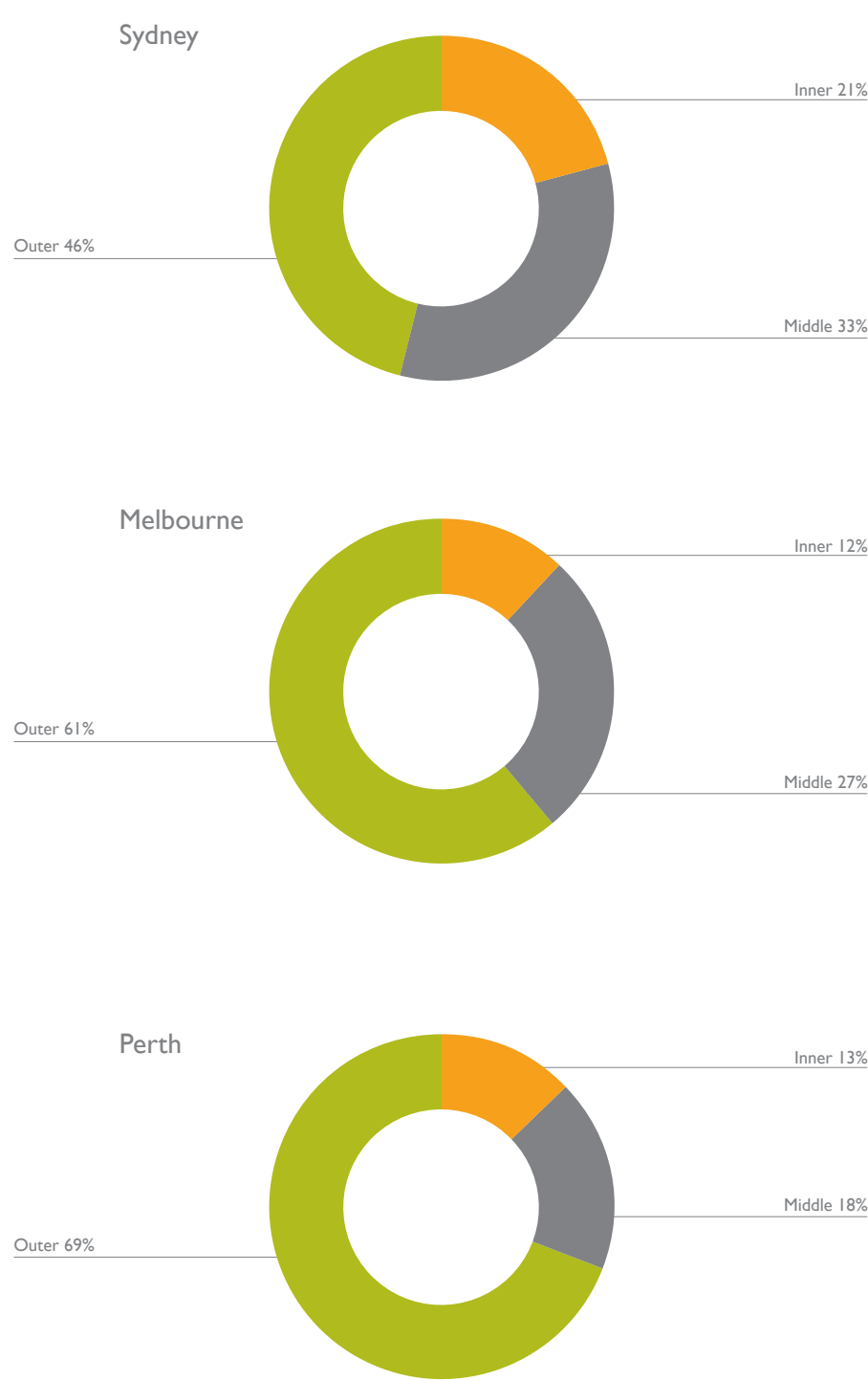
**Figure 2.26** Map displaying inner, middle and outer rings of Sydney, Melbourne and Perth





Source: BITRE analysis of ABS 2006 SLA boundaries.

Figure 2.27      Population growth in Sydney, Melbourne and Perth by sub-region, 2001 to 2010



Source: BITRE 2011 analysis of ABS Estimated Resident population 2011 release

**Table 2.1** Population statistics for Sydney, Melbourne and Perth, 2001 to 2010

Indicator	Sydney	Melbourne	Perth
Estimated Resident Population (ERP), 2010	4 575 532	4 077 036	1 696 065
Population change, 2001 to 2010	+ 447 260	+ 605 411	+ 303 063
<b>Average annual rates of growth, 2001 to 2010 for</b>			
Total population	1.1%	1.8%	2.2%
Population of central Local Government Area (LGA)	3.9%	6.3%	9.9%
Population of inner suburbs	1.4%	3.0%	1.8%
Population of middle suburbs	1.3%	1.0%	1.3%
Population of outer suburbs	1.0%	2.6%	2.9%
<b>Spatial distribution of growth, 2001 to 2010</b>			
Proportion of population growth in inner suburbs	20.5%	12.2%	13.0%
Proportion of population growth in middle suburbs	32.8%	26.9%	17.8%
Proportion of population growth in outer suburbs	46.7%	60.9%	69.3%
<b>Population growth in Statistical Local Areas (SLA)</b>			
SLA which added most population	Blacktown North* (+ 27 606)	Melton East* (+ 41 579)	Rockingham* (+ 30 112)
SLA which added 2nd most population	Auburn (+ 19 919)	Whittlesea North* (+ 33 796)	Swan* (+ 27 866)
SLA which added 3rd most population	Baulkham Hills North* (+ 19 063)	Wyndham North* (+ 33 377)	Wanneroo North West* (+ 27 866)
SLA which lost most population	Campbelltown North* (– 377)	Broadmeadows* (– 1 333)	None

Note: \* These SLAs are in the Outer ring of each city.

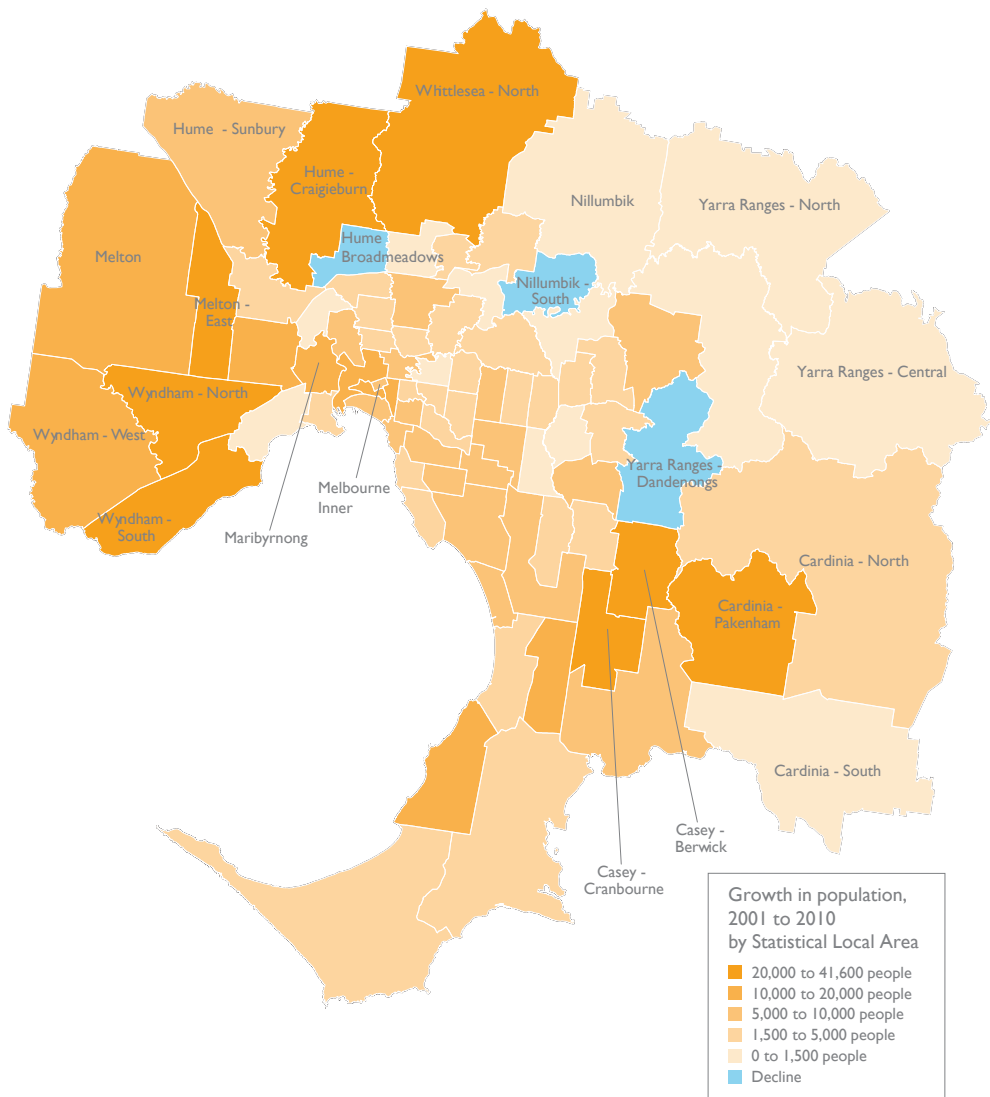
Source: BITRE analysis of ABS ERP 2011 release and ABS Census of Population and Housing 2001 and 2006.

A common characteristic of the three cities is that the central local government area experienced very rapid growth coming off a limited population base as the CBD and surrounding areas were redeveloped with higher density housing. This trend was most pronounced in the City of Sydney, which added 52,530 residents and was a significant share of Sydney's population growth (11.7 per cent).



Between 2001 and 2010 the outer suburbs of Melbourne and Perth grew rapidly but this pattern was not repeated in Sydney. Nevertheless, outer suburbs accommodated much of the population growth in all three cities, contributing 47 per cent of Sydney's growth, compared with 61 per cent for Melbourne and 69 per cent for Perth. While some of this outer suburban growth occurred in established suburbs (particularly in Sydney), most was attributable to greenfield developments on the urban fringe. As Figure 2.28 illustrates, Melbourne's growth was concentrated on the city's western, northern and south-eastern fringes. Perth's population growth was even more heavily concentrated in urban fringe developments, particularly those with coastal proximity. In Sydney, the main growth area was 30–40 kilometres north-west of the CBD, although urban consolidation also played an important role in housing the growing population.

**Figure 2.28** Change in population for Statistical Local Areas, Melbourne, 2001 to 2010

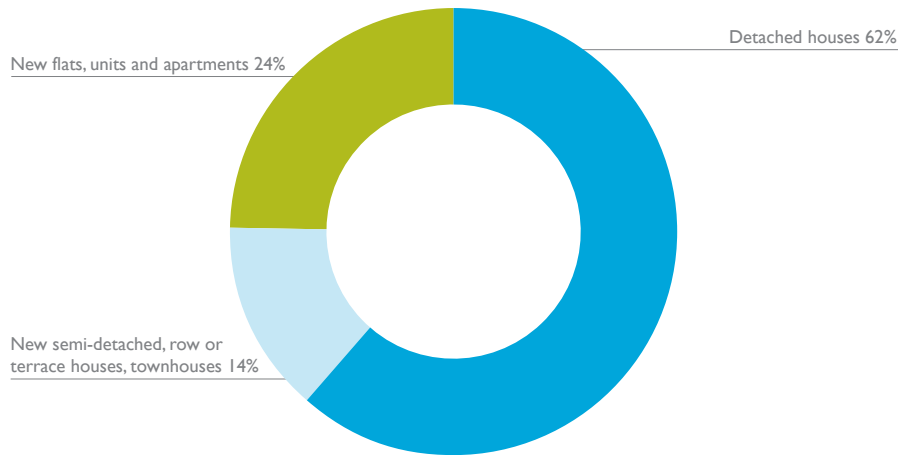


Source: BITRE analysis of ABS ERP 2011 release.

# Dwelling stock

*State of Australian Cities 2010* outlined dwelling approvals for 2008–09. Figure 2.29 updates this data for the 2010–11 financial year.

**Figure 2.29** Building approvals by dwelling type, Australia, 2010–11



Source: ABS 2011b

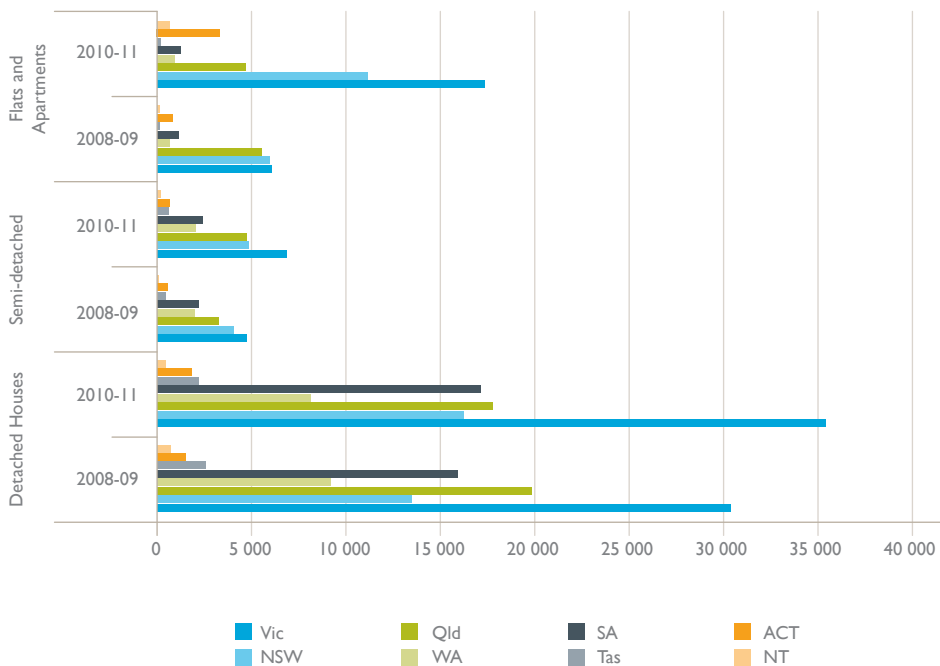
State and Territory data for building approvals show that the largest difference in the number of new flats, units and apartments in 2010–11 occurred in Victoria (which had 11,312 more approvals for new apartments in 2010–11) and Sydney (5,195 more apartments approved). The biggest proportional increase occurred in the Australian Capital Territory where the number of approvals for new flats, units and apartments more than trebled in 2010–11 compared with 2008–09. The ACT was the only jurisdiction where the number of approvals for apartments exceeded approvals for detached houses — by 1855 dwellings, as shown in Table 2.2 and Figure 2.30

**Table 2.2** Number of dwellings approved by dwelling type, States and Territories 2008–09 and 2010–11

	Detached houses		Semi-detached		Flats and Apartments	
	2008-09	2010-11	2008-09	2010-11	2008-09	2010-11
NSW	13,481	16,278	4,041	4,874	5,951	11,146
Vic.	30,446	35,459	4,769	6,857	6,073	17,385
Qld	19,884	17,779	3,259	4,731	5,522	4,690
SA	9,201	8,168	1,986	2,046	675	952
WA	15,960	17,152	2,187	2,409	1,137	1,231
Tas.	2,564	2,196	427	612	116	184
NT	729	468	90	203	153	646
ACT	1,488	1,821	541	662	806	3,343
Australia	93,753	99,321	17,300	22,394	20,433	39,577

Source: ABS 2011b

**Figure 2.30** Number of dwellings approved by dwelling type, States and Territories 2008–09 and 2010–11



Source: ABS 2011b

## Conclusion

International migration has been an important contributor to Australian cities and is expected to continue to be so, particularly in Sydney and Melbourne.

Greenfield developments remain the predominant way to accommodate population increases within Australia's cities. An exception to this is Sydney where infill rates are significantly higher.

## Chapter 2 References

Australian Bureau of Statistics (ABS) 2006, *Census of Population and Housing*, cat. no. 2069.0, Canberra.

ABS 2010a Australian Demographic Statistics TABLE 2. Population change, components, cat. no. 3101.0, Canberra

ABS 2010b, *Household and Family Projections, Australia, 2006 to 2031*, cat. no. 3236.0, Canberra.

ABS 2011a, *Regional Population Growth, Australia 2009-10*, cat. no. 3218.0, Canberra.

ABS 2011b, *Building approvals, Australia*, cat. no. 8731.0, Canberra.

Bureau of Infrastructure, Transport and Regional Economics (BITRE) 2010, *Population growth, jobs growth and commuting flows in Perth*, Research Report 119, Canberra.

BITRE 2011a, *Spatial trends in Australian population growth and movement*, Report 122, Canberra.

BITRE 2011b, *Population growth, jobs growth and commuting flows in Melbourne*, Research Report 125, Canberra.

BITRE 2011c, *Population growth, jobs growth and commuting flows in Sydney*, Canberra.

Buxton, M, Tieman, G, Bekessy, S, Budge, T, Mercer, D, Coote, M & Morcombe, J 2006, *Change and continuity in peri-urban Australia: State of the peri-urban regions: a review of the literature*, Monograph 1, RMIT University, Melbourne.

Coastal Taskforce August 2010, *Population Growth and Climate Change on Collision Course* [www.engineersaustralia.org.au/shadomx/](http://www.engineersaustralia.org.au/shadomx/) [Accessed 01.09.2011]

Department of Health and Ageing 2008, Customised projections prepared for the Australian Government Department of Health and Ageing by the Australian Bureau of Statistics. Commonwealth of Australia, Canberra.

Environment Australia 2001, *State of the Environment Australia 2001*, CSIRO Publishing, Canberra.

Flood, M & Barbato, C 2005, *Off to work: Commuting in Australia*, Discussion Paper No. 78, Australia Institute, Canberra.

Gaymer, S 2010, Quantifying the impact of attitudes on shift towards sustainable modes, paper presented to Australasian Transport Research Forum, 29 September–1 October 2010, Canberra.

Gough, A 2011, 'Traffic survey finds Brisbane commuters have longest travel times in nation' *Courier Mail*, 7 Aug. <http://www.couriermail.com.au/news/queensland/traffic-survey-finds-brisbane-commuters-have-longest-travel-times-in-nation/story-e6freoof-1226109998342> [Accessed 16.08.2011].

Gurran, N, Squires, C & Blakely, E 2005, *Meeting the Sea Change Challenge: Sea change communities in coastal Australia* – Final Report for the National Sea Change Taskforce, University of Sydney Planning Research Centre, Sydney.

Houston, P 2005, 'Re-valuing the Fringe: Some findings on the value of agricultural production in Australia's peri-urban regions', *Geographical Research*, 43 2:209-223.

Hugo, G & Harris, K 2011, *Population Distribution Effects of Migration in Australia*, Report for Department of Immigration and Citizenship, University of Adelaide. <http://www.immi.gov.au/media/publications/research/migration-in-australia/>

Kelly, J, Weidmann, B & Walsh, M 2011, *The Housing We'd Choose*, Grattan Institute, Melbourne.

Melbourne Institute 2009, 'Time spent travelling to and from work', in *Families, income and jobs, Volume 4: A statistical report on waves 1–6 of the HILDA survey*, Melbourne Institute, pp. 202–204.

Productivity Commission 2011, *Performance benchmarking of Australian business regulation: planning, zoning and development assessments*, Productivity Commission Research Report, Canberra.

The Treasury 2010, *The 2010 Intergenerational Report*, The Treasury, Canberra. <http://www.treasury.gov.au/igr/igr2010/> [Accessed 27.09.2011]



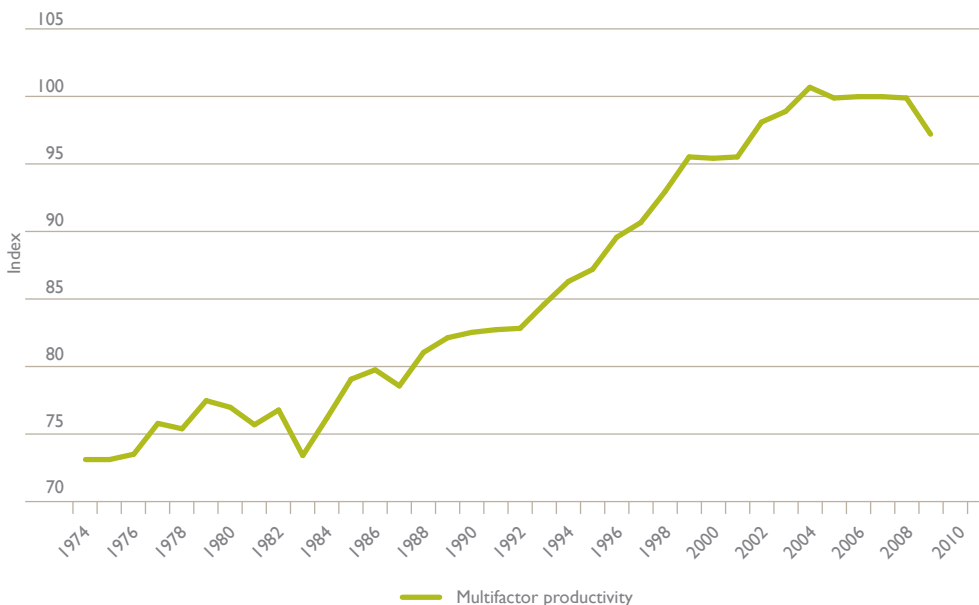
# Productivity

## Chapter 3

Structural drivers of economic growth include the 3Ps – population, participation and productivity (Treasury 2010) which form part of the 'supply side' of real GDP and real GDP per capita (Henry 2004). As noted in the *2010 Intergenerational Report* and described in the previous chapter the first P, working age population, is slowing and as such productivity and participation will be vital to Australia's future economic growth.

There are many ways to measure productivity but the most comprehensive method is multifactor productivity which refers to the combined contribution to productivity of both labour and capital. As illustrated in Figure 3.1, multi-factor productivity has levelled off then declined slightly in Australia since 2004 (ABS 2010).

**Figure 3.1** Australia's multifactor productivity, 1974 to 2009



Source: ABS 2010

As noted in *State of Australian Cities 2010*, since major cities account for four-fifths of the nation's economic activity, their productivity is pivotal to Australia's continuing economic progress.

The productivity section examines the tension between agglomeration (the concentration of certain activities within a certain area) driving productivity in major cities and the transaction costs pulling it backwards. Since transport is one of the major transaction costs of modern cities, an examination of how the largest Australian cities are arranging themselves to reduce this cost is the centrepiece of the chapter.

Participation in the labour force is the subject of the second section of the chapter which looks beyond national aggregate figures by examining participation rates between major cities.

The third section of this chapter looks at the interface of productivity and participation: industry structure. This provides an explanation of some of the major economic forces operating in major cities. The chapter closes by looking briefly at infrastructure investment.

## Summary indicators

Dimension	Indicators
Productivity	Australia's multifactor productivity Selected city labour productivity
Transaction costs - transport	Vehicle kilometres travelled Proportion of jobs with access to public transport Median peak travel time for commuters Amount of freight transported per person Cost of transporting freight
Participation	Labour force participation rates Unemployment rates
Industry structure	Proportion of employed persons by industry
Infrastructure provision	Value of transport infrastructure work



## Key findings

- Productivity growth has slowed and then declined since 1998. The major cities account for 80 per cent of the nation's economic activity.
- Agglomeration (the concentration of certain activities within one area) is a key driver of productivity in the larger capital cities and is strongly associated with employment density.
- While there has been an increased concentration of jobs in urban cores, a trend to a polycentric structure is also evident with a large proportion (50 to 70 per cent) of new jobs located in the outer suburbs in Sydney, Melbourne and Perth.
- Employed residents of Sydney took 35 minutes on average for the journey to work in 2006, which was longer than the average time taken by Melbourne residents (31 minutes) or Perth residents (26 minutes). Commuting times have changed little for a decade.
- Public transport trips in the eight capital cities have increased by 14.7 per cent from 2004 to 2008 and the public transport mode share increased from 9.3 per cent to 10.6 per cent over the same period, well above the population growth rate and higher than many comparable cities internationally.
- In depth analysis of 2001 and 2006 Census journey to work data for Sydney, Melbourne and Perth shows that urban commuting patterns became increasingly complex, with strong growth in outward and cross-suburban commutes. Commuters mainly used public transport to reach inner city jobs. Around 60 per cent of commuter travel by public transport in each city was to a workplace located in the central local government area, whereas public transport mode share to outer suburban jobs was five per cent or less. During the same period commuters' active travel (walking and cycling) mode share rose in all three cities.
- Australia's labour force participation rate is relatively high by international standards and has been mainly driven by increased participation of women in paid employment. Rates are significantly higher in capital than non-capital cities.
- Unemployment levels varied across major cities from a low of two per cent to a high of nine per cent.
- Industry structure in cities is highly variable suggesting that each city plays a unique role in the nation's economic system.
- The finance and insurance sector is continuing to grow in its dominant position in terms of Gross Domestic Product (GDP) and gross value added.
- Traditional industries such as manufacturing have declined as a proportion of GDP. Despite this decline, these industries are still major employers in cities and continue to make up a significant proportion of the gross value added of Australia's economy.
- Mining has now overtaken manufacturing as the industry contributing the second highest proportion of gross value added due to a significant recent increase in the terms of trade.
- There has been a significant increase in Australia's investment in infrastructure in the past decade.

## The concepts of agglomeration benefit and transaction costs

Late in the 19th century, the economist Alfred Marshall asked why firms found it advantageous to locate in cities (Marshall 1920). He suggested three reasons: to be near customers, to access a large pool of labour and to benefit from technological spillovers that occur when firms co-locate. A century of research has largely confirmed Marshall's views. Some firms benefit more than others from this process of agglomeration which is why banking, finance, law, advertising and government services are concentrated in the centre of major cities.

There are two components to this effect. The first is urbanisation: the larger the city, the higher the labour productivity. The second is localisation, which is related to the actual spatial organisation within a city and affects the ease with which firms can interact with each other (Rawnsley and Szafreñic, 2010).

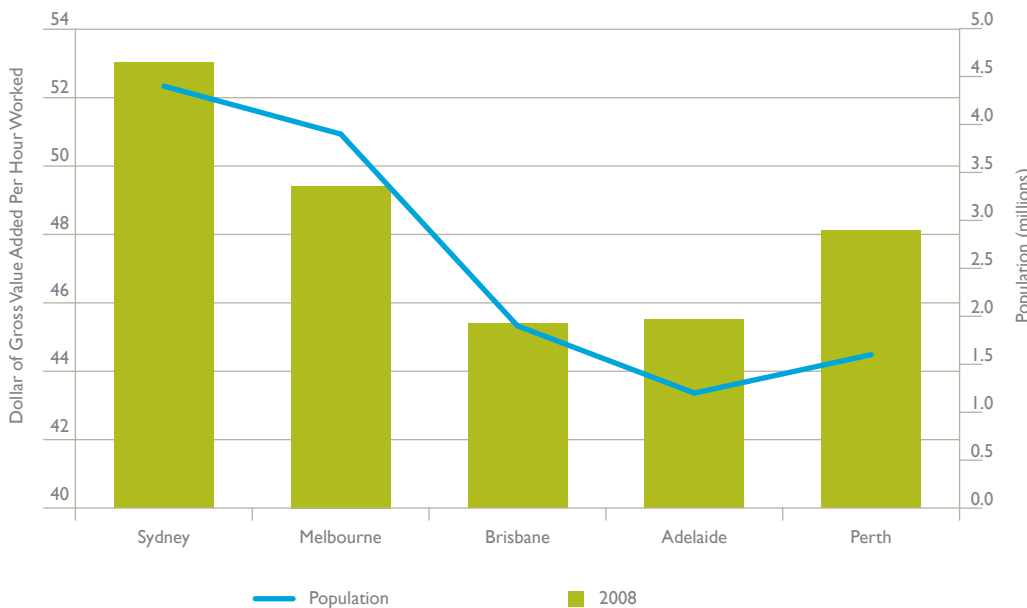
Opposing agglomeration benefits are transaction costs. This concept of transaction costs is associated with the Nobel Laureate, Ronald Coase (Coase 1960) and John Commons. Transaction costs are the costs incurred in participating in the market. For example, the sticker price of a toothbrush might be \$7.00 but other (transaction) costs include search time, travel time and paying for the toothbrush. Therefore the real cost is the combination of \$7.00 plus transaction costs. If labour is exchanged for money, then travel is often a major transaction cost. Employees have an incentive to maximise salary and minimise transaction costs such as travel and parking. Commuting patterns in cities will reflect this tension.

## Agglomeration

Over the past 25 years, microeconomic reform and macroeconomic policy settings in Australia have lifted the productive capacity of the major cities. However, concerns that those reforms and policy instruments may not be able to deliver the same results into the future has led to attention being focused on increasing the level of agglomeration via improved transport linkages, increasing employment densities within existing employment clusters or expanding the areas of employment.

Assessing the possible benefits of increasing urban agglomeration has been problematic because Australian statistical and local government boundaries within and between cities vary so much in area and population (Trubka 2009). A recent study has built a picture of labour productivity for Australia's largest cities and the impact of the relative size of each major capital city on labour productivity. The data (Figure 3.2) shows that there is higher productivity in Melbourne and Sydney (Rawnsley and Szafraneic 2010). It also suggests that population is not the only factor that influences productivity, as seen in the case of Perth which has higher labour productivity relative to its population. The industry mix within each city also influences the outcome. That is, more productive industries tend to locate in particular cities.

**Figure 3.2** Selected capital cities labour productivity, 2008



Source: Rawnsley & Szafraneic 2010

The study also measured labour productivity data against 'effective job density' (the level of employment relative to the time taken to gain access to that employment and the transport mode split that is currently experienced by those employees) of various areas within Melbourne to determine the benefits of agglomeration for different industries. The results showed that agglomeration improves productivity for industries such as finance and insurance, property and business services, tertiary education, health and community services, and cultural and recreational services over others such as manufacturing and wholesale trade which are generally more attracted by the availability of large (relatively inexpensive) sites to locate their operations.

There are many impediments to maximising agglomeration including community opposition to proposed developments, higher transaction costs, rising land costs and congestion. However, with an ageing population and relative decline in labour force participation, increases in GDP will have to be achieved, in most part, through increased per capita productivity. How policy makers respond to the challenge of spatially organising our cities to increase productivity in the future will have an increasingly important impact on Australia's future economic growth.

## Transaction costs: An overview of urban transport

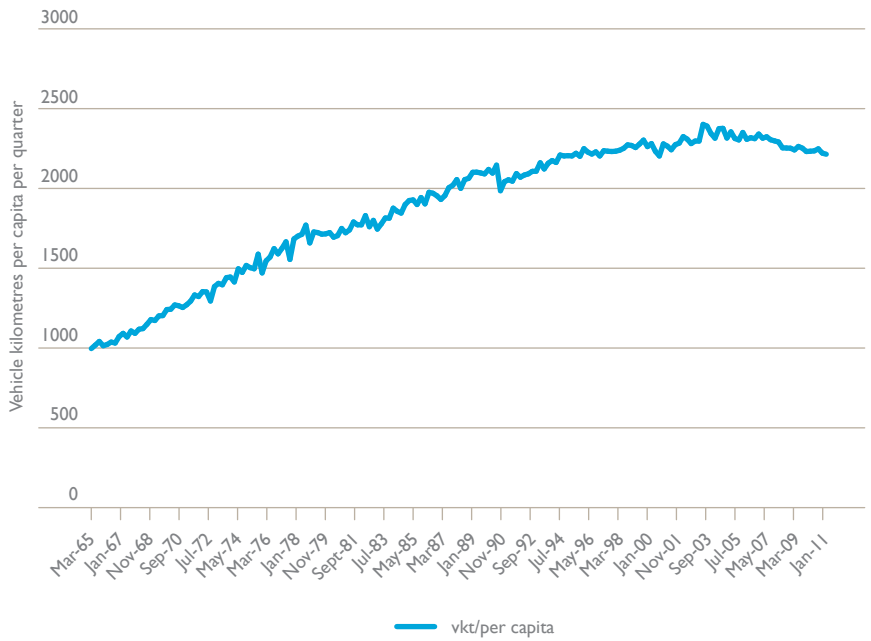
Transport costs are just one of the transaction costs incurred in urban markets but it is one of the most important and has a profound effect on the productivity of cities. An overview of urban transport at the beginning of this section gives context to detailed examination by BITRE of how the spatial structure of cities is expressed through commuting patterns of Perth, Melbourne and Sydney.

*State of Australian Cities 2010* noted that Australia's urban passenger transport task has been dominated by car travel since the 1950s. This has been made possible by a rapid improvement and spread of the road system and an even more rapid expansion in car ownership.

From 2000–01 to 2008–09, the total passenger vehicle kilometres travelled in the eight capital cities increased by 16 per cent (24 billion kilometres). Of the 173.5 billion passenger kilometres travelled within these metropolitan areas in 2008–09, more than 146.5 billion (84 per cent) were by passenger car. Note that the proportion of car use has declined slightly from 85.8 per cent in 2000–01 (BITRE, 2011a).

Total passenger kilometres travelled were originally projected to rise to 225 billion by 2020, with car travel accounting for nearly 190 billion passenger kilometres (BITRE, 2007). More recent research by BITRE (2011a) has shown a flattening of the trend (Figure 3.3) suggesting that there may be a limit to growth in per capita travel. These trends are replicated in many advanced economies (BITRE, 2011e).

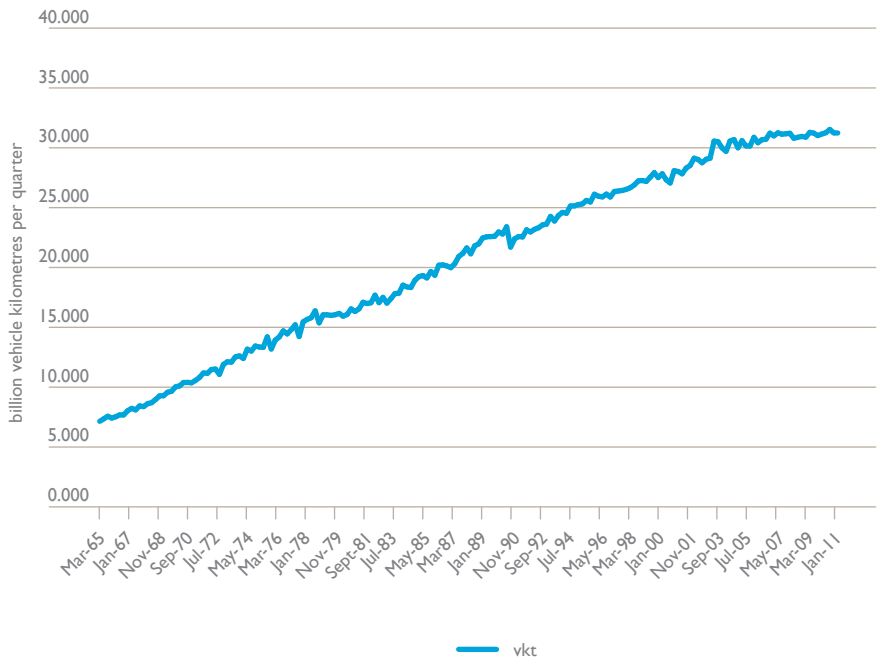
Figure 3.3      Vehicle kilometres travelled (vkt) per capita 1965 to 2011



Source: Derived from BITRE 2011e

Despite slowing of growth in per capita travel the total number of kilometres travelled has continued to increase. This is related to population growth and to a lesser extent the increased travel for freight in metropolitan centres, as shown in Figure 3.4.

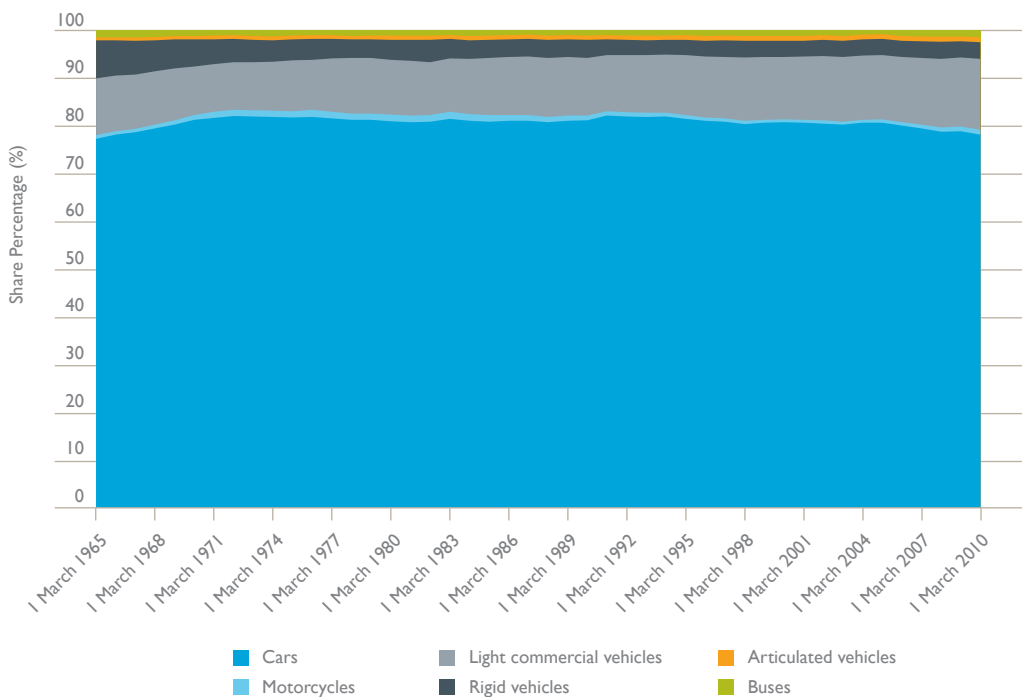
**Figure 3.4** Aggregate and predicted vehicle kilometres travelled (vkt) capital cities, 1965 to 2011



Source: Derived from BITRE (2011e)

Although the proportion of total vehicle kilometres travelled (vkt) attributable to car travel has decreased slightly over the past decade, this has been offset by an increase in the proportion of travel by light commercial vehicles and motor cycles (Figure 3.5) resulting a net increase in aggregate vehicle kilometres travelled.

**Figure 3.5** Share in capital city transport task (vkt) by vehicle types, March 1965 to March 2010

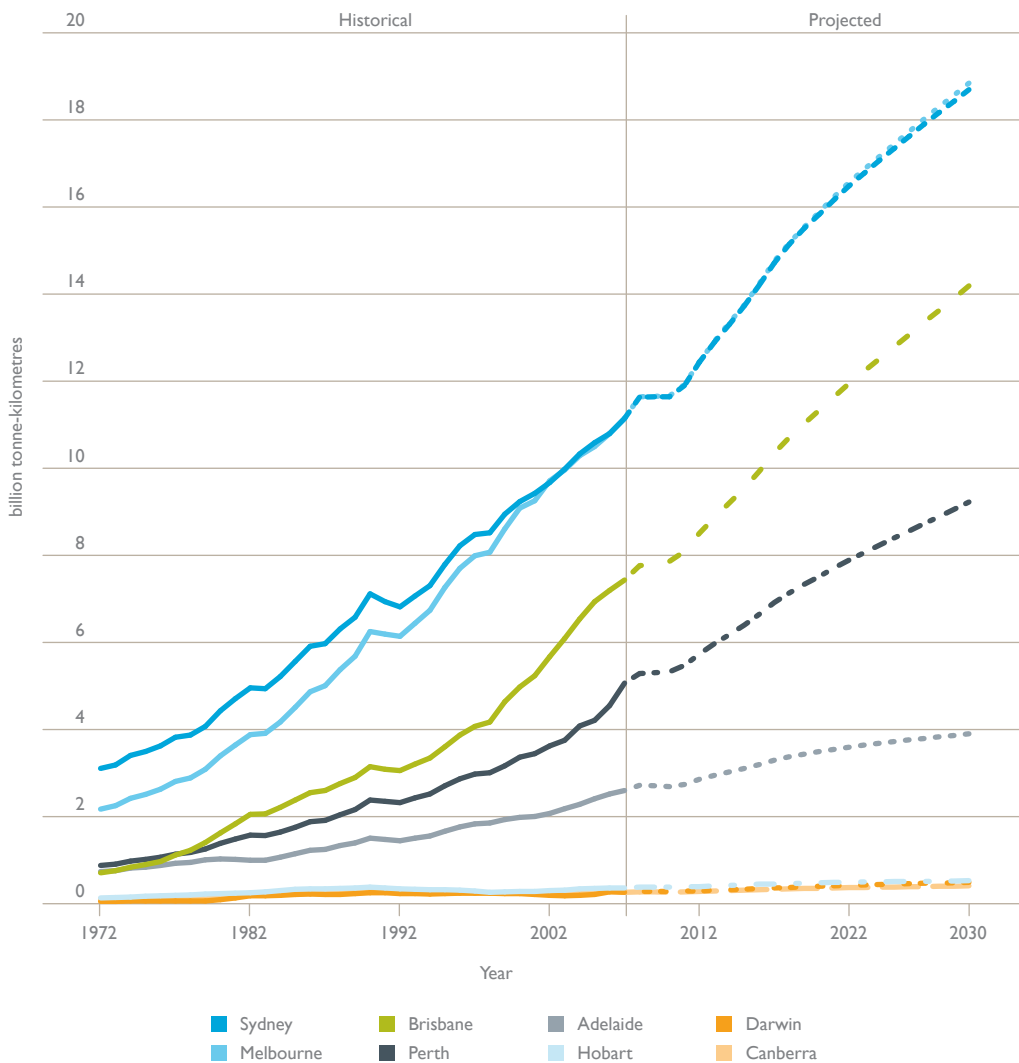


Source: BITRE 2011a

## Freight

Even though personal passenger travel exhibits a saturating trend over time there is, as yet, no sign of approaching saturation in per capita freight movement in Australia. Part of the reason for this is that freight rates (cost of transporting goods) are falling. Real freight rates fell approximately 45 per cent from 1965 to 1990, and then a further three per cent in the 1990s (BITRE 2008a). Projections by BTRE (after 2008, known as BITRE) suggest that the commercial freight task will grow 3.5 per cent a year between 2000 and 2030 compared with passenger car travel which is projected to grow by only 1.7 per cent a year (BTRE 2007). This growth in the freight task for capital cities is represented in Figure 3.6 in terms of how many more billion tonne-kilometres will be travelled by 2030.

Figure 3.6 Historical and projected freight travel in capital cities 1972 to 2030



Source: BTRE 2007

Despite the growth in freight's share of the transport task, the share of car travel as a percentage of the total will remain very high.



Public transport

Past BTRE estimates (2007), assuming that the public transport mode share remained stable, concluded that the costs of congestion could rise from \$9.5 billion in 2005 to \$20.4 billion in 2020 (the business-as-usual scenario). However, in an alternative scenario whereby public transport, walking and cycling were to double their mode share, BITRE estimates that the avoidable congestion cost in 2020 could be reduced to about \$14 billion.

Public transport use has been rising significantly in most capital cities since 1991 (Figure 3.7). For example, Sydney's Cityrail experienced 5.7 per cent growth in 2008 and Sydney buses 3.2 per cent. Melbourne rail trips grew by 38 per cent over the three years to September 2008. Melbourne bus patronage grew 7.4 per cent and tram patronage 5.3 per cent in one year to 2007, and Melbourne's public transport mode share has increased from nine per cent in 1999 to 13 per cent in 2008. Public transport trips in the Translink area of South East Queensland (Brisbane/Gold Coast/ Sunshine Coast) increased from 100.8 million trips in 1998–99 to more than 171 million trips in 2007–08. Over the past 10 years, public transport use in Perth has increased by 67 per cent, three times the rate of population growth over the same period.

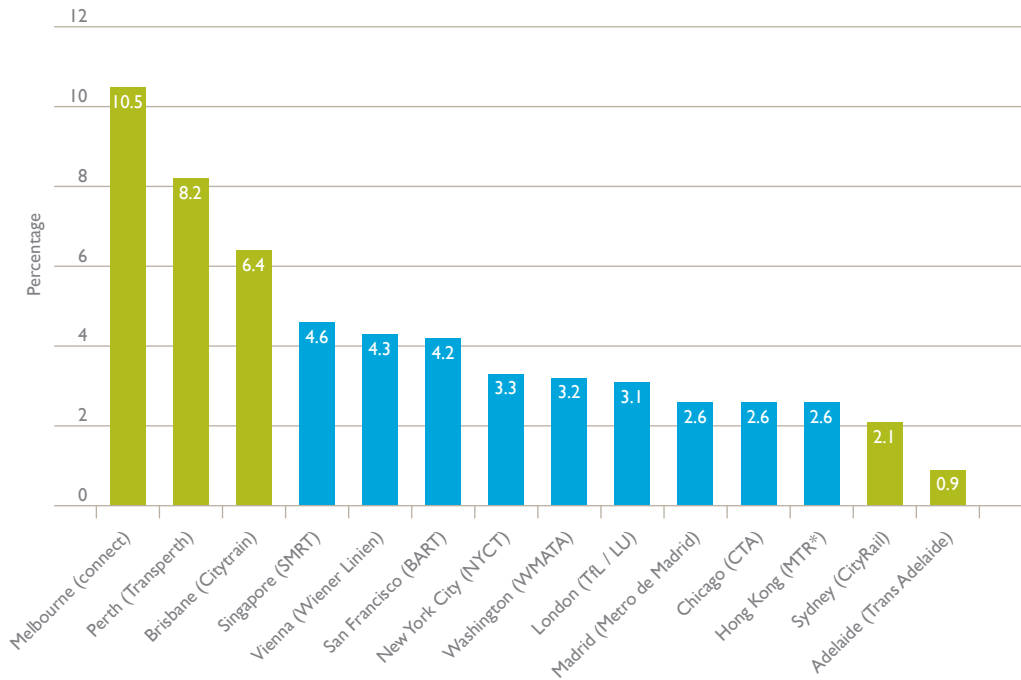
Figure 3.7 Public transport use in capital cities, 1988-99 to 2009-10



Source: BITRE 2009a

In total, public transport trips in the eight capital cities increased by 14.7 per cent from 2004 to 2008, and the public transport mode share increased from 9.3 per cent to 10.6 per cent. This growth rate is well above population growth and higher than many comparable international cities, albeit off a low base. For example, growth in passenger rail transport patronage in Australian cities has been higher than major international centres (Figure 3.8).

**Figure 3.8** Rail patronage growth per annum in major international cities,



Source: Stanley and Barrett 2010

Whether the above trend growth of the past few years will continue into the long term, leading to a sustained increase in the public transport mode share, is uncertain. However, the growth in the population of Australian cities alone is expected to contribute to continued strength in public transport use.

This level of growth has not occurred without presenting new challenges. Increased congestion on public transport in Australia's cities has reduced reliability. There is a call for more services in major centres to reduce persistent crowding during peak periods. Overcrowding, particularly on trains, has been regularly reported in Melbourne (Lucas 2011), Sydney (Simmonds 2011), Brisbane (Hurst 2011) and Perth (Acott 2011) over the past year, as transport authorities have grappled with increased patronage. Convenience is cited as a main reason for using public transport, but lack of reliability, personal comfort and privacy could quickly erode patronage.

## Minimising transaction costs through city structure: a detailed study of Sydney, Melbourne and Perth

This section looks in detail at how cities are structuring themselves to reduce the travel costs of economic activity. It does this by looking at commuting patterns in Perth, Melbourne and Sydney.

Commuting patterns are shaped by the spatial distribution of population and jobs in our cities. This section compares journey to work flows in three cities—Sydney, Melbourne and Perth—drawing on the findings of an ongoing BITRE study of spatial patterns of population growth, jobs growth and commuting (BITRE 2010, 2011d, 2011e). The section highlights some key features of urban commuting flows, discussing patterns of change since 2001 and the implications for transport use and infrastructure.

Commuter travel is a significant component of urban passenger transport demand, particularly during peak periods. Table 3.1 summarises the transport modes used for the journey to work in 2006, and the changes that have occurred since 2001. The private vehicle mode share is highest in Perth (81 per cent), while the public transport and active travel mode shares are both at their highest in Sydney (at 21 per cent and five per cent respectively).

Commuters mainly use the public transport system to reach inner city jobs. While roughly 20 per cent of jobs are located in the central local government area (LGA) of each city, about 60 per cent of commuter public transport use involves travel to a workplace in the central LGA. The public transport mode share is typically very low for outer suburban jobs, two to three per cent for Perth and Melbourne and five per cent in Sydney.

**Table 3.1** Transport mode use by commuters in Sydney, Melbourne and Perth, 2001 and 2006

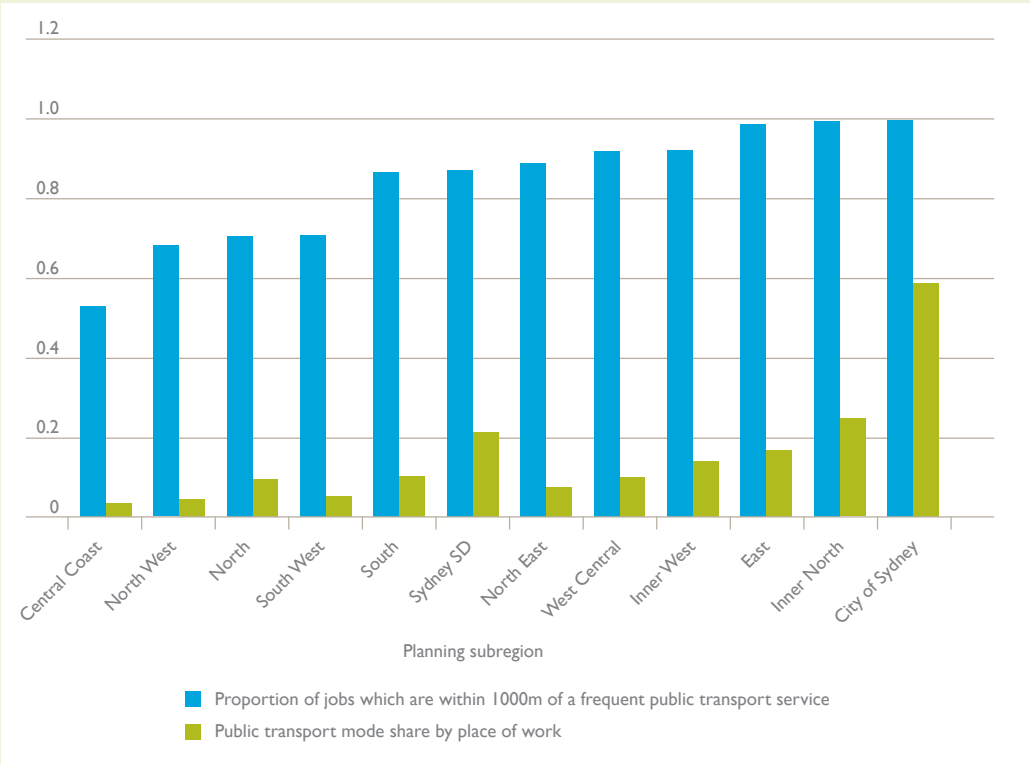
Indicator	Sydney	Melbourne	Perth
<b>Mode share of commuting trips, 2006 (%)</b>			
Private vehicles	68.6	76.4	80.5
Public transport	20.7	13.6	10.2
Active travel (cycling and walking)	5.3	4.7	3.7
Other*	5.4	5.3	5.6
<b>Percentage point change in mode share of commuting trips, 2001 to 2006</b>			
Private vehicles	+1.1	-1.7	-0.5
Public transport	-1.1	+0.8	+1.1
Active travel (cycling and walking)	+0.5	+1.0	+0.3
Other*	-0.5	-0.2	-0.9

Note: \*Includes work from home and other transport mode. Did not go to work and mode unstated were excluded from mode share calculations.

Source: BITRE analysis of ABS Census of Population and Housing 2006 and 2001

Looking at these patterns in more detail in Sydney (Figure 3.9), whether jobs are located within one kilometre of public transport has a measurable but limited influence on public transport use, suggesting that journey origin and length may play a key role in modal choice.

**Figure 3.9** Public transport access and use by subregion of work, Sydney, 2006



Note: A frequent public transport service is defined to be one which departs at least eight times during the morning peak (7am to 9am).

Source: New South Wales Bureau of Transport Statistics (2011 data request)

Table 3.1 shows that from 2001 to 2006, commuters' active travel mode share rose in all three cities with the most pronounced increase occurring in Melbourne. Perth and Melbourne both experienced a shift away from private vehicles towards public transport patronage for the journey to work. In contrast, Sydney's commuters were more car dependent in 2006 than in 2001 although recent data indicates that this mode shift has since reversed (TDC 2010).

Changes in commuting patterns have implications for the use of different transport modes and for investment in transport infrastructure. For example, the Victorian Government's spatial projections of population and employment growth through to 2026 imply substantial growth in commuter travel for the origin-destination pairs listed in Table 3.2 which would create increased demand for public transport and road infrastructure to facilitate these commutes. Some implications of this growth have been recognised in the Victorian Government's infrastructure planning (e.g. Outer Suburban Arterial Roads program, Regional Rail Link project). While rail infrastructure is likely to play an important role in accommodating increased commuting to the CBD, the expanding volume of shorter distance commuting flows within the Outer Southern, Outer Western and Outer Northern subregions of Melbourne is likely to require investment in road infrastructure and expanded bus services.

**Table 3.2**      **Principal expected contributors to growth in commuting flows, Melbourne, 2006 to 2026**

Sub region of residence	Sub region of work	Estimated share of total change in commuters
Outer Southern	Outer Southern	18%
Inner	Inner	9%
Outer Western	Outer Western	8%
Outer Northern	Outer Northern	7%
Outer Western	Middle West	5%
Outer Western	Inner	4%

Note: Table represents results of scenario modelling of State government population and employment projections, using BITRE gravity model regression parameters for Melbourne.

Source: BITRE 2011b

Transport infrastructure also plays an important role in shaping urban commuting patterns. The existing rail and freeway network, built over many decades, plays a significant role in explaining current urban commuting flows. Large scale expansions of this infrastructure can fundamentally reshape commuting flows (BITRE 2011b).

## *Commuting flows*

BITRE conducted a study to explore contributing factors to commuting flows and how commuting behaviour has responded to recent changes in population and employment.

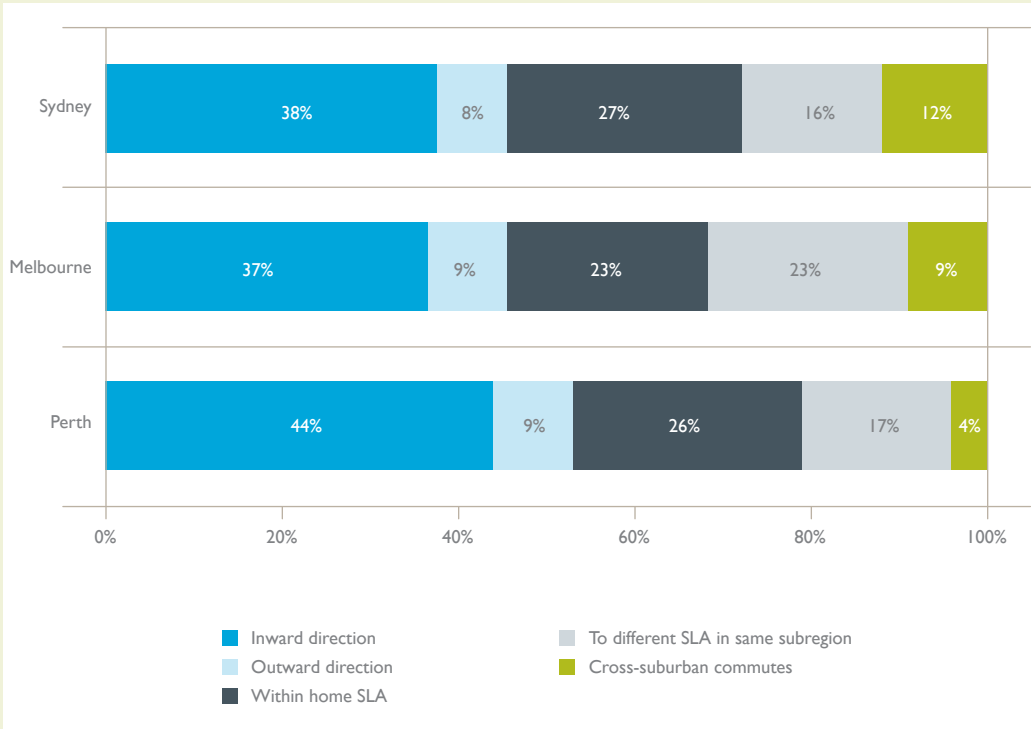
The main influences on urban commuting flows identified were:

- The spatial distribution of the residential population and jobs (including skills and industries)
- Travel costs, particularly the time spent commuting
- Transport infrastructure, such as rail and freeway networks (BITRE 2010, 2011a and 2011b).

Two fundamental drivers of change in urban commuting flows are changes to the spatial distribution of the residential population and of jobs. Since industries have different preferences as to where they locate, the industry mix of jobs growth in each city has implications for the spatial distribution of employment, and in turn, for commuting patterns.

People's journeys to work can be described spatially by their place of residence (origin) and their place of work (destination). Figure 3.10 presents a snapshot of these origin-to-destination commuter flows in 2006. About one quarter of commutes involve a place of work located within the person's home statistical local area (SLA), while 42 to 46 per cent of commutes involve a place of work in the home sub-region. The other prominent category of commuter flow is inward flows, which represent 37 to 44 per cent of commutes in each city.

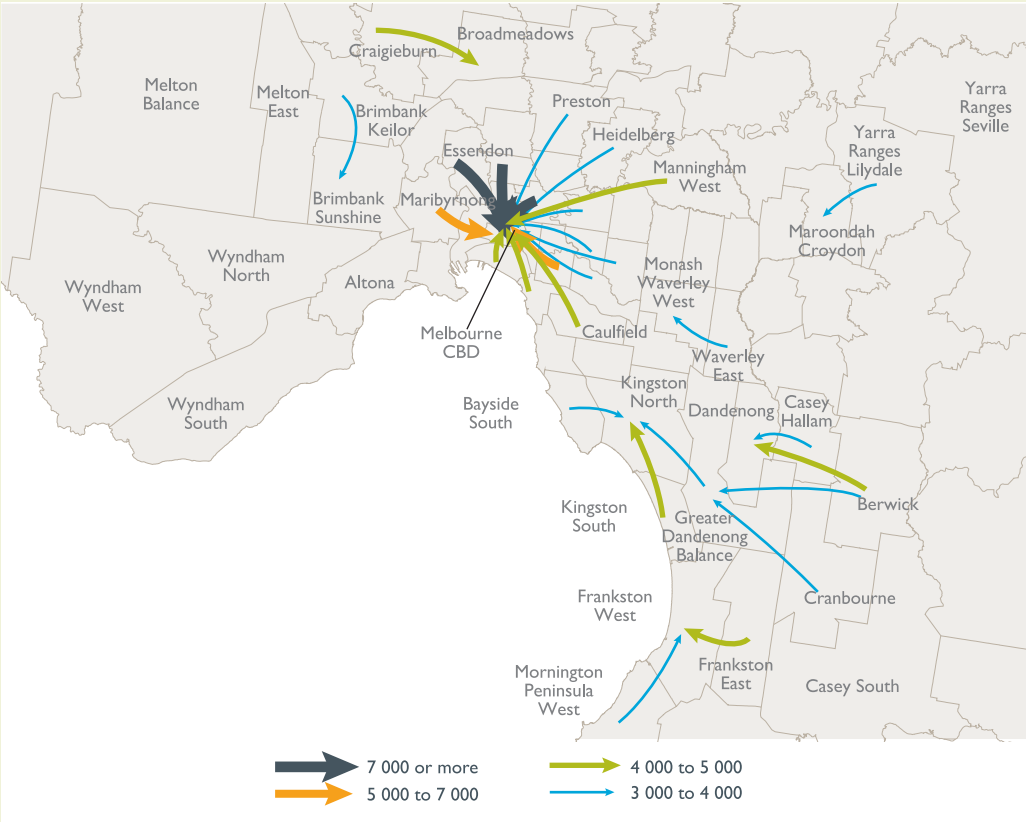
**Figure 3.10** Mix of different types of commuter flow within Sydney, Melbourne and Perth, 2006



Source: BITRE analysis of ABS Census of Population and Housing 2006.

Because the central LGA accounts for about 20 per cent of jobs, inward commutes to a workplace in the central LGA are very prominent, as can be seen for Melbourne in Figure 3.11.

**Figure 3.11**      **Commuting flows in Melbourne that involve 3000 or more persons, 2006**



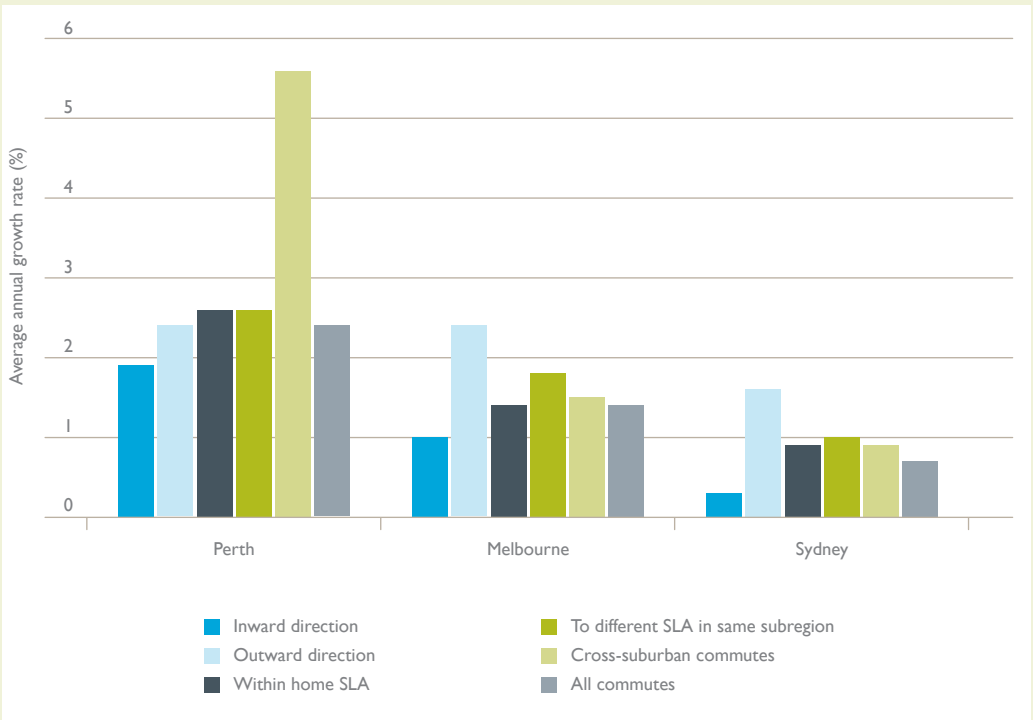
Note: For clarity of presentation, the three City of Melbourne SLAs have been aggregated to a single entity. Excludes commutes within SLA of residence.

Source: BITRE analysis of ABS Census of Population and Housing 2006

Figure 3.12 shows how growth rates varied for the different types of commuting flows. Urban commuting patterns became increasingly complex between 2001 and 2006, with inward commutes becoming a little less dominant and strong growth in outward commutes and cross-suburban commutes. Inward flows experienced the slowest rate of growth in all three cities, while Melbourne and Sydney recorded strong growth in outward commuting. There was rapid growth in cross-suburban commutes in Perth's outer suburbs. Commutes within the home sub-region (including the home SLA) grew at a rate similar to the city-wide average and as a result, the proportion of people who worked in their home subregion remained unchanged for all three cities.



**Figure 3.12**      **Growth by type of commuter flow for Sydney, Melbourne and Perth, 2001 to 2006**



Notes: Further information on flow type definitions provided in Table 3 footnote and BITRE (2010).

Source: BITRE analysis of ABS Census of Population and Housing 2006 and 2001.

The time people spend commuting to and from work is an important element of quality of life in urban areas affecting the relationships people have with their families, communities and workplaces as well as emotional and physical wellbeing (Flood and Barbato 2005). Table 3.3 shows that employed residents of Sydney took 35 minutes on average for the journey to work in 2006, which was longer than the average time taken by Melbourne residents (31 minutes) or Perth residents (26 minutes). These between-city differences in travel time reflect differences in distances travelled and traffic congestion.

**Table 3.3** Indicators of commuting distance, time delay for Sydney, Melbourne and Perth

Indicator	Sydney	Melbourne	Perth
Average straight line commuting distance, 2006 (km) <sup>(1)</sup>	11.3	11.1	10.5
Average commuting time, 2006 (minutes) <sup>(2)</sup>	35	31	26

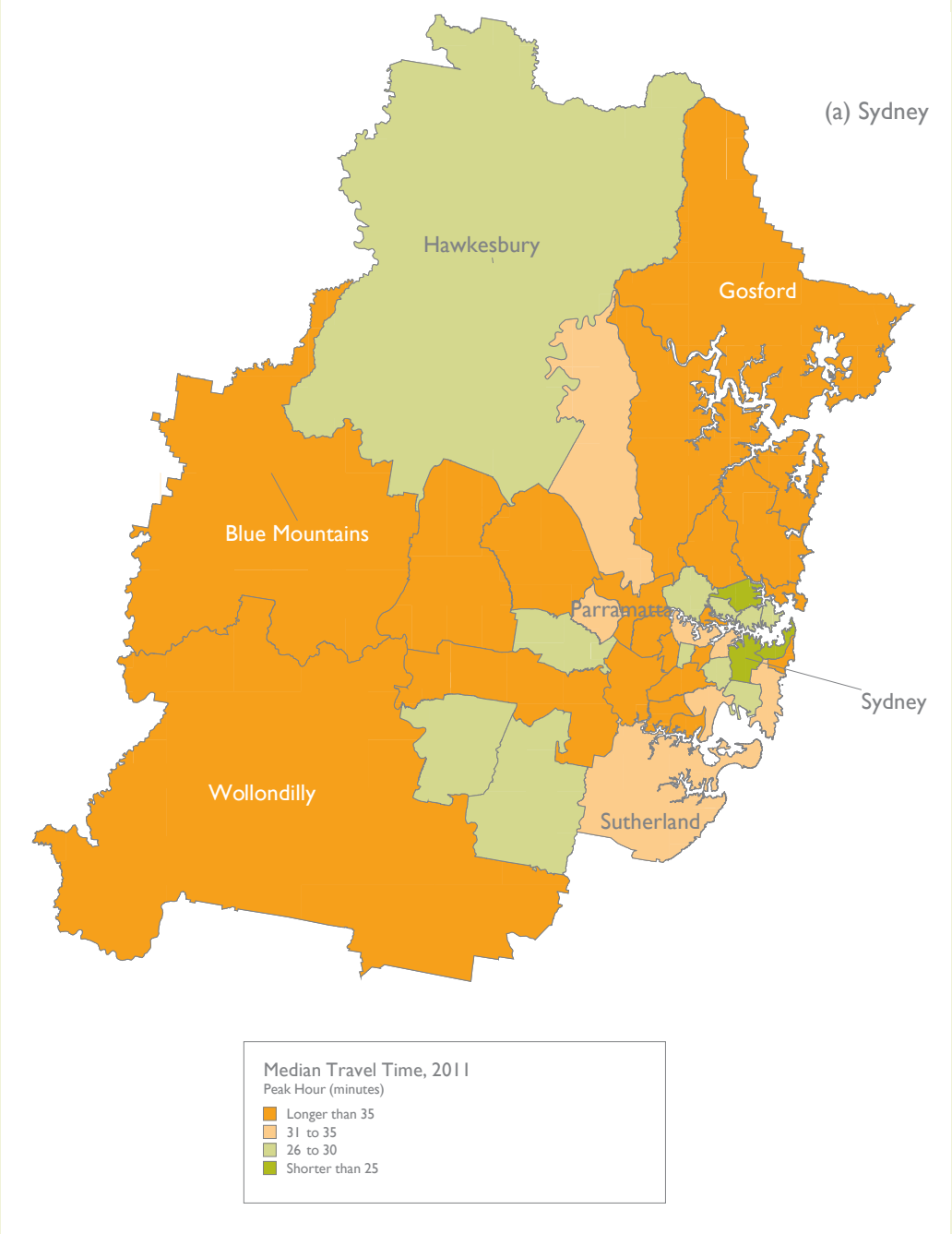
Note: BITRE estimates of the average road distance are 14.8km for Melbourne and 14.6km for Sydney

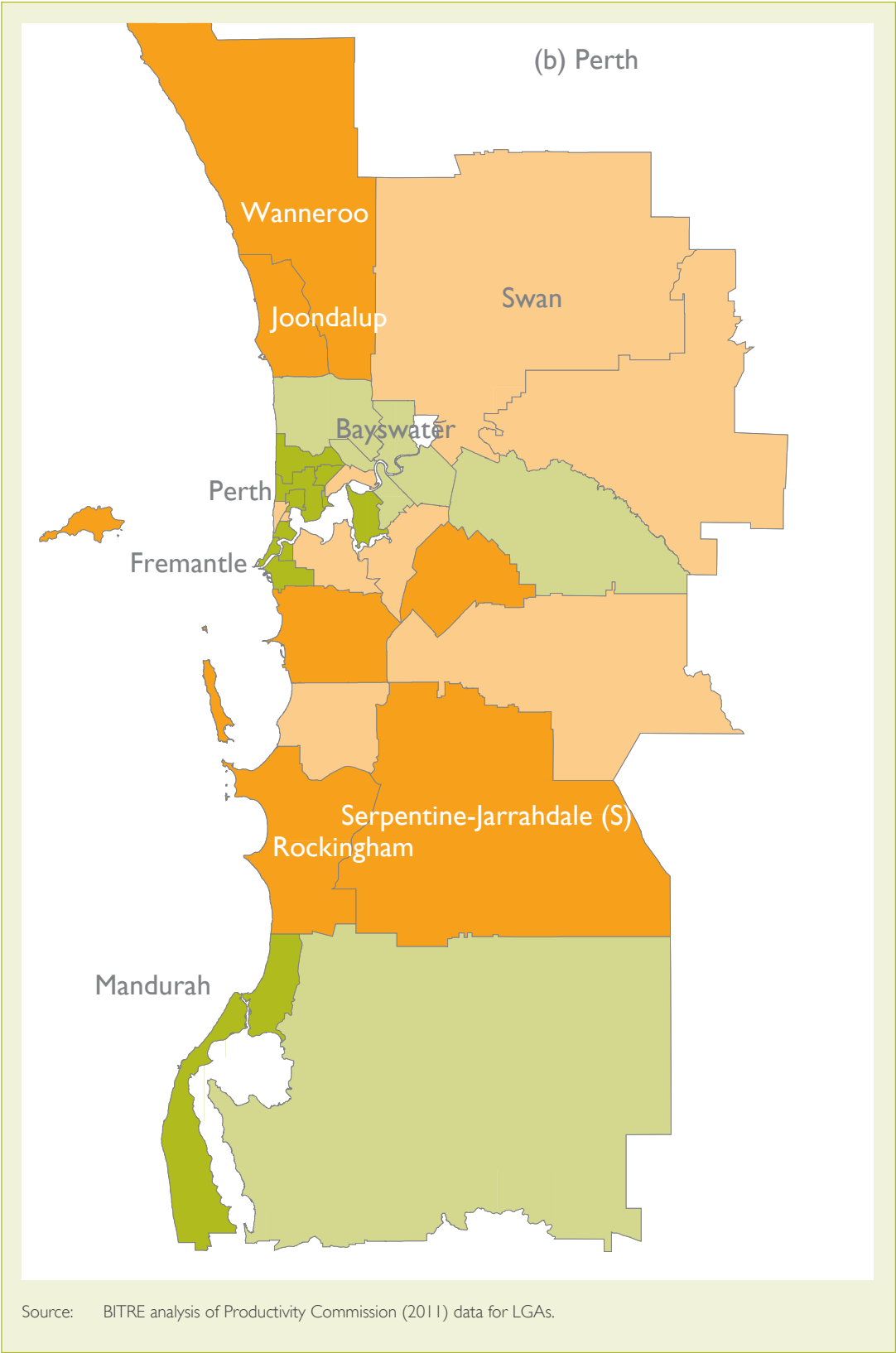
Sources: BITRE 2011 analysis of (1) ABS Census of Population and Housing 2006, (2) Melbourne Institute 2009

Outer suburban residents typically have longer distance journeys to work than middle suburban residents, who in turn in turn travel further than inner suburban residents. Average commuting times display a similar but less systematic pattern of spatial variation (see Figure 3.13). State government travel surveys indicate the gap in one-way average commuting time between inner and outer suburban residents was six minutes for Melbourne in 2007–08 and seven minutes for Sydney in 2005–06. Within the outer suburbs, commuting times are greatest for residents of the most distant locations, such as Gosford, Penrith, Cardinia and Rockingham.

Other things being equal, increases in the amount of time spent travelling to work in our cities are detrimental to urban wellbeing as this takes away from time that could otherwise be spent with family and friends or in economically productive activities. Average commuting times per one-way trip rose by 2.4 minutes for Sydney full-time workers from 2002 to 2006, and there was a minimal increase for Melbourne and Perth (Melbourne Institute 2009). Recent State government travel surveys identify a further one minute increase in average commuting times for Sydney between 2006–07 and 2008–09, but no change occurred in Melbourne between 2007–08 and 2009–10.

Figure 3.13 Median peak travel time for commuters in (a) Sydney and (b) Perth, 2010





In the 2006 Census the number of cycling trips had increased from 2001. More recent evidence presented in Chapter 5 suggests that cycling's share of the total transport task may again be increasing.

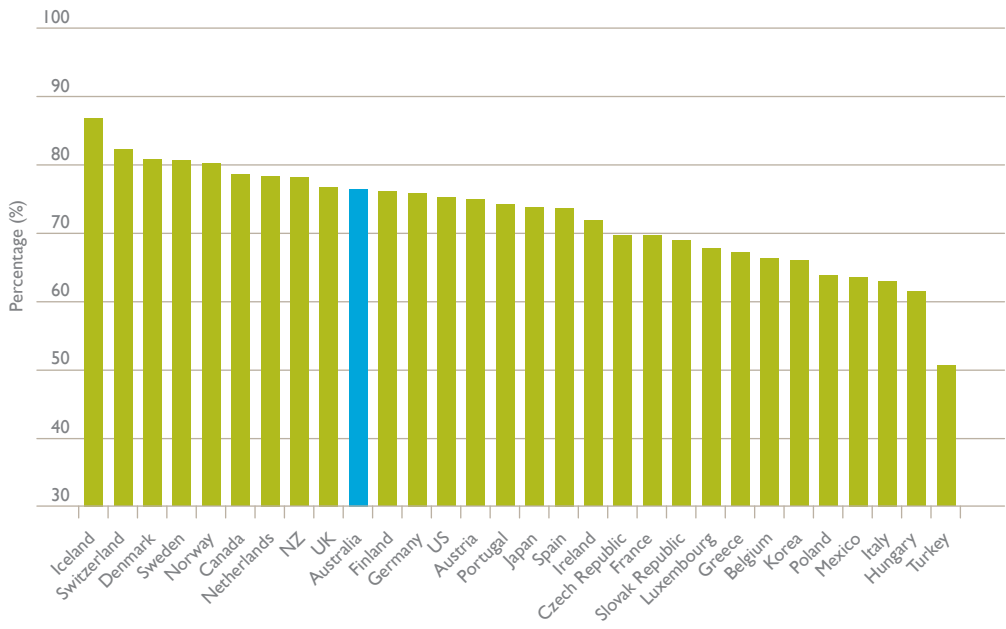
This section has discussed some of the key findings that emerge from BITRE's current research into spatial patterns of population growth, jobs growth and commuting in Sydney, Melbourne and Perth. Much greater detail is available from the individual reports (BITRE 2010, 2011a, 2011b), which consider recent trends in the context of the relevant metropolitan planning goals for each city. Future research will include:

- a study of spatial patterns of population growth, jobs growth and commuting in South East Queensland
- a comparative report, bringing together results for the four largest Australian cities, highlighting common themes and differences and drawing out the implications of the research.

## Workforce Participation

While there are some concerns about the validity of international comparisons of labour force participation (Abhayaratna and Lattimore 2006), recent estimates indicate that Australia's participation rate of 76.5 per cent for people aged from 25 to 64 years in 2008 was the tenth highest in the OECD (Figure 3.14) (OECD Statistics Database 2010).

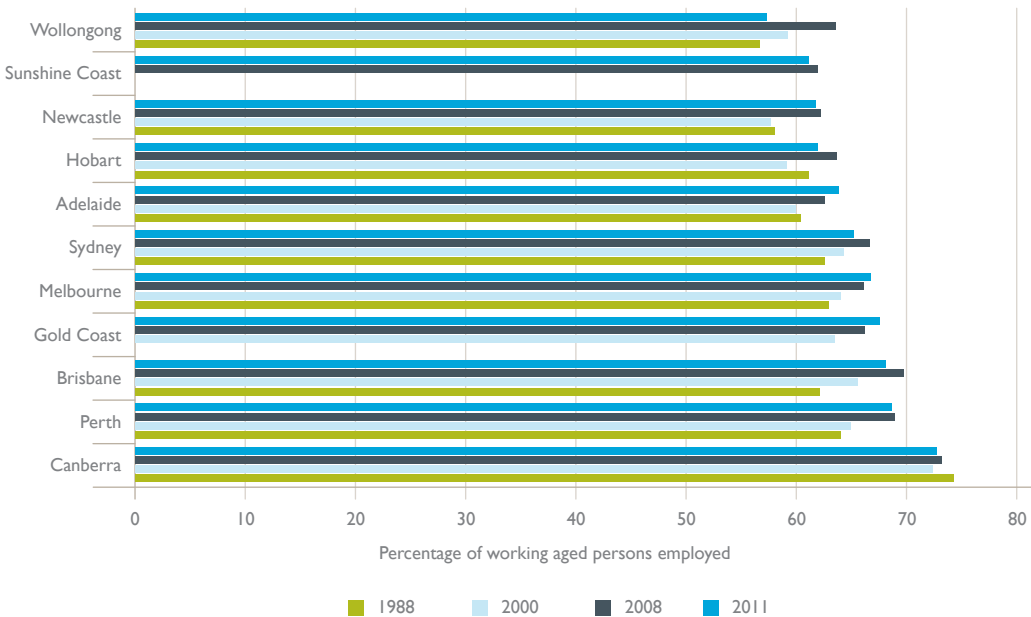
**Figure 3.14** Workforce participation rates, selected OECD countries 2010



Source: OECD Statistics Database 2010

The participation rates for all major cities was not available because the city areas used in this report are not always the same as the boundaries used to collect labour market statistics. Those cities where data was available are shown in Figure 3.15.

**Figure 3.15** Labour force participation rates in selected major cities



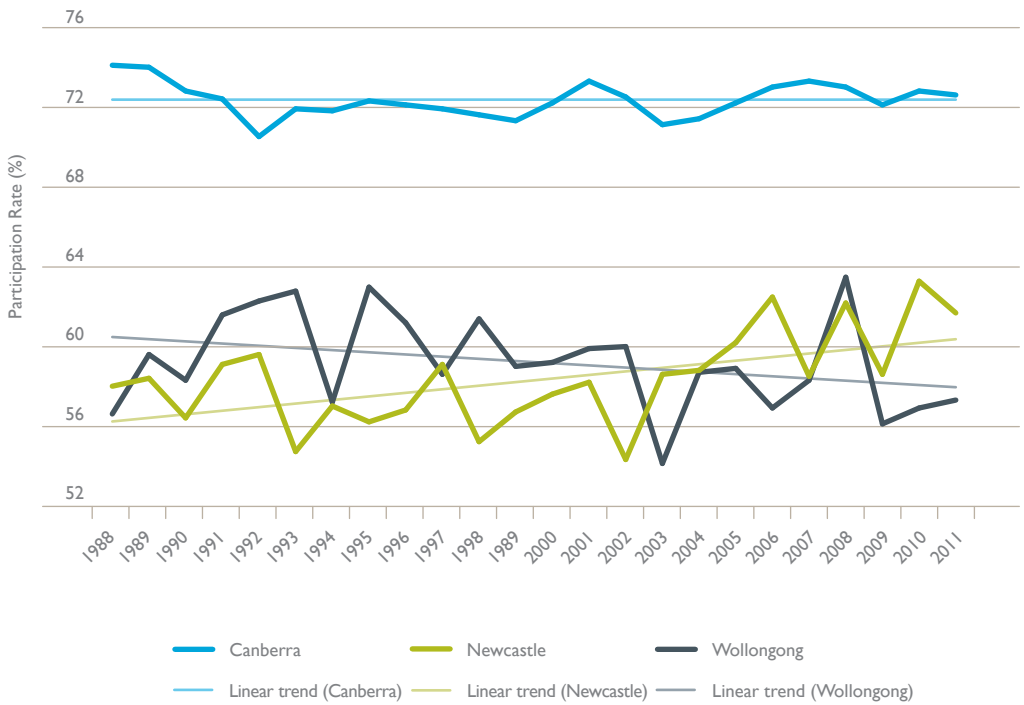
Note: Data not available for Sunshine Coast 1988, 2000; Gold Coast 1988.

Source: Derived from ABS 2011b

Figure 3.15 shows growing labour force participation rates for the 15-64 year age group have been a feature of the larger capital cities since 1988. Of note are the different experiences of each city: Brisbane's and Perth's participation rates have been consistently the highest and this has long pre dated the mining boom. In 2000, Adelaide staged a strong recovery after a long period of decline and since then its increase in participation rates has been statistically the strongest of any city. The two largest centres of the Australian economy, Sydney and Melbourne, showed more modest but consistent improvements.

Figure 3.16 shows the labour force participation rates in a selection of smaller cities since 1988. Here the trend seems to be variability rather than growth. Canberra's participation rates are the highest of any city in Australia and its experience over the past quarter of a century is one of considerable stability. Wollongong and Newcastle have had lower rates of participation but there has been a rising participation rate in Newcastle while Wollongong's has declined.

Figure 3.16 Labour force participation rates selected smaller cities



Source: Derived from ABS 2011b



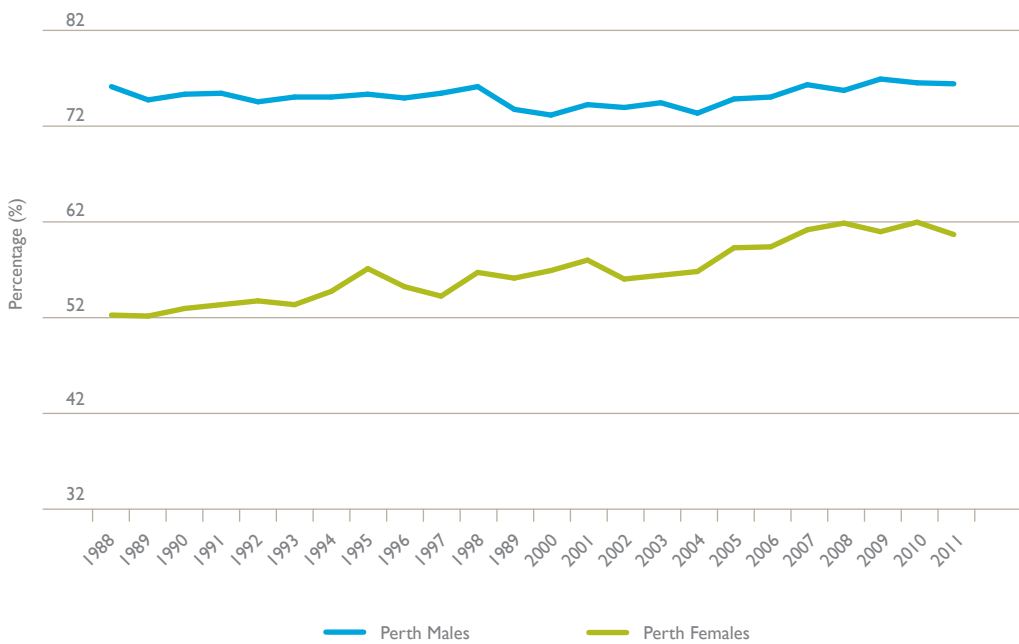
Newcastle, New South Wales

### Labour force participation by gender

Participation rates can be further explored by looking at gender. Male participation rates in Australia are about 2.2 per cent below the OECD average while female participation rates are four per cent higher than the OECD average, mainly due to the higher proportion of older women in paid employment (The Treasury 2010).

Gender participation rates vary considerably across major cities. Figure 3.17 shows the data for Perth which has one of the highest rates in Australia. The male participation rate seems near or at its practical ceiling, so the increase in participation rates for this city has been driven almost entirely by females entering the paid labour force.

**Figure 3.17** Labour force participation rates in Perth, 1988 to 2011

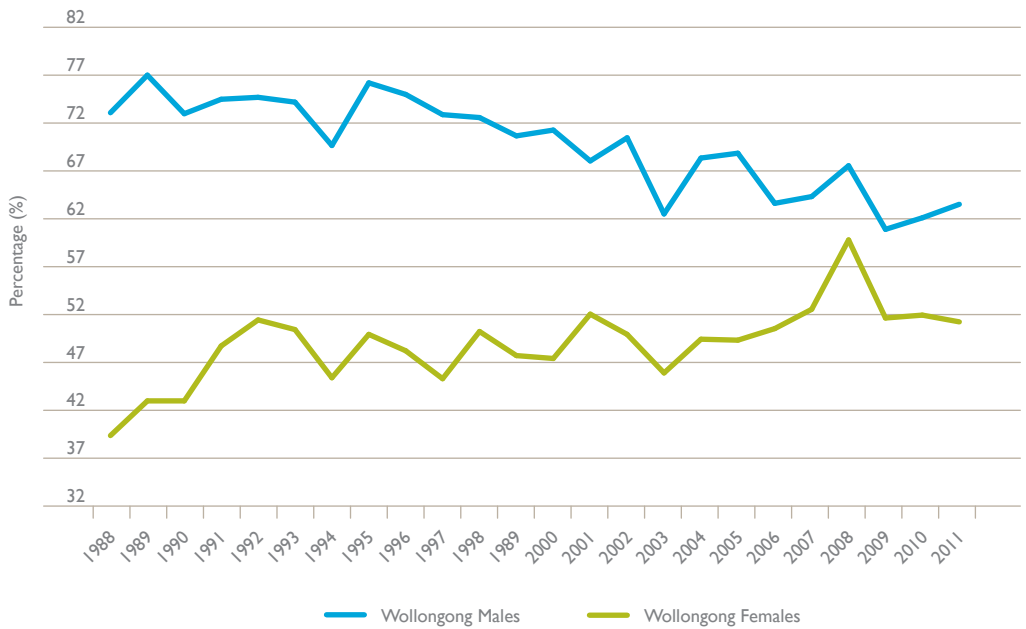


Source: Derived from ABS 2011b

Wollongong's experience has been quite different. Figure 3.18 shows that an increase in females entering paid employment has been more than offset by a steep fall in male participation rates. This pattern is relatively common across many of the smaller non capital cities.



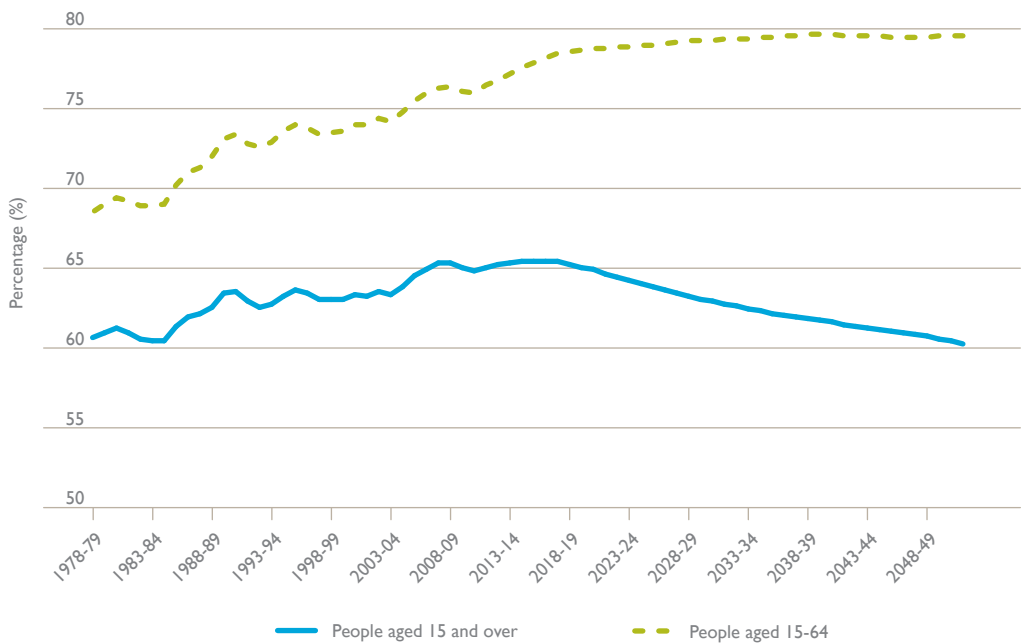
**Figure 3.18** Labour force participation rates in Wollongong 1988 to 2011



Source: Derived from ABS 2011b

Treasury figures suggest (Figure 3.19) that participation rates will fall over the course of the next few decades, due mainly due to the ageing population structure (The Treasury 2010).

**Figure 3.19** Actual and projected participation rates 1978-79 to 2048-49



Source: The Treasury 2010

# Employment

Employment and unemployment is an important aspect of participation rates because they show both labour utilisation and potential supply. Australia's unemployment, represented in Figure 3.20, has steadily decreased since 1990 to a low of 4.2 per cent in 2007. The Global Financial Crisis in late 2008 resulted in a spike in the national unemployment rate to 5.7 per cent in 2009. The annualised unemployment rate then continued to fall and was at 5.3 per cent at August 2011 seasonally adjusted (ABS 2011a).

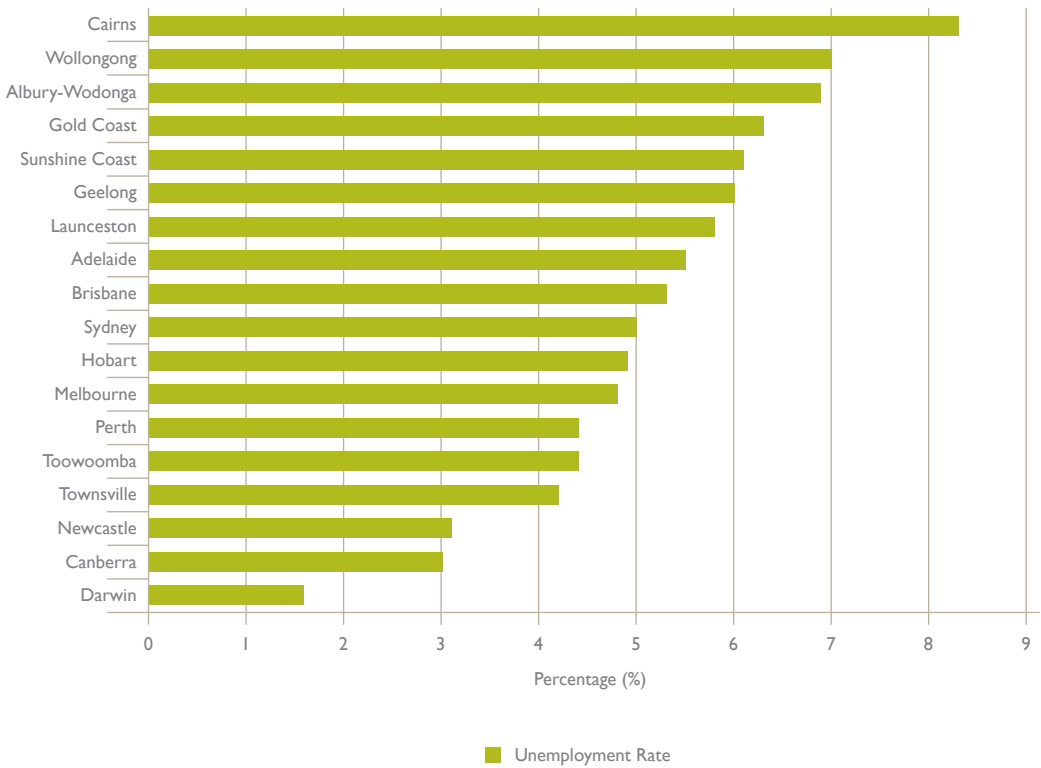
**Figure 3.20**      **Australia's unemployment rate 1990 to 2011**



Source:    ABS 2011b

There are significant differences in unemployment rates between Australia's major cities (Figure 3.21). As at the June quarter 2011, Darwin had the lowest unemployment rate at 1.6 per cent while Cairns (8.5 per cent) and Wollongong (7.2 per cent) had the highest. It is noteworthy that Newcastle had the second lowest unemployment rate of all major cities, despite significant changes in its industrial structure in the 1990s associated with the loss of steelmaking and related manufacturing jobs.

Figure 3.21      Unemployment rate in major cities, June quarter 2011



Source: DEEWR 2011 June quarter 2011

## Industry structure

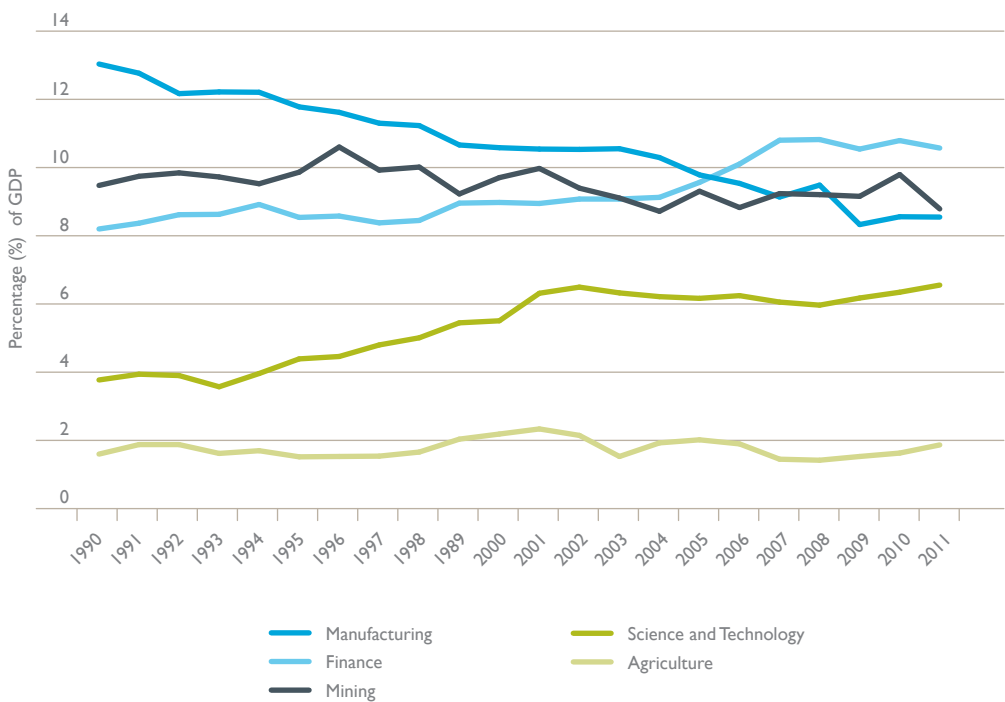
This section looks at industry structure, the factor that binds both productivity and participation. It begins with an overview of the major industrial changes in Australia in the last quarter of a century as context for the recent experiences of industry change in the major cities.

Australia is often described as an advanced or deindustrialised economy. The underlying paradigm for these terms is that as a nation's economy progresses, it will move from a reliance on agriculture to manufacturing and then onto a service economy.

There are three ways of measuring how or whether Australia fits into this broad context. The first and most common is to measure the contributions of particular industry types to the national GDP.

In Figure 3.22 below five industry divisions are shown that have experienced the most significant change in their contribution to GDP. The other 14 divisions have been relatively stable. Manufacturing experienced the most significant change with its share of GDP nearly halving in a 19 year period. At some point in 2007, financial services overtook it as Australia's largest economic sector. Agriculture also nearly halved its proportion of GDP. Favourable seasonal conditions and a spike in the terms of trade are evident in the 2000 and 2002 periods as is the long drought and poor terms of trade in more recent years. The graph illustrates the continuing growth in the dominance of the finance and insurance sector. It also shows the significant recent growth in the mining industry albeit with the volatility that has long characterised the industry. Noteworthy too is the increasing contribution to GDP of the so-called knowledge intensive industries in the science and technical category. Indeed, their rate of growth is not far behind the mining industry and are demonstrating less volatility.

Figure 3.22 Selected industries' contribution to GDP

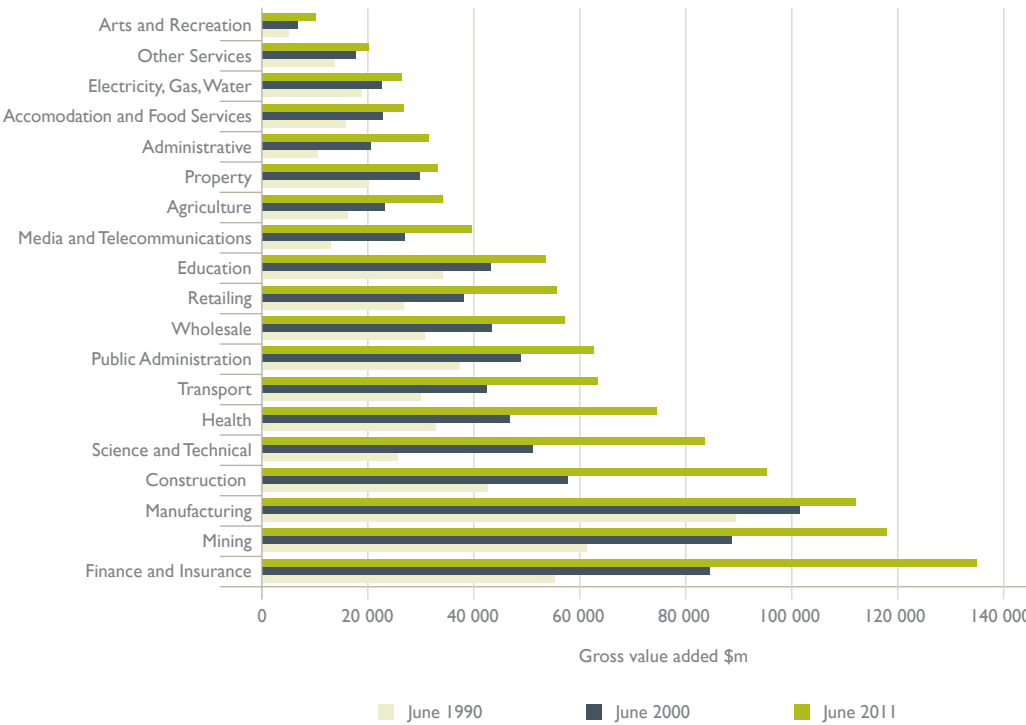


Source: Derived from ABS 2011a

A second method of comparing industry contribution is Gross Value Added (GVA), shown in Figure 3.23. When the changes in industry GVA are plotted, a different picture emerges. The finance and insurance sector is continuing to grow in its dominant position in terms of GDP and GVA.

The GVA data shows that the finance and insurance sector is increasing in its dominance and mining has now overtaken manufacturing as the industry contributing the second highest proportion of gross value added.

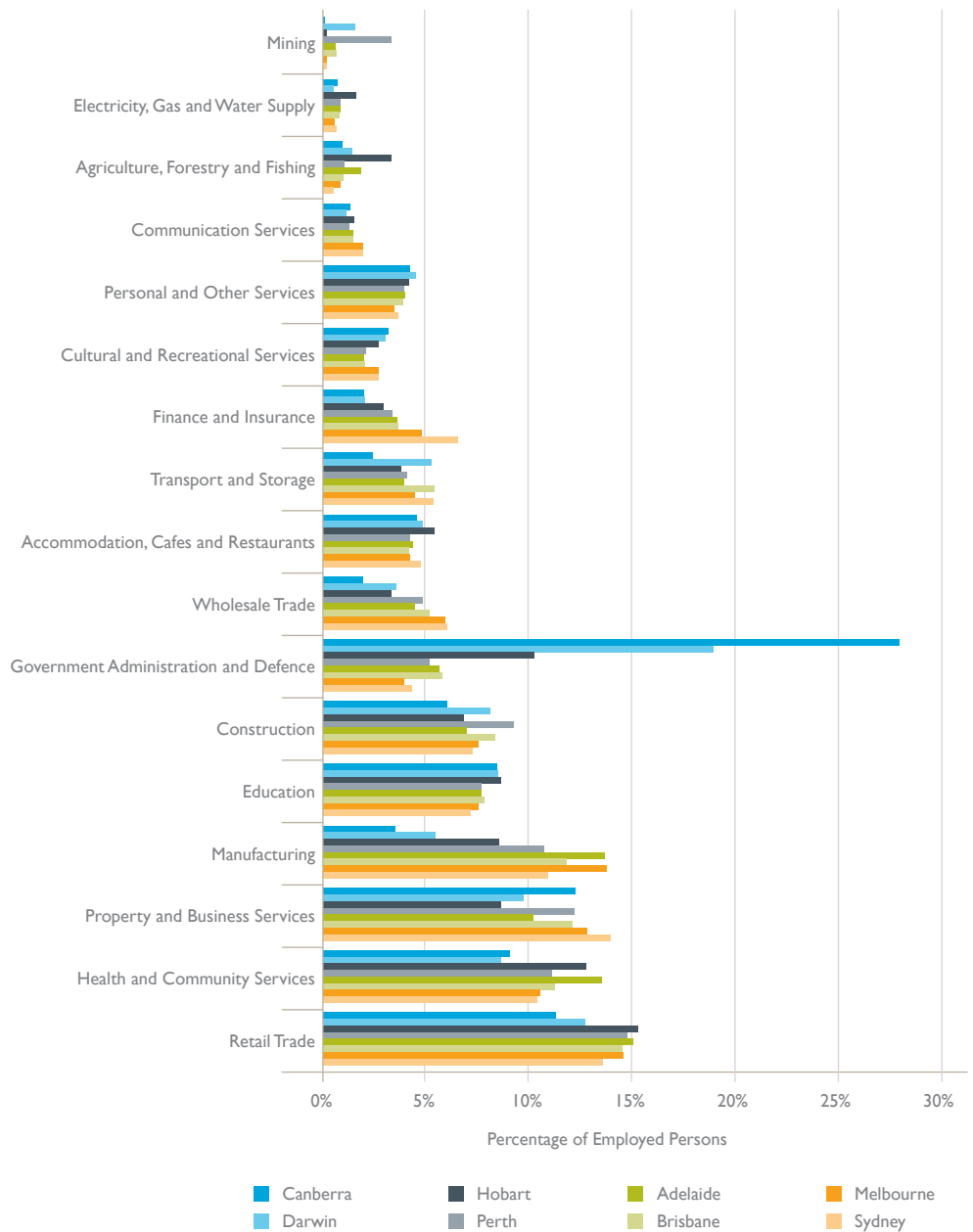
**Figure 3.23** Gross value added across industry sectors, 1990 to 2009



Source: Derived from ABS 2011a

A third measure of examining industry structure is the number of persons employed by industry sector. Examining industry structure in capital cities (Figure 3.24) shows Canberra's and Darwin's unique government-service focus. It also shows that in cities, the majority of people are employed in manufacturing, property and business services, health and community services, and retail trade.

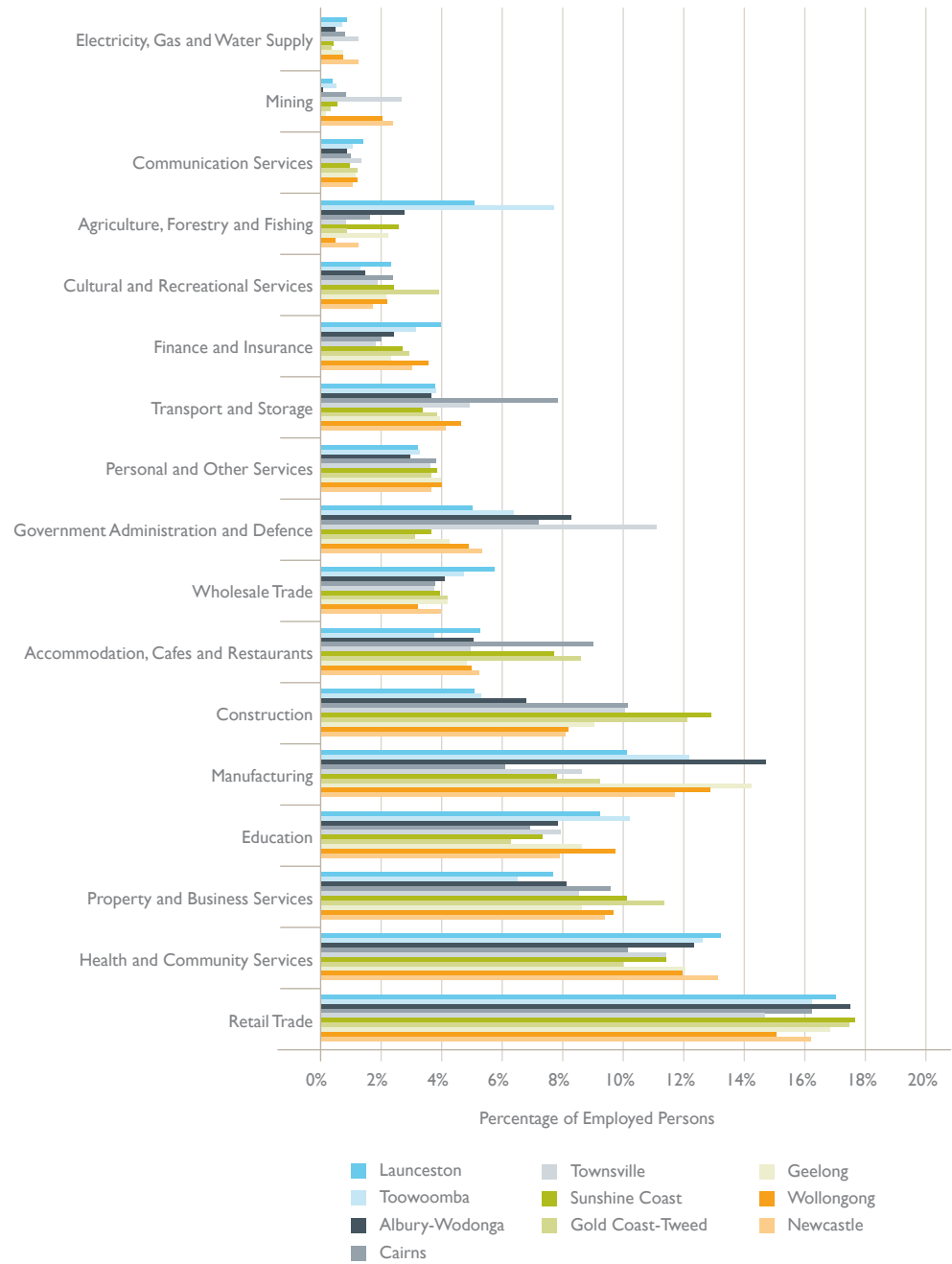
Figure 3.24 Proportion of employed persons by industry division in capital cities



Source: Derived from BITRE 2009b

Figure 3.25 shows that non-capital cities exhibit more variability. Noteworthy is the difference between capitals and non capitals in the finance, property and business and cultural sectors. These sectors generate a significant proportion of the nation's GVA and indicate an economic concentration in the capitals.

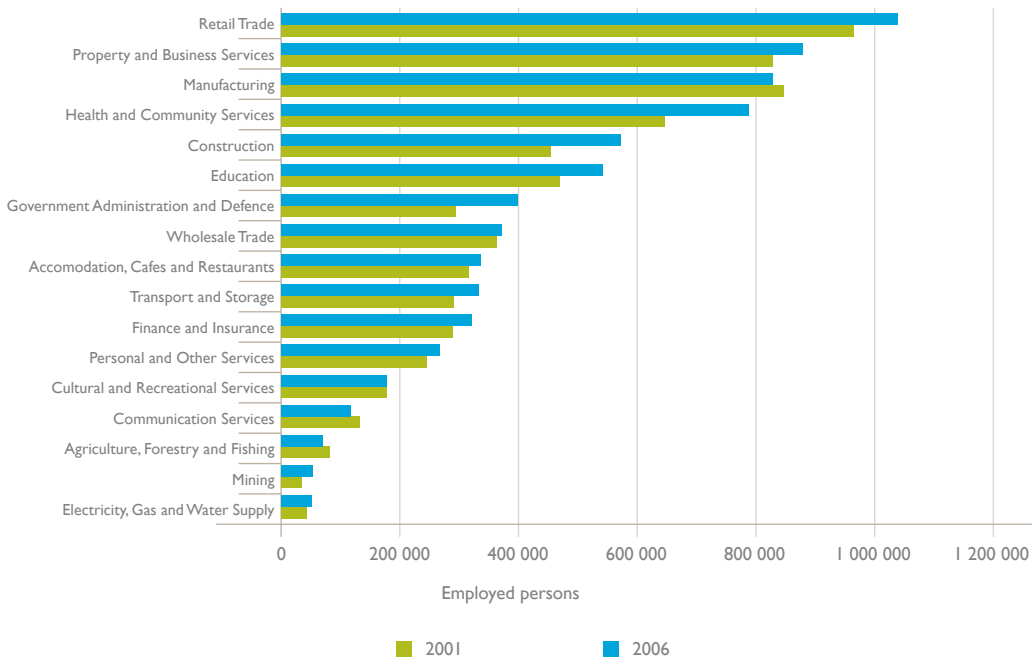
Figure 3.25 Proportion of employed persons by industry division in non capital cities



Source: Derived from BITRE 2009b

Examining changes in industry structure between 2001 and 2006 using persons employed measure (Figure 3.26) the growth in the services sector of major cities' economies becomes apparent.

**Figure 3.26** Major cities' employment by industry sector 2001 and 2006

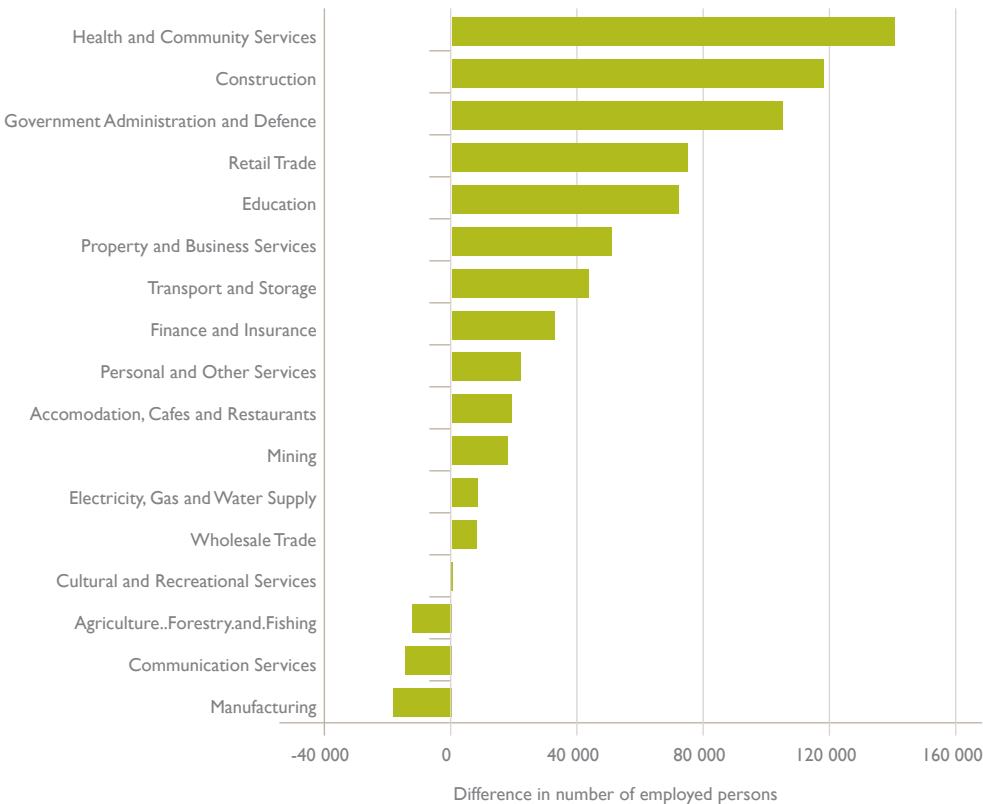


Source: Derived from BITRE 2009b

If the data in Figure 3.26 is expressed as growth and contraction (Figure 3.27) then small losses in employment in the communication (-2.3 per cent), manufacturing (-0.4 per cent) sectors is shown. Agricultural employment in major cities declined by 3.2 per cent mainly due to the contraction of agriculture in western Sydney (Malcolm and Fahd 2009). Manufacturing employment in the rest of Australia grew by 1.6 per cent, however this was not enough to offset a small overall national fall in this key sector of 0.1 per cent. These falls in employment were more than counterbalanced by strong gains in the services sectors (health, education, retail and government services) and the construction sector. It is important to note that change in employment is not the same as changes in GVA. Changes in employment in the property and business sector, for example, are likely to be far more significant in terms of the effect on the overall economy than changes to retail employment.



**Figure 3.27**      **Relative change in major cities' employment (employed persons) by industry sector 2001 and 2006**



Source: Derived from BITRE 2009b

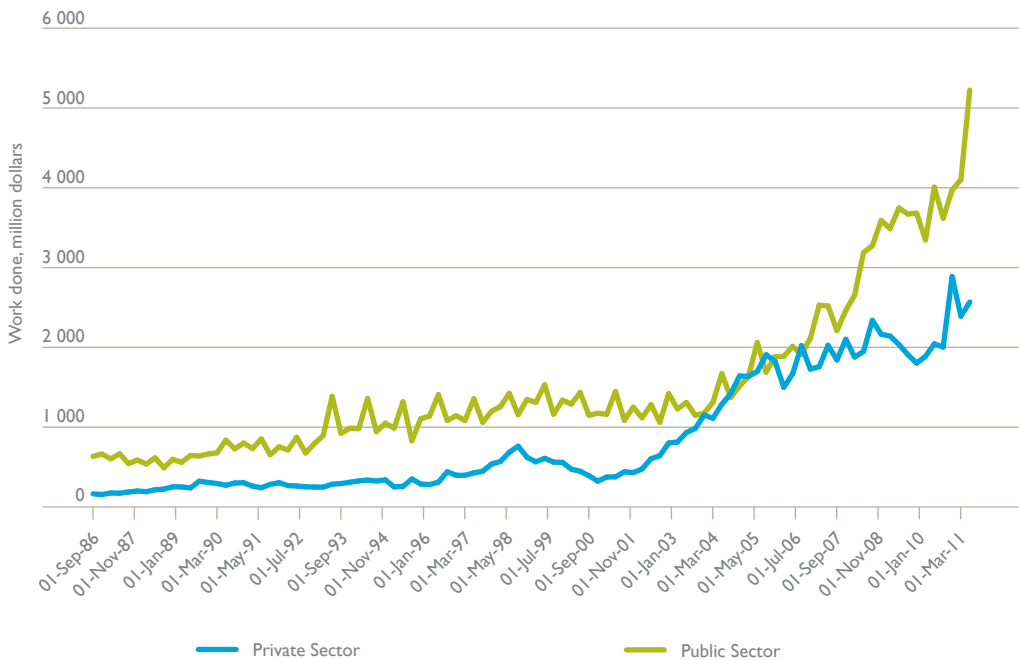
## Infrastructure

Infrastructure is a major component of productivity but a complete understanding of the area is not well developed in Australia due mainly to disparate data sources of variable quality. As such, only summary data is presented here. Investment is undergoing fundamental change in Australia where average annual infrastructure construction between 2007-08 and 2009-10 was almost double the average over the previous eleven years in real terms (from \$28 billion per year to \$54 billion per year).

Much of this was private capital investment driven largely by the mineral extraction boom. In the period from March quarter 2005 to September quarter 2010 new private capital expenditure increased by 73.0 per cent (or \$12.14 billion) to \$28.76 billion (ABS 2010). The mining industry accounted for 66.2 per cent (or \$8.034 billion) of this increase, and this spending has been largely driven by the need to develop mine sites and construct infrastructure to service the increasing demand for natural resources by emerging economies in Asia, particularly China.

Investment in transport infrastructure (Figure 3.28) however, was dominated by a sharp rise in public sector spending, particularly since 2007.

Figure 3.28 Value of transport engineering work by sector of project owner, 1986 to 2011



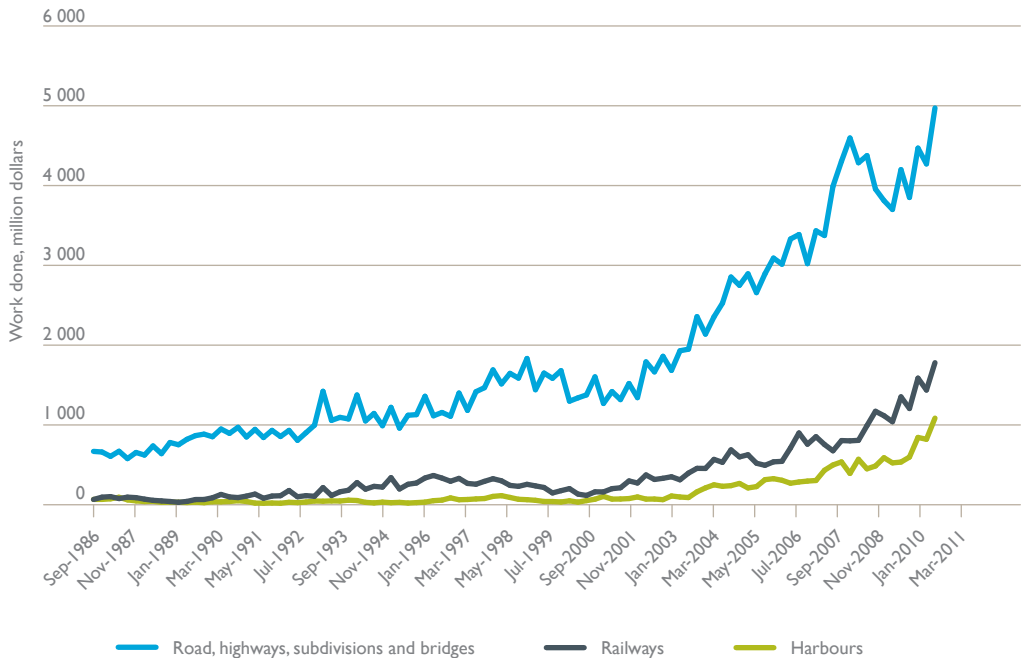
Source: ABS 2011b

When the transport infrastructure is broken down by mode (Figure 3.29), investment increased across all sectors with the stimulus spending in road construction at the end of 2008 clearly visible.



Sydney Harbour Bridge, New South Wales

**Figure 3.29** Value of transport engineering work by mode of transport, 1986 to 2011



Source: ABS 2011b

## Conclusion

It seems clear from the current studies that increasing agglomeration (measured by job density) results in a significant productivity boost to Australian cities and by implication maintaining or increasing job density is important to improving productivity. The BITRE work on commuting patterns suggest that cities are already doing this by increasing core density while at the same time moving to a polycentric arrangement outside the core as cities strive to reduce their major transaction cost: transport.

There has been concern that there may be limited scope to further increase productivity by increasing labour force participation, given the ageing population. While this may be broadly true at the national level, the variation in participation rates between cities would suggest that there is still scope to improve rates by better aligning labour demand with this underutilised human capital.

The discussion on industry structure shows that specificity is required in how it is being measured. Assessing an industry by proportion of GDP or even employment can be misleading. Manufacturing is a case in point. While it has declined as a proportion of the national economy and employs slightly fewer people than it did a decade ago, manufacturing is still producing significant value add to the economy.

## Chapter 3 References

Abhayaratna, J & Lattimore, R 2006, *Workforce Participation Rates – How Does Australia Compare?* Productivity Commission, Melbourne <http://www.pc.gov.au/research/staffworkingpaper/workforceparticipation> [Accessed 27/09/11].

Acott, K 2011, 'Crowded buses add to train woes', *The West Australian* 6 April <http://au.news.yahoo.com/thewest/a/-/wa/9141547/crowded-buses-add-to-transport-woes/> [Accessed 22.08.2011].

Australian Bureau of Statistics (ABS) 2006, *Census of Population and Housing 2006*, Canberra.

ABS 2010, *Experimental Estimates of Industry Multifactor Productivity, 2008-09*, cat. no. 5260.0.55.002, Canberra.

ABS 2011a, *Australian National Accounts: National Income, Expenditure and Product, Jun 2011*, cat. no. 5206.0, Canberra.

ABS 2011b, *Labour Force, Australia, Detailed – Electronic Delivery, Aug 2011*, cat. no. 6291.0.55.001, Canberra.

Bureau of Transport and Regional Economics (BTRE) 2007, *Estimating urban traffic and congestion cost trends for Australian cities*, Working Paper 71, Canberra.

Bureau of Infrastructure, Transport and Regional Economics (BITRE) 2008a, *Freight rates in Australia 1964–65 to 2007–08*, Information Sheet 28, Canberra.

BITRE 2008b, *A regional economy: A case study of Tasmania*, Report 116, Canberra.

BITRE 2009a, *Australian transport statistics Yearbook 2009*, Canberra.

BITRE 2009b, *Changes in Australia's industry structure: main cities 2001-2006*, Information sheet 32, Canberra.

BITRE 2010, *Population growth, jobs growth and commuting flows in Perth*, Research Report 119, Canberra.

BITRE 2011a, *Road vehicle-kilometres travelled: estimation from State and Territory fuel sales*, Report 124, Canberra.

BITRE 2011b, *Population growth, jobs growth and commuting flows in Melbourne*, Research Report 125, Canberra.

BITRE 2011c, *Australian Infrastructure Statistics Yearbook 2011*, Canberra.

BITRE 2011d, *Population growth, jobs growth and commuting flows in Sydney*, Canberra.

BITRE 2011e, *Traffic Growth: Modelling a Global Phenomenon*, Canberra.

Coase, R 1960, 'The Problem of Social Cost', *Journal of Law and Economics*, 3 1-44.

Department of Education, Employment and Workplace Relations (DEEWR) 2011, *Employment Service Area estimates for March 2011*, Canberra.

Department of Transport (Western Australia) 2011, *Public Transport for Perth in 2031*, Perth.

Flood, M & Barbato, C 2005, *Off to work: Commuting in Australia*, Discussion Paper No. 78, Australia Institute, Canberra.

Gaymer, S 2010, *Quantifying the impact of attitudes on shift towards sustainable modes*, paper presented to Australasian Transport Research Forum, 29 September–1 October 2010, Canberra.

Henry K 2004, *The Fiscal and Economic Outlook Address to the Australian Business Economists*, Australian Government, The Treasury, Sydney, <<http://www.treasury.gov.au/documents/830/HTML/docshell.asp?URL=abe.asp>>[Accessed 07.10.2011]

Hurst, D 2011, 'Bus overcrowding worse than ever', *Brisbane Times* 20 May [<http://www.brisbanetimes.com.au/queensland/bus-overcrowding-worse-than-ever-20110519-1eupf.html>] [Accessed 22.08.2011]

Infrastructure Australia 2010, *State of Australian Cities 2010*, Infrastructure Australia, Canberra.

Lampard, M, Copeland, A & Commodity Analysts 2010, *Minerals and energy, major development projects – October 2010 listing*, ABARE–BRS, Canberra.

Lucas, C 2011, 'Peak hour trains still a horror trip', *The Age* 17 May <http://www.theage.com.au/victoria/peakhour-trains-still-a-horror-trip-20110516-1epv3.html> [Accessed 22.08.2011]

Malcolm, P & Fahd, R 2009, *Ground Truthing of the Sydney Vegetable Industry in 2008*, New South Wales Department of Primary Industries, Sydney.

Marshall, A 1920, *Principles of Economics*, MacMillan, London.

Melbourne Institute 2009, 'Time spent travelling to and from work', in *Families, income and jobs, volume 4: A statistical report on waves 1–6 of the HILDA survey*, Melbourne Institute, pp. 202–204.

Productivity Commission 2011, *Performance benchmarking of Australian business regulation: planning, zoning and development assessments*, Productivity Commission Research Report, Canberra.

Rawnsley, T & Szafraneic, J 2010, *Agglomeration and Labour Productivity in Australian Cities*, SGS Economics and Planning, Melbourne <http://www.sgsep.com.au/agglomeration-and-labour-productivity-australian-cities> [Accessed 21.09.2011]

Senate Committee for Rural and Regional Affairs and Transport 2009, *Inquiry into Investment of Commonwealth and State funds in public passenger transport infrastructure and services*, 2.18.

Simmonds, K 2011, 'Buses, trains still crowded: commuters', *ABC Online* 31 December <http://www.abc.net.au/news/2010-12-31/buses-trains-still-crowded-commuters/1890790> [Accessed 22.08.2011]

Stanley, J & Barrett, S 2010, Moving people: solutions for a growing Australia, paper prepared on behalf of Australasian Railway Association, Bus Industry Confederation and International Association of Public Transport–UITP, <http://apo.org.au/research/moving-people-solutions-growing-australia> [Accessed 19.09.2011]

Transport Data Centre 2010, *2008/09 Household Travel Survey Summary Report* (2010 release), New South Wales Transport Data Centre, Sydney.

The Treasury 2010, *The 2010 Intergenerational Report*, The Treasury, Canberra. <http://www.treasury.gov.au/igr/igr2010/> [Accessed 27.09.2011]

Trubka, R 2009, *Productivity and the density of economic activity: preliminary estimates of agglomeration benefits in Australian cities*. Curtin University Sustainability Policy Institute, Perth.

Our growing cities have implications for the use of water, land, energy and other resources, and the generation of waste. They are also the source of considerable greenhouse gas emissions and are highly vulnerable to the likely implications of climate change, especially given the coastal locations of many of our major cities and their susceptibility to rising sea levels, storm surges and predicted increases in extreme weather events. As discussed in *State of Australian Cities 2010* cities do provide considerable opportunities to deliver more sustainable outcomes for our environment and our communities. This chapter considers the complexities of cities' energy budgets and looks at the energy embodied in our buildings and infrastructure. City water use is examined. The impact of climate change on our coastal cities is further explored.

### Summary indicators

Dimension	Indicators
Water	Total urban water supplied (ML) Capital city average annual residential water supplied Sources of urban water Water supplied by use
Air quality	Exceedence of fine particle health standards Trend in peak ozone levels, selected cities
Energy	Australian energy consumption, by sector Australian electricity production, by fuel Electricity and gas retail price index, capital cities Energy rating of buildings
Climate Change	Damage to urban infrastructure as a result of sea level rise and heat Heatwave related deaths in Australian cities
Waste	Landfill waste, selected capital city

## Key findings

- Since 2006, Australians have been consuming less energy per capita, particularly that generated by coal, recovering more waste from landfill per capita, producing less household waste, consuming less water and have cleaner air in their cities than they have done previously.
- Water restrictions were eased in south-eastern Australia after increased rainfall in late 2010 and early 2011. There has been significant investment in new infrastructure that will mean urban water supply is less dependent on rainfall. The main use of water in Australian cities continues to be in the residential sector.
- Air quality in Australia's major cities is now generally high by international standards and is expected to improve further as a result of improvements to motor vehicle technology and as older vehicles are replaced. Regional cities in south-eastern Australia generally have slightly poorer air quality ratings for particulate matter than other major cities due mainly to bushfire smoke and dust storms. Regional cities' air quality in southern Australia tends to be affected more by wood heaters and hazard reduction burns, and inland cities by agricultural activities. Many of these high particulate readings are transitory in nature.
- In terms of fatalities, heatwaves are the largest threat to Australian cities from natural disasters. The record breaking heatwaves in January 2009 severely tested the resilience of Adelaide and Melbourne in particular. In reports on the heatwave, South Australian and Victorian authorities have highlighted the need for more heatwave-resilient urban systems.
- The summer of 2010-11 brought with it extreme weather events. Northern parts of Australia were hit by cyclones and extensive parts of eastern Australia and mid Western Australia were subjected to severe flooding. Bushfires affected Western Australia.
- About 85 per cent of Australians live within 50 kilometres of the coast. More than 700,000 dwellings are within three kilometres of the coast and less than six metres above existing sea level. Projected impacts of climate change show that a significant number of residential buildings may be at risk of inundation and damage from a sea level rise of 1.1 metre (high end scenario for 2100). Projections also show an increased frequency of extreme weather events with associated storm surges and coastal erosion, and an increased risk of damage to property and infrastructure from inundation and erosion.
- Energy consumption across Australia is dominated by electricity generation, transport, and manufacturing sectors which together used more than 75 per cent of the energy consumed in 2009-10.
- About 70 per cent of energy is consumed indirectly in products and services used. For example, the energy embodied in the construction of a building is many times greater than the energy used within that building in a year.



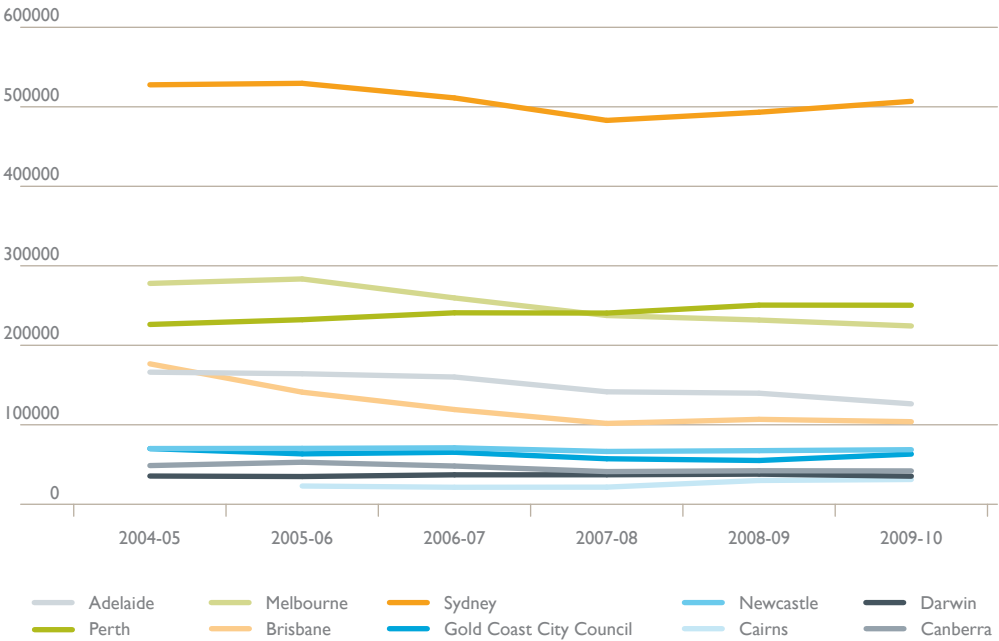
- In 2009–10 Canberra and Adelaide recorded the highest rates of waste recycled (70 per cent). Perth had the lowest rate at 40.6 per cent, but recorded an increase of 18 per cent over 2008–09 figures. Landfill levies continued to be imposed in most major Australian cities to encourage increased recycling. Brisbane will be subject to a levy from the end of 2011. Where data is available, it shows major cities are producing less household waste per capita. Recycling rates in the construction and demolition stream are increasing in most jurisdictions. Increasing recycling rates for the commercial and industrial waste stream, and for municipal solid waste pose challenges such as the lack or expense of technologies able to adequately manage 'wet' or putrescible waste.

## Water

Increased rainfall across eastern Australia in 2009–10 led to a rapid rise in storage levels in many city catchments, enabling most water utilities to ease restrictions or move to permanent water conservation measures. Continued record low rainfall in Perth and the 2011 floods in Queensland highlight Australia's extreme climatic variability and our ongoing water challenges.

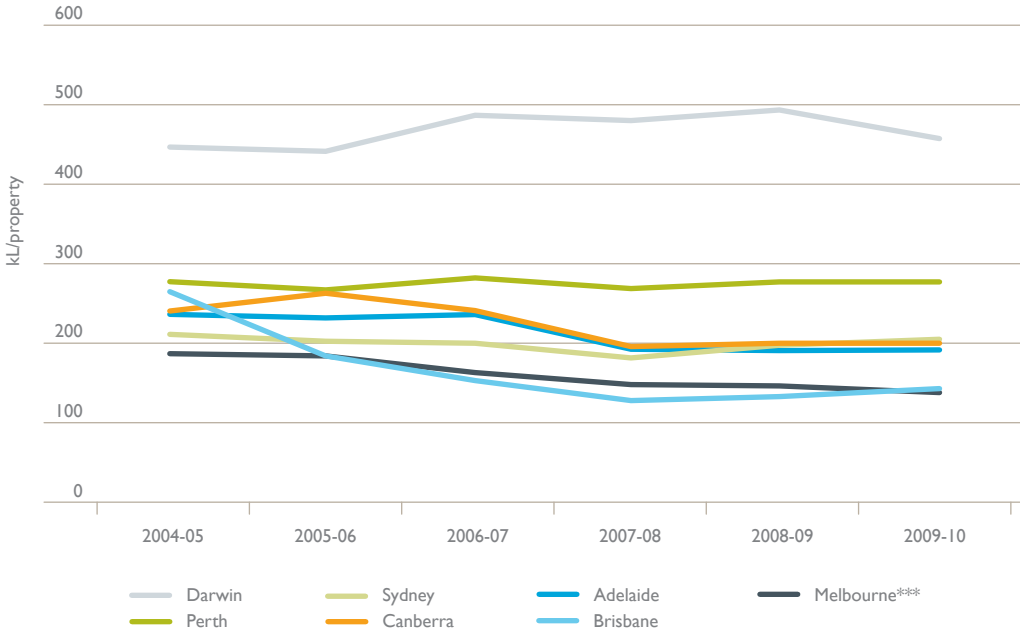
Significant investments in infrastructure have produced new water supply sources that are less dependent on rainfall. Some major projects are underway or recently completed, including desalination plants for Melbourne, Adelaide, Sydney and Perth and a major storage upgrade in the ACT. Increased rainfall coincided with the completion of water infrastructure projects, including Melbourne's North–South Pipeline and major desalination, recycling and dam enlargement works in Queensland and Sydney's desalination plant at Kurnell (National Water Commission 2011). Figure 4.1 and Figure 4.2 illustrate water supplied to selected Australian major cities.

Figure 4.1 Total urban water supplied (ML)



Source: Derived from National Water Commission 2011.

Figure 4.2 Capital city average annual residential water supplied 2004–2010



Note: Melbourne data based on City West water figures.

Source: Derived from National Water Commission 2011.

Comparisons of water use between cities should be made cautiously, as each city has unique circumstances and its water use reflects many variables including different climates, industry structure and demographics. In general, the average volume of water supplied to residential customers increased slightly in 2009–10, although most utilities reported figures within five per cent of those reported in 2008–09. Key exceptions included the retailers in Melbourne, where use continued to fall as restrictions remained unchanged over the year but rainfall improved. Figure 4.3 shows the source of annual average water supplied to selected major cities in 2009–10.

Darwin was the capital city with the highest water consumption per capita. Darwin's water supply is not restricted.

Perth also had relatively high consumption, primarily as a consequence of its climate with long dry summers. This level of consumption occurred despite water efficiency measures being in place in 2009–10. Perth residents are not as reliant on surface water as those in other jurisdictions, 20 per cent of the city's water supply coming from desalination and a further 49 per cent from groundwater aquifers (see Figure 4.3). Further investment in desalination in the plant at Binningup will provide 50 gigalitres of water a year when commissioned at the end of 2011.

### *Groundwater Replenishment in Perth*

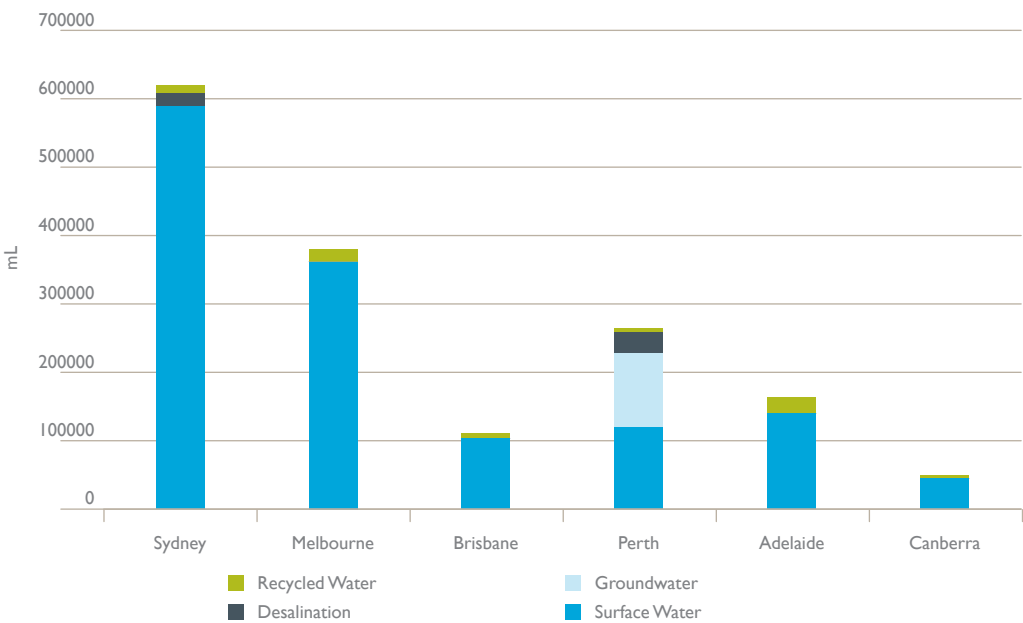
Groundwater replenishment is an innovative concept where recycled water is treated to drinking water standards and recharged into groundwater supplies. The project is trialing further treatment of water from the Beenyp Wastewater Treatment plant, by ultra filtration, reverse osmosis and ultra-violet (UV) disinfection to produce very high quality water.

The aim of the project is to provide the basis for building community confidence, gaining regulatory approval and demonstrating technical feasibility to deliver groundwater replenishment using recycled water as a new, sustainable water source option for Australia.

If successful and accepted by the public, the Water Corporation of Western Australia will develop a larger scale scheme that could provide 25–35 billion litres of drinking water.

At the other end of the scale, the average annual residential water supplied in Melbourne fell to 142 kilolitres (kl) per property, the lowest for any of the major capital cities. Storages reached their lowest historical point in mid-June 2009 before recovering gradually. The average residential water supplied in Sydney increased to 205 kl per property, the highest since 2004–05. Improved storage levels allowed Sydney Water to replace drought restrictions that had been in place since late 2003 with less restrictive rules. Brisbane’s average annual residential water use increased from 133 kl in 2008–09 (the lowest of all cities) to 143 kl in 2009–10, which was the largest increase of any capital city but still only marginally higher than Melbourne’s residential consumption pattern.

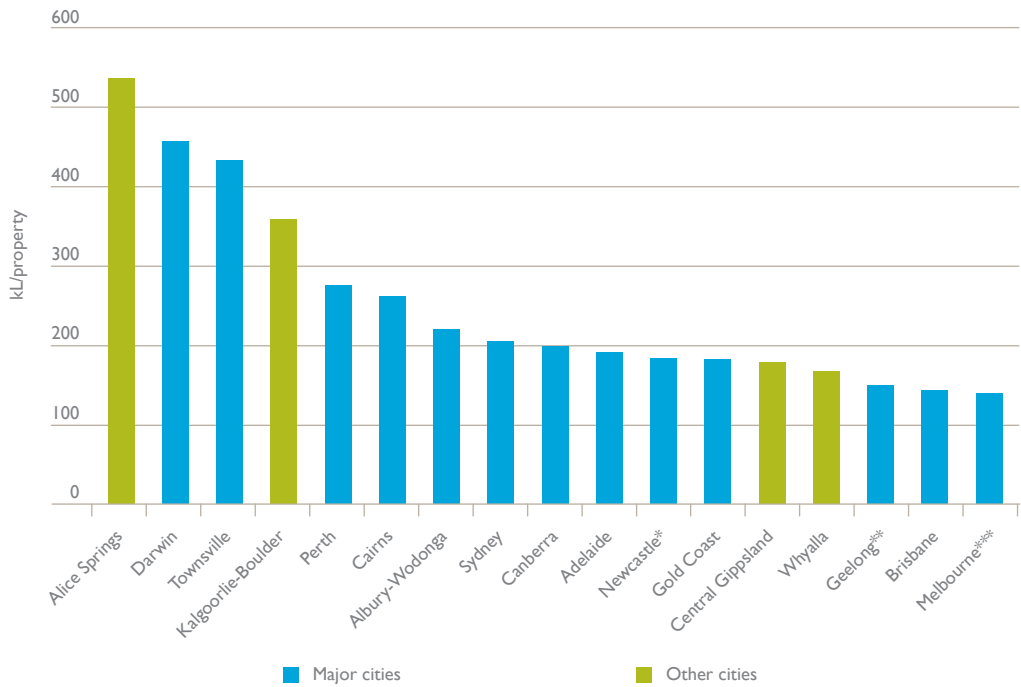
Figure 4.3 Sources of water 2009–10 (ML)



Source: Derived from National Water Commission 2011.

In Adelaide, the average annual residential water supplied stabilised at 191 kl per property after years of steady decline. While water restrictions remained in place, increased rainfall and flows from the Murray River allowed storages to increase slightly and reduced the requirement to pump water. Although not a major city, for comparative purposes Alice Springs supplies the highest average annual residential volume of water of all utilities due to its hot, dry climate (Figure 4.4).

In Canberra, the average annual residential water supplied was 199 kl per property in 2009–10, which was similar to the 201 kl per property supplied in 2008–09. Canberra remained on Level 3 restrictions throughout the entire year, as inflows to storages continued to be low (National Water Commission 2011). Storage subsequently reached 100 per cent due to high rainfalls but has since reduced slightly.

**Figure 4.4** Average annual residential water supplied 2009–10

Note: Data on the volume of water supplied to Tasmania's cities was not reported for the 2011 edition of the National Performance Report.

\*Includes lower Hunter area

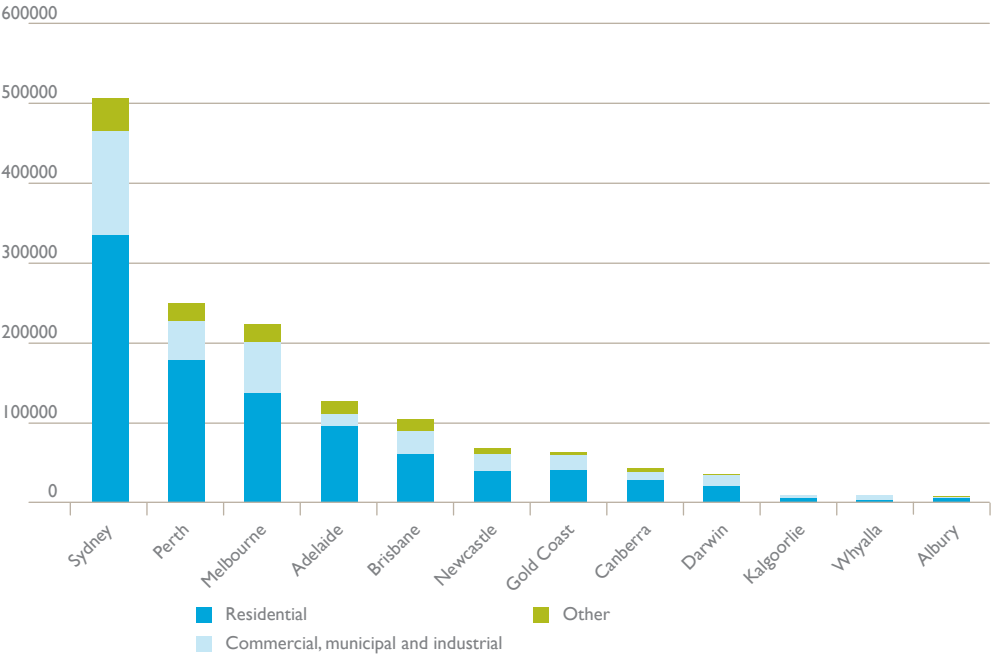
\*\* Includes surrounding region serviced by Barwon Water

\*\*\*Based on City West Water figures.

Source: Derived from National Water Commission 2011.

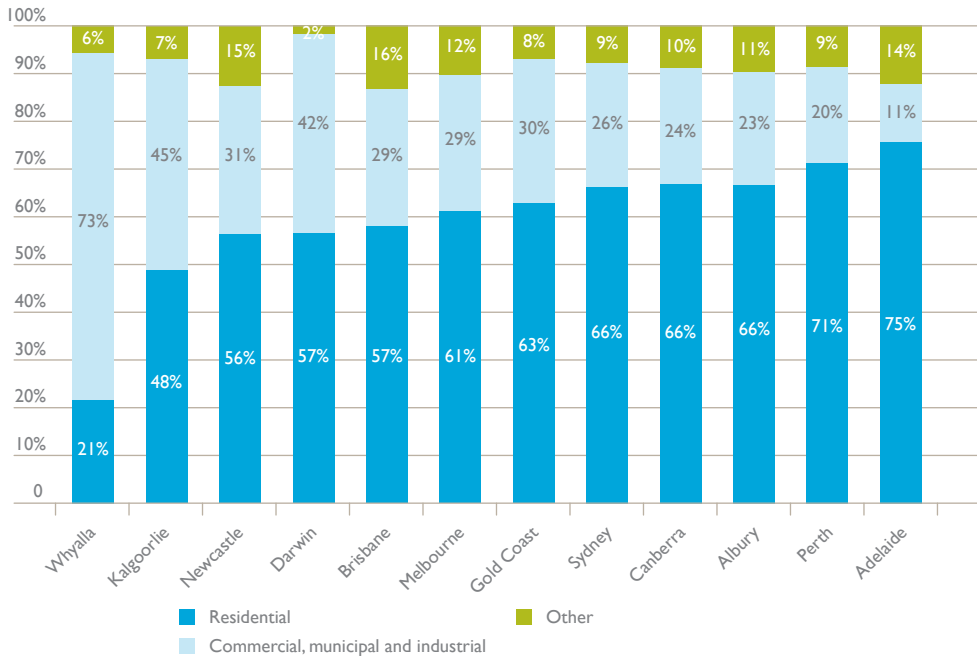
The capital cities display broadly similar patterns of water use by category of residential or commercial/industrial, in that residential use is the greater component (see Figure 4.5 and Figure 4.6). This is in contrast to industrial cities such as Whyalla, included here for comparative purposes.

**Figure 4.5**      **Volume of water supplied by use, selected cities 2009–10 (ML)**



Note: Volumes do not include environmental flows.

Source: Data derived from National Water Commission 2011.

**Figure 4.6** Proportion of water supplied by use, selected cities 2009–10

Source: Derived from National Water Commission 2011.

## Air quality

Urban communities are enjoying cleaner air in our cities. Air quality is expected to continue to improve as a result of better motor vehicle technology and as older high-emission vehicles are replaced. National vehicle emissions standards and fuel quality standards have contributed to reducing motor vehicle emissions. Specific pollution reduction activities undertaken by States and Territories have also improved air quality.

### Air pollution management and outlook

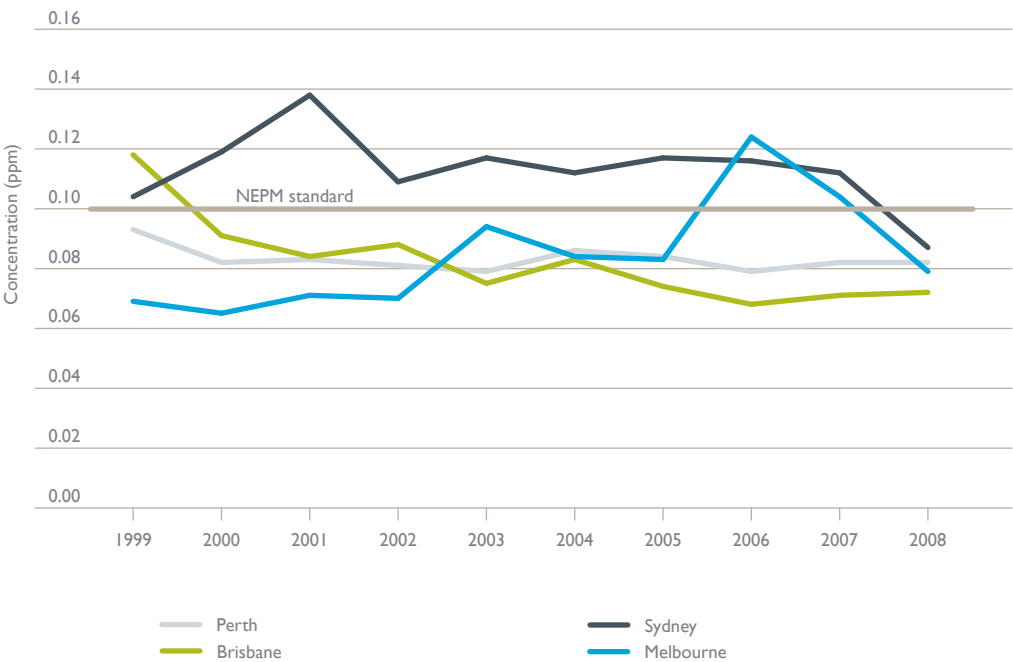
The National Environment Protection Council is a national statutory body which makes National Environment Protection Measures for ambient air quality. In accordance with the measures, air quality monitoring in Australia is conducted by the States and Territories for six criteria pollutants: ozone, nitrogen dioxide, sulphur dioxide, carbon monoxide, particles (as  $PM_{10}$  and  $PM_{2.5}$ ) and lead.

## Air pollution trends

In the past decade, there have been significant decreases in levels of some air pollutants. Carbon monoxide, nitrogen dioxide, sulphur dioxide and lead levels have all declined in urban air to levels significantly below the national air quality standards. These improvements are largely because of better standards for fuel quality and motor vehicle emissions. Ozone and particulate matter levels did not decrease in the assessment period. Occasionally peak ozone levels approached or exceeded national standards in some Australian cities and peak particulate matter levels frequently exceeded the standards in nearly all regions (Department of Sustainability Environment Water Population and Communities (DSEWPaC) 2011).

Ozone is not emitted directly but forms in sunlight from nitrogen oxides and volatile organic compounds emitted from motor vehicles and industrial and domestic sources. Sydney and the Illawarra regions of New South Wales generally experience higher ozone levels than other parts of Australia and, in the past decade, ozone levels in these regions exceeded the standards in most years in summer months, albeit for only a few hours. Peak ozone levels in other regions vary from year to year and can be associated with bushfires and only occasionally exceed the standards, if at all, as shown in Figure 4.7.

**Figure 4.7** One-hour average ozone levels 1999–2008 (parts per million)

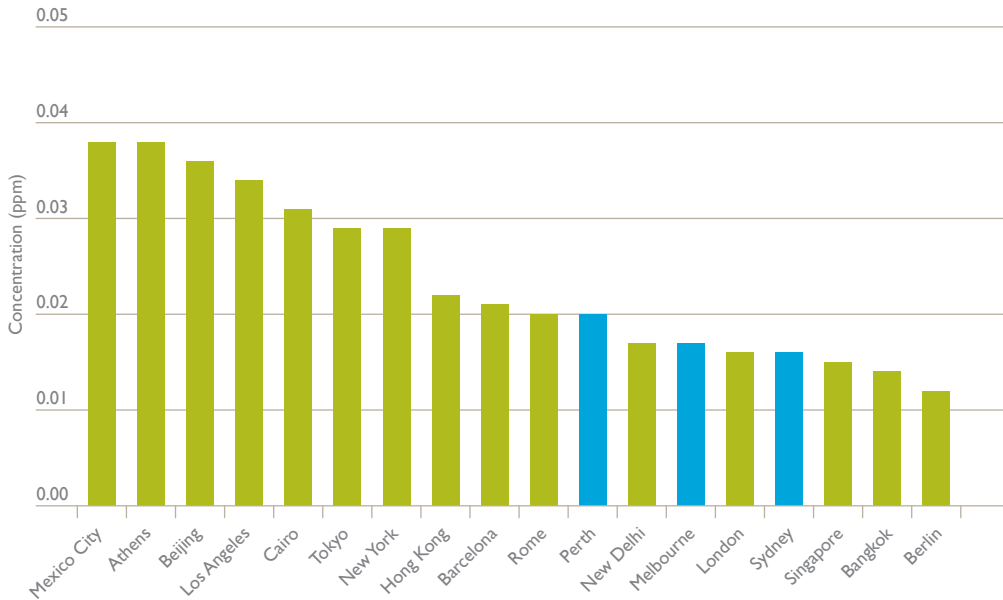


Source: DSEWPaC 2011



Nitrogen dioxide is mainly produced by motor vehicles and electricity generation and is a precursor to ozone production. Levels in Australian cities are between one third and one half of the national standard. This compares favourably against other cities internationally, as shown in Figure 4.8.

**Figure 4.8** Annual average oxides of nitrogen levels 2000–05 (parts per million)

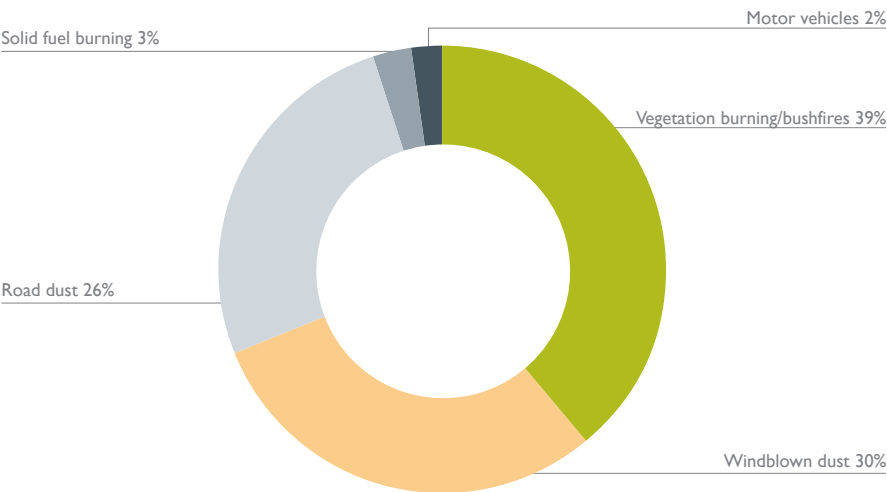


Source: DSEWPac 2011

# Particles

Particles are emitted either directly from a range of natural sources such as dust and bushfires and human activities such as road dust or are formed indirectly by conversion of precursor pollutants through photochemical processes. Figure 4.9 shows the main non-industrial sources of particles in Australia.

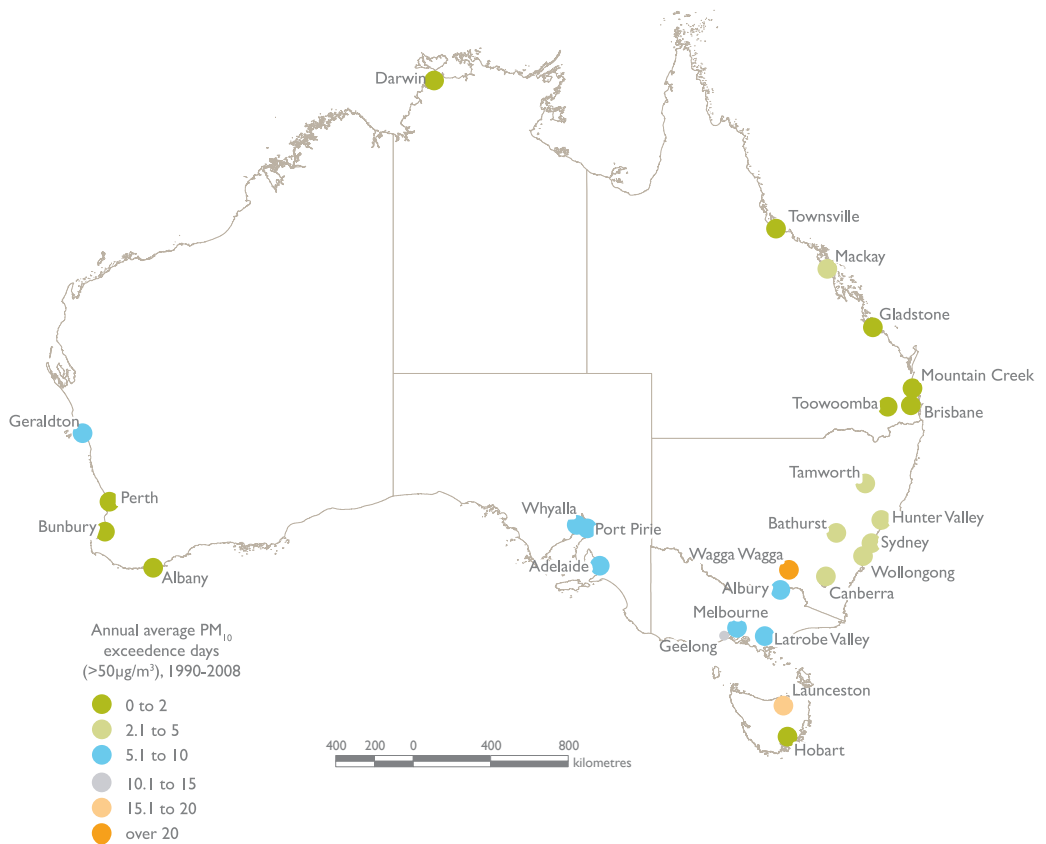
Figure 4.9 Main non-industrial sources of particulate matter (PM<sub>10</sub>)



Source: DSEWPac 2011

Peak PM<sub>10</sub> (particulate matter with an equivalent aerodynamic diameter of 10 micrometres (µm) or less) levels commonly exceeded the national standard in the assessment period in all parts of Australia. However, Australian cities' PM<sub>10</sub> levels are relatively low compared with other countries (Figure 4.10 and Figure 4.11).

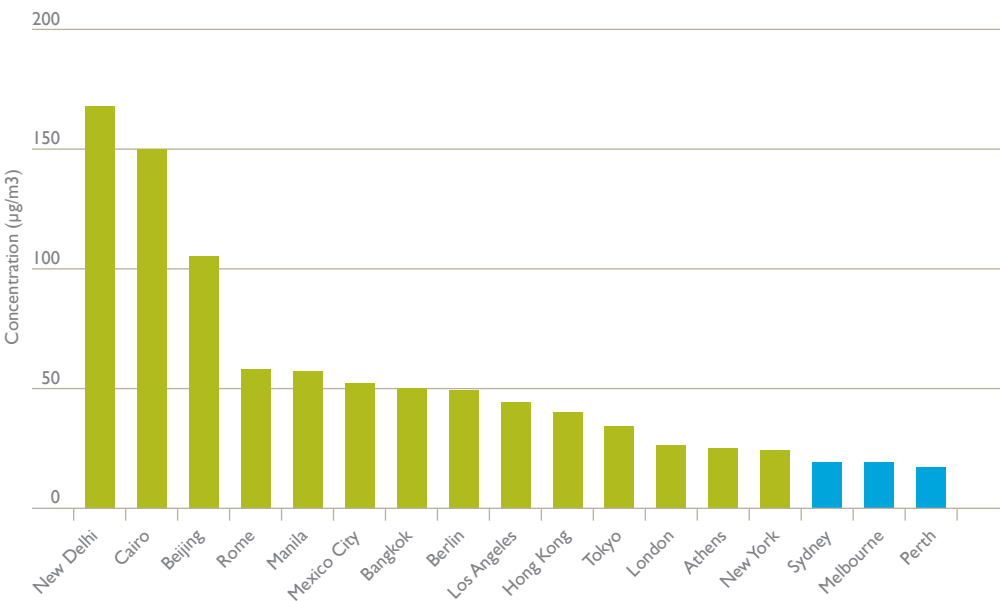
**Figure 4.10** Annual average number of particulate matter (PM<sub>10</sub>) exceedence days 1999–2008



Note: based on the worst performing station in a monitoring region.

Source: DSEWPac 2011.

Figure 4.11 Annual average PM<sub>10</sub> levels 2000–05 (micrograms per cubic metre)



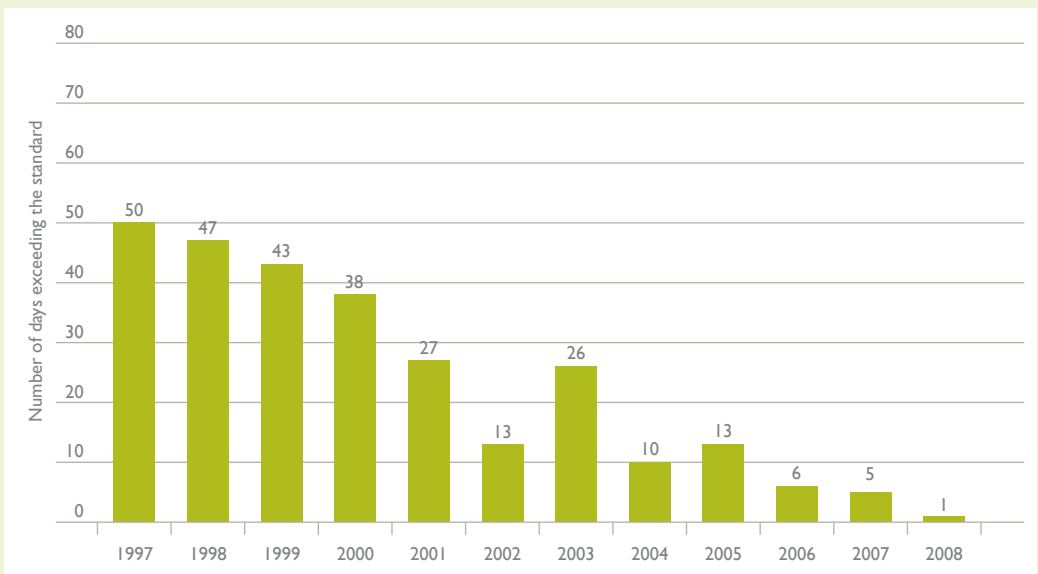
Source: DSEWPac 2011.

Peak particle levels tend to be seasonal and are most often associated with summer dust storms, bushfires and prescribed burning, which can affect entire regions. Concerted efforts in some parts of Australia, like Launceston, are delivering significant improvements to air quality.

### Launceston's wood smoke reduction success story

Many of Australia's cities have poorer air quality in winter due to the particle pollution from wood smoke from heaters which causes health problems, particularly for children and the elderly. Launceston has used wood for home heating for much of its history and has experienced the highest levels of particle pollution in Australia. In 1994 about 66 per cent of all households in Launceston used wood for heating which, combined with the city's location in a valley and prevailing weather conditions, produced inversion layers that trapped smoke. In 1997 Launceston experienced 50 days exceeding the national standard for particulate matter; yet within a decade the number of days exceeding the standard had dropped to five, and in 2008 there was only one day exceeding the standard (Figure 4.12). This reduction was due to highly successful initiatives involving three levels of government and the community.

**Figure 4.12**  $PM_{10}$  Exceedences in Launceston 1997–2008



Source: DSEWPac 2011.

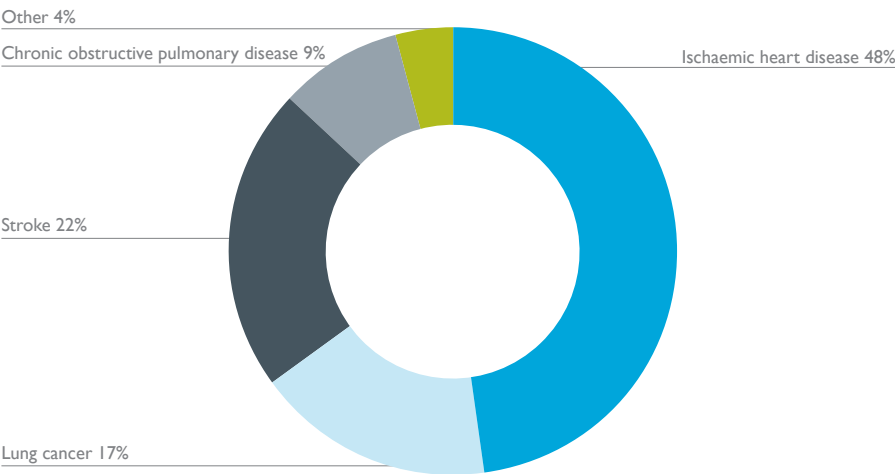
Sulphur dioxide is generated by coal, oil and gas-fired power plants as well as the processing of metal and mineral ores containing sulphur. Levels are low in Australia's major cities but higher in regional towns near industrial centres with smelters. Similarly, lead levels can be high in some regional centres but have decreased in major cities since the introduction of unleaded petrol. Some cities are less than 10 per cent of the national standard.

Carbon monoxide is a product of incomplete combustion and comes mainly from motor vehicles. Maximum carbon monoxide levels in Australia's major cities are generally less than one-third of the standard, having decreased in line with the introduction of improved motor vehicle emission controls.

### *Air pollution and health*

Urban air pollution is estimated to account for one per cent of the disease burden in Australia and more than 3,000 premature deaths, mainly among the elderly. It contributes to respiratory and cardiovascular diseases and cancer (DSEWPaC 2011) (see Figure 4.13). Air pollution exacerbates asthma, a major childhood illness in Australia. Motor vehicle air pollution is estimated to cause up to 4,500 cases of respiratory and cardiovascular disease each year and the estimated costs of air pollution in Australian capital cities' in 2005 was more than \$2 billion (DSEWPaC 2011).

**Figure 4.13** Proportion of premature deaths attributable to long-term exposure to urban air pollution



Source: DSEWPaC 2011.

## Energy

In 2008–09, Australia's energy production was 17,769 petajoules. Net energy *exports* accounted for 68 per cent of domestic energy production in 2008–09, while domestic *consumption* accounted for the remaining 32 per cent. Australia is the world's ninth largest energy producer accounting for about 2.4 per cent of world energy production. The main fuels produced in Australia are coal, uranium and natural gas, with coal being dominant.

Australia's total primary energy consumption is estimated to have increased by 1.1 per cent to 5,945 petajoules in 2009–10 (Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) 2011a).

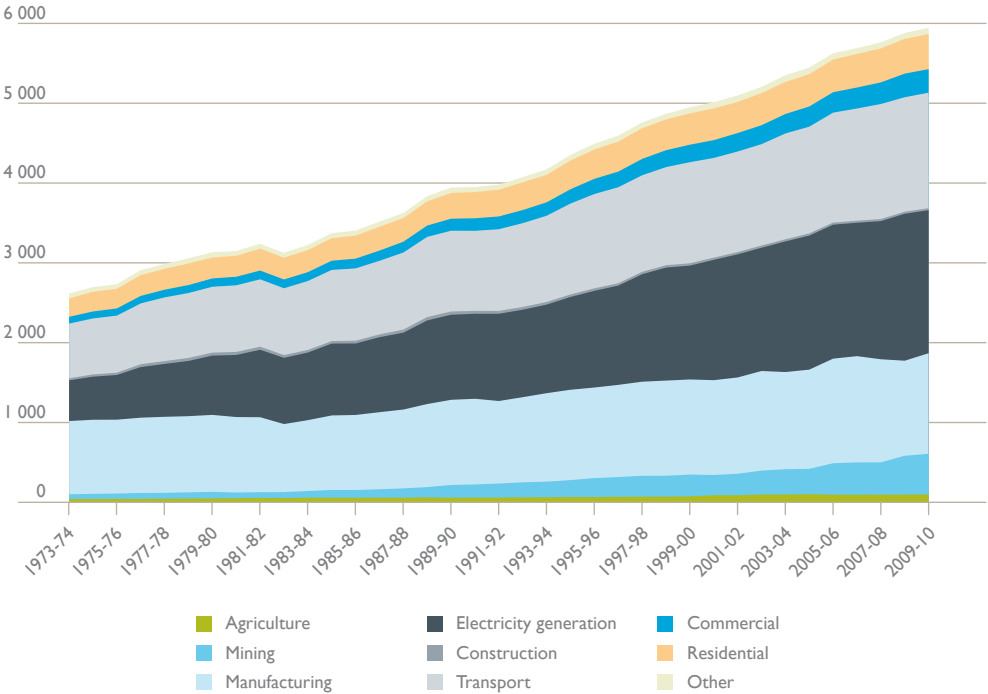
Renewable energy (excluding biomass) recorded the strongest annual consumption growth in the year 2009–10 at 17.1 per cent, followed by gas consumption which grew by 4.5 per cent. In contrast, coal consumption declined by 1.9 per cent. Five-year average annual growth patterns show coal declining by 0.5 per cent, oil increasing by 2.3 per cent, gas increasing by 5.6 per cent and renewable energy sources growing by 1.1 per cent. Of renewable energy sources, solar and wind energy each grew by 26 per cent and hydroelectricity by 13 per cent.

On a per capita basis, people living in urban areas consume more energy than those living in rural areas (Lenzen *et al* 2008) and 11.9 per cent of Australia's final energy consumption is for residential purposes. Figure 4.14 shows that transport uses more than three times this amount and 45.4 per cent of transport energy useage is for passenger vehicles. Manufacturing and construction make up a further 28 per cent of final energy consumption by sector with commercial uses, mining and agriculture making up the remainder (ABARES 2011a).



Launceston, Tasmania

Figure 4.14 Total energy consumption in Australia by sector 1974-2009 (Petajoules)



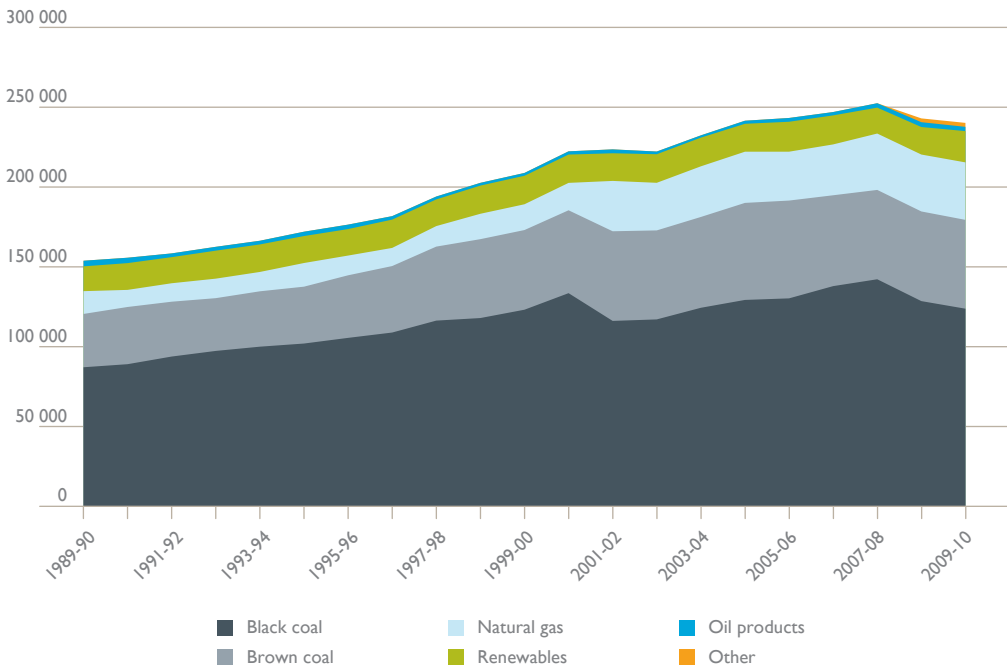
Note: One petajoule, or 278 gigawatt hours, is the heat energy content of about 43,000 tonnes of black coal or 29 million litres of petrol. Note that electricity generation (energy consumed or lost in conversion, transmission and distribution) made up 30.8 per cent total energy consumption in 2009–10.

Source: ABARES 2011a.

In 2009–10, total electricity generated in Australia declined by 1.2 per cent to 241,566 gigawatt hours or 870 petajoules compared to the 2008–09 financial year (ABARES 2011b). This was primarily due to declines in generation from combustible fuels including coal (down 2.9 per cent), oil products (down 11.6 per cent) and bio-energy (down 9.1 per cent). The unusually warm September quarter of 2009–10 also reduced demand for electricity, resulting in lower electricity production for the year.

Figure 4.15 illustrates that electricity production has been stabilising in Australia since 2001. As previously noted, in 2009 electricity consumption actually decreased. Moreover, Australia's total electricity generation declined by 1.2 per cent to 241,566 gigawatt hours in 2009–10 as a fall in generation from combustible fuels including coal, oil products and bioenergy more than offset an increase from renewable sources including wind, hydro and solar (ABARES 2011b). Solar energy generation increased largely as a result of government policies encouraging uptake of solar technologies. Considering that Australia's population is increasing, the decreases in electricity derived from fuels suggest that Australians are conserving more energy, albeit during a period of economic slowdown.

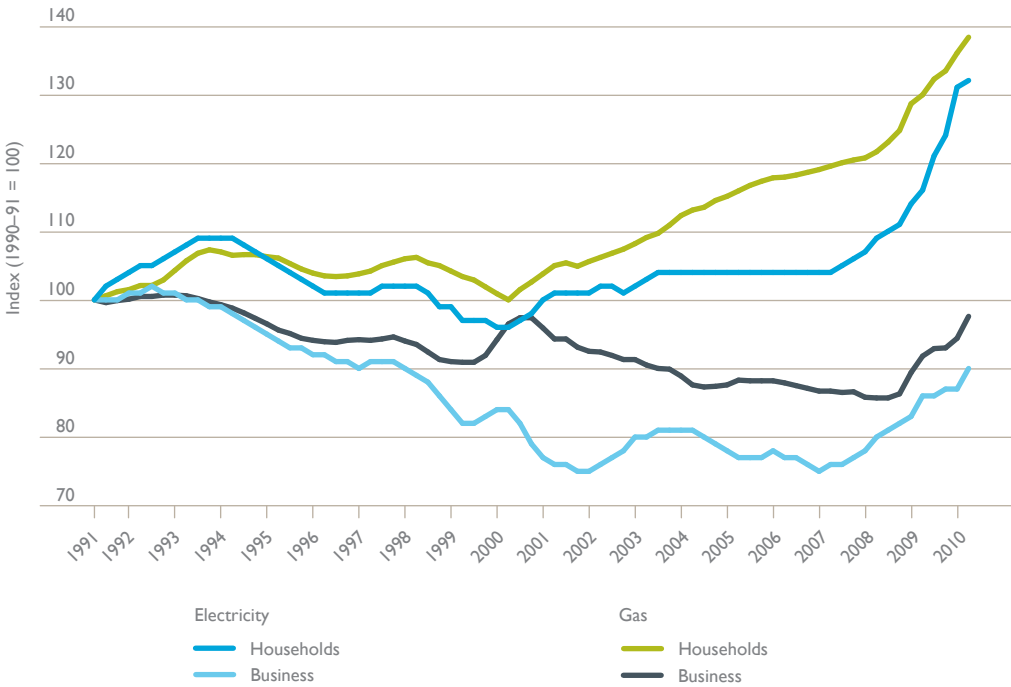


**Figure 4.15** Australian electricity production by fuel 1989–2010

Source: ABARES 2011b.

The stabilisation of electricity production may also reflect increases in energy prices in Australia's major cities. In 2009–10 the price of electricity rose significantly in New South Wales; regulated electricity prices rose by 21.7 per cent with further increases of seven to 13 per cent expected in 2010–11 (Australian Energy Regulator 2010). Similarly, in Victoria, electricity prices rose by 12 to 19 per cent in 2009–10. Figure 4.16 shows the long-term trend for energy prices in capital cities.

Figure 4.16 Electricity and gas retail price index (real) — Australian capital cities



Source: Australian Energy Regulator 2010

## Embodied and direct energy

Energy consumed directly in the form of automotive fuel, electricity and gas accounts for about 30 per cent of the energy needed for the average Australian household (Lenzen *et al* 2008). The remaining 70 per cent is consumed indirectly, embodied in all products and services purchased. Energy embodied in dwellings and transport infrastructure accounts for about 30 per cent of this while energy used to produce and distribute goods and services accounts for the remaining 40 per cent (Lenzen *et al* 2004). Embodied energy is the energy consumed to make a product, including the energy required to:

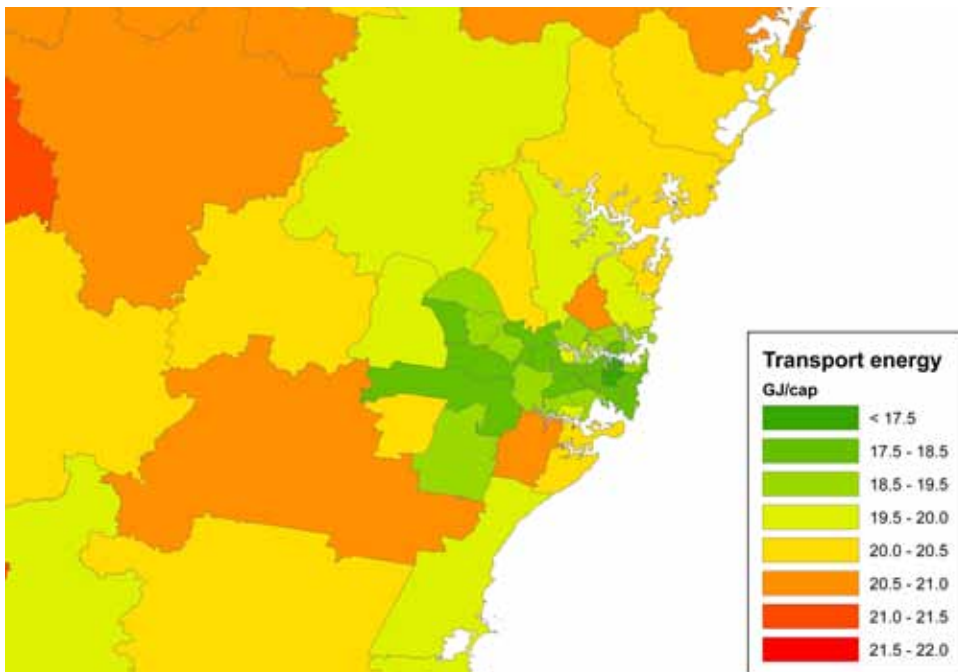
- mine, harvest and process raw materials
- manufacture and assemble products
- transport raw materials, parts and finished products.

The physical structures of cities, the glass, steel and concrete office blocks and brick and timber houses, roads, water and sewerage systems contain large amounts of embodied energy. In Australia the embodied energy entailed in construction alone is about the same as the energy used in operating all of our buildings (Troy *et al* 2003). The energy required in extracting raw materials, manufacturing and then assembling dwellings is many times greater than the energy used within a dwelling in a single year (Rickwood, 2009: 56). Concrete, for example, is a high carbon-intensive product: its production is responsible for an estimated six per cent of annual greenhouse gas emissions worldwide (Green Building Council of Australia (GBCA) 2011).

According to Rickwood (2009) the effect of dwelling type on embodied energy seems relatively small to non-existent, at least for buildings of up to three storeys, and possibly for buildings up to seven storeys. More important factors affecting the amount of embodied energy are the size of the dwelling and the choice of construction materials. Interestingly, active or 'in-dwelling' energy use is lowest in medium-density dwelling types (that is, low-rise apartments and townhouses).

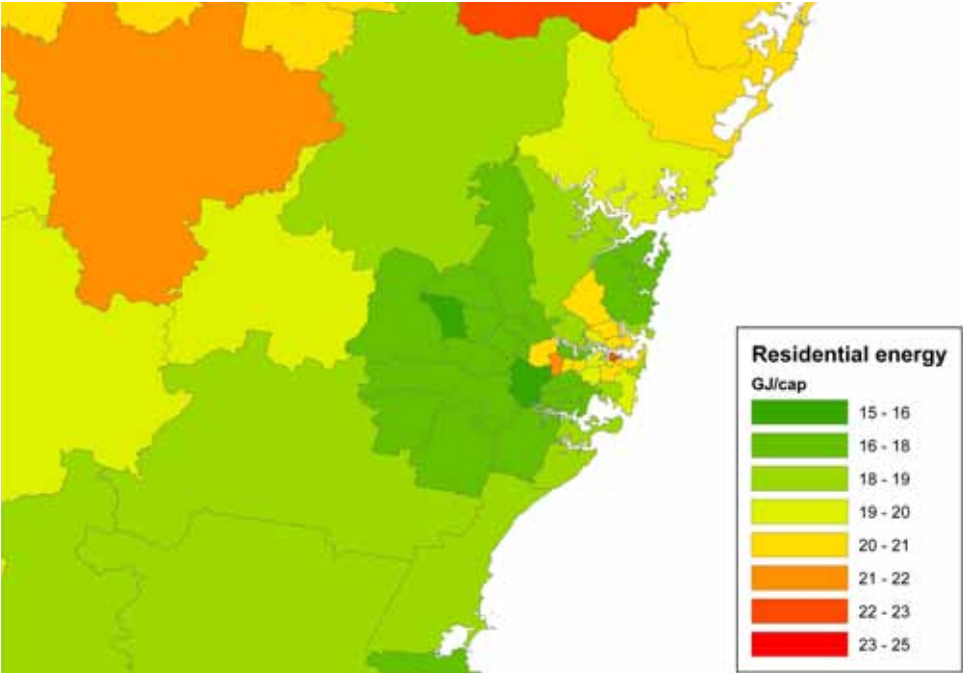
Transport energy use in Sydney rises with increasing distance from the city centre (Figure 4.17) with private cars accounting for most of this. However, per-capita residential energy is slightly higher in the areas around the harbour (Figure 4.18) and is generally higher among smaller and older households. Research shows a clear relationship in Sydney between embodied energy and income (Figure 4.19) with larger housing around the more affluent harbour and eastern suburbs accounting for relatively higher embodied energy (Lenzen *et al* 2008). Contrasted with this is Sydney's south-west, characterised by larger families with lower incomes, more modest houses, and low embodied energy costs, due primarily to lower overall expenditures.

**Figure 4.17** Per capita transport energy used in greater Sydney



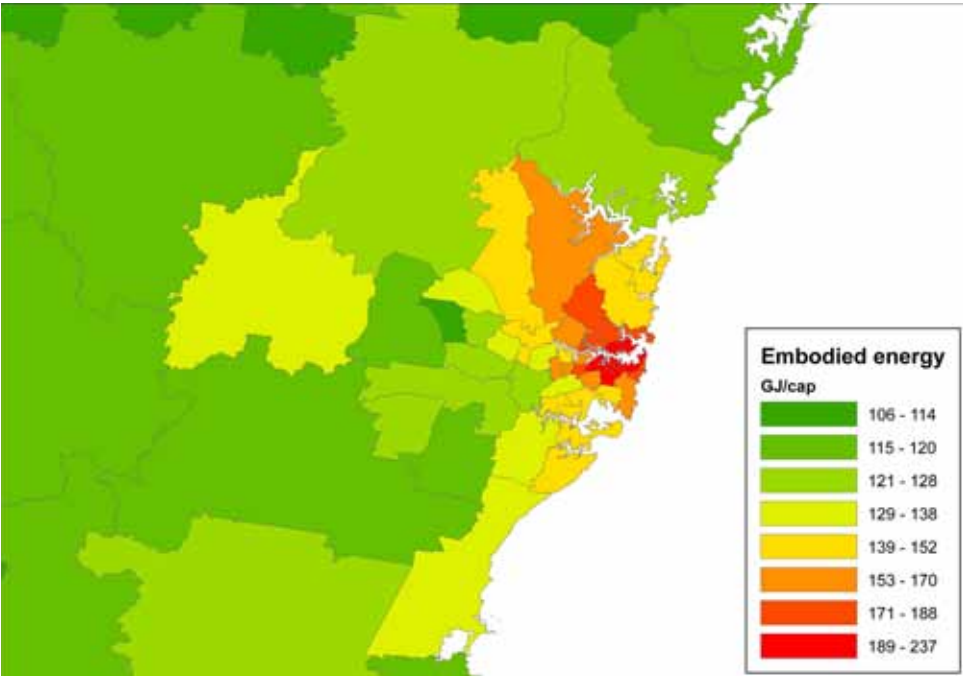
Source: Lenzen *et al* 2008

Figure 4.18 Per capita residential energy used in greater Sydney



Source: Lenzen *et al* 2008

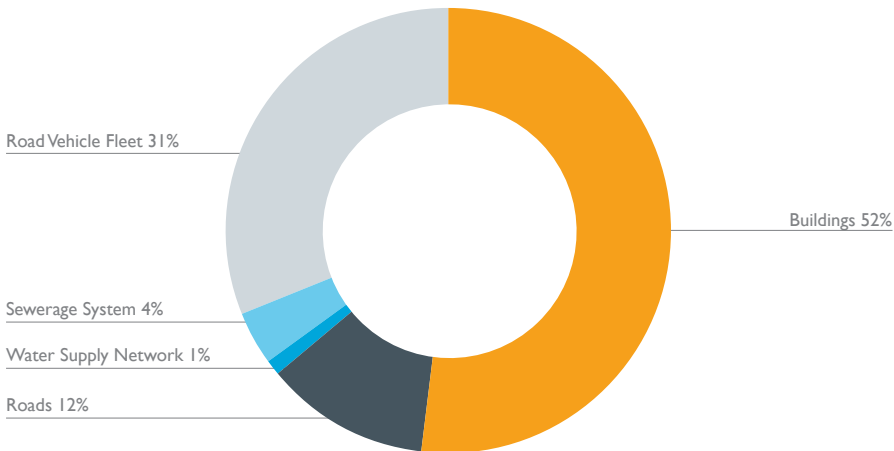
Figure 4.19 Per capita embodied energy in greater Sydney



Source: Lenzen *et al* 2008

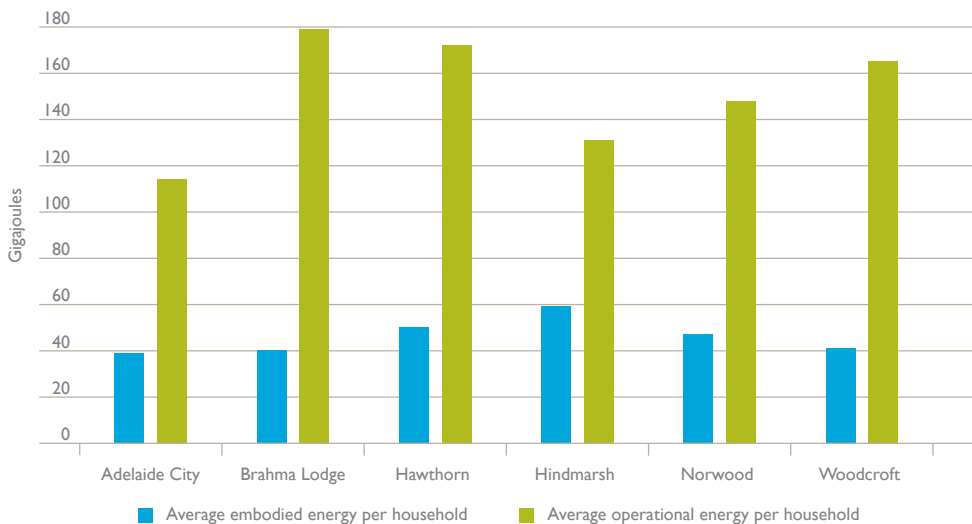
A study of Adelaide and surrounding suburbs examined the embodied energy of other infrastructure such as roads and sewerage in addition to houses. Figure 4.20 shows that buildings constitute the largest share of a city's embodied energy (52 per cent), followed by vehicles (31 per cent) and roads (12 per cent). The findings corroborate the research cited above, showing that annualised embodied energy constitutes between one quarter and approximately half of active energy (Figure 4.21).

**Figure 4.20** Proportion of average annual embodied energy in Adelaide, by sector



Source: Troy *et al* 2003

**Figure 4.21** Average annual embodied and direct (operational) energy in Adelaide



Note: This study does not account for all embodied energy for a household such as food and recreation.

Source: Troy *et al* 2003

# Building Energy Ratings Schemes

As illustrated in Figure 4.21, the construction, fitting out and operation of buildings account for a substantial proportion of energy consumed in cities.

There are a number of rating schemes produced by governments and the private sector that measure and report on the energy consumed at the various stages of building life cycles. Table 4.1 summarises these schemes.

**Table 4.1** Rating Australia's buildings throughout their life-cycle

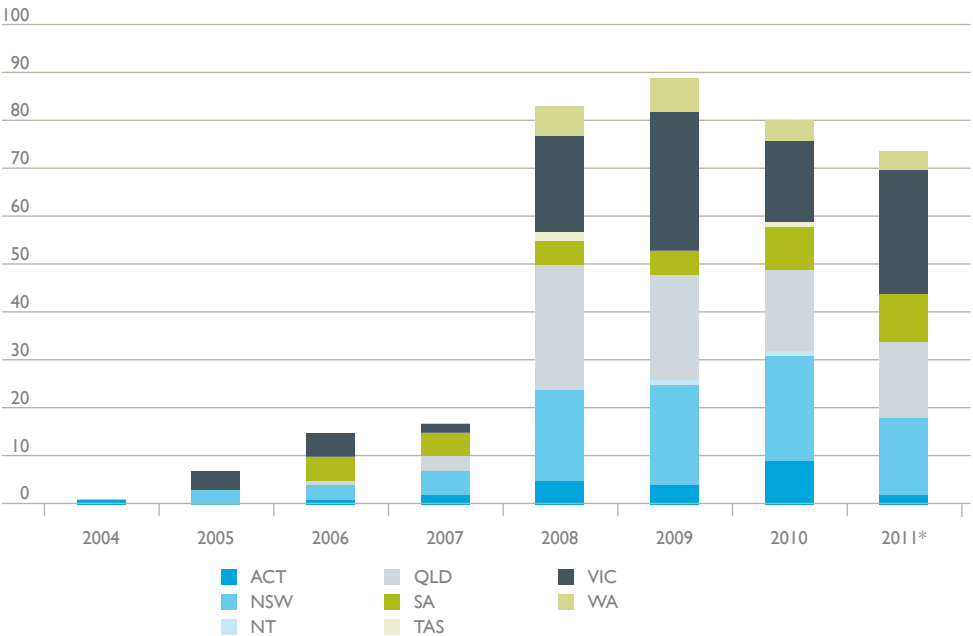
Rating Tool	Types of property assessed	Categories assessed	Design	Construct	Operate	Retrofit
<b>Green Star</b> Voluntary rating system Administered by: Green Building Council of Australia, Website: <a href="http://www.gbca.org.au">www.gbca.org.au</a> Ratings available: 4 Star, 5 Star and 6 Star Green Star Operations rating tool to be released in 2012 Communities rating tool to be released in 2012	Office buildings, tenancies and fitouts, retail centres industrial healthcare and education facilities, multi-unit residential and public buildings	Management, Indoor Environment Quality, Energy, Transport, Water Materials, Land Use & Ecology, Emissions, Innovation Holistic assessment framework addressing all categories and having a single Green Star rating as an output	✓	✓		✓
<b>NABERS</b> - the National Australian Built Environment Rating System (NABERS Energy formerly known as ABGR) Administered by: New South Wales Office of Environment and Heritage on behalf of the Australian Government, Website: <a href="http://www.nabers.com.au">www.nabers.com.au</a> Ratings available: 0 to 5 Stars in half star increments Voluntary rating system (except NABERS Energy for offices which is used in the CBD program)	Office, residential, retail, hotels and data centres	Energy Water Waste (offices only) Indoor Environment Quality (offices only) Categories are rated separately and independently, providing four separate NABERS ratings as outputs			✓	
<b>NatHERS</b> - Nationwide House Energy Rating Scheme Administered by: Department of Climate Change and Energy Efficiency on behalf of the Ministerial Council on Energy, Website: <a href="http://www.nathers.gov.au">www.nathers.gov.au</a> Ratings available: 0 to 10 Stars Mandatory scheme, nationally legislated	Residential	Potential energy efficiency / thermal comfort, based on layout, construction and orientation according to climate, using various computer software tools including AccuRate, BERS and FirstRate	✓			✓

Rating Tool	Types of property assessed	Categories assessed	Design	Construct	Operate	Retrofit
<b>BASIX – the Building Sustainability Index</b> Operated by: New South Wales Department of Planning and Infrastructure Website: <a href="http://www.basix.nsw.gov.au">www.basix.nsw.gov.au</a> Ratings available: BASIX certificate Mandatory scheme, written into legislation in New South Wales	Residential	Energy, Water	✓			✓
<b>Five Star (5 Star) Homes</b> Operated by: Sustainability Victoria for the Victorian Government, Website: <a href="http://www.sustainability.vic.gov.au">www.sustainability.vic.gov.au</a> Ratings available: 5 Star standard Mandatory scheme, written into Victorian legislation	Residential	Energy, Water	✓			✓

### Green Star rating scheme

Green Star is a national, voluntary environmental rating system that evaluates the environmental design and construction of buildings. Green Star was developed by and for the property industry in order to establish a common language, set a standard of measurement for green buildings, promote integrated, whole building design, recognise environmental leadership, identify building life-cycle impacts and raise awareness of green building benefits. The first Green Star rating tool was launched in 2003. Since then, Green Star rating tools have been developed to rate the Design and As Built phases of offices, education, healthcare, industrial, multi unit residential, retail and public buildings. There were 340 certified projects and 490 registered projects as at July 2011 (Figure 4.22). It is estimated that the area of Green Star rated space in Australia is equivalent to 11 per cent of Australia's CBD office space. Green Star Certification is a formal process which involves a project using a Green Star rating tool to guide the design or construction process during which a documentation-based submission is collated as proof of this achievement.

Figure 4.22 Number of Green Star rated projects, 2004 to 2011



Note: \*2011 to September

Source: Data supplied by the Green Building Council of Australia 2011

## Climate change

The Garnaut Review update report (2011) confirmed the finding of the earlier review that the earth's climate is continuing to change. Global temperatures have continued to increase and the rate of sea level rise has accelerated.

The update report notes that the decade ending in 2010 was Australia's warmest since record keeping began and continues a trend of each decade being warmer than the previous that extends back to the 1940s. The milder year in 2010 demonstrates that individual years can still be relatively cool even as the warming of Australia's climate continues (Garnaut 2011 p. 16).

The likely impacts of climate change for Australia include increased risk and changes to the frequency, intensity and distribution of 'severe weather events', that is weather events that are of an intensity that is rare at a particular place and time of year. Severe weather events include heatwaves, heavy sustained rainfall and floods, droughts, tropical cyclones and east coast lows, as well as bushfires.



## *Severe weather events – Queensland floods summer 2010-11*

The Queensland floods affected more than 78 per cent of the State (an area bigger than France and Germany combined). Thirty-five people died in the floods, three remain missing and over 2.5 million people were affected. The severe weather events that led to the floods also affected north eastern New South Wales.

Coupled with the effect of the La Niña event, Australia also experienced uncharacteristically persistent monsoonal rainfall during the end of 2010 and beginning of 2011, with periods of rain lasting longer than usual. The period from July to December 2010 was the wettest on record for Australia, while December 2010 was the wettest on record for Queensland.

The Brisbane City flood gauge exceeded its major flood level on 12 January 2011. The Brisbane River experienced a major flood peak of 4.46 metres, its highest peak since 1974. Electricity was switched off in many parts of Brisbane's central business district and most businesses were closed. Around 115,000 customers across Queensland were without electricity. During the flood peak 14,100 Brisbane properties were affected with 1,203 houses suffering inundation. Businesses were severely affected: 1,879 were partially inundated and 557 were completely inundated. The Bureau of Meteorology registered record flood peaks at more than 100 Queensland river height stations, indicating that in many locations the floods were the most severe in living memory (Queensland Floods Commission of Inquiry, 2011).

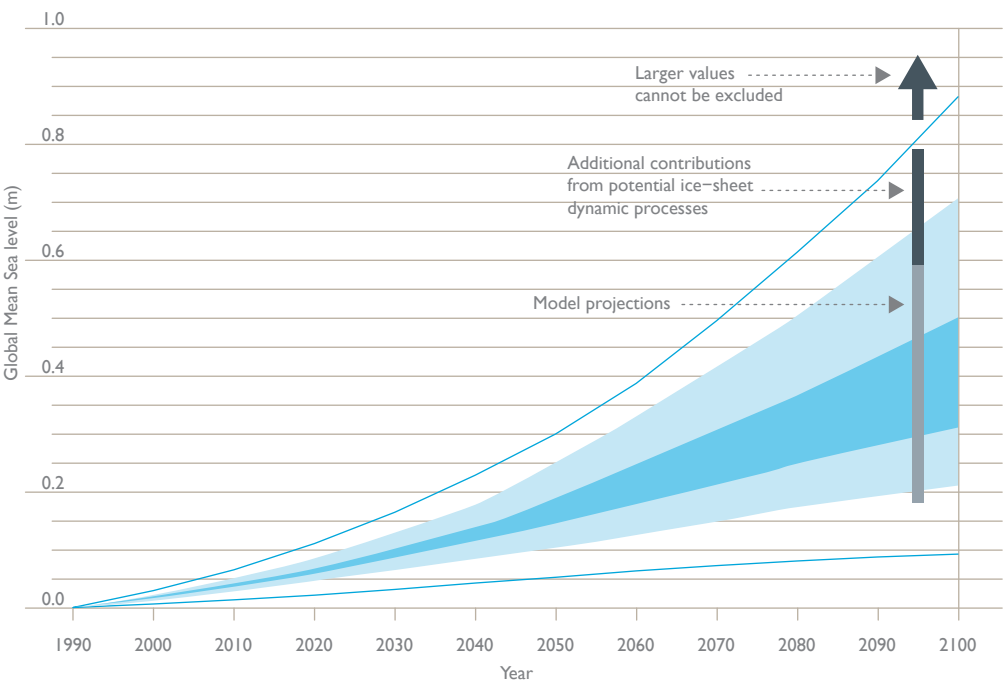
The Queensland Reconstruction Authority (2011) has estimated that the scale of the disaster was likely to cost in excess of \$5 billion.

## *Sea-level rise*

Roughly 85 per cent of the Australian population lives within 50 kilometres of the coast. More than 700,000 dwellings are within three kilometres of the coast and less than six metres above existing sea level (Watson 2011).

Coastlines and beaches are ever-changing, dynamic environments, which means that Australia faces significant threats from sea-level rise. Projected impacts of climate change show that a significant number of residential buildings may be at risk of inundation and damage from a sea level rise of 1.1 metre (high-end scenario for 2100) (Department of Climate Change and Energy Efficiency (DCEE) 2011a). Projections also show increased frequency of extreme weather events with associated storm surges and coastal erosion and increased risk of damage to property and infrastructure from inundation and erosion (DCEE 2011b).

Figure 4.23      Summary of the globally averaged sea level rise projections for 1990–2100



Source: Church *et al* in Department of Environment and Resource Management (Qld) 2011.

Queensland is arguably most vulnerable to the effects of climate change. The Queensland Department of Environment and Resource Management's (DERM) report *Queensland Coastal Processes and Climate Change* is a significant step towards assisting Australian communities adapt to and prepare for climate change. According to the report, between 35,900 and 56,900 residential buildings in Queensland may be at risk of inundation under a projected sea-level rise of 1.1 metre by 2100, with a replacement value of between \$10.5 billion and \$16 billion. Storm tides are not included in the assessment but if they were, it is likely that a higher number of properties would be identified as at risk.

Importantly, even moderate levels of sea-level rise are projected to cause large increases in the frequency of extreme events such as storm surges (Figures 4.23 to 4.25). Based on the historical relationship between sea level rise and change in the average return interval of extreme sea level events, research suggests that, for example, with a 0.5 metre sea level rise the probability of an extreme event that currently has a one in 100 year chance of occurring could increase to more than once a year (DERM 2011).

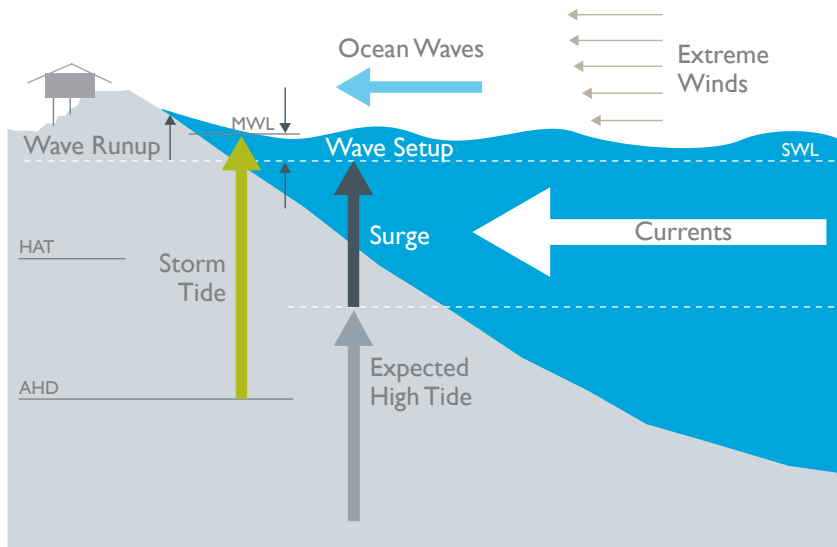
Figure 4.24      Damage caused during a high sea-level event, Gold Coast, Queensland



Source: Department of Environment and Resource Management (Qld) 2011.

There is a multiplying effect between sea-level rise and extreme events which varies around Australia. Storm tides are the most damaging type of such extreme events and are produced by the combination of storm surge (a local rise in sea level caused by the combined action of severe winds and low-pressure systems such as tropical cyclones on the ocean) combined with normal astronomical tide variations. This multiplying effect between sea-level rise and extreme weather events is likely to have the greatest effect in eastern Australia and major population centres (Antarctic Climate and Ecosystems Cooperative Research Centre and DERM 2011).

Figure 4.25 Elements of a storm tide

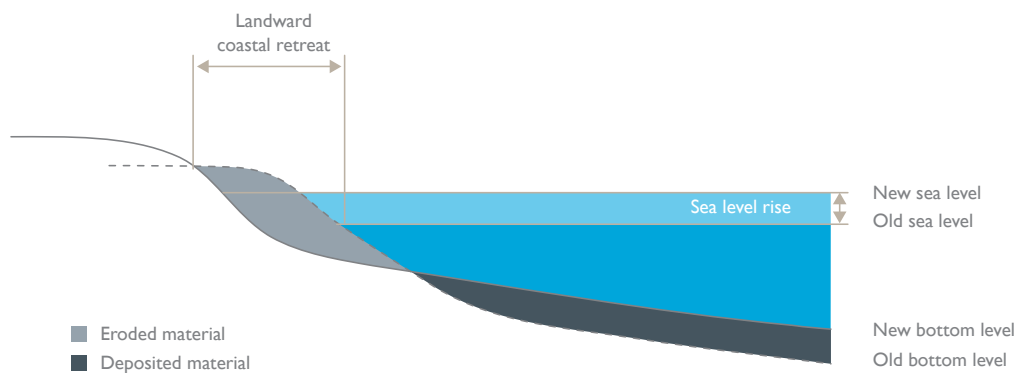


Note: HAT(Highest Astronomical Tide); AHD (Average Heigh Datum); MWL (Mean Water Level); SWL (Still Water Level)

Source: Harper in Department of Environment and Resource Management (Qld) 2011 p.9.

Rates of coastal erosion along the Queensland coast are expected to increase as sea levels rise (Figure 4.26). In Queensland there are about 15,200 residential buildings within 110 metres of 'soft', erodible coastlines. About 5,400 are within 55 metres (DEERM 2011 p.19).

Figure 4.26 Beach erosion processes



Source: Department of Environment and Resource Management (Qld) 2011.

## Urban heat islands

Australia's growing urban areas transform some ground surfaces from soil and green tracts which naturally lower surrounding air temperature by evapotranspiration to concrete and asphalt which absorb more of the sun's radiation and heat the air. Cities are now often much warmer than the surrounding landscapes due to this heating combined with heat stored in infrastructure such as roads and buildings. As well, air conditioners and vehicles release 'heat exhaust', especially in summer when air conditioner use peaks.

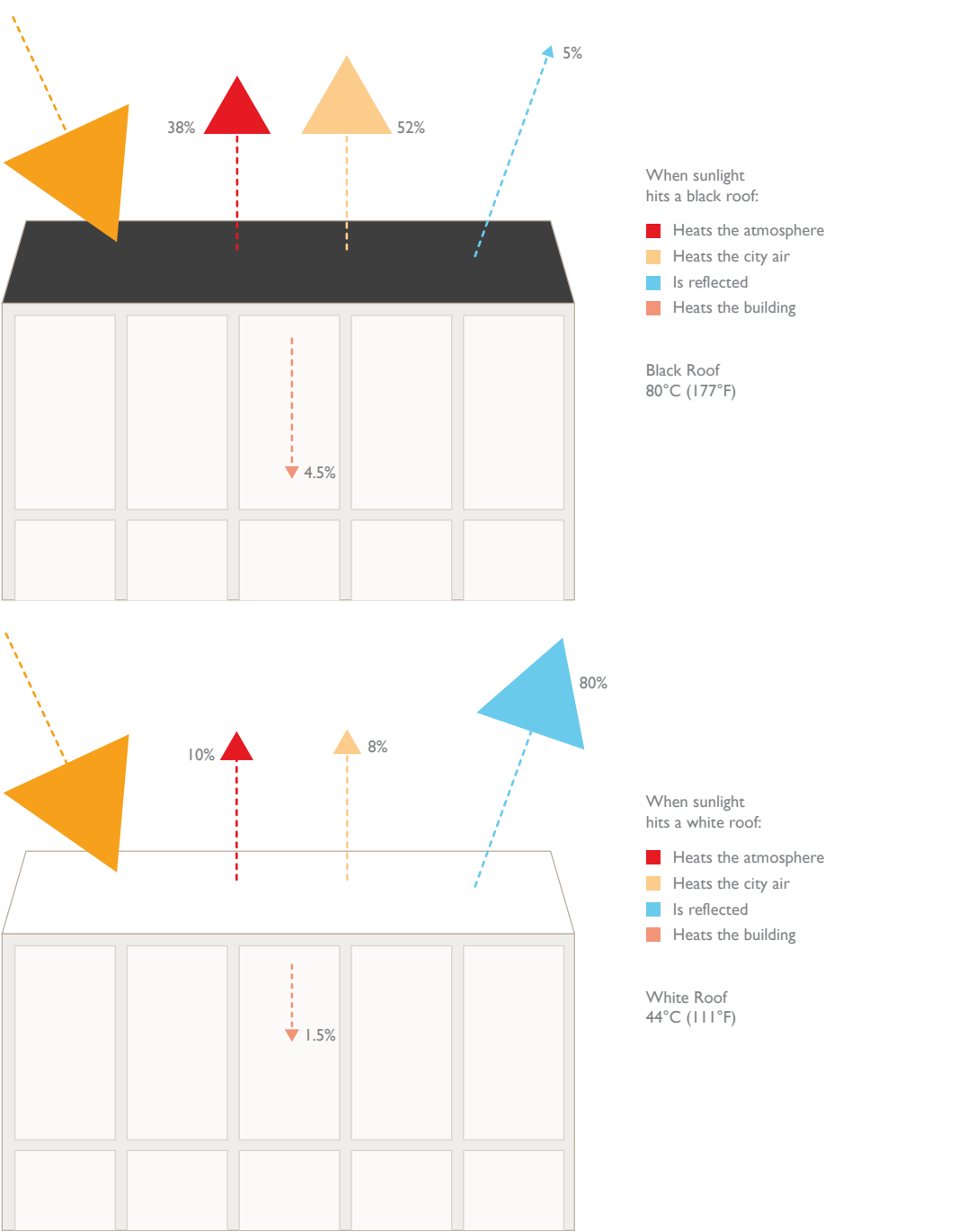
Consequently, the difference between ambient air temperatures in a city and its surrounding rural areas can be three to four degrees celsius higher in summer months, a phenomenon called the 'urban heat island effect'. In some cities, there are noticeable changes in the vegetation season, with flowers blooming earlier in the spring and deciduous trees changing colour later in autumn (Ichinose *et al* 2008).

A study of Brisbane showed that the urban heat island has a significant effect on near-ground-level wind and temperature, especially in the CBD. Results showed the formation of a day and night urban heat island with nighttime temperature increased by five degrees over the city. This also increased sea-breeze penetration over the city (Khan and Simpson 2001).



Geelong, Victoria

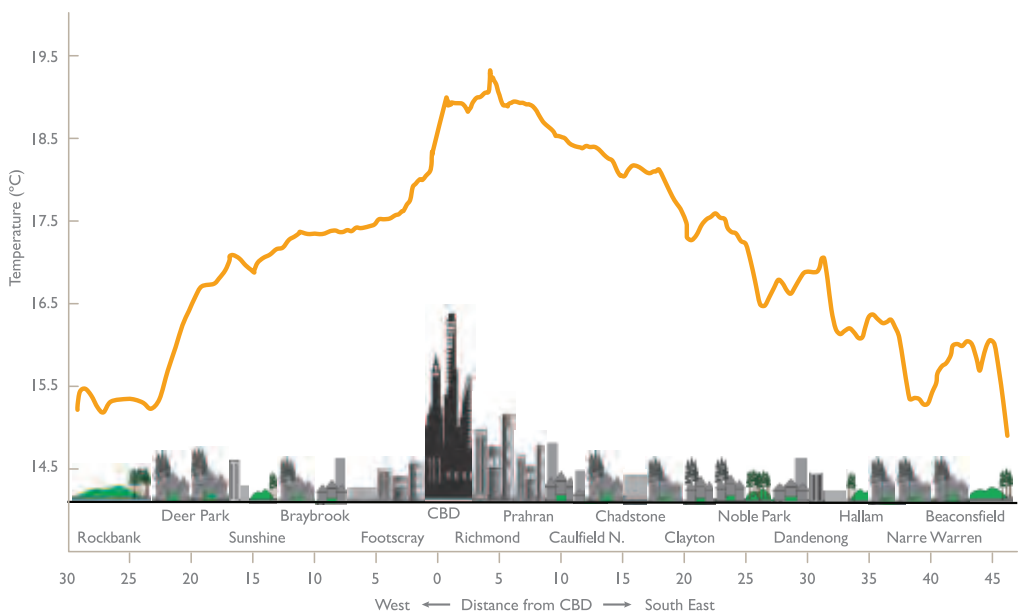
Figure 4.27 Comparative reflectivity of black and white roofs



Source: Global Cool Cities Alliance 2011

A study of Melbourne showed that across four sites of increasing housing density, urban heat storage was significant. It was influenced by the complexity of the skyline (urban canopy), albedo (the fraction of incident light scattered by a surface), and heat storage/re-radiation. Daily surface temperatures were different among the urban sites. Greater night temperatures were observed with increasing density as a result of variations in heat storage release partly due to 'urban canyons' (Coutts *et al* 2010). The study highlighted differences in building rooftop colour and identified this as a key factor in the city's overall albedo, a highly important factor influencing urban heat storage (Figure 4.27). The study found that areas in Melbourne with the highest albedo and lower heat generation were due to a large amount of light-coloured concrete and corrugated iron used as rooftop materials. The increase in density and built-up surfaces of urban areas contributed to increased heat from a greater urban surface area (Figure 4.28).

**Figure 4.28** Depiction of urban heat island effects over Melbourne



Note: based on air temperature measurements taken at 1:00 am, 23 March 2006.

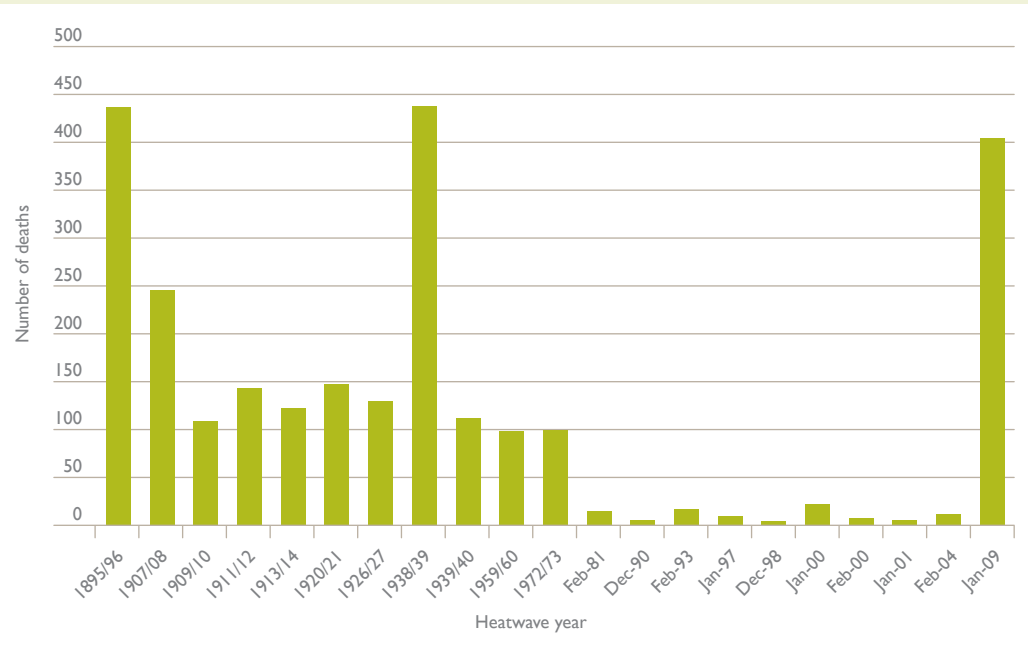
Source: Adapted from: Coutts *et al* in Queensland University of Technology 2010.

The Melbourne study recommended that improvements in local climate (reducing surface temperatures) could be made by using lighter-coloured building and roofing materials to increase albedo. Creating rooftop gardens in urban centres would increase evapotranspiration.

# Heatwaves: Australia's deadliest natural disasters

Heatwaves kill more people than more obvious natural disasters such as bushfires and floods. The 2003 European heatwave was estimated to have resulted in more than 45,000 deaths. Figure 4.29 shows how in south-eastern Australia more than 1,200 people died as a result of the 1908, 1939 and 2009 heatwaves.

Figure 4.29 Heatwave deaths during events affecting south-eastern Australia



Source: Queensland University of Technology 2010.

Between 27 January and 8 February 2009 southern Australia experienced a major heatwave. Maximum temperatures were 12 to 15 degrees above average for 11 days. Adelaide experienced a new maximum temperature of 45.7°C, as did Melbourne (46.4°C), while Launceston's record daily maximum increased by 2.6 degrees to 39.6°C. Adelaide had eight consecutive days above 40°C and Melbourne had three consecutive days above 43°C for the first time since record keeping began in 1855 (Figure 4.30). Night temperatures were also unusually high. For example Adelaide experienced its hottest night on record with a minimum of 33.9°C on 29 January. A cool change on 30 January provided little relief, dropping temperatures to an average of 30.8°C. The situation became critical when power was lost on the evening of 30 January.



## Human health impacts

In Melbourne, there were 374 excess deaths (deaths above what would be expected for the period of the event) and in Adelaide it was estimated that between 50 and 150 people died and more than 3000 heat-related illnesses were reported. People unable to avoid or reduce exposure to heat are most vulnerable during heatwaves. Fatalities in heatwaves are generally highest for the over-75 age group (Loughnan 2009).

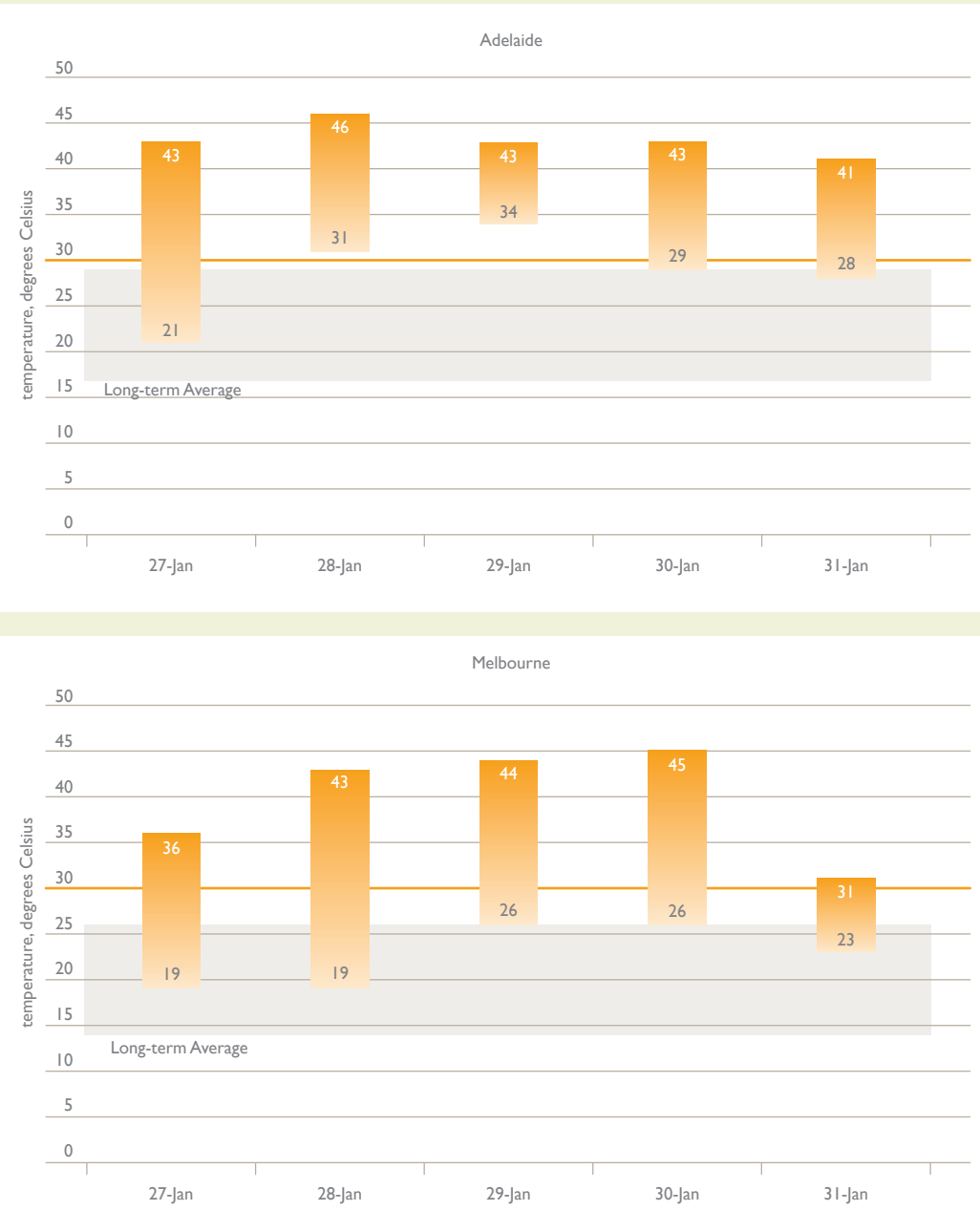
## Infrastructure impacts

Electricity and rail transport systems are vulnerable to the complex interactions between excessive heat and supply and demand. By the evening of 30 January 2009 two of the three 500kV lines supplying electricity to South Australia, western Victoria and the western side of Melbourne became inoperable due to the load placed on them and the extreme heat (Queensland University of Technology (QUT) 2010). From the morning of 30 January, Basslink (the cable connection linking the Tasmanian and Victorian electricity grids) began to progressively shutdown as it approached its maximum operating temperature, eventually completely shutting down around midday. As a result of these failures, an estimated 500,000 residents in Melbourne were without power during the evening of 30 January (Government of Victoria in QUT 2010 p.52).

The two main heat impacts affecting trams and trains during the 2009 heatwave were buckling of rail tracks and the discomfort and heat stress experienced by tram passengers as only about half of Melbourne's 485 trams had passenger air-conditioning. The impact on tram services was minimal as trams could still operate on buckled tracks, causing delays rather than cancellations. The impact on trains was more severe with 24 per cent of services cancelled (QUT 2010).

The economic costs of heatwaves go beyond infrastructure damage and premature deaths. Illness and transport disruptions cause loss of human productivity while crop and livestock damage reduces agricultural productivity.

**Figure 4.30** Minimum and maximum temperatures, Adelaide and Melbourne, 2009 heatwave



Adapted from: Bureau of Meteorology information In Queensland University of Technology 2010.

## Emergency management

At times ambulance, paramedics, hospitals and mortuary capacity were under severe strain.

As a result of the 2009 heatwave, Victoria and South Australia have transitioned from a largely reactive and response-driven approach to one based on avoidance and risk reduction, encapsulated in the *Heatwave Plan for Victoria 2009–10* and *South Australia's Extreme Heat Arrangements Plan*. The 2009 heatwave led to improvements not only in planning for such events but also in education, communication and service capacity. There is also better coordination between agencies such as health departments, police, ambulance and emergency services, as well as community and charity organisations, such as Red Cross. There are now identified threshold temperatures for activating and escalating coordinated responses as well as measures to declare a heatwave emergency.

The effects of climate change mean that heatwaves are very likely to increase in frequency, severity and duration. Based on projections by the International Panel on Climate Change (IPCC) the CSIRO estimates that without preventive action, the number of heat-related deaths among people aged over 65 in six of Australia's largest cities is likely to increase from about 1,100 a year at present to between 2,300 and 2,500 by 2020 and to between 4,300 and 6,300 by 2050 (CSIRO 2011). City dwellers and urban buildings are more exposed to the effects of extreme and prolonged heat because of urban heat island effects. Factors such as surfaces radiating stored heat, buildings which reduce airflow, buildings with a high thermal mass, and waste heat from air conditioners contribute to higher night temperatures that can increase mortality and illness among at-risk sections of the population (QUT 2010).

## Waste and landfill

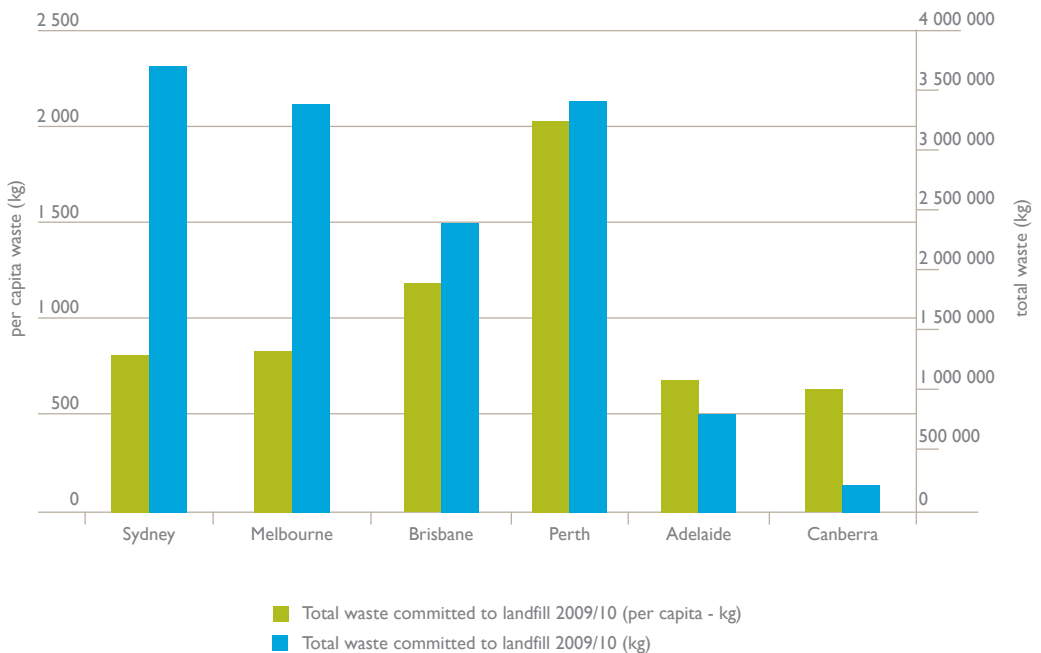
Recent national figures show that in 2006–07, Australia generated 43,777,000 tonnes of waste in the municipal solid, commercial and industrial, and construction and demolition streams. Of that waste, 22,707,000 tonnes (52 per cent) were recycled and 21,069,000 tonnes (48 per cent) went to landfill. It is reasonable to assume that the large majority of that waste was generated in our urban centres.

Historically, landfill has been the most common form of waste disposal in Australia. However, over the past two decades the national policy consensus has developed to the point where landfill is considered to be the least preferred option because of the environmental effects and land constraints (Hyder Consulting 2009).

Recognition of these issues has seen Australian, State, Territory and local governments gradually adopt new legislation and strategies to increase recycling rates and to change community values, behaviour and attitudes to waste. An example of this is the National Waste Policy, which was endorsed by the Council of Australian Governments in 2010 and sets Australia's waste management and resource recovery direction to 2020.

Figure 4.31 represents the waste disposed of into landfill in capital cities in 2010 and the waste committed to landfill per capita. Figure 4.31 illustrates that while there has been positive movement there remain noticeable differences between jurisdictions, particularly Perth and to a lesser degree Brisbane. Information on waste generation and recycling differs between jurisdictions so comparisons can be problematic.

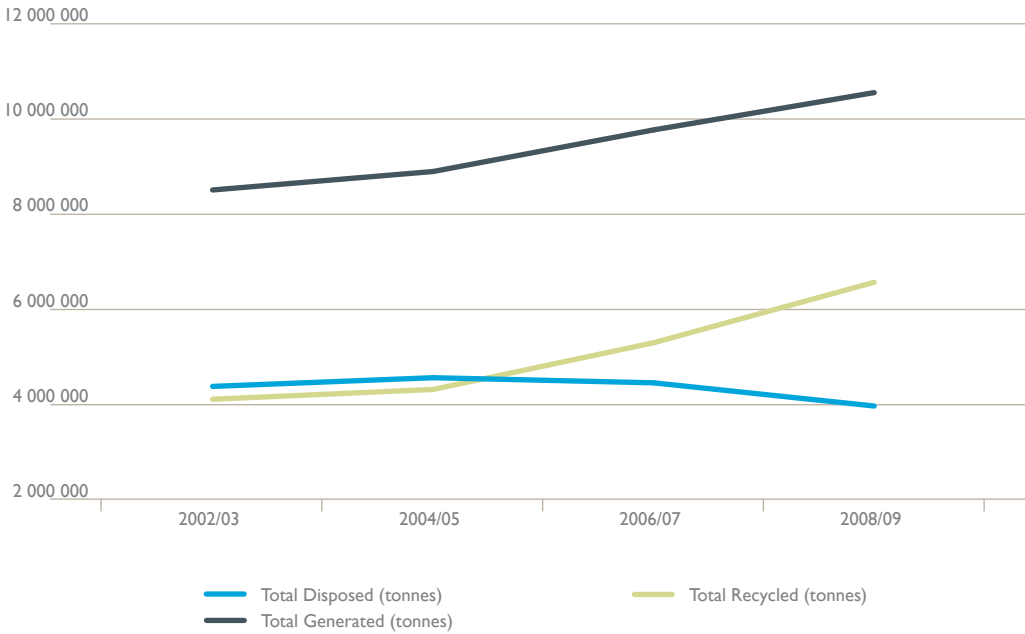
**Figure 4.31** Landfill waste per capita, selected capital cities



Source: New South Wales Department of Premier and Cabinet, EPA Victoria, Zerowaste South Australia, Queensland Department of Environment and Resource Management, Western Australia Department of Environment and Conservation and ACT Department of Territories and Municipal Services.

Figure 4.32 illustrates how New South Wales government strategies for reducing waste being disposed of into landfill, in this case the *New South Wales Waste Avoidance and Resource Recovery Strategy*, have been successful.

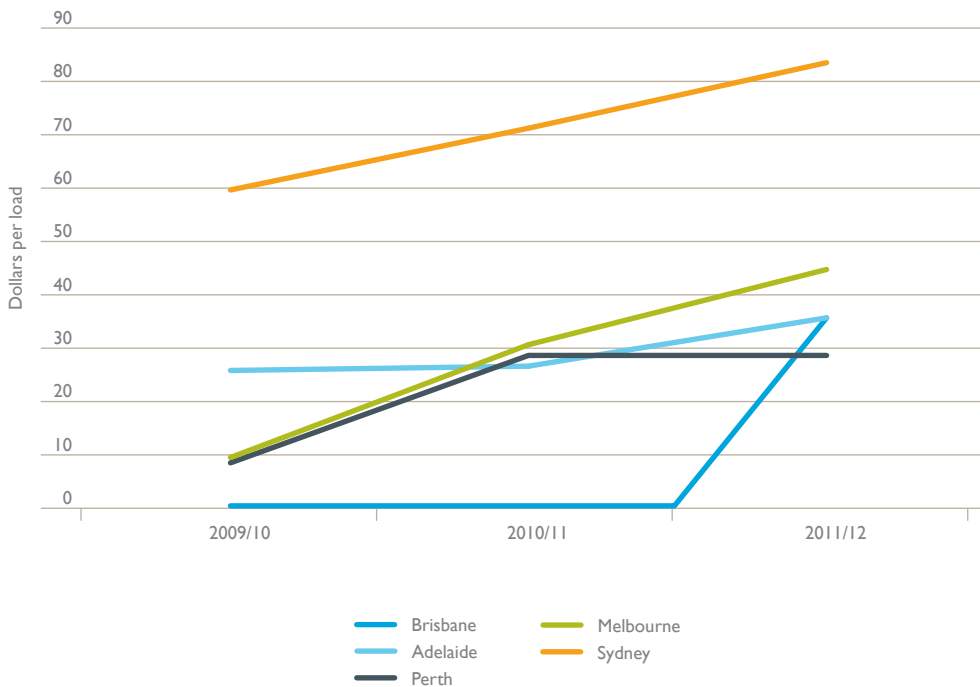
Figure 4.32 Sydney landfill waste reduction, 2002-2009



Source: New South Wales Department Environment Climate Change and Water 2011.

In 2008–09, Sydney residents and industry recycled about 6.5 million tonnes of waste, or 62 per cent of waste generated. This is up from 48 per cent in 2002–03 when the first strategy was brought in. Figure 4.32 clearly illustrates how recycling has absorbed almost all the materials entering the waste management system in Sydney since 2002–03.

A consistently used regulatory instrument in the majority of State government waste strategies has been to implement landfill levies, as illustrated in Figure 4.33. The Queensland Government intends to introduce a levy from the end of 2011. It is argued that they better reflect external costs, are an efficient source of revenue for government, and that they encourage the market to find other solutions. Essentially, levies work by discouraging the use of landfill by imposing higher costs while promoting the use of alternatives with lower external costs, such as recycling (Schollum 2010).

**Figure 4.33** Selected capital city landfill levies

Source: Schollum 2010

While increases in recycling rates across jurisdictions have been partially attributed to levy increases, waste strategies have also contained significant community awareness programs aimed at delivering a message about the importance of generating less waste and recycling.

Regardless of policy variations, any reduction in the proportion of total waste going to landfill is positive. There is also growth in Australia's waste management services sector with an estimated 2,120 private and public trading businesses, more than double the number operating eight years ago. They are employing 26,812 people, an 86 per cent increase since June 2003 (ABS 2011).

Despite these positive steps, a clear concern for future sustainability is the increasing volume of putrescible waste, solid waste that contains organic matter able to be decomposed, going to landfill. A recent report from New South Wales stated that processing and recovery of wet or putrescible waste is comparatively more complex and costly than dry waste recycling and investment. As a result, the flow of putrescible waste to landfill has not yet been arrested (Wright Corporate Strategy Pty Ltd 2009) p.1).

Putrescible waste is a major contributor to greenhouse gases and its increase has impeded some jurisdictions' progress towards their recycling targets for municipal solid waste, and to a lesser extent the commercial and industrial stream. Some of the negative effect of greenhouse gas emissions from landfills has been offset by increasing landfill gas capture in capital cities.

## Conclusion

Looked at as a whole, there is a positive story coming from this survey of sustainability. On a per capita basis, Australian cities are consuming less energy and water and emitting less air pollution and waste. The previous chapter also showed that per capita transport consumption and, by extension, transport energy is also falling. This marks a major change in nearly half a century of per capita consumption increases in all these areas. However, population rises mean that cities will continue to create more environmental pressures.

The discussion of embodied and active energy illustrates just how complex the energy budgets in cities are but work on improving the sustainability of the built environment continues in both the public and private sectors. Meanwhile, Australia over the last 12 months has experienced the impact of a number of extreme weather events which are predicted to increase in frequency as a result of climate change. A focus on the need for adaptation and resilience in our major cities has been highlighted.

## Chapter 4 References

Australian Bureau of Statistics (ABS) 2011, *Waste Management Services*, Australia, 2009-10, cat. no. 8698.0, Canberra.

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) 2011a, *Energy in Australia 2011*, Canberra.

ABARES 2011b, *Energy Update 2011*, Canberra.

Australian Energy Regulator 2010, *State of the Energy Market 2010*, Australian Competition and Consumer Commission, Canberra.

Coutts, A, Beringer, J & Tapper, N 2010, 'Changing urban climate and CO<sub>2</sub> emissions: Implications for the development of policies for sustainable cities', *Urban Policy and Research* 28 1:27-47.

CSIRO 2011, *Climate change: science and solutions for Australia*, Collingwood Vic.

Department of Climate Change and Energy Efficiency (DCEE) 2011, *Climate Change Risks to Australia's Coasts*, Canberra.

DCEE 2011, *Climate change risks to coastal buildings and infrastructure: a supplement to the First Pass National Assessment*, Canberra.

Department of Environment and Resource Management (Qld) (DERM) 2011, *Queensland Coastal Processes and Climate Change*, Brisbane.

Department of Sustainability Environment Water Population and Communities (DSEWPoC) 2011, *State of the Air in Australia 1999-2008*, Canberra.

Garnaut, R 2011, *Garnaut Climate Change Review – Update 2011*, Paper 5: The science of climate change, Commonwealth of Australia, Canberra.

Global Cool Cities Alliance 2011, *Key Facts*, 2011, from [http://www.globalcoolcities.org/?page\\_id=23](http://www.globalcoolcities.org/?page_id=23) [Accessed 23.08.2011]



Green Building Council of Australia (GBCA) 2011, *Revised concrete credits*, Sydney Retrieved 22/8/2011, from <http://www.gbca.org.au/green-star/materials-category/draft-revised-concrete-credits/3453.htm> [27.07.2011]

Hyder Consulting (2009). Australian landfill capacities into the future. Canberra.

Ichinose, T, Matsumoto, F & Kataoka, K 2008, 'Counteracting urban heat islands in Japan', in *Urban Energy Transition: From fossil fuels to renewable power* ed. P. Droege, Elsevier, Oxford.

Khan, S & Simpson, R 2001, 'Effect of a heat island on the meteorology of a complex urban airshed' *Boundary-Layer Meteorology* 100 3:487-506.

Lenzen, M, Dey, C & Foran, B 2004, 'Energy requirements of Sydney households', *Ecological Economics*, 49 3:375-399.

Lenzen, M, Wood, R & Foran B 2008, 'Direct versus embodied energy: the need for urban lifestyle transitions', in *Urban Energy Transition: From fossil fuels to renewable power* ed. P. Droege, Elsevier, Oxford.

National Water Commission 2011, *National Performance Report 2009–10 urban water utilities*, Canberra.

Queensland Floods Commission of Inquiry 2011, *Interim Report August 2011*, Queensland Government, Brisbane.

Queensland Reconstruction Authority 2011, *Monthly report, August 2011*, Queensland Government, Brisbane.

Queensland University of Technology (QUT) 2010, *Impacts and adaptation response of infrastructure and communities to heatwaves: the southern Australian experience of 2009*, National Climate Change Adaptation Research Facility, Gold Coast Qld.

Loughnan, M 2009, The Importance of Place: Victorian Climate Change Adaptation Program [PowerPoint presentation], Monash University, Melbourne.

Schollum, P 2010, *Evaluation for the social optimum for the Landfill Levy in WA*, Cooperative Education for Enterprise Development (CEED), Perth.

Troy, P, Holloway, D, Puller, S & Bunker, R 2003, 'Embodied and operational energy consumption in the city', *Urban Policy and Research*, 21 1:9-44.

Watson, P 2011, 'Is there evidence yet of acceleration in mean sea-level rise around mainland Australia?' *Journal of Coastal Research*, 27 2:368-377.

Wright Corporate Strategy Pty Ltd 2009, *Public Review Landfill Capacity and Demand*, New South Wales Department of Planning, Sydney.



Liveability describes the degree to which a place supports quality of life, health and wellbeing.

In broad terms, liveable cities are healthy, safe, harmonious, attractive and affordable. They have high amenity, provide good accessibility and are environmentally sustainable.

The importance of cities to a globally competitive economy is now widely acknowledged (COAG 2011) and liveability is recognised as an important component of competitive advantage. International city indicators have been produced in recent years to inform decisions about where to set up businesses or seek employment. By international standards Australian cities are ranked among the most liveable in the world.

The features of cities that make them liveable include the quality of the design and amenity of the built and natural environment. Equally important is the degree of access to employment, education, health and community services; to social, cultural and recreational opportunities and facilities; to open space and natural landscapes. Other characteristics reflect qualities of urban communities, such as a diversity of people and activities that add vibrancy to places and enrich personal experiences. Essential to community wellbeing is social cohesion, which is the level of trust among people, and social inclusion, which is the extent to which all members of the community have access to the available opportunities and resources. These attributes are described in more detail in this chapter.

# Summary Indicators

Dimension	Indicators
Liveability	Property Council of Australia 2011 <i>My city survey</i> The Economist 2011 <i>Quality of Life Index</i>
Global city indices	PricewaterhouseCoopers 2011 <i>Cities of Opportunity</i>
Inequality	Wilkinson and Pickett 2010 <i>Income inequality and social outcomes</i>
Climatic comfort	Mean rainfall and temperatures 1992 to 2011, major cities
Housing	Households composition and dwelling type Tenure and residential mobility
Affordability	Housing affordability Household expenditure Mercer 2011 <i>Cost of Living</i> The Economist 2011 <i>World Wide Cost of Living</i> Australian dollar exchange rate
Health	Life expectancy for males and females, Indigenous and non-Indigenous Obesity and overweight rates for males and females aged 15 and over Physical inactivity rates for
Active Travel	Walking and bicycle riding rates
Safety	Road fatalities
Accessibility	Access to higher education by transport mode
Social inclusion	Proportion of the Indigenous population in major cities Aged cared accommodation projected deficits Use of locally available public transport by people with a disability
Community wellbeing	Australian Wellbeing index Community indicators survey,Victoria 2007

## Key findings

- Australia's largest cities are in the top 10 of most global liveability rankings and have retained or improved their position.
- Melbourne is ranked the most liveable city in the world by one international standard but Adelaide is the most liveable city in Australia as rated by its residents.
- Capital cities were rated highly by a survey of more than 4,000 residents for recreational opportunities, outdoor and natural environments and for variety of cultural, entertainment and educational facilities.They rated poorly on roads and traffic congestion, public transport services, environmental sustainability and climate change, and providing quality affordable housing (Property Council of Australia (PCA) 2011).
- The cost of greenfield developments is significantly lower than infill developments in all capitals except Sydney where cost of land and associated infrastructure charges on greenfield developments push their price higher than some infill.
- Australia has had one of the largest increases in real house prices among OECD countries, particularly since 2000. Price growth rates have been similar between capital cities and the rest of Australia.

- Household size continues to decrease as couple families with children continue to decline as a proportion of household mix.
- A relatively high proportion of Sydney households live in units and other medium/high density dwellings compared with other capital cities, particularly Melbourne. Families with children overwhelmingly occupy separate houses.
- Income inequality remains an area where Australian cities are not performing as strongly as many other OECD countries.
- People living in the major cities are generally less likely to die from preventable causes than people in country areas, regardless of socioeconomic levels.
- Although a substantial gap remains between Indigenous and non-Indigenous Australians, in many wellbeing indicators there has been a positive trend in the long term unemployment rate in major cities for Indigenous 18-64-year-olds, which has decreased from 57 per cent in 1994, to 25 per cent in 2008.

## Liveability measures

Liveability in many ways is highly subjective but both public and private sector organisations seek to measure this concept to inform policy and investment decisions.

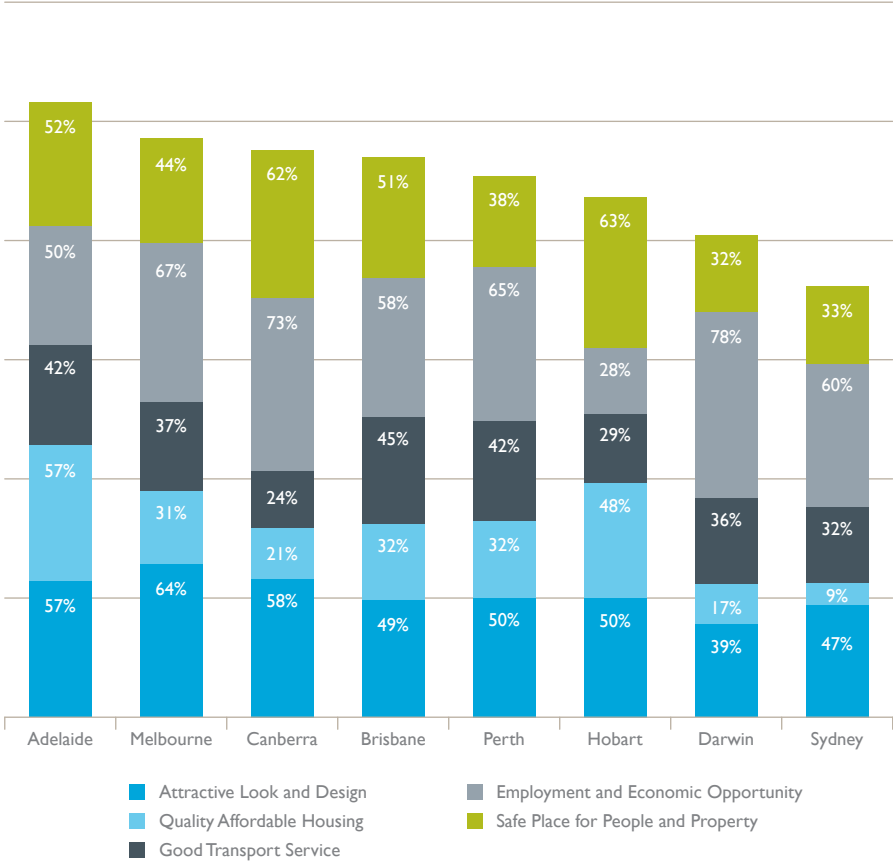
While there is no definitive set of factors that constitute liveability, there are some commonly acknowledged characteristics of cities that enhance quality of life. A survey of Australian residents of capital cities commissioned by the Property Council of Australia (PCA) entitled *My City: The People's Verdict* found that Adelaide rated most highly as a liveable city (PCA 2011). The survey asked people to rank the importance they placed on a set of 17 attributes that make a city liveable, which can be grouped as follows:

- Safety – the city is for people and their property
- Accessibility – there are good healthcare services, employment and economic opportunities, quality public transport, an efficient road network and minimal traffic congestion, and good schools and other educational facilities
- Affordability – it is an affordable place with a good standard of living and there is a range of quality affordable housing
- Health – the city has a good climate, is clean, well-maintained and unpolluted, and there is a wide range of recreational opportunities such as playgrounds, cycle paths and parks
- Diversity – there is a wide range of cultural entertainment options and a diverse range of people who get along well
- Environmental sustainability – good approaches to environmental sustainability and climate change are enacted
- Quality design and amenity – the natural environment and the look and design of the city (the buildings, streetscapes and cityscape) are attractive.

Across the various attributes, the cities were rated highly for their recreational outdoor environments, natural environments and variety of cultural, entertainment and educational facilities. However, they rated poorly on roads and traffic congestion, public transport services, environmental sustainability and climate change, and provision of quality affordable housing.

The strengths and weaknesses of the capital cities are reflected in how residents ranked their cities on the attributes. Darwin ranked highest on economic opportunity, Brisbane for good transport service, Hobart for safety, Adelaide for affordable housing and Melbourne for an attractive look and design (Figure 5.1).

**Figure 5.1** Property Council of Australia Liveability Index 2011 – Survey responses for liveability attributes



Note: Percentage of survey respondents who agreed that their city had these liveability attributes.

Source: PCA 2011

## Quality of life and community wellbeing

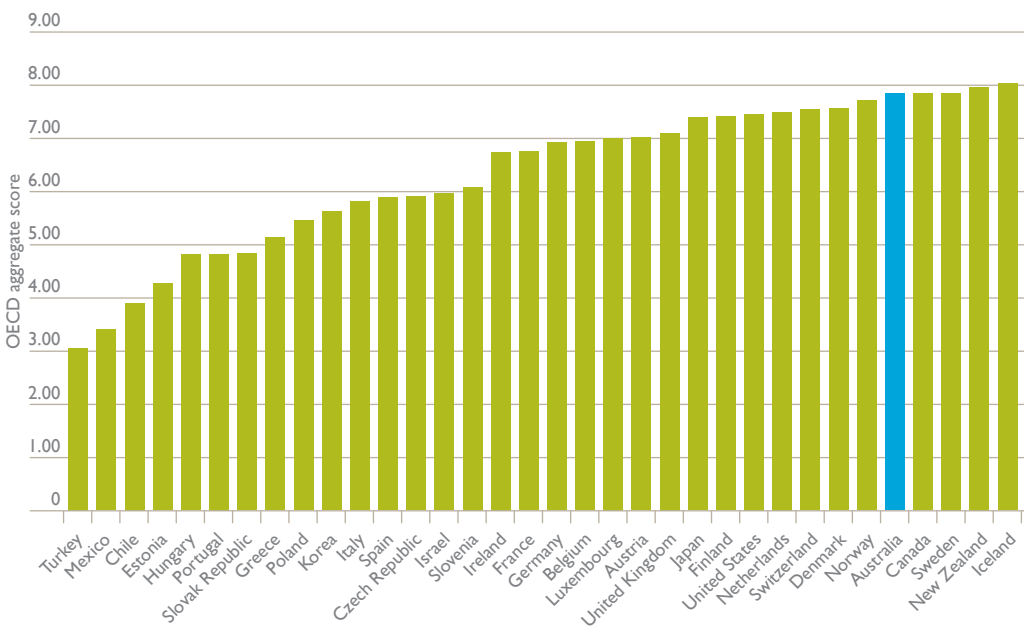
Quality of life and community wellbeing are two mutually reinforcing aspects of how liveability of a city is experienced. Quality of life relates to the experience of individuals and households that make up a population, whereas community wellbeing relates to how quality of life is experienced by the population as a whole, and in particular to social interaction and how well people 'get along' together.

### OECD Better Life Index

Since 1961, the Organisation for Economic Cooperation and Development (OECD) has primarily used GDP to measure economic and social progress. For the past decade the OECD has been developing new measures of good quality of life to identify the best way to measure the progress of societies – moving beyond GDP and examining the areas that impact on people's lives such as security, leisure, income distribution and a clean environment. The OECD has identified 11 dimensions as essential to well-being, known as the *Better Life Index*. The index includes indicators for housing, income, employment, education, local environment, health, safety, richness of community ties, overall satisfaction with life and work life balance.

Where all the indicators are equally weighted, Australia ranks amongst the top five OECD countries on a score out of 10 on the *Better life index* (Figure 5.2).

Figure 5.2 OECD Your better life index, 2011 Aggregate of score data



Note: \* Aggregate score has been calculated as the sum of score data for each of 20 indicators across 11 topics divided by the number of scores where data is available. Imputed values have not been used.

Source: OECD 2011a

## International liveability ranking

In 2011, Melbourne was ranked the most liveable city in the world by the Economist Intelligence Unit in its annual liveability survey, scoring 97.5 out of 100 (Economist Intelligence Unit (EIU) 2011a). The survey evaluates a city's stability, healthcare, culture and environment, education and infrastructure, but not the cost of living. Other Australian cities in the top 10 were Sydney, Perth and Adelaide (Table 5.1).

Table 5.1 Economist top 10 liveability ranking 2011

City	Rank	Overall rating	Stability	Healthcare	Culture and environment	Education	Infrastructure
<b>Melbourne</b>	<b>1</b>	<b>97.5</b>	<b>95</b>	<b>100</b>	<b>95.1</b>	<b>100</b>	<b>100</b>
Vienna	2	97.4	95	100	94.4	100	100
Vancouver	3	97.3	95	100	100	100	92.9
Toronto	4	97.2	100	100	97.2	100	89.3
Calgary	5	96.6	100	100	89.1	100	96.4
<b>Sydney</b>	<b>6</b>	<b>96.1</b>	<b>90</b>	<b>100</b>	<b>94.4</b>	<b>100</b>	<b>100</b>
Helsinki	7	96	100	100	90	91.7	96.4
<b>Perth</b>	<b>8</b>	<b>95.9</b>	<b>95</b>	<b>100</b>	<b>88.7</b>	<b>100</b>	<b>100</b>
<b>Adelaide</b>	<b>9</b>	<b>95.9</b>	<b>95</b>	<b>100</b>	<b>94.2</b>	<b>100</b>	<b>92.9</b>
Auckland	10	95.7	95	95.8	97	100	92.9

Source: Economist Intelligence Unit (EIU) 2011a

## Cities of opportunity

In 2011 PricewaterhouseCoopers (PwC 2011) published the fourth edition of its *Cities of Opportunity Study*. This edition was expanded to 26 cities and for the first time included an overall ranking, reflecting a growing emphasis on a holistic examination of socioeconomic balance. Sydney remains the only Australian city in the study. The study analyses Sydney using an expanded set of 66 variables in 10 indicator categories: intellectual capital and innovation; technology readiness; transportation and infrastructure; health, safety and security; sustainability; economic clout; ease of doing business; cost; demographics and liveability; and lifestyle assets.

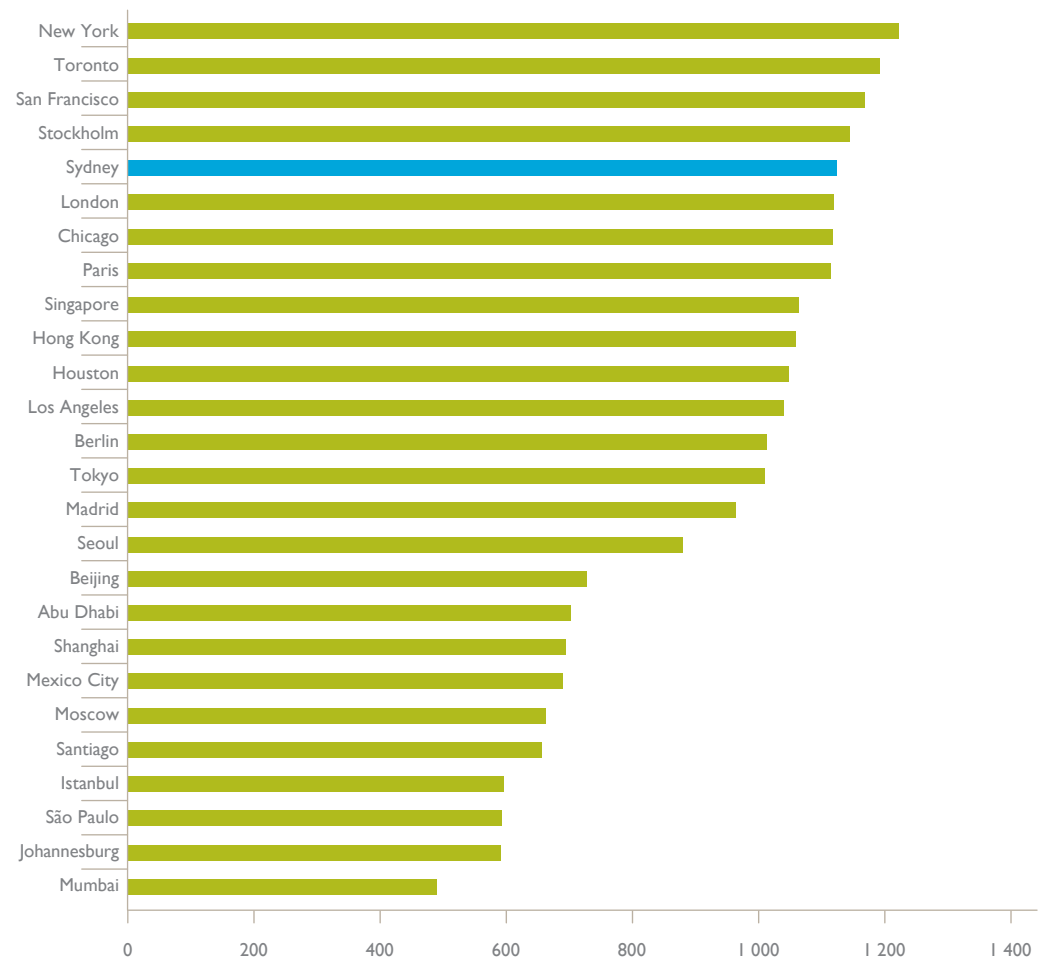
The objective was to develop an image of city success. Building on the 2010 PwC study's finding that successful cities feature close links between economics and quality of life, the 2011 PwC study expanded and changed the mix of cities, all of which are financial capitals of their regions.



The study reports that Sydney:

- is in the top five cities in terms of overall ranking (Figure 5.3)
- ranks second for sustainability and demographics and liveability
- ranks fourth for health, safety and security
- is in the middle group (17th) for technology readiness (which includes internet access in schools, broadband quality, and software and multimedia development and design)
- is in the middle group (15th) for transportation and infrastructure, top scoring with the miles of mass transit track indicator and at the bottom for cost of public transport.

**Figure 5.3** PwC Cities of Opportunity score, international cities



Source: PwC 2011

Four of the PwC Cities of Opportunity indicator dimensions are detailed in Table 5.2, illustrating Sydney's strengths in demographics liveability and intellectual capital compared with the other 25 cities in the study, as well as two areas, technology readiness and transportation and infrastructure where some other cities have an advantage.

Each of the dimensions is made up of a range of indicators as described below:

- Demographics and liveability considered the size of a city's working-age population and speed of workers' commutes, housing stock, quality of living and life satisfaction, heat and humidity, and the risk of natural disaster.
- Intellectual capital is a source of innovation that drives a nation's social and economic development. Stockholm is significantly ahead of other cities in this category. Sydney ranked first for libraries with public access, second for percentage of domestic expenditure on research and development, and third for research performance of top universities. Conversely, Sydney ranked 13th for entrepreneurial environment and 12th for class size.
- Technology readiness illustrates the software, hardware and bandwidth required for economic and academic progress. Analysis shows a strong positive correlation between cities with robust information and communications technology and strong intellectual assets (PwC 2011). New York, Seoul, Stockholm, San Francisco, Chicago, Singapore and Hong Kong have been able to leverage high-technology and attract large numbers of technical people and related investors. Sydney ranked in the middle against the three variables of internet access in schools, broadband quality, and digital economy, and was 21st for software and multimedia development and design.
- The city rankings for 'cost of public transport' tend to be lower when rankings for housing, quality of living or literacy and enrolment in secondary and tertiary education are higher. This suggests that a relatively higher cost of public transport is acceptable if the system provides access and convenience to citizens. Sydney was the lowest ranked city against the cost of public transport but was at the top for 'miles of mass transit track', which is the total miles of metro, tram and light rail track within a city per 100,000 people. (PwC 2011)

Table 5.2 PwC Cities of Opportunity city rankings for selected indicators

Demography and Liveability		Intellectual Capital and Innovation		Technology Readiness		Transportation and Infrastructure	
Stockholm	26	Stockholm	26	New York	26	Paris	26
<b>Sydney</b>	<b>25</b>	Toronto	25	Seoul	25	Chicago	25
Toronto	24	San Francisco	24	Stockholm	24	New York	24
San Francisco	23	New York	24	San Francisco	23	San Francisco	23
Los Angeles	22	Paris	22	Chicago	22	Madrid	22
Madrid	22	Los Angeles	21	Singapore	21	Tokyo	21
Berlin	20	<b>Sydney</b>	<b>20</b>	Hong Kong	20	Hong Kong	20
Paris	19	Houston	20	Los Angeles	19	London	20
Chicago	19	Tokyo	20	Houston	18	Seoul	18
Houston	19	Chicago	17	Tokyo	18	Mexico City	17
Singapore	16	London	16	London	16	Stockholm	17
Abu Dhabi	15	Berlin	15	Toronto	15	Beijing	15
Hong Kong	14	Seoul	14	Paris	14	<b>Sydney</b>	<b>14</b>
New York	13	Madrid	13	Moscow	13	Moscow	13
Sao Paulo	12	Singapore	12	Berlin	12	Shanghai	12
Mexico City	11	Hong Kong	11	<b>Sydney</b>	<b>11</b>	Toronto	12
Seoul	10	Moscow	10	Shanghai	11	Singapore	10
London	10	Shanghai	9	Beijing	9	Berlin	9
Tokyo	8	Beijing	8	Madrid	8	Abu Dhabi	8
Beijing	7	Mexico City	8	Istanbul	7	Istanbul	7
Santiago	6	Abu Dhabi	6	Sao Paulo	6	Los Angeles	6
Istanbul	5	Santiago	5	Santiago	6	Houston	5
Johannesburg	4	Sao Paulo	4	Abu Dhabi	4	Santiago	4
Mumbai	3	Johannesburg	3	Mexico City	3	Sao Paulo	3
Shanghai	3	Mumbai	2	Mumbai	2	Mumbai	3
Moscow	1	Istanbul	1	Johannesburg	1	Johannesburg	1

Source: Adapted from PwC 2011

# Inequality and social outcomes

Wilkinson and Pickett's (2010) research published in the book *The Spirit Level* examines international data that relates inequality at a national scale to a range of social development measures including health, social relations and human capital. They found that health and social problems are worse in more unequal countries, as shown in Figure 5.4.

**Figure 5.4** International comparisons of income inequality and health and social outcomes



Social and health outcomes based on a combined index of

- Life expectancy
- Maths and literacy
- Infant mortality
- Homicides
- Imprisonment
- Teenage births
- Trust
- Obesity
- Mental illness (including drug and alcohol addiction)
- Social mobility

Source: Wilkinson and Pickett 2010

Quality of life of individuals and households and the social and health outcomes for urban communities are closely associated with the natural and built environments of the cities. The next section of this chapter describes some of the aspects of the built and natural environments in Australian major cities that affect liveability.

## Climatic comfort

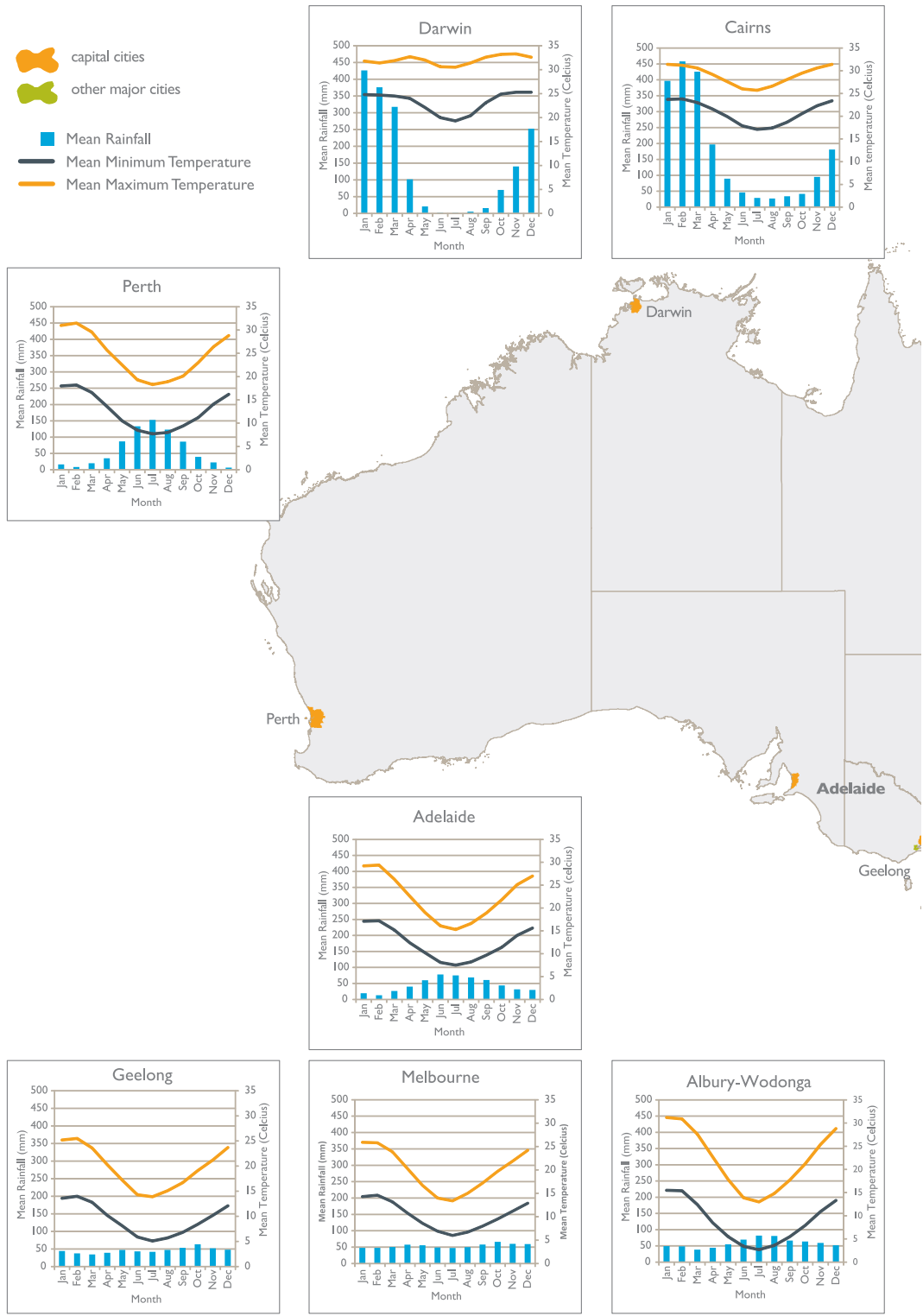
The climate has a significant influence on people's preferences for where they live. As described earlier, Australia's population is highly concentrated in the cities along the south-eastern coastline, which are in the more temperate zones. However, there is strong growth in warmer coastal regions, particularly in Queensland and the tropical cities of north Queensland and Darwin. There are considerable differences in the climatic conditions that people experience across the major cities and within the largest cities, depending on attitudes and distance from the coast.

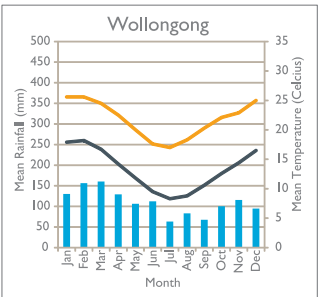
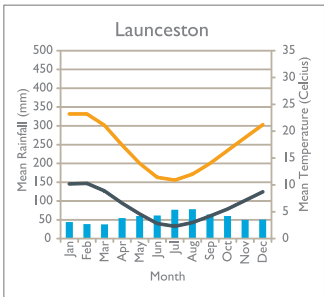
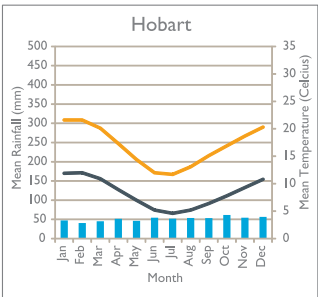
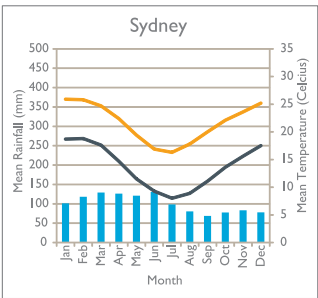
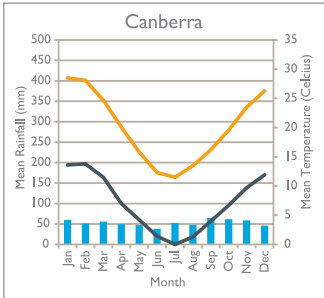
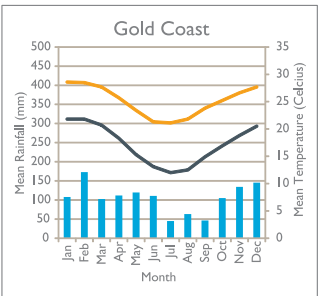
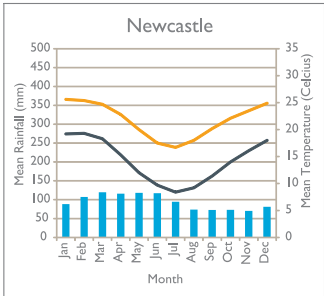
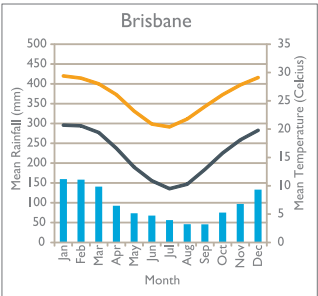
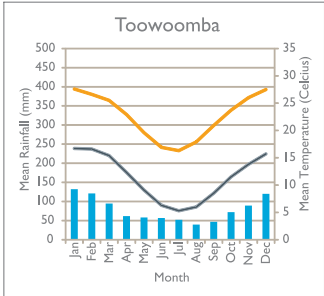
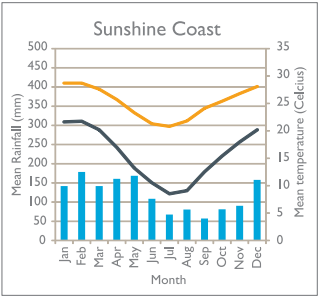
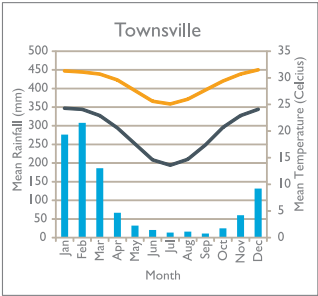
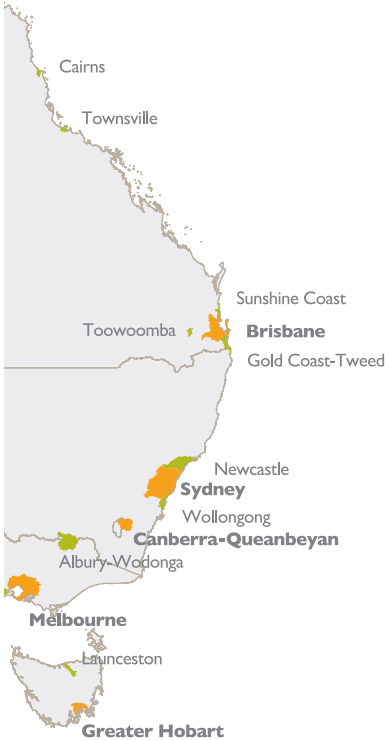
Housing, public space, commercial buildings and infrastructure influence the climatic comfort experienced in cities and can moderate the extremes of weather if designed to suit the unique seasonal weather patterns of each city (shown in Figure 5.5).



Brisbane, Queensland

Figure 5.5 Mean rainfall and temperatures 1992 to 2011, major cities





Source: Bureau of Meteorology 2011

# Housing

The availability of suitable and affordable housing and the type and distribution of residential development are fundamental to the liveability of cities and the wellbeing of individuals and households.

## Housing supply

The National Housing Supply Council (NHSC) *2010 State of Supply* report concluded that there is a substantial and growing undersupply of housing in Australia. It also showed that while the impact of the global financial crisis on Australia has been less pervasive and severe than in other advanced economies, the financial crisis has led to some tightening in lending criteria among lending institutions, making access to credit more difficult for residential property developers and to a lesser extent, for some residential purchasers. A longer-lasting effect of the crisis on supply is likely to be reduced multi-unit development because of the effect of the crisis on financing structures for such developments in Australia (NHSC 2010).

The actual number of dwelling units commenced nationally in 2008–09 was 131,600, which was significantly below the 158,500 dwelling units commenced in 2007–08 and the 152,200 dwelling units commenced in 2006–07 (NHSC 2010).

The NHSC identified that the net dwelling supply gap increased from 23,400 dwellings in 2002 to 178,400 dwellings in 2009 as shown Figure 5.6, and detailed in Table 5.3.

**Figure 5.6**      **Change in dwelling demand and supply, Australia 2002 to 2009**



Source: NHSC 2010



**Table 5.3** Estimates of the net dwelling supply gap for 2002 to 2009 using 2001 as a base year, Australia

	Change in underlying demand – number of dwelling units ('000s)	Supply growth, net of demolitions, with allowance for unoccupied dwellings excluding 'Resident absent'	Net dwelling supply gap 2002–2009 based on the difference between change in underlying demand and supply adjusted for demolitions and unoccupied dwellings
2002	138.1	114.7	23.4
2003	139.7	132.9	30.2
2004	138.3	136.5	32
2005	137.1	139.5	29.6
2006	137.4	134.2	32.8
2007	162.1	128.4	66.5
2008	157.4	124.4	99.5
2009	205.9	127.1	178.4

Note: National Housing Supply Council estimates of underlying demand for dwellings since June 2001.

Source: NHSC 2010

Not only has there been a national fall in dwelling approvals, there are also significant differences across States. Victoria and to a greater extent South Australia registered an above trend increase in both detached houses and medium and high density dwellings (Table 5.4). By contrast, Western Australian approvals fell for houses but rose for other dwelling types and Queensland approvals showed a significant fall in both housing types. The fall in approvals was most significant in New South Wales where approvals were well below the previous reporting period of State average monthly approvals and well below demand given the growth highlighted in Chapter 2.

**Table 5.4** Houses and other dwellings, average monthly approvals and per cent change, January 1998 to December 2007 and January 2008 to December 2009

	Houses			Other dwelling types		
	Average monthly 1998-2007	Average monthly 2008-2009	Per cent change	Average monthly 1998-2007	Average monthly 2008-2009	Per cent change
NSW	1,927	1,253	-35	1,720	1,039	-40
Vic.	2,633	2,729	4	930	1,008	8
Qld.	2,112	1,907	-10	1,024	818	-20
SA	684	806	18	171	224	31
WA	1,514	1,441	-5	335	368	10
Subtotal for five States	9,208	8,554	-7	4,339	3,656	-16

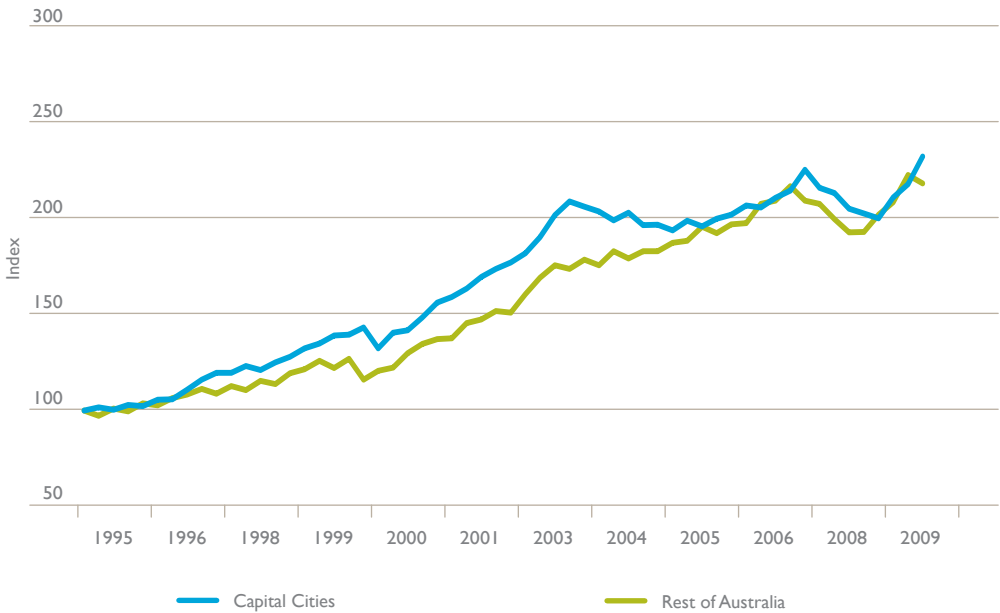
Note: 'Other dwelling types' comprise apartments, terraced houses and other medium density dwellings as well as about one per cent non-residential dwellings (such as rooming house units).

Source: ABS 2010a

# Housing affordability

Growth in real house prices over the past decade has been strong both in capital cities and in other regions (Figure 5.7). Based on ABS *House Price Index* data (ABS 2011a), real house prices have more than doubled since 1995.

Figure 5.7 Growth in real house prices 1995 to 2009



Note: Housing Price Index June 1995=100 deflated by CPI

Source: Unpublished data from ABS, APM (Australian Property Monitors), RBA (Reserve Bank of Australia)

A recent research discussion paper by the Reserve Bank of Australia (RBA) has confirmed that house prices within Australia's major cities tend to be higher in closer proximity to city centres (Kulish, Richards and Gillitzer 2011). An analysis of selected suburbs in Sydney found that average land values for suburbs within four kilometres of the CBD were around 16 times higher than in suburbs more than 50 kilometres from the CBD. The report suggests that the rapid growth of house prices in inner suburbs reflects changes in population and incomes. It also proposes that these findings highlight changing preferences where households value proximity to the CBD due to poor transport infrastructure and higher transport costs, in addition to constraints in the supply of appropriately zoned land and well-located housing.

The paper also reported that house prices tend to be higher in waterfront suburbs. The 'waterfront effect' was reported to be largest in Sydney and Perth, adding around 50 per cent to house prices, and lowest in Brisbane and Adelaide (Kulish, Richards and Gillitzer 2011). This phenomenon was also recorded in cities outside of the capitals.

Prices in capital cities were found to have increased around one percentage point faster per year than those in cities outside of the capitals (Kulish, Richards and Gillitzer 2011). This was attributed to constraints in the construction of new housing in capital cities relative to non-capital cities. The cities with the largest populations – Sydney and Melbourne – had the highest house prices. On average house prices grew faster than apartment prices, which the paper suggested was due to an increase in the price of land in capital cities rather than the housing structures themselves.

The recent growth in house prices largely reflects increases in the prices of existing houses. Since the early 2000s, the real prices of houses (when compared to inflation) have increased substantially with real construction costs growing more modestly. Land has made up a growing share of house prices, increasing from 53 per cent to 61 per cent in the 15 years to March 2009. However, increasing construction costs are responsible for a higher proportion of the increase in house prices in some regional sub-markets, particularly in resource towns (ABS 2011a).

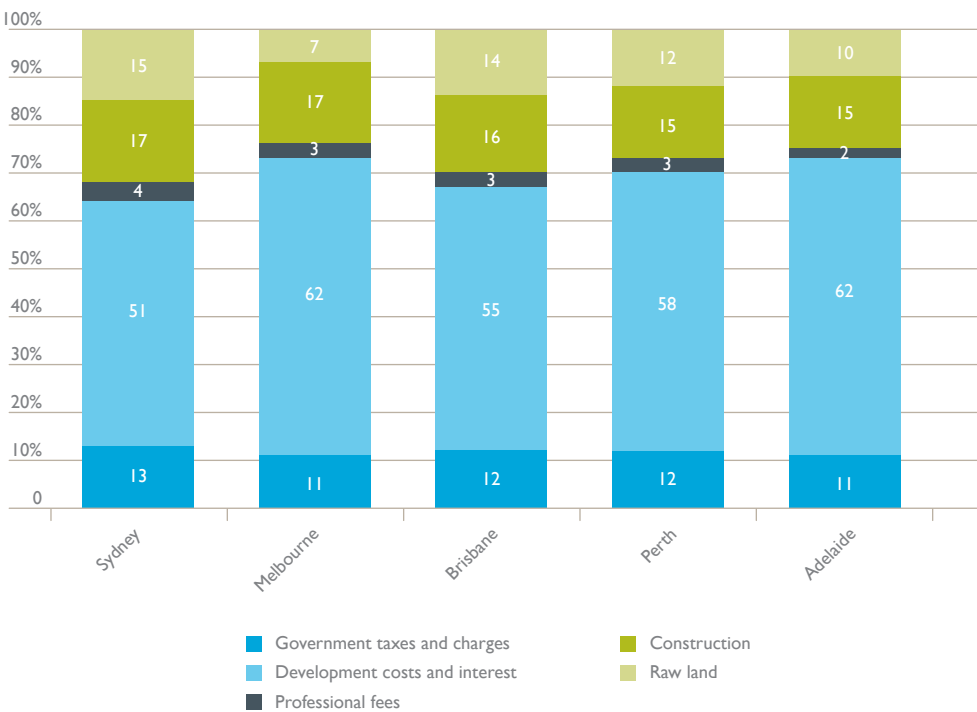


Whittlesea, Victoria

Government taxes and charges, local government fees and infrastructure charges form a major component of real house prices. Such costs have been calculated in the recent *National Dwelling Costs Study Report 2010* (Urbis 2010). Areas with ageing inner urban infrastructure costs carry additional issues with a mix of historic and wider catchment servicing costs. Greenfield sites are more amenable to full cost recovery as part of new service infrastructure construction (Figure 5.8 and Figure 5.9). The report raises questions about the relative affordability and sustainability of infill compared to greenfield development.

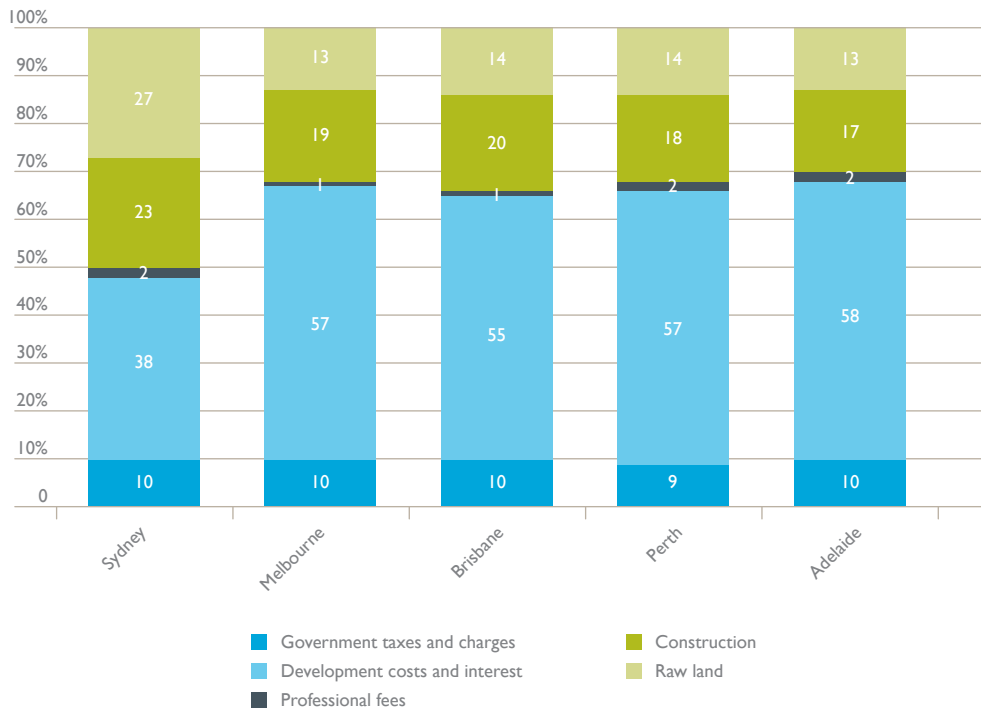
Infill areas with ageing urban infrastructure may require additional costs of replacing and expanding capacity. Greenfield sites, on the other hand, may be more amenable to full cost recovery (where costs of construction of new infrastructure are included in the dwelling sale price. (Figure 5.8 and Figure 5.9).

**Figure 5.8**      **Relative importance of cost components of developing infill developments by city**



Source: URBIS 2010

**Figure 5.9** Relative importance of cost components of developing greenfield developments by city



Source: URBIS 2010

**Table 5.5** Costs of developing infill dwellings by city

	Sydney	Melbourne	Brisbane	Perth	Adelaide
	(\$)				
Raw land	85,000	32,184	72,000	60,000	47,619
Government taxes and charges	91,486	83,177	85,443	75,861	71,407
Professional fees	24,071	16,609	16,040	16,904	7,452
Construction	282,137	301,846	290,809	308,073	290,561
Development costs and interest	70,927	55,707	61,070	59,903	51,350
Total cost	553,621	489,523	525,362	520,741	468,389

Note: Figures are rounded to the nearest \$. Numbers may not sum to totals due to this rounding.

Source: URBIS 2010

Table 5.6      Costs of developing greenfield dwellings by city

	Sydney	Melbourne	Brisbane	Perth	Adelaide
	(\$)				
Raw land	151,875	50,000	54,000	52,000	49,714
Government taxes and charges	130,048	71,195	75,707	69,644	65,561
Professional fees	9,773	2,050	3,050	8,588	4,071
Construction	211,146	212,911	201,588	219,204	217,289
Development costs and interest	57,869	38,600	35,406	34,522	38,492
Total cost	560,711	374,756	369,751	383,958	375,127

Note:      Figures are rounded to the nearest \$. Numbers may not sum to totals due to this rounding.

Source:    URBIS 2010

The NHSC 2010 report has shown that, with the exception of Sydney, housing construction is generally more expensive in infill compared to greenfield locations. In this report the cost of land in greenfield areas in Sydney is estimated to be up to \$100,000 per dwelling more than in Melbourne (Tables 5.5 and 5.6). In an alternative analysis, however, Trubka *et al* (2008) found that greenfield development is more expensive once the total cost for infrastructure provision is taken into account.

Most metropolitan planning strategies (as discussed in Chapter 6) identify the need for a mix of greenfield and infill development to adequately cater for the demand for housing supply, and also different preferences in location and housing types. It is, therefore, helpful to understand how housing preferences vary between cities, for different households and over time.

Two recent reports by the Grattan Institute (Kelly *et al* 2011; Weidmann and Kelly, 2011) have explored the housing preferences of different households in different Australian cities. They found that there are very real differences in the type of housing sought by people at different life stages and in different household circumstances (see box insert).

### Housing preferences

The Grattan Institute conducted survey research into housing preferences. The findings are reported in two reports: *The Housing We'd Choose 2011* and in a second working paper, *What Matters Most? Housing Preferences Across the Australian Population 2011*. The survey sought responses from a sample of more than 700 residents of Sydney and Melbourne about their housing and location priorities.

The first report showed that when asked to make choices based on the housing prices and their budgets, the housing people chose was a much more varied mix than either city currently provides. In particular, the research suggests significant shortfalls of semi-detached housing and apartments in the middle and outer areas of both cities.

The first report also presents recent construction trends and argues that there are barriers to delivering more of the housing people say they want. These disincentives include the cost of materials and labour for buildings over four storeys, land assembly and preparation, and the risk and uncertainty of our planning systems.

The second working paper found that although it is often assumed that living in a separate house on a large block of land is what most Australians want, 'whether the house is detached' was only the fifth most important variable while having a big garden was ranked 20th.

The data presented in the second report also suggests that there are real differences in priorities across the population. In particular, while young families were focused on house size and type, older and single-person households were much more likely to think that characteristics of where they live are more important. Given our ageing population and the growth of smaller households, these differences could result in significant shifts in the mix of dwelling stock (Kelly *et al* 2011; Weidmann and Kelly, 2011).

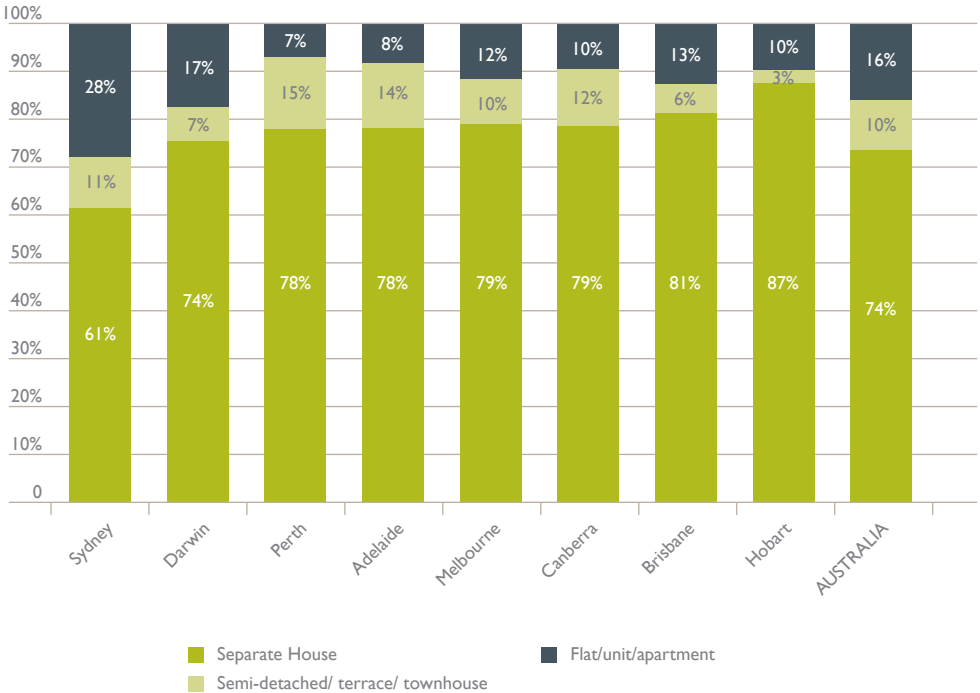
## ***Multi-unit dwellings***

Australia is witnessing an increasing trend toward inner-city living and increased urban density. An ageing population, shrinking household sizes, lifestyle choices and government policies aimed at increasing urban density are all part of this trend.

*State of Australian Cities 2010* described the composition of existing dwelling stock across each of the major cities in Australia. Multi-unit residential buildings (also known as flats, units or apartments) are mostly located in the older inner suburbs. In the most recent ABS *Survey of Housing Occupancy and Costs 2007-08*, Sydney had the highest proportion of apartment-dwellers of the capital cities. Almost one quarter (24 per cent) of Sydney's resident population lived in flats, units or apartments.

Multi-unit dwellings were home to 28 per cent of Sydney households. In contrast, just 7.1 per cent of households in Perth and 8.4 per cent of households in Adelaide lived in flats, units or apartments (ABS 2009a) (Figure 5.10).

Figure 5.10 Proportion of households living in dwelling type, by capital city, 2007-08

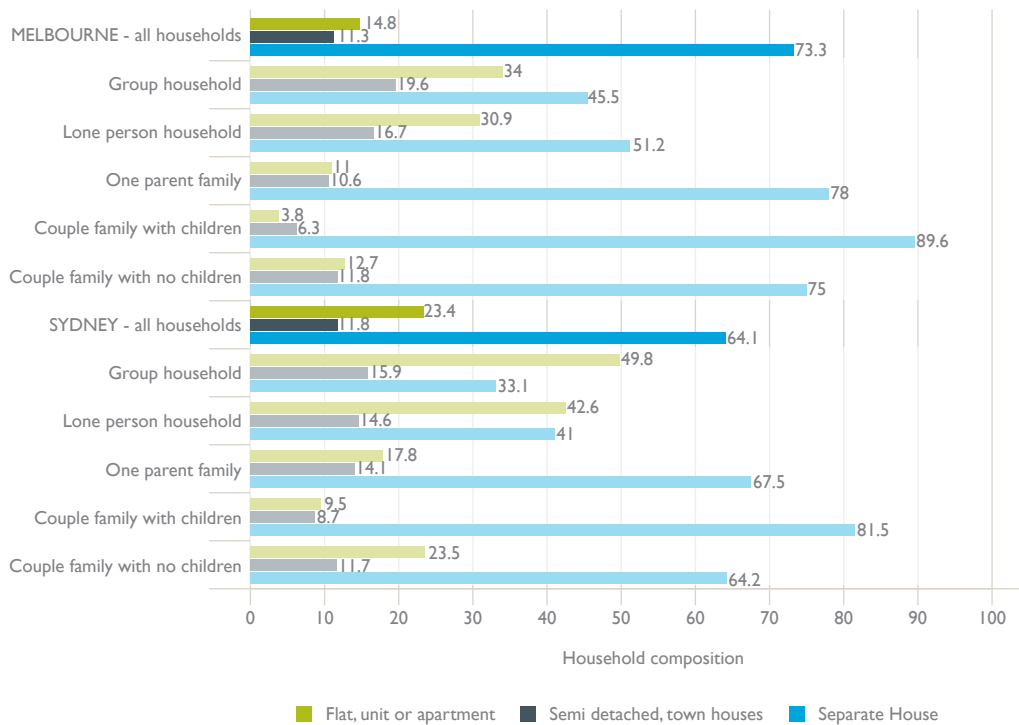


Source: ABS 2009a

In 2007-08, 73.5 per cent of capital city households lived in detached houses, 10.4 per cent were in semi-detached, terrace or townhouses, and 16 per cent were in units or apartments (ABS 2009c). Households with children overwhelmingly occupied separate housing, (82 per cent of family households in Sydney and 90 per cent of family households with children in Melbourne), amounting to about 426,000 dwellings in Sydney and 407,000 dwellings in Melbourne. Conversely, a large proportion of apartment-dwellers were either unrelated group households or lone-person households (Figure 5.11).



**Figure 5.11** Proportion of population and household types by dwelling type, Sydney and Melbourne, 2006



Source: BITRE analysis of ABS Census of Population and Housing 2006

The importance of designing higher-density residential development to accommodate a greater diversity of households has been highlighted in recent research for the Victorian Department of Health into the experiences of 40 children growing up in high-rise housing in Melbourne (Whitzman and Mizrahi 2009). This research found that children who lived within an 800 metre radius from their school or within 300 metres of local green space were more likely to access those spaces independently than children who had to travel further. Accessibility and proximity to home, amenity and the range of play and socialisation opportunities are important influences on children's environmental experience.

## *Strata and community title*

Multi-unit residential dwellings in Australian cities generally fall under strata or community title. Existing apartment buildings range in age from 1930s-style walk-up flats, to 1960s mid- to high-rise apartment blocks, to townhouse and high-rise blocks from the 1970s and 1980s. Newer apartment buildings are generally aimed at mid- to high-income households, while the more affordable options are available in older apartment buildings.

As these buildings age, the costs of maintenance and operations are of increasing concern to owner-occupiers and landlords. Sinking-fund and administrative costs are increasing, and many are hit with special levies to cover unexpected large costs such as concrete cancer, lift replacements or major structural repairs. Repairs and maintenance can increase the cost of housing for both owners and renters.

It is argued that no satisfactory process has yet been devised to deal with blocks that are at the end of their physical or economic life (Sherry, 2006).

## *Tenure*

As the average household size decreases, the number of households in Australia is growing at a faster rate than the population, resulting in greater demand for housing. Many Australians change housing at different life stages and move for education or employment, when they become partnered, when they have children and for lifestyle reasons.

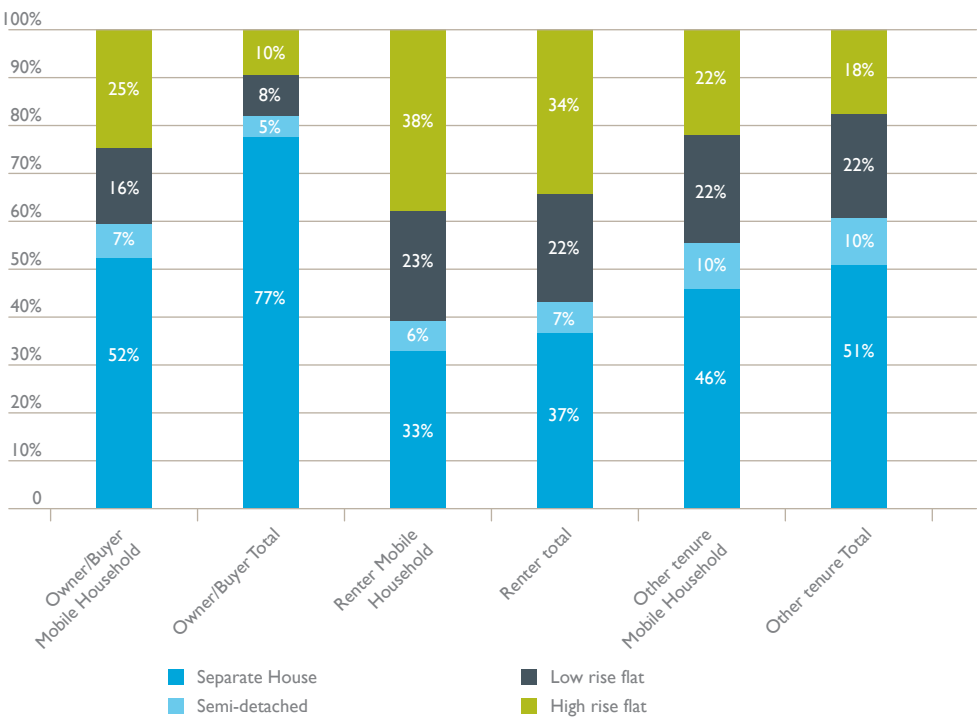
Some households are compelled to move because of the cost of housing. The security of tenure of private renters is also influenced by the decisions of their landlords. In 2007–08, 56 per cent of private renters had a fixed period lease of six or 12 months and a further 20 per cent had either a month by month or other fixed period lease arrangement.

Renters from State or Territory housing authorities on the other hand were more likely to have an indefinite tenure arrangement (78 per cent).

Housing tenure is strongly associated with dwelling structure and other built forms. Data from the 2006 Census shows a substantially larger proportion of renters in attached dwellings (including both medium density dwellings like townhouses and villas and higher density flats, units and apartments) and a larger proportion of owner-occupiers live in detached dwellings (houses).

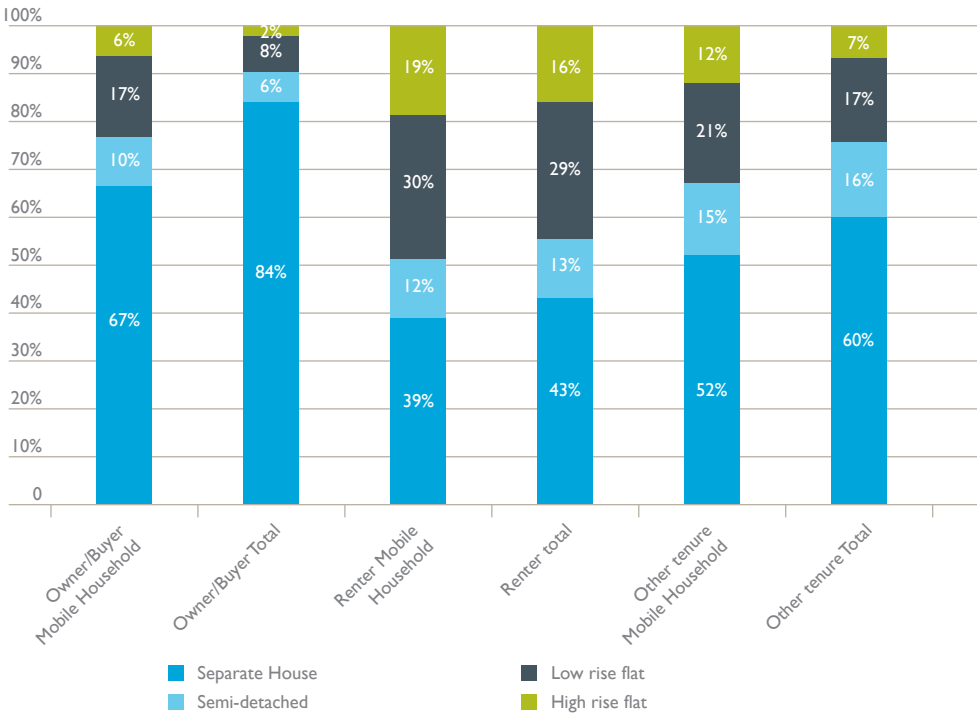
In Sydney and Melbourne there was also a large proportion of low income families who were renters in flats or high-density dwellings. Low-income households were defined as having a gross household weekly income of less than \$1,200, approximately the median income based on the 2006 Census. A larger proportion of Sydney renters are in high density dwellings (61 per cent) than Melbourne renters (48 per cent).

Figure 5.12 Sydney dwelling tenure: Low income mobile households and total households and total households



Source: BITRE analysis of Census of Population and Housing 2006.

Figure 5.13 Melbourne dwelling tenure: Low income mobile households and total households



Source: BITRE analysis of Census of Population and Housing 2006

### Low income households with children

The 2006 Census data analysed by BITRE in Figure 5.12 and Figure 5.13 shows that a substantial proportion of the low income households had moved within the previous year. These 'low income, mobile households' with children, that is low-income families with children who had a different address in Australia a year prior to the 2006 Census, comprise about seven per cent of total households in Sydney (184,000 households) and 11 per cent in Melbourne (160,800 households). Whether these moves were voluntary or involuntary, the implications for these families' wellbeing could be substantial.

## Homelessness

*State of Australian Cities 2010* reported rates of homelessness based on the 2006 Census.

A new data collection, the Specialist Homelessness Services collection, is being developed by the Australian Institute of Health and Welfare (AIHW) to provide better information about people who are homeless, the pathways people take in and out of homelessness, and the types of work that homelessness agencies undertake. Information collected will include whether a client has a diagnosed mental illness or was undergoing treatment for mental health issues, and previous episodes of homelessness. People turned away from homelessness agencies will also be recorded and, for the first time, children will be counted as individual clients.

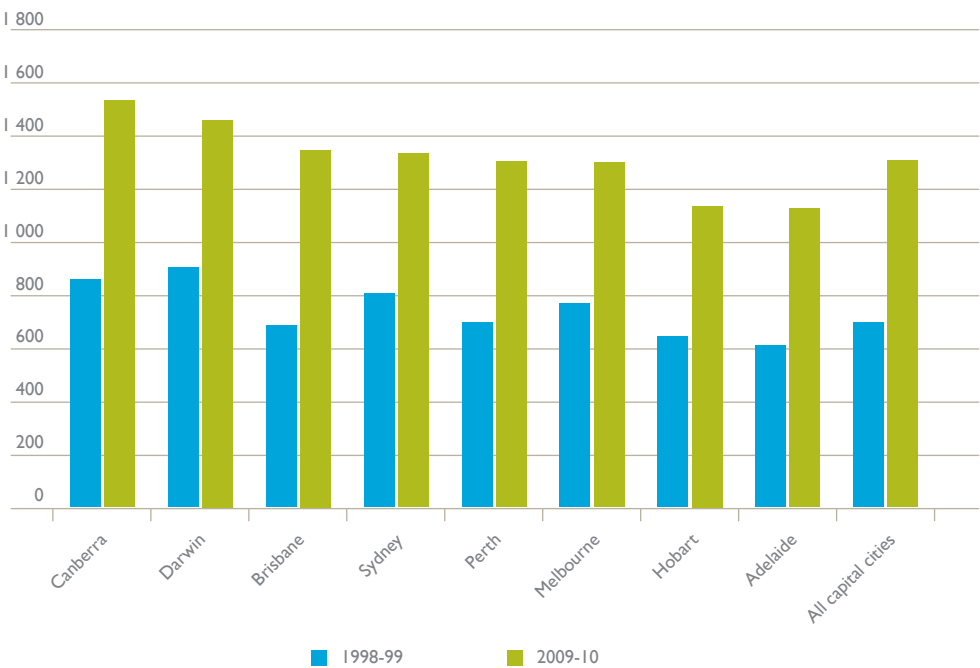
The Specialist Homelessness Services collection, jointly funded by Federal, State and Territory governments, is expected to be published in 2012 to provide more information for the Australian Government's homelessness strategy.

## Living affordability

While housing comprises the largest proportion of household expenditure, there are other costs of living which influence the affordability of cities. The *ABS Household Expenditure Survey*, conducted every five years, collects information on household expenditure on housing, transport, energy, water and a range of consumer goods and services. This is an important source of information about the cost of living.

Data from the 2009–10 survey shows that Canberra households spend the most on goods and services in Australia, the average expenditure per household totalling \$1,536.28 a week. Adelaide and Hobart had the lowest expenditure (Figure 5.14) (ABS 2011b).

Figure 5.14      Total household expenditure on goods and services, 1998-99 and 2009-10, Capital Cities



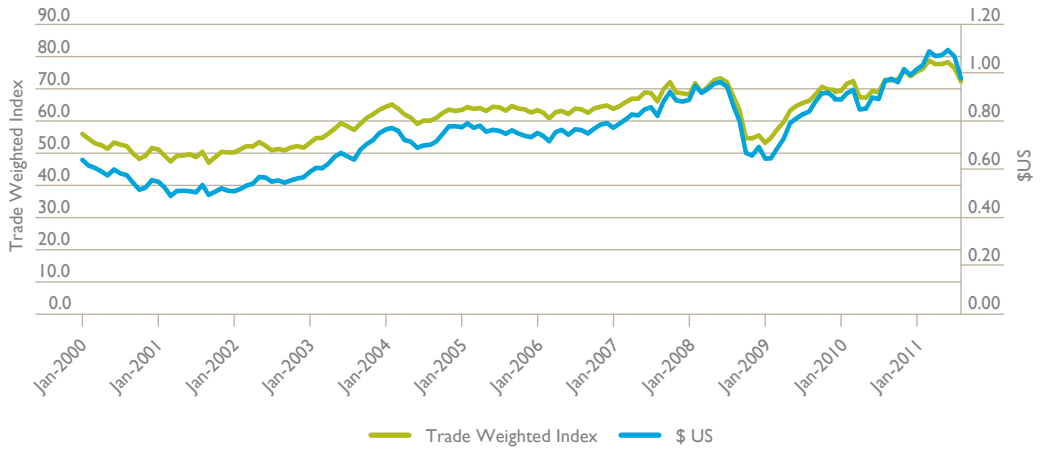
Source: ABS (2011b)

Moreover, between 1998 and 2010 the household expenditure in Canberra has increased by a relatively greater amount than other capitals. Household expenditure in Brisbane and Perth is now equivalent to that of Sydney and Melbourne.

### *Cost of living – global comparisons*

A number of indices consider cost of living on an international basis. Relative international costs of living are calculated using the United States dollar as the reference currency because the main purpose of such surveys is to advise expatriates on the relative cost of living in foreign cities. Figure 5.15 shows that the Australian dollar has increased significantly in value against the US dollar since early 2009 and the performance of the Trade Weighted Index indicates that this currency appreciation was general. This means that the cost of living in Australia as measured in US dollars will rise irrespective of other changes. However, it does not necessarily mean that the cost of living in Australian cities for those earning Australian dollars has risen.

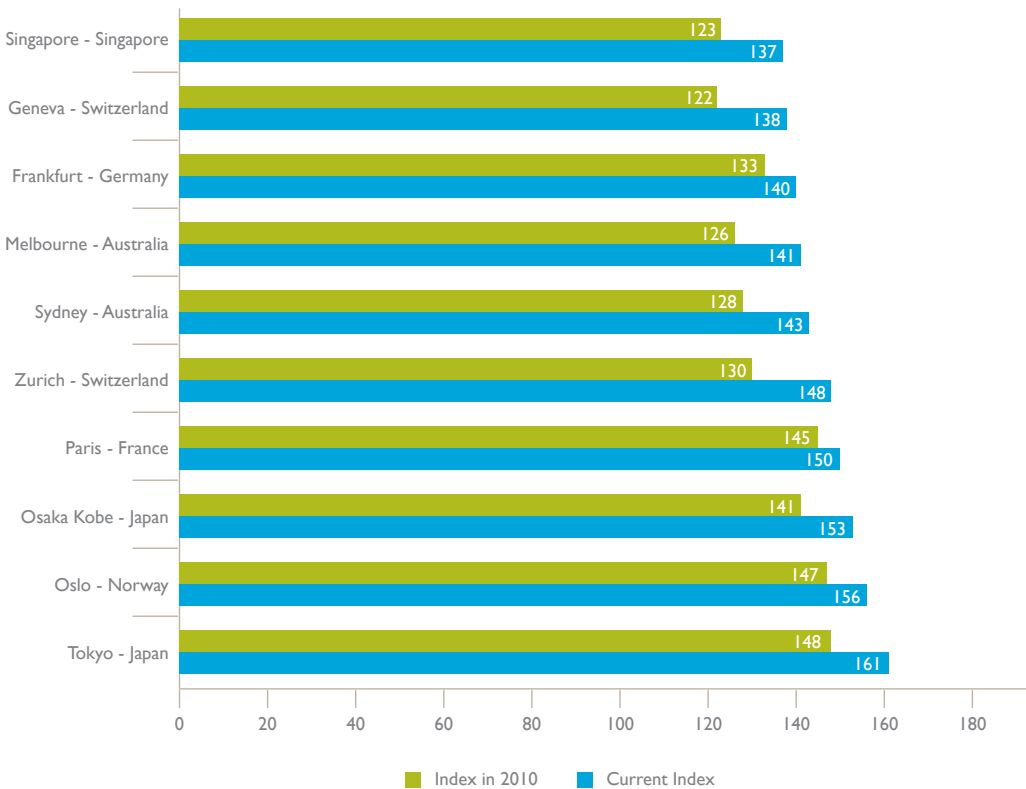
Figure 5.15 Australian Exchange Rates January 2000 to September 2011



Source: Reserve Bank of Australia 2011

Both *The Economist* Intelligence Unit (EIU) and the Mercer Corporation have noted this increase in the cost of living, relative to other countries. According to the EIU, Sydney and Melbourne are the sixth and seventh most expensive cities respectively, followed by Perth and Brisbane in 13th and 14th places out of 140 cities in the ranking (Figure 5.16). 10 years ago Sydney was ranked 71st, Melbourne 80th, Perth 91st and Brisbane 93rd (EIU 2011b).

Figure 5.16 The Economist's relative cost of living index



Source: EIU 2011a

Mercer Corporation's annual cost of living survey of 250 cities (2011) shows that the cost of living in Australian cities compared with cities in other countries has been rising over the past decade (Table 5.7 and Figure 5.17). The 2011 Mercer survey shows that since 2010, Sydney has jumped 10 places to be the 14th most expensive place to live. Melbourne moved from 33 to 21 and Perth jumped 30 places to be ranked 30th. Adelaide made the biggest jump to 46th, up 44 places. This recent movement corresponds to the recent strength of the Australian dollar, which appreciated by almost 14 per cent against the US dollar over the previous 12 months. In considering the cost of living it should be noted that the value of Australian wages, being paid in Australian dollars, has also increased.

The Mercer survey evaluates a range of goods and services, including housing, transport, food, clothing, household goods and entertainment. The main factors determining a city's ranking are the relative strength or weakness of the national currency against the US dollar and price movements over the previous 12 months compared with those in New York City. As noted earlier in this section, Mercer's analysis was developed primarily to advise on remuneration adjustments for United States expatriates.



Table 5.7 Mercer Cost of Living rankings 2010 and 2011

City	2010 rank	2011 rank	Change in rank 2010-2011
Sydney	24	14	+10
Melbourne	33	21	+12
Perth	60	30	+30
Brisbane	55	31	+24
Canberra	74	34	+40
Adelaide	90	46	+44

Source: Mercer 2011

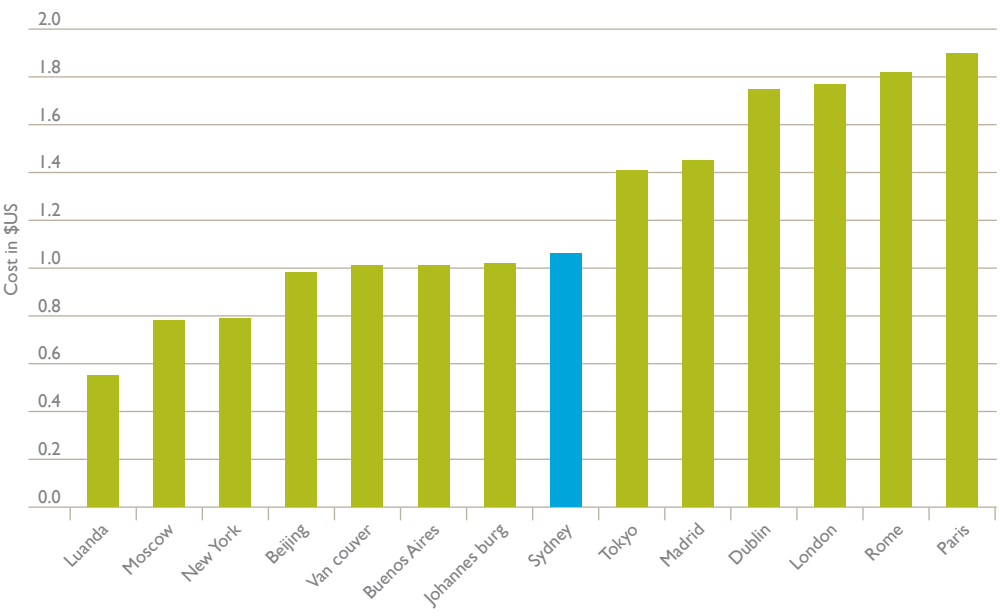
Figure 5.17 Change in Mercer cost of living rank, selected capital cities 2010 to 2011



Note: Lower rank represents higher cost of living

Source: Mercer 2011

Figure 5.18      Relative cost of one litre of unleaded 95 octane petrol, selected cities 2011



Note: Fuel prices fluctuate significantly over short time periods, at time of writing Sydney's petrol prices are closer to US\$1.40

Source: Mercer 2010

Fuel as a commodity is less influenced by differences of local production and consumption, compared with other items included on the Mercer cost of living index like milk, coffee or a takeaway burger. As shown in Figure 5.18, the relative cost of fuel in Sydney is among the middle-ranked cities and notably less than the European cities apart from Moscow where there are national oil reserves. A large part of this difference is that as at September 2010, the tax component of the petrol price in Australia was the fourth lowest in the OECD (ACCC 2011).

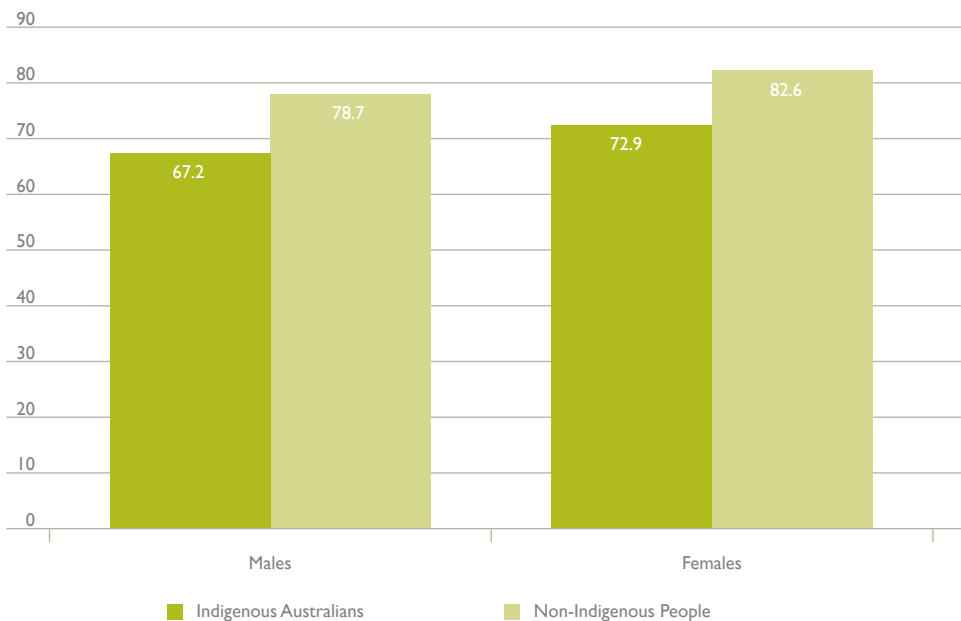
## Health

Where people live, the lifestyles they lead and the types of housing and environments they inhabit, can affect their physical and mental health. Good health confers many benefits for individuals and their communities including better productivity, reduced health care costs, good social relations and increased life expectancy.

Urban living has both risks and benefits for human health. As noted in *State of Australian Cities 2010* urban environments have a strong effect on public health concerns, with contributing factors being water and air quality, noise, temperature, access to open and green space, opportunities to exercise, and opportunities for social interaction. A higher proportion of people in the lowest socioeconomic groups suffer poor health, including obesity and mental illness.

Life expectancy is a standard measure of population health. In 2008, average life expectancy at birth in Australia was 81.5 years, more than two years higher than the OECD average (OECD 2011a). The life expectancy of Indigenous Australians is about 10 years less than those for non-Indigenous Australians (Figure 5.19).

**Figure 5.19** Life expectancy for Aboriginal and Torres Strait Islander peoples and non-Indigenous peoples, 2005–2007



Source: ABS 2009b

Chronic non-communicable diseases including cancer, cardiovascular disease, chronic respiratory conditions and diabetes are the main cause of death in OECD countries, accounting for three-quarters of all deaths in 2008 (OECD 2011a). It is a similar story in Australia with heart disease and stroke being the first and second most common causes of death (ABS 2011c).

Many chronic diseases are strongly associated with modifiable lifestyles and behaviour. People who are physically active, drink moderately, do not smoke, eat plenty of fruit and vegetables, and have a normal weight have a much lower risk of early death than those with less healthy lifestyles.

These preventable diseases not only reduce overall life expectancy; they also lead to reduced productivity and 'quality of life' years and add a significant health burden to the economy.

The geographical distribution of risk behaviours and the incidence of chronic diseases within urban communities can be highly uneven, and greater detail on rates of incidence of chronic disease can be found in the *Social Health Atlas of Australia 2011* published by the Public Health Information Development Unit (PHIDU) at the University of Adelaide.

### Social Health Atlas of Australia

The *Social Health Atlas of Australia* was first published in 1999 and uses data from the ABS National Health and related surveys. The website also hosts publications, interactive mapping and data sets on a broad range of health determinants across the life course. A major emphasis is on the development and publication of small area statistics for monitoring inequality in health and wellbeing. The *Social Health Atlas of Australia* adds to the body of evidence in Australia on the disparities in health that exist between groups in the population. People of low socioeconomic status (those who are relatively socially or economically deprived) experience worse health than those of higher socioeconomic status for almost every major cause of mortality and morbidity.

In a comprehensive review of literature concerned with the relationship between population health and built environments, Kent *et al* (2011) identify three domains of the built environment that support human health, namely;

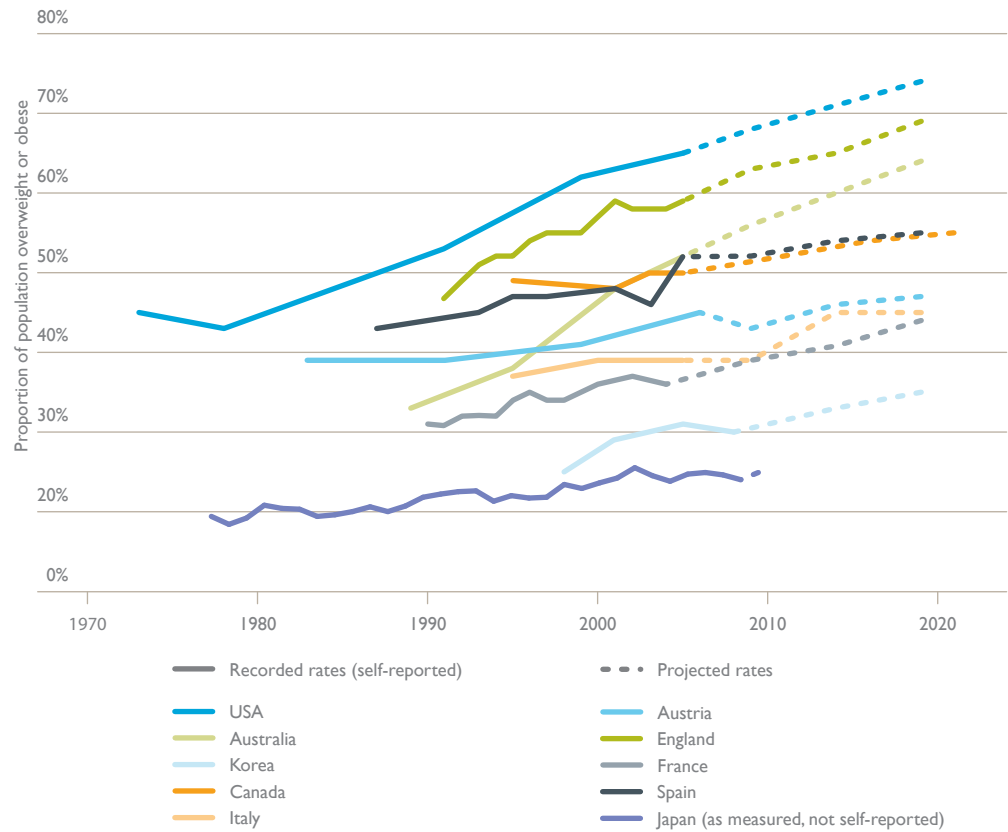
- Physical activity – getting people active for travel and recreation
- Social interaction – connecting and strengthening communities through incidental interaction, planning and building community spaces and designing for crime prevention
- Nutrition – better access to healthy food and promoting responsible food advertising.

Where built environments do not support human health the outcomes are evident in the rates of the three major risk factors for chronic disease: physical inactivity, obesity and social isolation.

## Obesity

Obesity rates are high in Australia relative to most OECD countries and have been increasing faster than in any other OECD country over the past two decades (Figure 5.20). More than 60 per cent of adults and 25 per cent of children are overweight or obese in Australia. The proportion of overweight people is projected by the OECD to rise a further 15 per cent over the next decade (OECD 2011b).

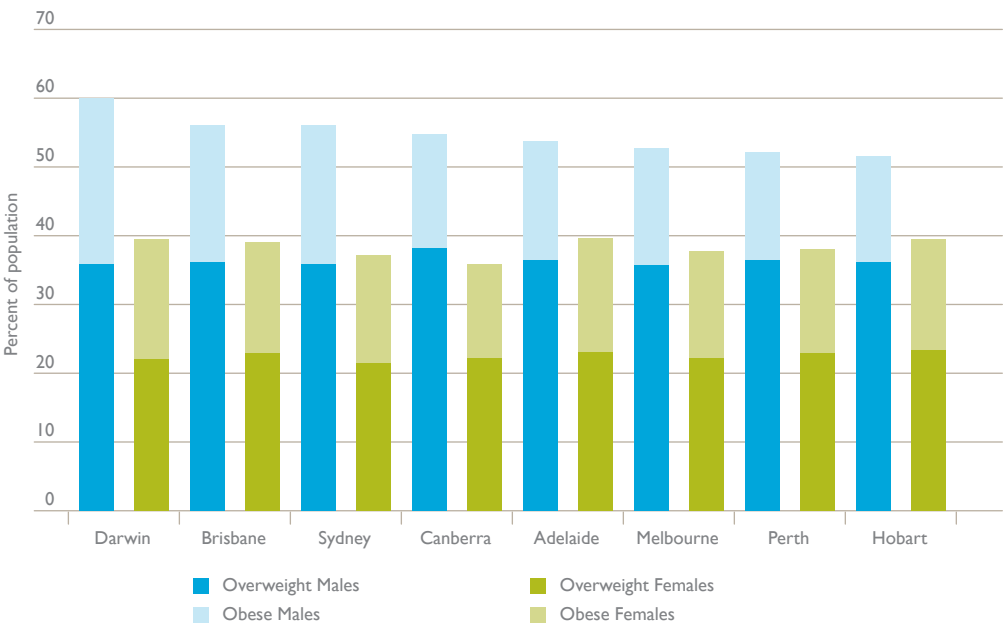
**Figure 5.20** Past and projected overweight rates 1970 to 2020 for selected OECD countries



Source: OECD 2011b

There is little difference between capital cities in the proportion of obese women but Darwin, Sydney and Melbourne stand out as having higher than average proportions of men who are obese as shown in Figure 5.21. Australian women with low education levels are 1.4 times more likely than more educated women to be overweight but this is a smaller risk than in many OECD countries. The gap is smaller, but not absent, in men (OECD 2011).

**Figure 5.21** Proportion of overweight and obese males and females, over 18 years of age, for capital cities, 2007–08



Note: Based on ABS 2009c

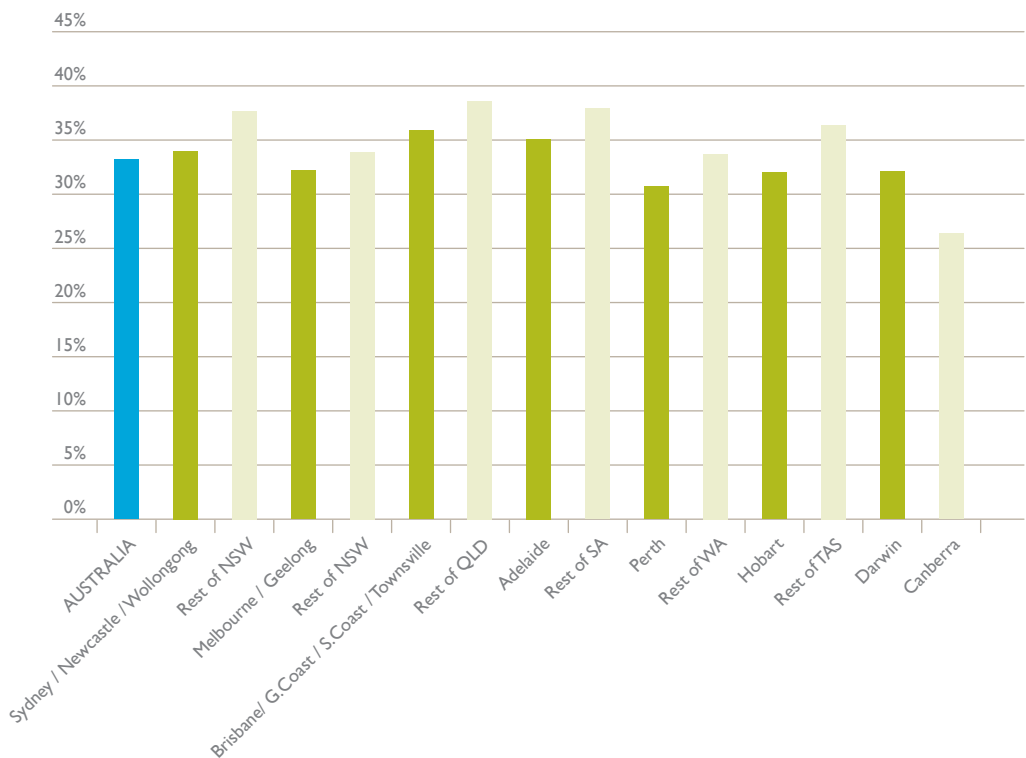
Source: PHIDU 2011

## Physical Activity

*State of Australian Cities 2010* noted that 33.5 per cent of the Australian population aged over 15 years was physically inactive in 2007–08, up from 32.8 per cent in 2004–05. Physical inactivity is estimated to cost the Australian economy about \$13.8 billion a year (Medibank Private 2008). Data from the next national health survey due to be released shortly will provide information on whether this trend has continued.

Residents in the capital cities are generally more physically active than their counterparts in the rest of their respective States outside the major cities (Figure 5.22), which may reflect the difference in the age profiles of major cities which is generally younger, compared with non-metropolitan areas, as noted in Chapter 2.

**Figure 5.22** Physical inactivity – proportion of persons aged 15 years and over, by location, 2007–08



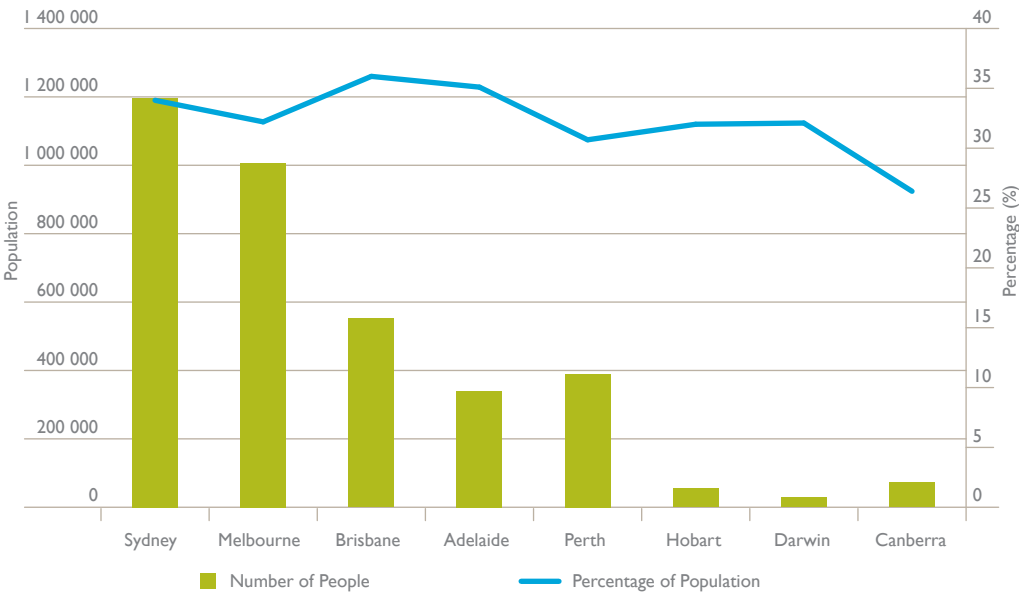
Note: Physical inactivity is defined as those aged 15 years and over who reported that they did not exercise in the two weeks prior to interview for the 2007–08 National Health Survey, through sport, recreation or fitness (including walking).

Based on ABS 2009c

Source: PHIDU 2011

Between the capitals, Canberra and Perth have the most physically active populations while the major cities of Queensland are the least active (Figure 5.23).

**Figure 5.23**      **Physical inactivity – number and proportion of persons aged 15 years and over, capital cities, 2007-08**



Note: Physical inactivity is defined as those aged 15 years and over who reported that they did not exercise in the two weeks prior to interview for the 2007-08 National Health Survey, through sport, recreation or fitness (including walking).

Based on ABS 2009c

Source: PHIDU 2011

## Social inclusion

Social inclusion refers to the degree to which people have access to opportunities and resources and can participate in civic life. Social inclusion is related to health because people who are socially included are more likely to have the resources (like healthy food, adequate housing, sufficient income) and opportunities to participate in education, employment and social and recreational activities that help to maintain good health.

The Social Inclusion Unit's *Compendium of Social Inclusion Indicators 2009* identifies poverty as among the most relevant factors that affect social inclusion. People with a low income are less likely to have the resources needed to participate in the activities, living conditions and amenities that are generally available to most people in society. Examining the level of inequality within and between cities and regions can help to understand which groups of people and which localities are more likely to be advantaged or disadvantaged in relation to the resources and opportunities available to them.

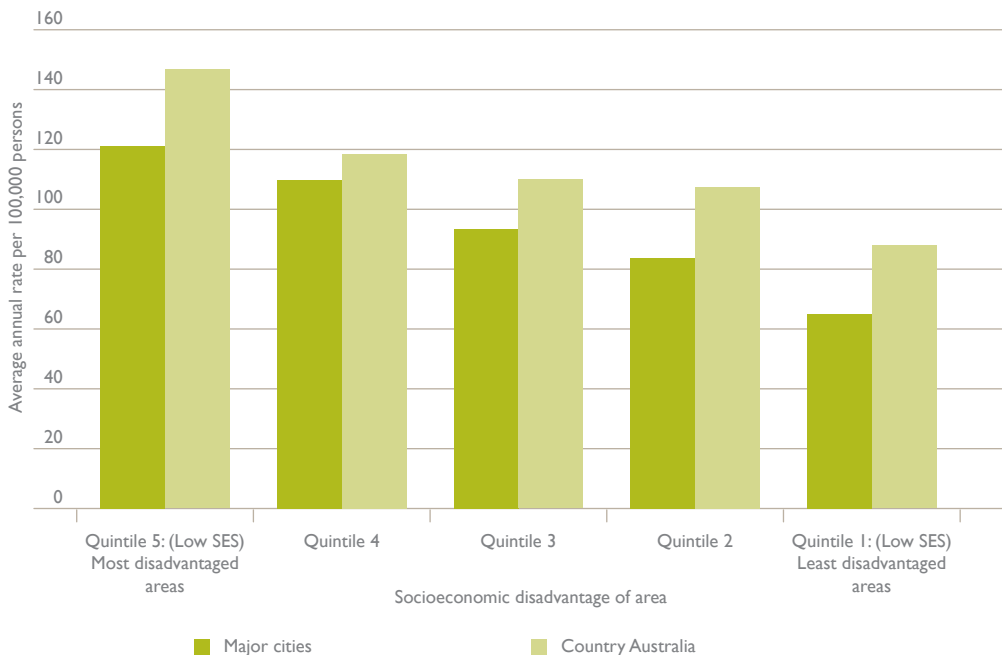


## Monitoring Inequality in Australia

*Monitoring Inequality in Australia 2010* is an online database published by the Public Health Information Development Unit at the University of Adelaide. It includes data on a range of population characteristics, including demography, socioeconomic status, health status and risk factors and use of health and welfare services. The data shows variations for each indicator by socioeconomic status. Data are shown in five groupings of areas (quintiles) each representing approximately one fifth (20 per cent) of the population. The quintiles range from the 20 per cent of the population living in the highest socioeconomic status (SES) areas (Quintile 1 - least disadvantaged) to the 20 per cent of the lowest SES areas (Quintile 5 - most disadvantaged).

Comparing areas within cities and non-metropolitan regions based on relative advantage or disadvantage in Figure 5.24 illustrates that, while the influence of inequality on health is apparent in Australia for both urban and regional communities, populations in the major cities are generally less likely to die from a preventable cause than people in country areas. This is regardless of socioeconomic levels.

**Figure 5.24** Preventable deaths at ages 0 to 74 by socioeconomic status (SES), major cities and country Australia, 2003 to 2007



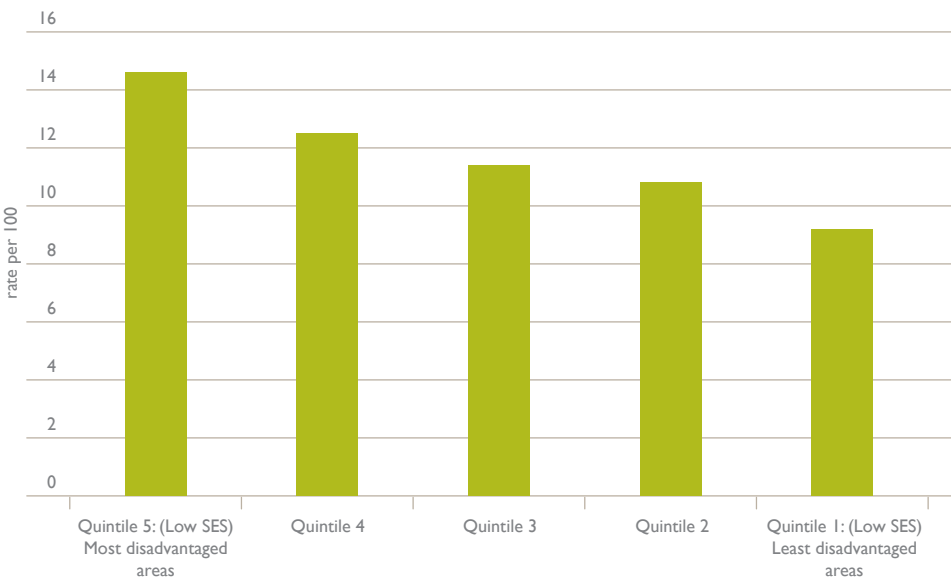
Note: \*Metropolitan areas are equivalent to the 18 major cities

Source: PHIDU 2010

## Mental health

Poor mental health can result from, and increases an individual's likelihood of, being socially excluded. Mental health problems are associated with unemployment, lower income and poor physical health. Levels of reported psychological distress in the metropolitan areas are related to income levels. Less than 10 per cent of people in the top fifth of incomes (quintile 1) in major cities report having high psychological distress compared with nearly 15 per cent of the people in the lowest income bracket (Figure 5.25).

**Figure 5.25** High or very high psychological distress levels for adults\*  
by socioeconomic status (SES), major cities, 2007-08



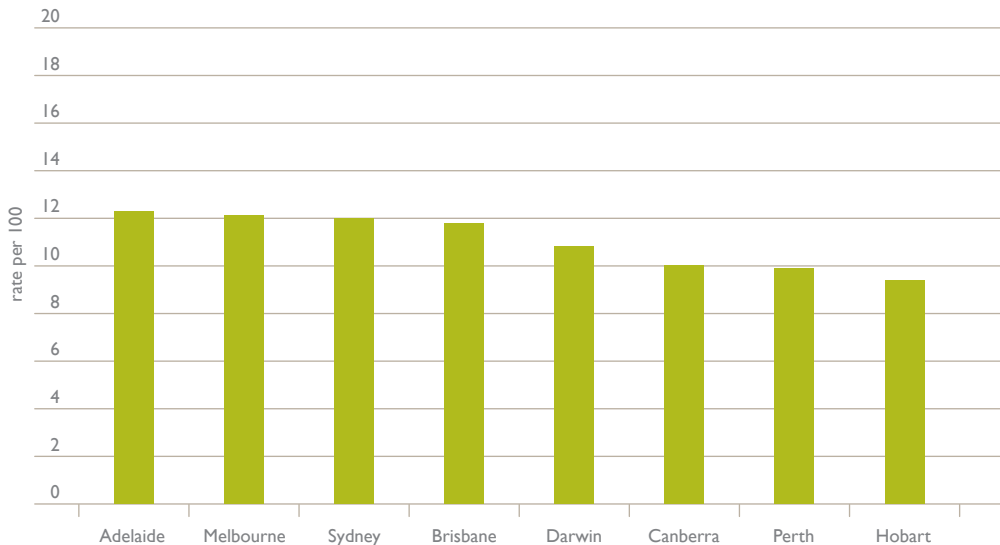
Note: The data have been derived from the Kessler Psychological Distress Scale-10 items (K-10), which is a scale of non-specific psychological distress based on 10 questions asked of respondents about negative emotional states in the 4 weeks prior to interview for the 2007-08 National Health Survey. 'High' and 'Very high' distress are the two highest levels of distress categories (of a total of four categories).

Based on ABS 2009c

Source: PHIDU 2010

There are some variations between capital cities in terms of rates of mental health problems, as indicated in Figure 5.26, with the larger capital cities displaying higher rates of high or very high psychological distress than the smaller capital cities.

**Figure 5.26** High or very high psychological distress levels, for adults in capital cities, 2008



Note: The data have been derived from the Kessler Psychological Distress Scale-10 items (K-10), which is a scale of non-specific psychological distress based on 10 questions asked of respondents about negative emotional states in the 4 weeks prior to interview for the 2007-08 *National Health Survey*. 'High' and 'Very high' distress are the two highest levels of distress categories (of a total of four categories).

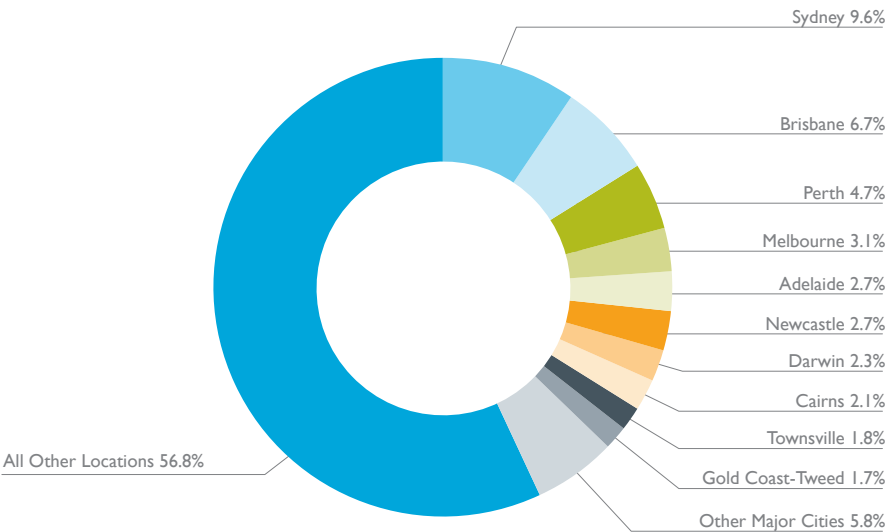
Based on ABS 2009c

Source: PHIDU 2010

## Urban Indigenous communities

*State of Australian Cities 2010* noted that about one third of Australia's Indigenous population lives in the major cities. Data from the 2006 Census shows that Sydney and Brisbane have the largest urban Indigenous populations of the capital cities with 48,640 and 33,905 Aboriginal and Torres Strait Islander people respectively, representing close to 15 per cent of the total Indigenous population. Although Melbourne has a greater total population than Brisbane or Perth, the Indigenous population of Melbourne is less than these two capitals and closer in numbers to that of the smaller capitals Adelaide and Darwin (Figure 5.27).

**Figure 5.27** Indigenous population in capital cities as a proportion of the total Indigenous population, 2006.



Source: ABS 2006

As noted previously, one important indicator of equality and social inclusion is employment status. The report *Overcoming Indigenous Disadvantage: Key Indicators 2011* shows that the unemployment rate for Indigenous people living in the major cities was 17 per cent in 2007, compared with the national unemployment rate of 4.2 per cent in 2007. Although a substantial gap remains between Indigenous and non-Indigenous unemployment rates, there has been a positive trend in the long-term unemployment rate in major cities for Indigenous 18 to 64-year-olds, which has decreased from 57 per cent in 1994 to 25 per cent in 2008 (Productivity Commission 2011).

## Transport and social inclusion

The connections between transport and social inclusion have recently been given greater consideration in urban research. Recent work in Victoria (Currie *et al* 2009; Delbosc and Currie, 2011 and Stanley *et al* 2011) has explored the spatial differences in measures of transport disadvantage, social exclusion and wellbeing in a survey of inner metropolitan, outer suburban, peri-urban and regional areas of Victoria. This showed very clear differences in mobility and car reliance between geographic locations. Car reliance peaked in Melbourne's fringe, with regional areas showing slightly less car reliance.

## Children and young people

According to the OECD, Australia provides well for children as measured by material well-being, education and health. The child poverty rate has fallen over the past decade and is now below the OECD average; reading scores are above the OECD average; and older children are less likely to be out of education or employment (OECD 2011a).

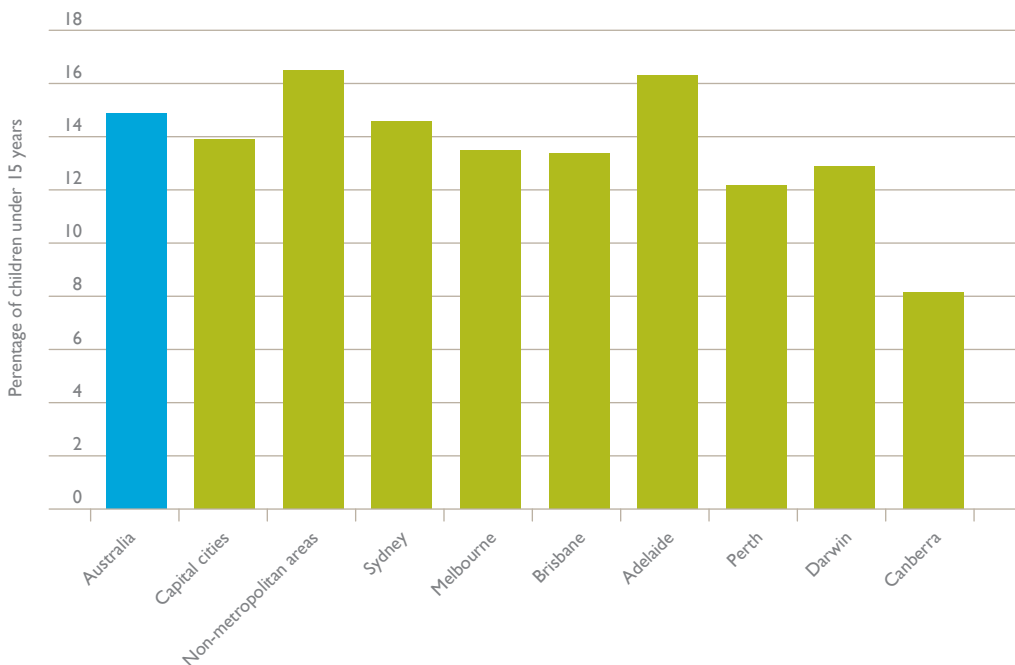
A report on child disadvantage in Australia (NATSEM 2011) identifies the two most important factors affecting the social inclusion level for children and young people which are growing up in a jobless households and participation in tertiary education.

Joblessness among sole parent families is a significant problem. With just over half of sole parents in employment in 2009, Australia compares poorly with other OECD countries and results in above average poverty for these families. This issue is of particular concern as about one in five children live in such households, and projections show that the number is likely to increase by 20 per cent over the next 25 years.

For children living in households where no adult has been engaged in paid work over the past two years there is an increased likelihood that they will also become unemployed adults.

According to ABS 2006 Census data (Figure 5.28) the percentage of Australian children aged under 15 years in jobless families was 14.8 per cent. The proportion of children in jobless families is lower in capital cities compared to the Australian average and compared to non-metropolitan areas. There are notable differences between major cities. Adelaide has the highest proportion of children in jobless families (16.2 per cent) and Canberra the lowest (8.1 per cent).

**Figure 5.28** Percentage of children 0 to 15 years in jobless households, 2006

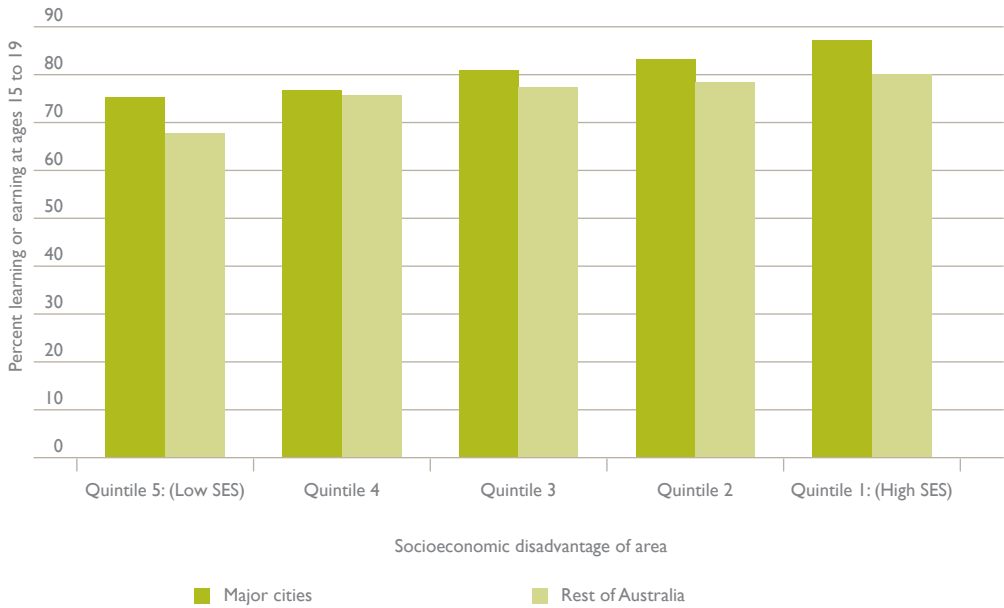


Note: Based on ABS 2006 Census data (unpublished)

Source: PHIDU 2011

In terms of participation in education or employment, ABS 2006 Census data shows that fewer young people from a low socioeconomic background and from regional and remote areas were learning or earning than other young people aged 15 to 19 years (Figure 5.29).

**Figure 5.29** Percentage of young people aged 15 to 19 years who are learning or earning, by socioeconomic status 2006



Note: Based on ABS 2006 Census data (unpublished)

Source: Source PHIDU 2010

## Older people

Elderly and frail aged people have high rates of disability and are more likely to need health care and specialised community services. An ageing population will increase demand for these services in most cities and regions.

Some major cities will have greater need for services than others but an emerging issue for all cities will be the rapid increase in the number of older people who have some form of dementia.

### Dementia and Alzheimer's Disease

In 2009, dementia and Alzheimer's disease were the third leading cause of death. The number of deaths in Australia from these causes has increased 126 per cent from 3,655 in 2000 to 8,277 in 2009. The impacts and increased need for support services will be felt in those cities with higher proportions of people over 65 years, especially in areas near regional cities where older people are relocating for retirement.

Not all people with dementia are older people, however. Newcastle and the Hunter region has become one of the few areas in Australia to address the need for specific support for people suffering from Younger Onset Dementia (ABC News Online 2011). The condition affects about 800 people under the age of 65 in the Hunter; which is about 10 per cent of the total number of people living with dementia and Alzheimer's in the Hunter region (Alzheimer's Australia 2010).

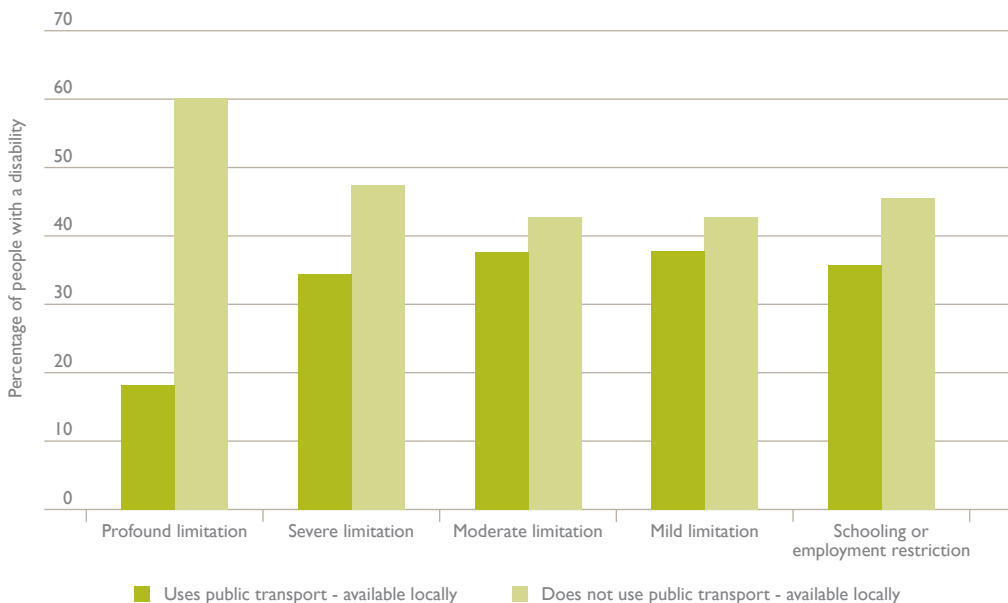
## People with a disability

Public transport use by people with disabilities is a good measure of social inclusion related to a city's transport services. When people with disabilities are restricted from using affordable and convenient local public transport, their ability to participate fully in the community is also significantly restricted.

*State of Australian Cities 2010* reported on the steady increase in the proportion of people with a disability over the past four decades related to the ageing of the population. According to the results of the most recent *ABS Survey of Disability, Ageing and Carers* (ABS 2011d) four million people in Australia (18.5 per cent) reported having a disability in 2009.

Of all people with a reported disability, 82 per cent had public transport available in their local area and the less severe a person's disability the more likely they were to use the available public transport. Figure 5.30 shows that 18 per cent of people with a profoundly limiting disability use public transport available locally compared with 38 per cent of those with a mildly limiting disability.

**Figure 5.30** Use of locally available public transport, by disability status, 2009



Source: ABS 2011d

## Healthy built environments

*State of Australian Cities 2010* reported that people living in neighbourhoods which support physical activity are more likely to be physically active, whether for recreational purposes or through incidental exercise.

Active travel refers to walking and cycling for travel purposes, and may also include walking or cycling to reach public transport. Walking and cycling are recognised as sustainable modes of transport and involve incidental exercise that has benefits for health and wellbeing.

Mixed-use, compact development that is well connected to jobs, facilities and services makes active travel a more viable option by keeping trip distances shorter. Shorter distances for travel in local areas are also easier with connected street patterns.

The provision of suitable walking and cycling infrastructure enables more people to use active travel for short journeys. Research reviewed by Kent *et al* (2011) has found that well maintained footpaths and bicycle paths encourage active travel, as does the provision of places to rest, bicycle parking and other end of trip facilities.

Higher residential density is often considered conducive to active travel. The research reviewed by Kent *et al* (2011) suggests, however, that increasing residential density alone does not necessarily encourage physical activity. Rather, a mix of social, economic and built form elements including mixed use and good urban design, in some combination, are more likely to influence levels of physical activity.

### Active travel

*State of Australian Cities 2010* used data collected in the 2006 Census to report on the types of transport people use to travel to work in the major cities. This Active Travel feature provides more detail on the non-motorised modes of travel in our cities.

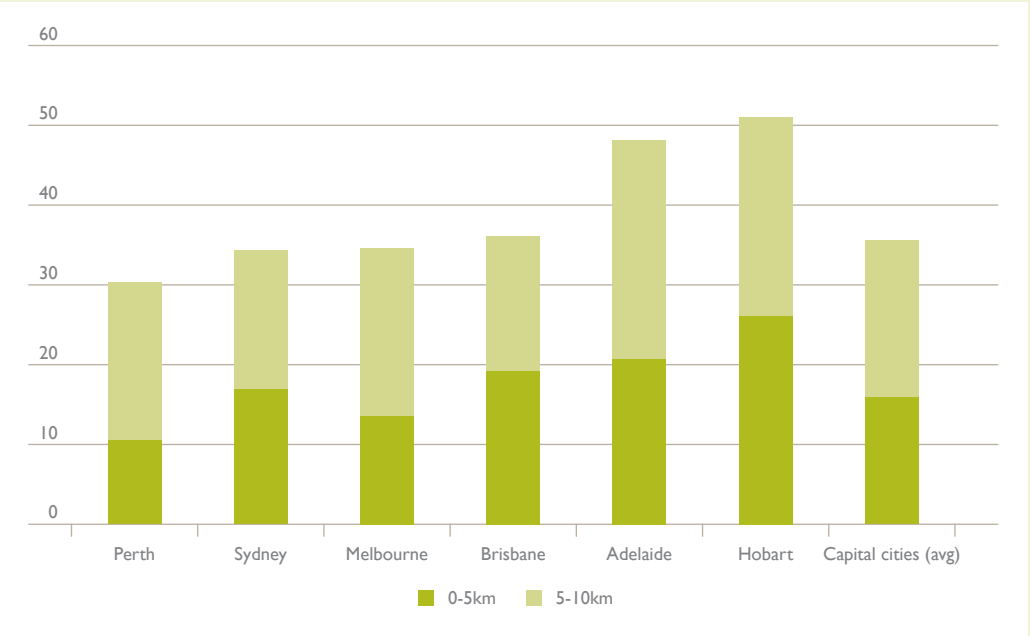
### Distance travelled by mode

The average distance that people commute to work or study differs across our cities. Some influencing factors include: the density and land use patterns of our cities; the attraction of the CBD as an employment centre; and the proximity of employment to residential communities. More than half the population in Hobart, for example, commutes less than 10 kilometres to work or study, compared with less than one third of the population in Perth (Figure 5.31).

For larger cities like Sydney, Melbourne and Brisbane there are significant differences in these factors across neighbourhoods and activity centres.



Figure 5.31 Proportion of all commutes that are less than 10 km by city

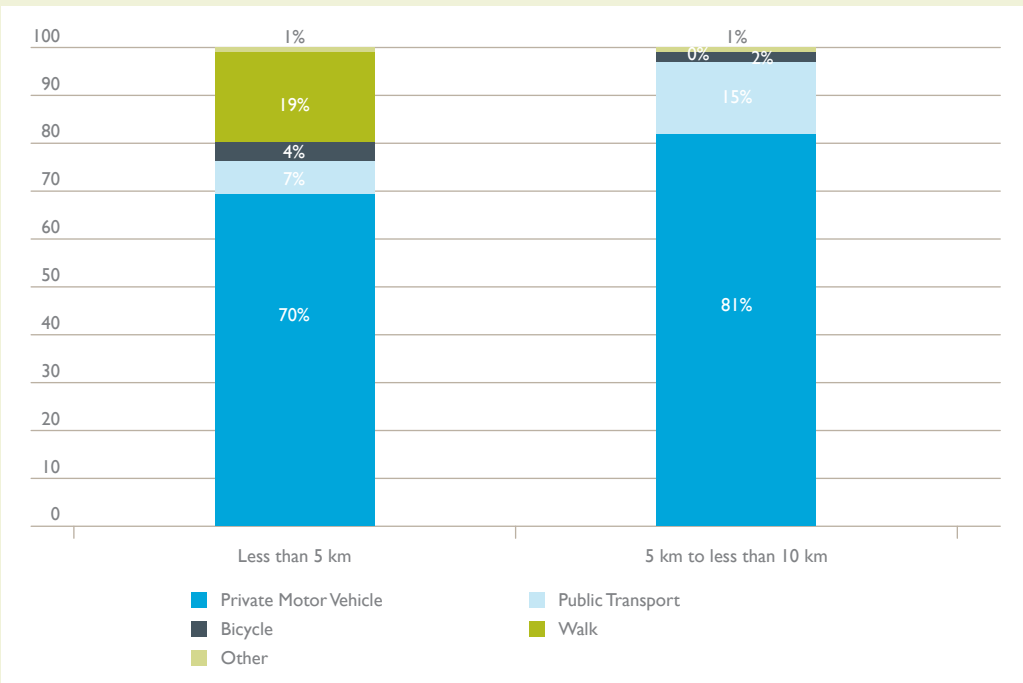


Source: ABS 2009d

There is much potential in our major cities to increase the mode share of active travel trips for trips of under five kilometres.

Figure 5.32 demonstrates that the majority of trips under five kilometres are currently undertaken by motorised transport (cars and public transport).

Figure 5.32 Mode share of trips under 5 km and 10 km in Australia



Source: ABS 2009d

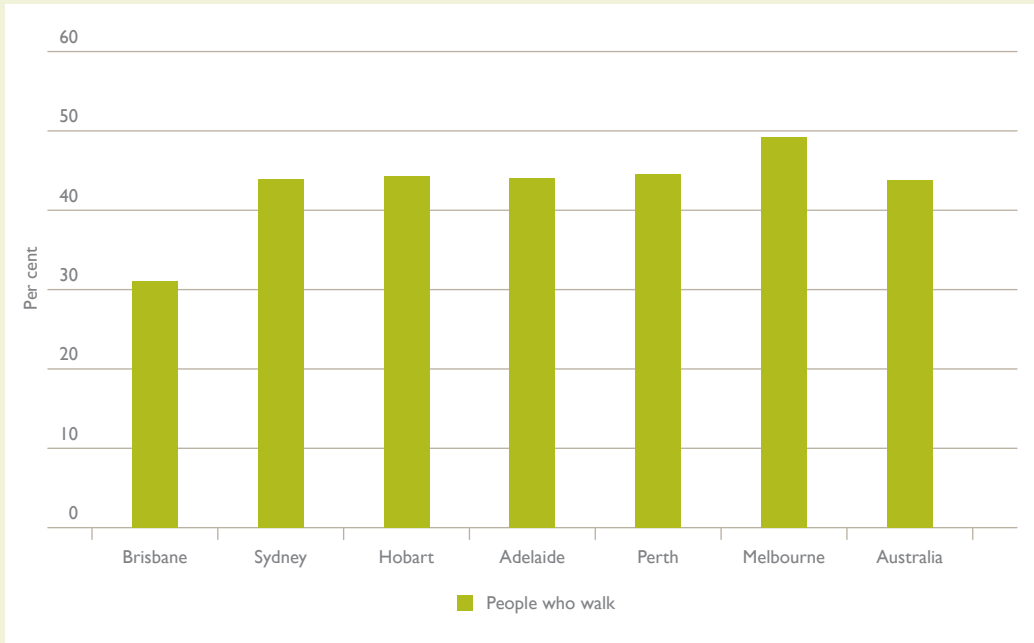
## Walking

Almost all trips contain a walking component, so good access, safety and amenity for pedestrians are vital to a well-functioning neighbourhood or city.

A survey undertaken by the ABS in 2009 found that across Australia about four per cent of people walk as the primary mode of travel to get to work or study (ABS 2009d). This proportion varies from State to State, with New South Wales having the highest mode share of walking and Western Australia the least.

Walking is used as a primary transport mode by many for day-to-day trips other than to work or study. Figure 5.33 shows that 49.2 per cent of people in Melbourne reported walking for transport for day-to-day non-commute trips.

**Figure 5.33** Percent of people who reported walking for transport for day-to-day trips other than work or full time study



Source: ABS 2009d

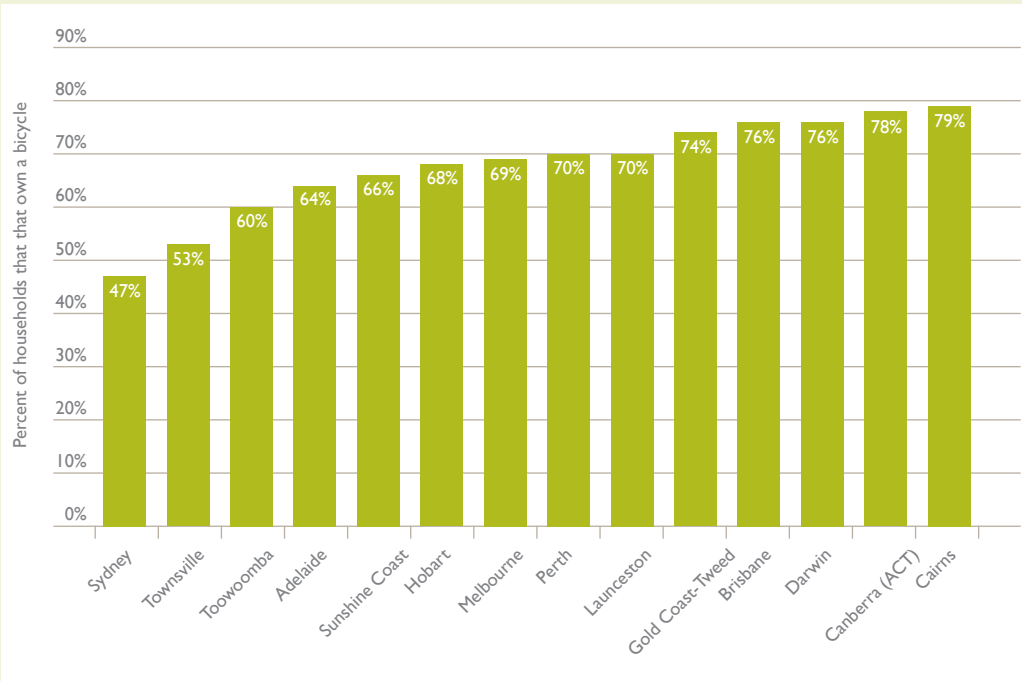
## Cycling

Cycling is becoming increasingly popular in Australia although like the United States, Canada and the United Kingdom, it lags well behind other OECD countries such as the Netherlands, Denmark, Switzerland and Japan.

## Bicycle Ownership

The majority of households in our major cities have access to a bicycle with bicycle ownership rates ranging from 47 per cent in Sydney to 79 per cent in Cairns (Figure 5.34).

Figure 5.34 Percent of households that own a bicycle, selected major cities



Note: Albury-Wodonga, Geelong, Newcastle and Wollongong are excluded because the small sample size makes the data unreliable for these cities.

Source: Munro 2011 adapted from data collected for the National Cycling Participation Survey.

Bicycles outsold cars in Australia every year between 2001 and 2010, with more than 11.5 million bikes being sold in that period, two million more bikes than cars (National Heart Foundation 2011).

## National Cycling Participation Survey 2011

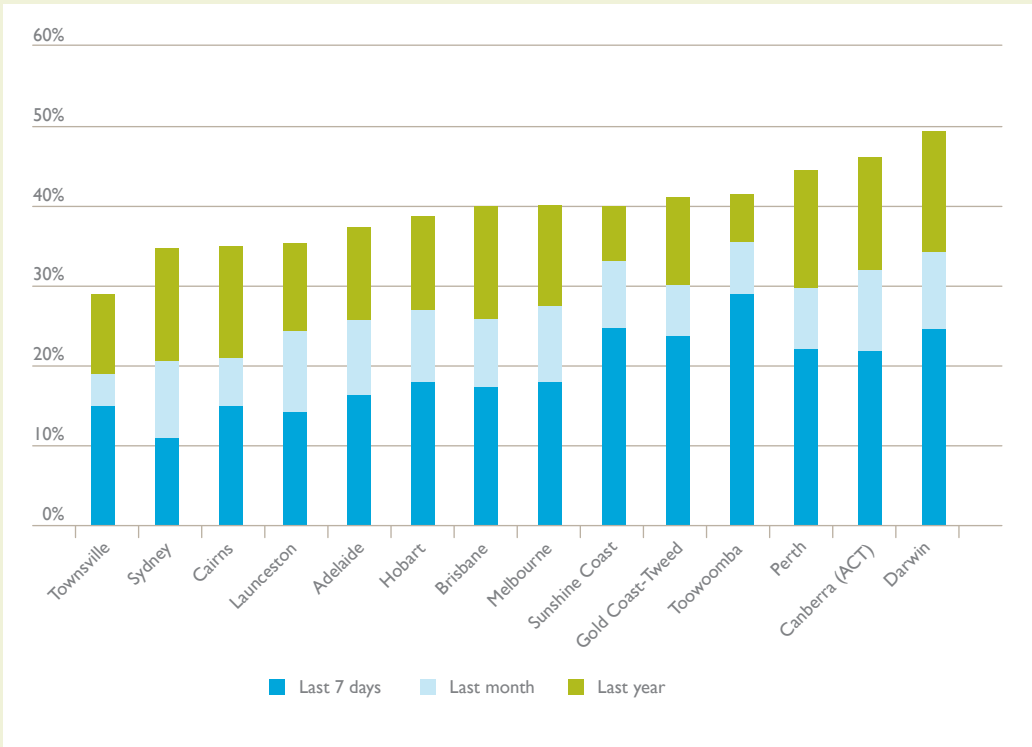
Through the *National Cycling Strategy 2011-2016*, all Australian governments have agreed to seek to double the number of people cycling between 2011 and 2016.

The Australian Bicycle Council commissioned a *National Cycling Participation Survey* of 10,000 households to establish baseline statistics for 2011. It found more than one in 10 adults had ridden a bicycle in the previous week and nearly a third had ridden at least once in the previous year.

Data for selected major cities shows that (Figure 5.35):

- Darwin, Canberra and Perth have the highest cycling participation rates of the major cities
- Toowoomba has the highest participation rate of regular (weekly) bicycle users
- Sydney has the least proportion of people who regularly ride
- Townsville has the lowest overall cycling participation of the major cities.

**Figure 5.35** Cycling participation as a proportion of resident population of selected major cities



Note: Albury-Wodonga, Geelong, Newcastle and Wollongong are excluded because the small sample size makes the data unreliable for these cities.

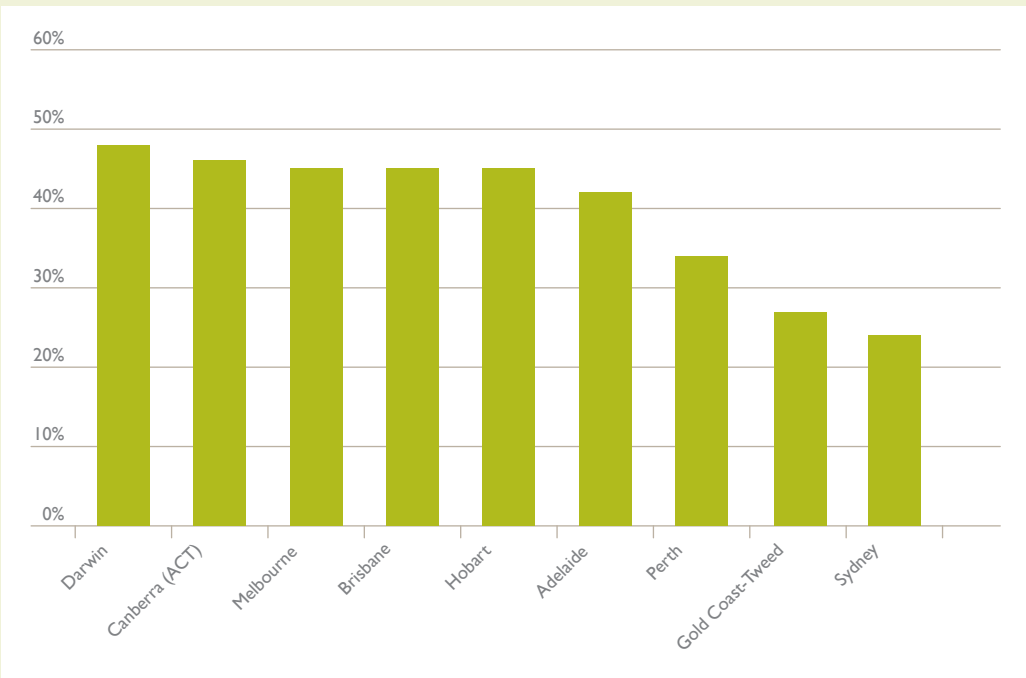
Source: Munro 2011 adapted from data collected for the National Cycling Participation Survey.

## Cycling for transport

There is also evidence that more people are riding to work. Of the people who regularly ride their bicycles, 38 per cent of people living in capital cities do so for transport purposes, compared with 29 per cent in regional areas (Figure 5.36).

Data from Sydney, Melbourne, Brisbane, Perth and Adelaide showed annual increases of up to 18.3 per cent on main cycle route use between 2005 and 2009. In Perth almost three million bicycle movements were recorded commuting to and from the CBD during 2010, three times more than in 1998 (Western Australia Department of Transport 2011). Despite this, a comparison between the 2001 and 2006 Census shows that while the number of people commuting to work increased, cycling's mode share of the national commute to work actually declined from 1.4 to 1.3 per cent. This was accompanied by growth in public transport patronage. It should be noted that the five-yearly Australian Census is held in August when weather can be inclement in some cities and therefore less conducive to active travel.

**Figure 5.36** Proportion of regular bicycle riders who ride for transport purposes



Source: Adapted from data collected for the Australian Bicycle Council 2011 National Cycling Participation Survey

## Safety

A perception that a city is safe for people and their property was the most highly rated attribute of liveability in the survey of Australian residents referred to earlier in this chapter (PCA 2011). Two main factors that contribute to people's sense of safety are their perceived risk of injury and their perceived risk of being a victim of crime. In Australia the incidence of crime is lower than the OECD average (OECD 2011).

### Road Safety

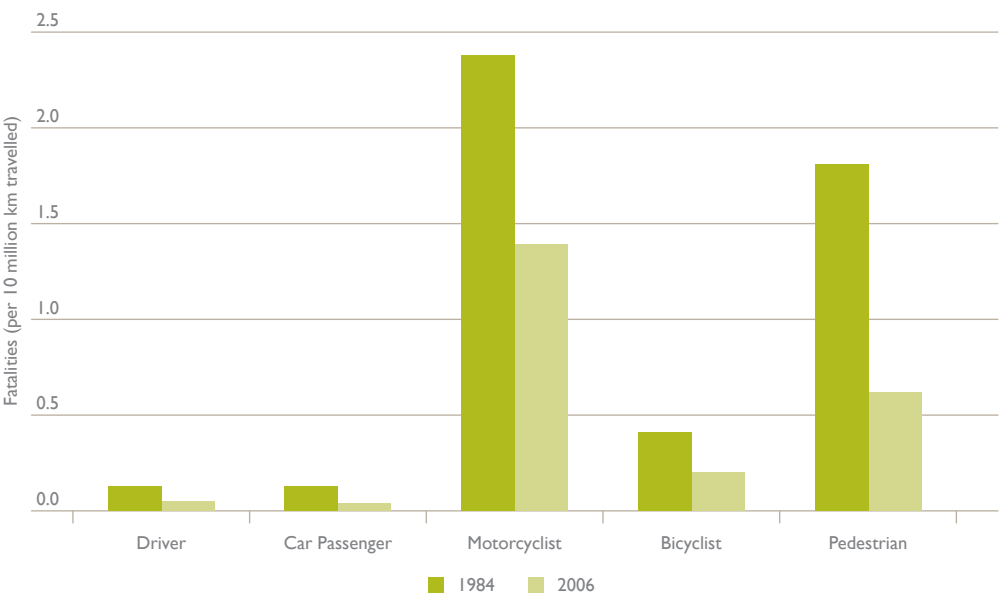
On average, four people are killed and 90 are seriously injured every day on Australia's roads.

The major cities have much lower rates of road deaths than regional and remote areas with four deaths per 100,000 people in major cities compared with 16 deaths and nearly 25 deaths per 100,000 for regional and remote areas respectively (Australian Transport Council (ATC) 2011).

Nevertheless, the numbers of road injuries and deaths in cities contributes to the fear of injury that influences people's travel and choice of transport mode, particularly for cyclists and pedestrians. A national survey conducted by the Cycling Promotion Fund and the National Heart Foundation found that more than 62 per cent of Australians cite road safety as the main reason for not riding a bicycle, or for riding less frequently. Fear is strongest among people who identify as infrequent bicycle riders (Taverner Research 2009). This fear was confirmed by 81 per cent of regular cyclists of whom only 19 per cent said they felt unsafe riding in traffic despite 76 per cent of respondents claiming they felt confident in their ability to ride in traffic (Taverner Research 2009).

The *National Road Safety Strategy 2011-2020* reports that between 1980 and 2010, the nation's annual road fatality rate declined from 22.3 to 6.1 deaths per 100,000 people (ATC 2011). This is further illustrated by Figure 5.37 which shows that for transport modes, with the exception of motorcycling, the 2006 fatality rate is between one half and one quarter of the 1984 rate (Austroads 2010).

**Figure 5.37      Fatality rates (per 10 million km travelled) 1984 and 2006**



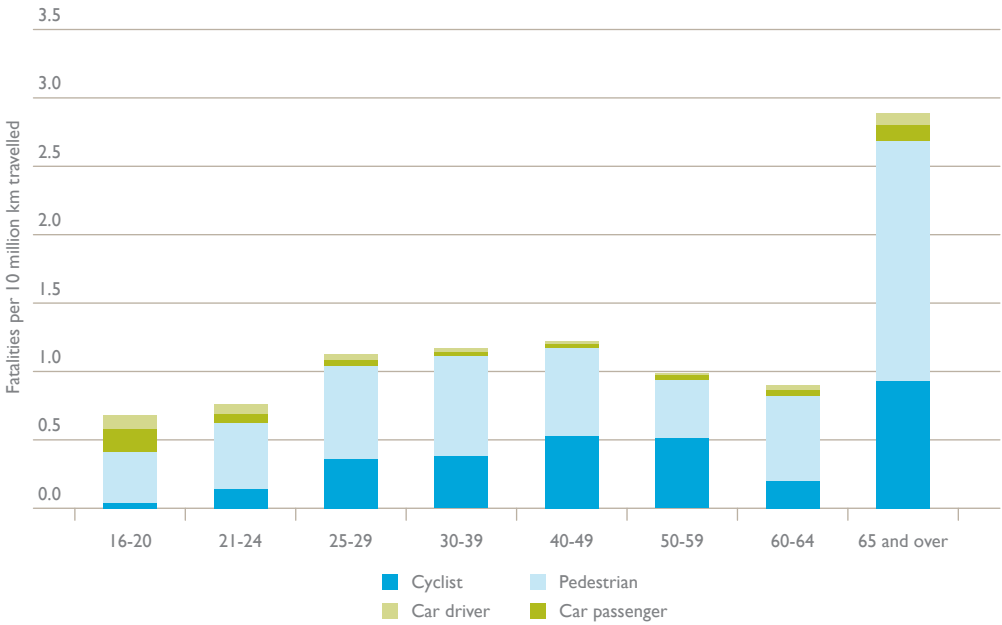
Source: Austroads 2010

Factors that have helped to improve urban road safety over the past decade include:

- 50km/h urban default speed limits, linked to a 20 per cent reduction in casualty crashes
- Introduction of 40km/h and lower in high-risk pedestrian and school areas
- Greater enforcement of speed limits, particularly in urban areas to address low-range speeding
- Greater acceptance among the community of reduced speeds in built-up areas.

The current *National Road Safety Strategy 2011–2020* aims to reduce the number of serious road crash injuries and fatalities by at least 30 per cent by 2020. It prioritises the improvement of road safety for pedestrians, bicycle riders, motorcyclists and young drivers in particular.

**Figure 5.38**      **Fatality and serious injury rates for cyclists and pedestrians**  
**(per 10 million km travelled) by age 2002-2006**



Source: Austroads 2010

## Cycling fatalities

Perceptions of increased risk are not consistent with the data. In proportion to total road fatalities and in light of increasing cycling participation rates, cycling fatality rates have remained low and fairly static over the past decade and there has only been mild growth in the numbers of injuries (Austroads 2010).

## Pedestrian fatalities

In 2010 pedestrian fatalities as a proportion of total road fatalities averaged between 24 and 30 per cent for Australia's five largest cities, and this reflects the national average over the past decade (Austroads 2010). Serious injury rates for male pedestrians are highest for the 21 to 25-year-old group and decline with age until 65 and over (Austroads 2010). Serious injury rates for female pedestrians are highest for the 26 to 29-year-old group and then also decline with age until 65 and over (Austroads 2010) (Figure 5.38).

In the Melbourne metropolitan area in the period from 2006 to 2010 alcohol was a factor in 90 of 177 (50.8 per cent) of pedestrian fatalities, and 41 per cent of all pedestrians killed and injured (Vicroads 2011).



## *Safety using public transport*

In contrast to the risk of personal injury which is the main safety concern for road users, fear of crime is frequently referred to as a safety concern for public transport users. International research has shown that fear of crime is now widely recognised as a barrier to public transport use (Booz and Company 2008; Crime Concern 2002). However, Australian studies have shown that very few men or women cited concerns about personal safety as a reason for not using public transport for their usual journey to work or study (ABS 2008; Transport Data Centre 2009).

Surveys of customer satisfaction in Sydney and Perth suggest that more than 90 per cent of bus and train passengers are satisfied with their level of safety (Transport Data Centre 2009; Transperth 2010). Transperth states that while 98 per cent of train passengers indicate they feel safe during the day, there are still reasonably high figures for nights with 75 per cent saying they felt safe on board a train at night while 70 per cent said they felt safe at stations at night. Similar figures applied to buses (Western Australia Public Transport Authority 2010). In Melbourne a recent report focusing on concerns for personal safety for people using public transport suggested that media coverage itself is acting to influence perceptions (Currie *et al* 2010).

## **Accessibility**

Urban accessibility refers to the ease with which people can reach employment and training opportunities, facilities, services and social activities within cities. Good accessibility means that a majority of people in an urban area are able to take advantage of these resources and opportunities within a reasonable amount of time and cost.

The way our cities and neighbourhoods are planned and the extent and reliability of transport infrastructure largely determines urban accessibility.

## *Access to employment*

Nearly 72 per cent of the working-age population aged 15 to 64 has a paid job, considerably higher than the OECD average of 65 per cent. Australia escaped the worst of the global recession and, as noted in Chapter 3, the Australian unemployment rate is one of the lowest in the OECD.

Despite the strength of the national economy, there remain specific localities and cities where large groups of people are either unemployed or underutilised, that is, people who are working below their skill level or for fewer hours than they would prefer. More than 60 per cent of involuntary part-time workers have no post-school qualifications and one-third of them are aged under 25. A challenge for cities and communities is to address spatial concentration of under-utilised labour by improving access to better education, training and employment opportunities and transport to link people to these opportunities.

## *Access to services by public transport*

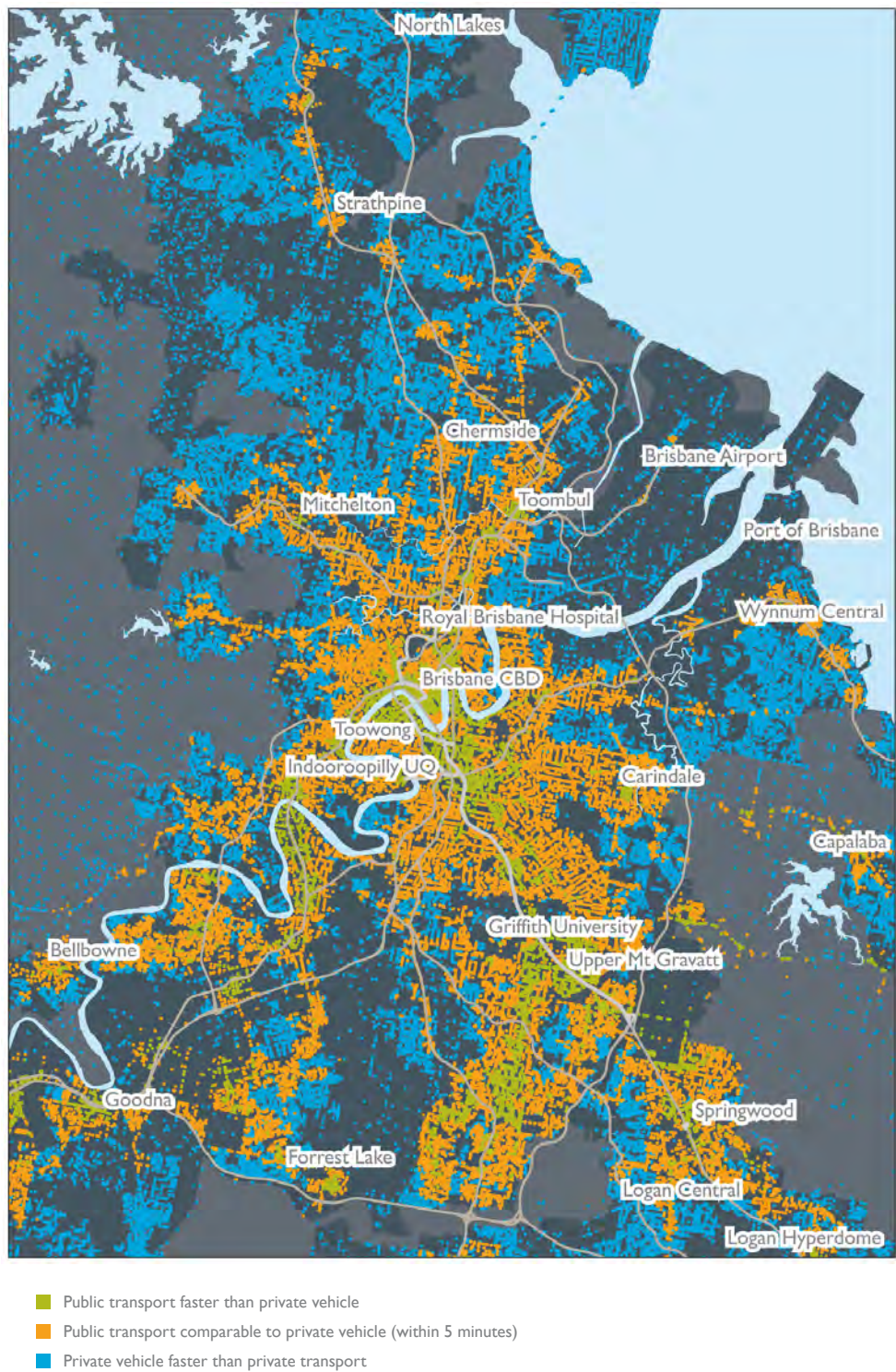
Public transport systems enable access to services and facilities and provide a relatively low cost method of travel.

According to the ABS (2008), the most commonly reported reason for not using public transport to get to work or study was that there was no service available at a convenient time (28 per cent). A similar proportion (27 per cent) indicated that they did not use public transport because of the convenience, comfort and privacy offered by travel in their own vehicle.

Over recent years, the Queensland Government and Brisbane City Council have made significant improvements to public transport networks and services within Brisbane. Public transport has become the transport mode of choice for many people travelling to Brisbane's central business district.

Figure 5.39 shows that it is quicker to get to the central business district by public transport than private vehicle from many areas of Brisbane. In many more areas there is no time difference between public and private transport.

Figure 5.39      Public and private transport access to Brisbane’s central business district



Source: Queensland Department of Transport and Main Roads 2011

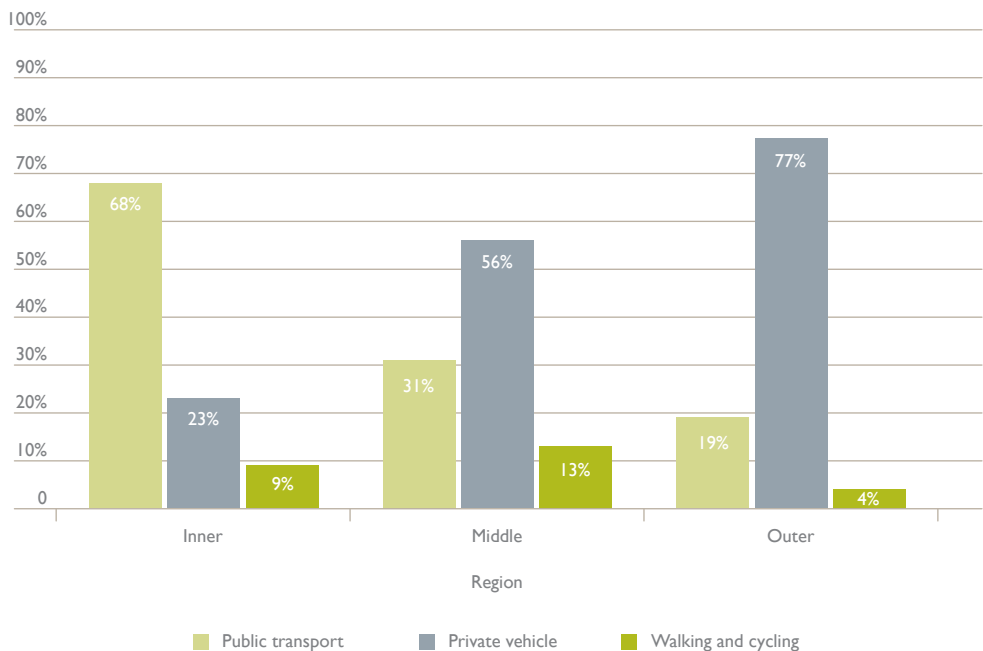
### Access to higher education and vocational training

Australian universities are typically located in major cities and serve students from across Australia and the world. Within cities, universities are a focal point for research and innovation, attracting knowledge industries and generating skilled employment. Frequent and convenient public transport services to higher education facilities can help to enable people, especially those on low incomes, to gain skills and qualifications.

Traditionally located in the centre of cities, more recently established universities tend to be further afield where students, staff and employees are more likely to need a car for travel. The cost of travel in time and fuel can be a barrier to access to higher education and training for people on low incomes, especially students. The issue of fuel price vulnerability was reported for households in the *State of Australian Cities 2010*.

Fuel vulnerability will affect accessibility for different groups of people. In the case of accessing higher education, Figure 5.40 illustrates the distribution of travel mode to higher education institutions across three regions in Melbourne. There is a substantial cluster of these institutions in the inner and middle rings where access by public transport is higher than in the outer areas. More than three quarters of trips by people in the outer metropolitan regions to tertiary education are by private vehicle whereas the majority of trips to educational institutions by people living in the inner area are made by public transport. There is a potential risk of experiencing transport related social exclusion from higher education for people living in these outer areas if fuel prices rise substantially.

**Figure 5.40** Journey to higher education by travel mode, Melbourne 2009-10



Source: Victoria Department of Transport 2011



Source: Victoria Department of Transport 2011

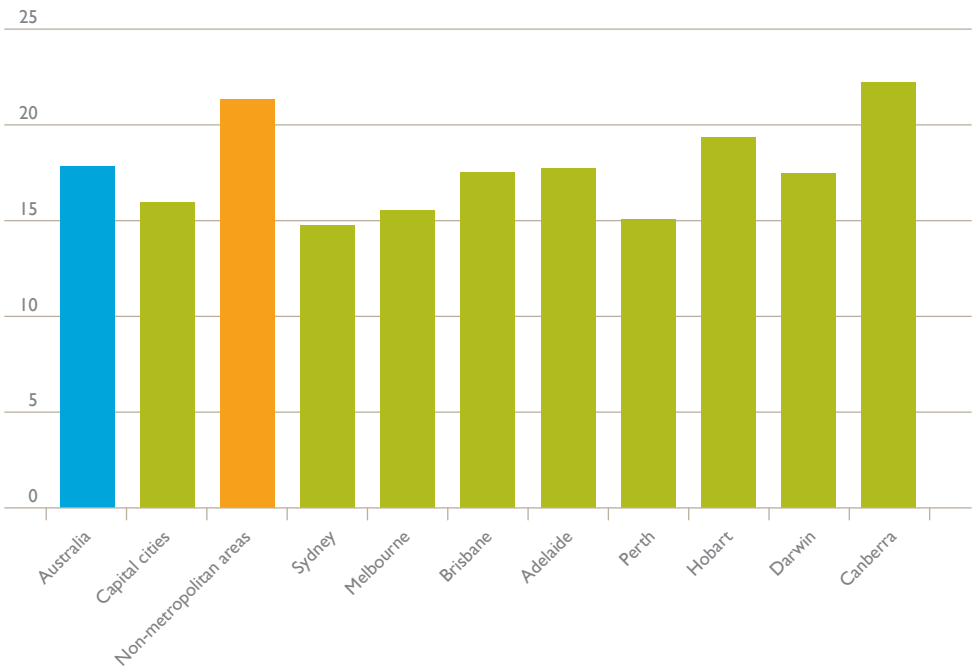
# Community Wellbeing

In line with a broader global movement to redefine the meaning and measurement of the progress of societies ‘beyond GDP’ a number of Australian States and local governments have developed measures of community wellbeing. Community wellbeing brings together economic, social and environmental factors with democratic, spiritual, emotional and cultural dimensions. It values healthy individuals as well as healthy communities; reflects new and traditional learning; and seeks to increase both the equity and sustainability of well-being (West *et al* 2010).

The *Community Indicators Victoria Survey* (2007) is a new data set derived from survey of approximately 24,000 Victorians involving 300 residents in all 79 local government areas across Victoria. Local governments in other States are drawing from the Victorian Community Indicators framework to develop similar data sets, though there is no uniform set that is applied nationally.

Volunteering is one of the indicators of community connectedness and wellbeing. The Victorian Community Survey found that there was a strong correlation between the rate of volunteering within a local government area and the degree to which people felt they were part of the community. Figure 5.4I shows the rate of volunteering in the capital cities for 2006 compared to the national average and to non-metropolitan areas. Volunteering is generally higher in non-metropolitan areas than the capital cities. However, Canberra stands out as the city with the highest rate of volunteering, higher than the national average and even higher than in non-metropolitan areas.

**Figure 5.4I**      **Percentage of population aged 15 years and over who participated in voluntary work**



Note: Based on ABS 2006  
Source: PHIDU 2011



## Conclusion

The characteristics of liveable cities are mutually reinforcing. A city that offers good amenity and quality urban design will also be healthier. A city that is affordable and accessible will support social inclusion and equality. A city that is planned to support social cohesion will be safer, with higher levels of wellbeing and quality of life for its residents. In turn, the liveability of cities will contribute to their productive potential.

## Chapter 5 References

ABC News Online 2011, 'Newcastle gets young dementia support program', 20 September, <http://www.abc.net.au/news/2011-09-20/newcastle-young-dementia-support/2907304> [Accessed 22.09.2011]

Access Economics 2011, *Caring Places: planning for aged care and dementia 2010-2050: A report prepared for Alzheimer's Australia*, Alzheimer's Australia Canberra.

Alzheimer's Australia 2010, *HOPE: Helping other possibilities emerge*, Newsletter, July, Alzheimer's Australia, Canberra.

Australian Bureau of Statistics (ABS) 2006, *Census of Population and Housing*, cat. no. 2069.0, Canberra.

ABS 2008, *Australian Social Trends, Public Transport Use for Work and Study*, cat. no. 4102.0, Canberra.

ABS 2009a, *Housing Occupancy and Costs 2007-08*, cat. no. 4130.0, Canberra.

ABS 2009b, *Experimental Life Tables for Aboriginal and Torres Strait Islander Australians, 2005-2007*, cat. no. 3302.0.55.003, Canberra.

ABS 2009c, *National Health Survey: Summary of Results, 2007-2008* (Reissue), cat. no. 4364.0, Canberra.

ABS 2009d *Environmental Issues: Waste Management and Transport Use*, March 2009, cat. no. 4602.0, Canberra.

ABS 2009e, *Housing and Mobility Conditions*, cat. no. 4130.0.55.02, Canberra.

ABS 2010, *Yearbook Australia 2009-10*, cat. no. 1301.0, Canberra.

ABS 2011a, *House Price Indexes, eight capital cities*, cat. no. 6416.0, Canberra.

ABS 2011b, *Household Expenditure Survey, Australia 2009-10: Summary of Results*, cat. no. 6530.0, Canberra.

ABS 2011c, *Causes of Death, Australia, 2009* cat. no. 3303.0, Canberra.

ABS 2011d, *Disability, Australia, 2009*, cat. no. 4446.0, Canberra.

ABS 2011e, *Motor Vehicle Census 2010*, cat. no. 9309.0, Canberra.

Australian Competition and Consumer Commission (ACCC) 2010, *ACCC reports on unleaded petrol prices costs and profits*, Canberra. <http://www.accc.gov.au/content/index.phtml/itemId/962278> [Accessed 20.09.2011]

Australian Department of Infrastructure, Transport, Regional Development and Local Government, 2008, *Fatal and serious road crashes involving motorcyclists*, Monograph 20, Commonwealth of Australia, Canberra.

Australian Transport Council (ATC) 2011, *National Road Safety Strategy 2011-2020*, Canberra. [http://www.infrastructure.gov.au/roads/safety/national\\_road\\_safety\\_strategy/index.aspx](http://www.infrastructure.gov.au/roads/safety/national_road_safety_strategy/index.aspx) [Accessed 15.09.2011]

Austrroads 2010, *The Road Safety Consequences of Changing Travel Modes*, Austrroads Publication No. AP-R361/10, Sydney.

Austrroads 2011, *Australian National Cycling Strategy 2011-2016*, Australian Bicycle Council, Sydney.

Baum, S & Gleeson, B 2010, 'Space and Place: Social Exclusion in Australia's Suburban Heartlands', *Urban Policy and Research* 28 2:135-159.

Bauman A, Rissel C, Garrard J, Ker, I, Speidel, R & Fishman, E 2008, *Cycling: Getting Australia Moving: Barriers, facilitators and interventions to get more Australians physical active through cycling*, Cycling Promotion Fund, Melbourne

Booz and Company 2008, *Personal Security in Public Transport Travel in NZ: Problems Issues and Solutions*, Land Transport New Zealand Research Report 344, Land Transport New Zealand, Wellington <http://www.nzta.govt.nz/resources/research/reports/344/index.html> [Accessed 15.09.2011]

Box, S, Hale, C & Andrews, G 1988, 'Explaining Fear of Crime', *British Journal of Criminology*, 28 3:340-356.

Bunker, R, Holloway, D & Randolph, B 2005, *The social outcomes of urban consolidation in Sydney*, City Futures Research Centre University of New South Wales, Sydney.

Bureau of Meteorology 2011, Climate data online. <http://www.bom.gov.au/climate/data/> [Accessed 11.10.2011]

Council of Australian Governments (COAG) 2011, COAG Meeting Canberra 19 August 2011 Communiqué, [http://www.coag.gov.au/coag\\_meeting\\_outcomes/2011-08-19/index.cfm](http://www.coag.gov.au/coag_meeting_outcomes/2011-08-19/index.cfm) [Accessed 19.09.2011]

Crime Concern 2002, *People Perceptions of Personal Security and Their Concerns about Crime on Public Transport: Literature review*, Department for Transport (UK), London.

Currie, G, Richardson, T, Smyth, P, Vella-Brodrick, D, Hine, J, Lucas, K, Stanley, J, Morris, J, Kinnear, R, Stanley, J, 2009. 'Investigating links between transport disadvantage, social exclusion and well-being in Melbourne – preliminary results. *Transport Policy* 13:3.

Currie, G, Delbosc, A & Mahmoud, S 2010, 'Perceptions and Realities of Personal Safety on Public Transport for Young People in Melbourne', paper delivered at the Australasian Transport Research Forum 29 September to 1 October 2010, Canberra.

Delbosc, A & Currie, G 2011, 'The spatial context of transport disadvantage, social exclusion and well-being', *Journal of Transport Geography*, 19 6:1130-1137.

The Economist Intelligence Unit (EIU) 2011a, *Worldwide cost of living 2011*, The Economist, London.

EIU 2011b, *Cities' Liveability 2011*, The Economist, London.

Henley, G & Harrison, J 2011, *Trends in serious injury due to land transport accidents, Australia 2000-01 to 2007-08*, Injury research and statistics series no. 54, Australian Institute of Health and Welfare, Canberra.



- Kent, J, Thompson, SM & Jalaludin, B 2011 *Healthy Built Environments: A review of the literature*, Healthy Built Environments Program, City Futures Research Centre, University of New South Wales, Sydney. <http://www.fbe.unsw.edu.au/cf/hbep/publications/> [Accessed 12.09.2011]
- Kelly, JF, Weidmann, B & Walsh, M 2011, *The Housing We'd Choose*, Grattan Institute, Melbourne.
- Kulish, M, Richards, A & Gillitzer, C 2011 *Urban structure and housing prices: some evidence from Australian cities* Research Discussion Paper 2011-03 September 2011, Economic Group, Reserve Bank of Australia, Sydney.
- Medibank Private 2008, *The cost of physical inactivity*. <http://www.medibank.com.au> [Accessed 03.10.2011]
- Mercer Corporation 2010, *Worldwide Quality of living highlights*. <http://www.mercer.com/surveys/quality-of-living-report> [Accessed 28.08.2011]
- Mercer Corporation 2011, *Mercer Cost of Living Survey Highlights*. <http://www.mercer.com/costofliving> [Accessed 28.08.2011]
- Minnery, J, Adkins, B, Grimbeek, P, Summerville, J, Mead, E & Guthrie, D 2002, *Tenure security and its impact on private renters in Queensland*, Australian Housing and Urban Research Institute (AHURI), Melbourne.
- Munro, C 2011, *National Cycling Participation Survey 2011*, Australian Bicycle Council, Sydney.
- National Heart Foundation 2011 *Riding a Bike for Transport 2011 Survey Findings* National Heart Foundation and Cycling Promotion Fund. <http://www.cyclingpromotion.com.au> [Accessed 04.10.2011]
- National Housing Supply Council (NHSC) 2010, *2nd State of Supply Report 2010*, Commonwealth of Australia, Canberra.
- National Centre for Social and Economic Modelling (NATSEM 2011) *Unequal Opportunities: Life chances for children in the 'Lucky Country'* The Smith Family, Sydney.
- Organisation for Economic Cooperation and Development (OECD) 2011a, *Better Life Index*, OECD, Geneva. <http://www.oecdbetterlifeindex.org/> [Accessed 29.09.2011.]
- OECD 2011b *Obesity and the Economics of Prevention: Fit not Fat - Australia Key Facts* [http://www.oecd.org/documentprint/0,3455,en\\_33873108\\_33873229\\_46038593\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/documentprint/0,3455,en_33873108_33873229_46038593_1_1_1_1,00.html) [Accessed 29.09.2011]
- PricewaterhouseCoopers (PwC) 2011, *Cities of Opportunity 2011*, The Partnership for New York City, New York.
- Productivity Commission 2011, *Overcoming Indigenous Disadvantage: Key Indicators 2011*. <http://www.pc.gov.au/gsp/reports/indigenous/key-indicators-2011> [Accessed 23.09.2011]
- Property Council of Australia (PCA) 2011 *My city: the people's verdict*. Report prepared by Auspoll for the Property Council of Australia, Sydney.
- Public Health Information Development Unit (PHIDU) 2010 *Monitoring Inequality in Australia, 2010 Online Data* <http://www.publichealth.gov.au/inequality-graphs/monitoring-inequality-in-australia-introduction.html> [Accessed 11.10.2011]
- PHIDU 2011 *A Social health atlas of Australia, 2011*, [http://www.publichealth.gov.au/interactive-mapping/a-social-health-atlas-of-australia\\_-2011.html](http://www.publichealth.gov.au/interactive-mapping/a-social-health-atlas-of-australia_-2011.html) [Accessed 11.10.2011]
- Queensland Department of Transport and Main Roads 2011 'Public and private access to Brisbane's central business district', Unpublished data courtesy of Data & Analysis Centre, Queensland Department of Transport and Main Roads, Brisbane.

Randolph, B 2007, 'The Changing Australian City: New Patterns, New Policies and New Research Needs', *Urban Policy and Research* 22 4:481-493.

Reserve Bank of Australia 2011, *Exchange Rates*, Reserve Bank of Australia, Sydney. <http://www.rba.gov.au/statistics/hist-exchange-rates/index.html> [Accessed 04.10.2011]

Sherry, C 2006, 'Termination of Strata Schemes in New South Wales – Proposals for reform', *Australian Property Law* 13:227-239.

Social Inclusion Unit 2009 *How's Australia faring? Social inclusion: A compendium of social inclusion indicators*. A compilation of comparative data undertaken by the Australian Social Inclusion Board, Social Inclusion Unit, Department of the Prime Minister and Cabinet, Canberra.

Stanley, JK, Hensher D, Stanley, JR, Vella-Brodrick, D, 2011 Mobility, social exclusion and well-being: Exploring the links *Transportation Research Part A* 45:789–801.

Taverner Research 2009, *Sydney Cycling Research*. <http://www.taverner.com.au/index.htm> [Accessed 23.09.2011]

Transport Data Centre 2009, *2007 household travel survey summary report*, NSW Ministry of Transport, Sydney.

The Treasury 2009, *Australia's future tax system: Report to the Treasurer December 2009*, Part Two Detailed analysis, Vol 2, Canberra.

Trubka, R, Newman, P & Bilsborough, D 2008, *Assessing the costs of alternative development paths in Australian Cities*. Report commissioned by Parsons Brinckerhoff, Curtin University Sustainability Policy Institute, Perth.

UN HABITAT 2011, *State of the World's Cities 2010-2011: Bridging the urban divide*, United Nations Human Settlements Programme, London.

URBIS 2010, *National Dwelling Costs Study Report*, National Housing Supply Council, Canberra.

Vicroads 2011 *Crashstats*. <http://www.vicroads.vic.gov.au/Home/SafetyAndRules/AboutRoadSafety/StatisticsAndResearch/CrashStats.htm> [Accessed 11.09.2011]

Victoria Department of Transport 2011 Unpublished data from 2009/10 Victorian Integrated Survey of Travel and Activity (VISTA), courtesy of The State of Victoria, Department of Transport, Melbourne.

Weidmann, B & Kelly, J-F 2011, *What Matters Most? Housing preferences across the population*, Grattan Institute, Melbourne.

Western Australia Department of Transport 2011 *Monitoring of Perth Bicycle Network*. Report prepared for the Department of Transport: Bikewest by Painted Dog Research, June 2011, Government of Western Australia, Perth. <http://www.transport.wa.gov.au/cycling/20051.asp> [Accessed 10.09.2011]

Western Australia Public Transport Authority 2010, *Annual Report 2009-10* <http://www.pta.wa.gov.au/Portals/0/annualreports/2010/transperth/key-service-measures/index.html>

Whitzman, C & Mizrachi, D 2009, *Vertical Living Kids: creating supportive high rise environments for children in Melbourne, Australia: A Report to the Victorian Health Promotion Foundation*, Faculty of Architecture, Building and Planning, University of Melbourne Melbourne.

Wilkinson, R, & Pickett, K 2010, *The Spirit Level: why equality is better for everyone*, Penguin, London.

*State of Australian Cities 2010* noted that governance refers to the political and legal structures and mechanisms used to manage and coordinate our urban systems, how they interrelate with each other and 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 2010 report, and highlights progress on the COAG cities agenda and findings of the Productivity Commission into Planning, Zoning and Development Assessments.

### Key findings

- Revisions to ministerial council arrangements under COAG have seen the establishment of a new Standing Committee on Transport and Infrastructure. This Committee will progress the agenda of the former Australian Transport Council and COAG Infrastructure Working Group. It will also have long-term involvement in the implementation of the *National Urban Policy* and COAG cities reform agenda.
- The Productivity Commission has pointed to the need for improved governance arrangements to achieve greater efficiency and effectiveness of cities.
- The governance structure of Australia's major cities differs between States and Territories, and between capital and regional cities within them. There is evidence to support significant integration of the different levels of major city planning, infrastructure provision and management, particularly in capital cities.

### The Australian federation as it relates to major cities

There are three spheres of government in Australia: the Australian Government, six State and two Territory governments, and 565 local governments. The 18 major cities with populations above 100,000 comprise 158 local governments between them, plus the ACT Government. The ACT is in many ways a hybrid, with both State and Local Government functions but not the same level of autonomy from the national government as the States. Table 6.1 lists the number of local government areas contained within Australia's major cities.

Historically, as cities have grown so too have the number of local government areas incorporated in them. Amalgamation of local governments over the past two decades has seen the number of councils in Australia reduced from 766 to 565. Further reform of local government boundaries is expected in Western Australia which has 138 local governments, 43 per cent of which have fewer than 1,000 electors. The Capital City Statistical Division of Perth has 30 councils including the country's smallest local government area, Peppermint Grove Town, with a total area of 1.5 km<sup>2</sup> and a population of approximately 1,650.

Significant local government amalgamations have occurred in Queensland with those in South East Queensland being the largest in Australia. There is much interest in assessing the merits of these larger councils as it is expected the larger administrative units increase the capacity of major cities to address more complex urban management issues and to develop regional views on services and planning needs.

Over the past two decades many councils have created regional forums and groupings to address broader social and economic infrastructure planning. Many of these bodies have become organised cooperative groupings of councils such as the Northern Sydney Regional Organisation of Councils, the South West Grouping of Councils in Western Australia, the National Growth Areas Alliance in the fastest growing areas of our largest cities and the grouping of 68 coastal councils making up the National Sea Change Taskforce.

Australia's regional cities often contain local government areas that cover more than the urban footprint of the city. Over time the outer 'shire' and 'city centre' dimensions of regional cities have coalesced into single planning and servicing bodies.

**Table 6.1**      **Number of local government areas in Australia's largest cities**

Major City	Number of Local Government Areas
Sydney	43
Melbourne	31
Brisbane	5
Perth	30
Adelaide	19
Gold Coast- Tweed	2
Newcastle	5
Canberra-Queanbeyan*	3*
Wollongong	3
Sunshine Coast	1
Hobart	7
Geelong	1
Townsville	1
Cairns	1
Toowoomba	1
Darwin	3
Launceston	5
Albury-Wodonga	5

Notes\*:      denotes the inclusion of the Australian Capital Territory Government

Source:      Derived from ABS 2009 Regional Population Growth, Australia 2007-2008 (cat. no. 3218.0).

## Collaboration and integration across spheres of government

All spheres of government share responsibility for policy, planning, funding and delivery of infrastructure, transport and human services in Australia's major cities.

The Council of Australia Governments (COAG) was established in 1992 to enable policy reforms of national significance which require cooperative action. COAG is the peak intergovernmental forum in Australia, comprising the prime minister, federal treasurer, state premiers, territory chief ministers, state and territory treasurers, and the president of the Australian Local Government Association.

COAG policy agendas of relevance to Australia's major cities include infrastructure and transport regulation and investment, housing affordability and supply, micro-economic reforms to improve the efficiency of approval processes, and reform of health services.

### COAG Cities Agenda

On 7 December 2009, COAG agreed to a set of reforms for capital city strategic planning, adopting a national objective to *ensure Australian cities are globally competitive, productive, sustainable, liveable, socially inclusive and well placed to meet future challenges and growth.*

The objective was supported by a set of nine criteria that metropolitan planning systems should embrace. This will help address the very many challenges facing major cities, including managing population and economic growth, addressing climate change, improving housing affordability and addressing urban congestion. State and Territory governments have agreed to align their capital city metropolitan planning systems with the criteria by 1st January 2012.

The COAG Reform Council which reports to COAG on the progress of COAG's reform agenda has been asked to review the consistency of capital city planning systems against these criteria. An interim report was released to jurisdictions for feedback on 14 October 2011.

The final report will be provided to COAG by the end of December 2011. The COAG Reform Council, supported by a panel with expertise in urban policy, planning and design, will also provide advice on best practice approaches to city planning that jurisdictions can draw upon. Workshops have been held to consider:

- managing and harnessing stakeholder input and building the mandates necessary to deliver the long-term vision for our cities
- the interaction between planning systems and the private sector in delivering cities strategic plans
- how we measure and monitor the progress of cities.

## *Standing Committee on Transport and Infrastructure*

COAG has undertaken a review of ministerial councils to rationalise the number of entities and deliver effectively on priority reforms. This has resulted in the formation of a new Standing Committee on Transport and Infrastructure which will progress key reforms from the former Australian Transport Council and the COAG Infrastructure Working Group. Its terms of reference also include strategic planning to deliver on the goals and objectives of the *National Urban Policy* and the COAG cities reform agenda.

## Productivity Commission

The Productivity Commission independently benchmarked the planning, zoning and development assessments system of the State, Territory and Local governments, and also made observations about the impact of the Commonwealth on planning (Productivity Commission May 2011). The Commission highlighted leading practices and areas for improvement. The main findings and recommendations point to the need for improved governance arrangements to achieve greater efficiency and effectiveness in the functioning of cities. This report complements the work of the COAG Reform Council in city planning systems.



Hobart, Tasmania

## Productivity Commission Research Report on the Performance Benchmarking of Australian Business Regulation: Planning, Zoning and Development Assessments

Leading-practice strategic planning:

- provides clear guidance and set targets while allowing flexibility to adjust to changing circumstances and innovation;
- ensures high alignment between State-level strategic and infrastructure plans including for government-funded infrastructure, Queensland and Victoria demonstrating the strongest budgetary links; and
- enables development assessment or rezoning decisions falling outside the plan to be on a case-by-case basis in a framework characterised by transparency, accountability, probity and good community engagement.

The Commission concluded that coordination and consistency between plans—State-level strategic, regional and local—is achieved by a variety of methods and is central to good governance. However, when strategic plans are updated, the development of new local council plans may lag several years as in New South Wales, Western Australia, Queensland and Tasmania.

Planning resources and outcomes of local councils differed across jurisdictions. On a per capita basis, Queensland councils had the highest levels of resourcing with the largest number of staff and expenditure of about twice as much as councils in Victoria, Western Australia and Tasmania.

Workload pressure was identified by councils as a major impediment to performance. But more than half of respondents to business surveys indicated that a lack of competency of council staff and inability to understand the commercial implications of requests and decisions were some of the greatest hindrances in development approval (DA) processes.

Most communities reported their State and local governments to be 'somewhat effective' in planning for a liveable city, those in New South Wales and the Northern Territory most likely to report their government as 'not at all effective'.

There was reasonable consistency in planning priorities between State governments and local councils. Most reported 'accommodating higher population growth' as a top priority along with the accompanying need to transition to higher population densities through infill.

Community views as to what should be planning priorities differed substantially from priorities of their governments. In particular, 'safe communities', 'public transport' and 'traffic congestion' were identified by communities in all States and Territories as top planning priorities (Productivity Commission 2011, p 357).

## Other policy priorities for major cities

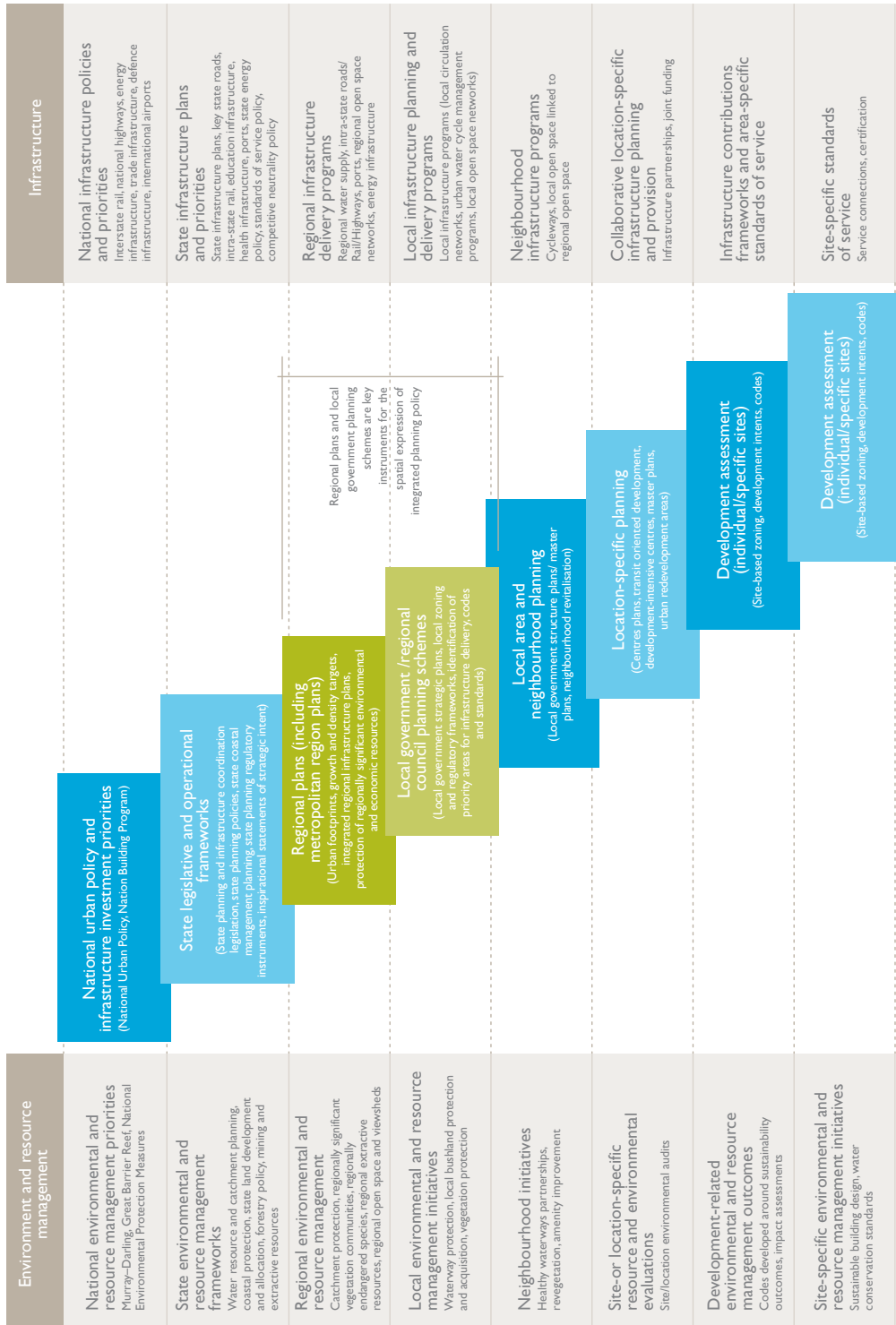
Other national initiatives that will assist intergovernmental cooperation and integration for city policy and planning include:

- A *Sustainable Population Strategy* (released in May 2011) focused on ensuring policies for natural and built environments, infrastructure provision and use and immigration address the challenges and opportunities of population growth and change.
- *The Nation Building Program*, including significant intra-city rail links (Department of Infrastructure and Transport 2010b)
- A *National Ports Strategy* to reduce truck queues at ports, to minimise the potential for urban encroachment, and to improve and sustain the competitive position of international trade gateways (Infrastructure Australia 2010).
- A *National Freight Strategy* aimed at securing and enhancing the network of freight movement across the nation, including interaction with urban areas (Infrastructure Australia 2010e).
- Funding catchment management bodies and authorities to provide important natural resource management and biodiversity strategic planning for our major cities.

Adoption of the *National Urban Policy* provides a much-awaited policy link in Australian land use and infrastructure planning, complementing the States and Territories hierarchical urban land use and environmental statutory policy-based systems. Figure 6.1 illustrates the policy 'line of sight' which now links the *National Urban Policy* and COAG objectives and criteria for cities, cascading through State and Regional Plans, to local plans and ultimately applications for development and on-the-ground built form outcomes. This framework has been embraced by the national Planning Officials Group.



Figure 6.1 National planning 'line of sight'



## Regional Development Australia

Regional Development Australia (RDA) is a national network of 55 committees made up of local leaders who work with all levels of government, business and community groups to support the development of their regions.

This Australian Government initiative brings together all levels of government to support the development of regional Australia. It is funded by the Australian Government and by State, Territory and local governments in some jurisdictions. It is administered by the Department of Regional Australia, Regional Development and Local Government.

RDA committee members are local people developing local solutions to local issues. They build partnerships to develop strategies and deliver sustainable infrastructure and services to their regions.

They also work with each other to identify issues that cross regions. As the regional development voice of their communities, RDA committees:

- consult and engage with communities
- promote and participate in regional programs and initiatives
- provide information and advice on their region to all levels of government, and
- support informed regional planning.

Each RDA committee has developed a Regional Plan which outlines priorities for the region and guides them in growing and strengthening their communities. These plans are available from each RDA's website.

## Metropolitan planning in States and Territories

Metropolitan planning has been adopted in different ways and to different extents by federal, State, Territory and Local governments. Although there are many models for metropolitan planning and governance, these can be summarised into statutory and cooperative approaches. The following section updates the *State of Australian Cities 2010* contents on metropolitan governance and planning arrangements.

### New South Wales

#### Governance

New South Wales is characterised by a relatively high number of local authorities rather than larger regional governments. In parts of the State cooperative regional governance structures have emerged, shires and cities forming regional cooperative organisations (ROCs). For example, the Western Sydney Regional Organisation of Councils represents 13 councils across Western Sydney.

A system of sub-regional strategies, which applies in the Sydney metropolitan area, allows groups of councils to undertake long-term cooperative strategic planning over broader 'catchments', negotiating housing and employment distribution across boundaries.

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. At a municipal level, councils are responsible for municipal strategic and statutory planning, in alignment with overall metropolitan and sub-regional strategies, and for delivery of local infrastructure and other services.

While local government has principal responsibility for initiating local land-use policy changes and determining development applications, the State government reserves the power to endorse or reject local land-use plans and to call in proposals for the planning minister's assessment and determination.

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 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.

It has replaced the previous State Plan with New South Wales 2021 which provides an overarching framework for aligning policy and implementation efforts of State government agencies, which must demonstrate alignment with metropolitan planning strategies.

New South Wales has begun work through Infrastructure New South Wales on preparing a long-term State Infrastructure Strategy which will provide a clearer and more certain 'pipeline' of infrastructure projects, supporting metropolitan and regional strategic objectives.

## 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.

The current metropolitan strategy, the Metropolitan Plan for Sydney, was released in 2010 after a comprehensive review of the 2005 strategy. Like the 2005 strategy, the Metropolitan Plan for Sydney contains an inbuilt requirement to be reviewed and updated every five years.

Planning strategies exist for the other major New South Wales cities:

- Central Coast Regional Strategy (part of Sydney)
- Lower Hunter Regional Strategy (Newcastle)
- Illawarra Regional Strategy (Wollongong)
- Far North Coast Regional Strategy (Tweed Heads)
- Sydney-Canberra Corridor Regional Strategy (Queanbeyan)
- Draft Murray Regional Strategy (Albury).

These regional strategies are key policy documents and are also reviewed every five years. They articulate long-term approaches for urban development, infrastructure planning and environmental protection. They are given statutory weight under section 117 of the *Environmental Planning and Assessment Act 1979 (New South Wales)*, to ensure that they are implemented through local land use plans.

## Victoria

### Governance

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 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 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 infrastructure planning for growth areas in the metropolitan region. The GAA has the role of developing whole-of-government policy positions in the growth areas of Casey-Cardinia, Hume, Melton-Caroline Springs, Whittlesea and Wyndham. The authority works with local councils to facilitate land development.

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 has been complemented by a State-wide blueprint to accommodate population growth in provincial 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 enjoyed 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. In 2002 the Victorian Government released *Melbourne 2030 – planning for sustainable growth* as a whole of government endorsed strategic planning framework for metropolitan Melbourne and its relationship with regional Victoria.

The Victorian Government has established an Urban Growth Boundary to set limits on metropolitan Melbourne's outward growth that can only be altered by Parliament. This boundary was expanded following the release of the *Melbourne @ 5 million* plan to accommodate faster than expected population growth. This strategy was developed in conjunction with the *Victorian Transport Plan (VTP)* which integrates new commitments for public and private transport, long term land supply for employment and residential growth, as well as implementing a strategic approach to managing environmental impacts.

The Victorian Government is in the process of developing a new outcome-based metropolitan planning strategy. During the process of development, decision-making for metropolitan planning will continue to rely on the underlying State Planning Policy Framework which sits within the Victoria Planning Provisions.

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 planning scheme maps online 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 decision makers to have regard to broader social, economic and environmental considerations. It unites all elements of the transport portfolio to ensure that transport agencies work towards a common goal of an integrated transport system. It integrates 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

### Governance

Queensland has regional planning committees to oversee development and implementation of regional plans. They are statutory groups made by the Minister for Local Government and Planning and comprise relevant State agencies and councils.

The Council of Mayors SEQ is a cooperative group of mayors from the councils in South East Queensland. This group examines strategic issues affecting the region.

The Queensland Government recently completed a substantial local government reform program, which involved amalgamating councils to form regional councils. The new councils are much larger and have a better capacity to undertake planning, development assessment, asset creation and management.

Queensland has a program for developing and sequencing major infrastructure designed to align with urban growth. The *Queensland Infrastructure Plan* (QIP) is Cabinet-endorsed and is the largest coordinated infrastructure program in Australia. It covers an extensive range of economic and social infrastructure. The QIP links infrastructure delivery with population growth and economic development priorities.

At the State level the roles and functions of metropolitan planning and infrastructure planning are integrated into the Department of Local Government 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. They are reviewed and approved by the Minister for Local Government and Planning and must align with the strategic policies set out in regional plans and State planning policies.

Local area plans are developed 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 Minister for Local Government and Planning and align with the State's strategic policies.

Local governments manage the vast majority of development assessments and mostly determine development applications.

## Metropolitan planning

Queensland's planning, development and building system is called Qplan. A significant milestone of Qplan was the commencement of the *Sustainable Planning Act 2009* on 18 December 2009. The tools used in Qplan are described in the Act and the Sustainable Planning Regulation 2009. Strategic components of Qplan include Regional Plans and State Planning Policies.

State planning policies articulate a position about a particular issue and they can apply across the State or in a specified area. 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.

The *South East Queensland Regional Plan 2009–2031* was established in 1998 and became a statutory planning tool endorsed by Cabinet in 2005. It has been reviewed periodically, most recently in 2009. 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 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 under review by Brisbane City Council with anticipated completion in 2012.

## Western Australia

### Governance

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. 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.

WAPC has State-wide responsibilities for urban, rural and regional land-use planning and land development matters. WAPC responds to the strategic direction of government and is responsible for the strategic planning of the State.

Funding for the Western Australian planning system is raised 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 regional schemes, Local Government planning scheme reviews, subdivision of land and the public consultation required for preparing State planning policies.

The Act requires preparation of a State planning strategy, the highest strategic planning document endorsed by WAPC. A planning strategy sets out key principles for the environment, community, economy and infrastructure and regional development, to guide future planning decisions. An example is *Directions 2031* which forms a key part of the State Planning Framework. *Directions 2031* aims to guide planning and infrastructure provision to manage population growth within the Perth and Peel regions to 2031 and beyond.

WAPC has prepared a State Planning Framework (Statement of Planning Policy Number 1) to guide its strategic direction. The framework unites existing State and regional policies (such as *Directions 2031*) within one document for decision-making on land use and development.

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 of a 50 per cent improvement on current trends in both infill and greenfield densities. 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 an integral part of the new Urban Development Program 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 has been developed to include a series of annual publications covering historical and current assessments to 20-year planning outlooks. More detailed analysis of future urban growth will be undertaken to monitor and manage the staging of future growth.

The Urban Development Program informs the deliberations of the Western Australian Land Availability Working Group, chaired by the Director-General of the Department of the Premier and Cabinet, which reports to the Ministerial Task Force on Approvals, Development and Sustainability.

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 relevant redevelopment authority.

## *South Australia*

### **Governance**

South Australia uses regional councils and regional organisations of councils as a means of working collaboratively over significant areas of the State. The South Australian Local Government Association has established regional organisations of councils to effectively represent regional interests and the State uses these groupings to help deliver a range of services. State Government representatives from the Department of Planning and Local Government attend all regional meetings as a means of exchanging information and working collaboratively to achieve agreed outcomes.

The State Government has established the Government Planning Coordination Committee to coordinate State-significant planning and development matters across government. The chief executive officers of State Government departments sit on the committee, as do relevant local government chief executive officers, as required. The Government Planning Coordination Committee reports directly to Cabinet.

As with most of the other States, the South Australian Government is responsible for setting the planning policy framework and local government is responsible for determining applications within that policy framework. South Australia also has statutory requirements for the use of planning assessment panels under certain circumstances.

## Metropolitan Planning

South Australia has a State planning framework known as the *Planning Strategy* which is required to be prepared by the Minister for Urban Development and Planning. The *Planning Strategy* covers the entire State and determines the planning policy within development plans for lands in both local government and State-managed areas.

The *Planning Strategy* is a whole of government endorsed plan. It is a strategic level plan and a statutorily required plan. The *Planning Strategy* is constantly under review as required by the Act, with the Greater Adelaide area having been updated recently. Reviews of the rest of the State have been completed during the first half of 2011, with one volume currently under consultation.

The *Planning Strategy* for the greater Adelaide area is referred to as the *Planning Strategy for greater Adelaide* or the *30 year plan for greater Adelaide*. It is a cabinet approved whole of government document and was authorised on 17 February 2010.

While it will not be the subject of a significant review until 2015, the targets within it will be monitored on a yearly basis and will inform reviews as required to meet the long term targets.

## Tasmania

### Governance

Governance arrangements for regional and city planning in Tasmania embrace both cooperative and statutory approaches.

In 2007 the Tasmanian Government established the Regional Planning Initiative (RPI) and signed Memoranda of Understanding (MOUs) 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 to prepare:

- regional land use strategies;
- regional planning scheme templates; and
- new council planning schemes consistent with the regional strategy and template.

Regional planning steering committees comprising local and State government representatives were established under the MOUs. The Government provided funding for the engagement of project teams and consultants to conduct the research, analysis, plan preparation and consultation prescribed in the MOUs.

The Government also initiated amendments to the *Land Use Planning and Approvals Act 1993* authorising the Planning Minister to:

- declare a region and a regional land use strategy; and
- require councils to ensure their new schemes comply with the regional strategy and the State-wide planning scheme template.

The amendments empowered the Planning Minister to review and revise regional land use strategies.

In 2010, the Minister requested the recently created Tasmanian Planning Commission (TPC), through a statement of expectation, to oversee the implementation of the RPI and the cooperative regional governance arrangements operating under the MOUs.

The three regions have produced their respective regional land use strategies for declaration by the Minister, draft regional planning scheme templates and commenced the preparation of new planning schemes. The TPC has also developed a draft system for a hierarchy of plans that integrate relevant planning and implementation functions across State and local governments. It is supported by evidence and spatial/place based systems.

The three regional steering committees, in conjunction with the TPC, have driven the RPI process.

## Metropolitan Planning

The Planning Minister also requested the TPC to manage implementation of the COAG Capital Cities Agreement and COAG Reform Council's compliance process. A capital city steering committee of metropolitan council representatives from the southern steering committee and State agency representatives was formed to integrate State agency and local government strategies for the greater Hobart plan and to ensure that it builds on the southern regional land use strategy. The Launceston City Council has also approached the State government to undertake a similar exercise to produce a greater Launceston city plan.

The final element of the Regional Planning Initiative is to resolve a city-region governance structure and system for ongoing regional and metropolitan land use planning which is integrated with related economic, infrastructure and social planning functions. The TPC has produced a draft discussion paper on city-region governance principles, functions and options in consultation with representatives of the three regional steering committees and the capital city steering committee.

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

### Governance

In mid-2008 the Northern Territory established eight new regional shires under a process of local government reform. The city of Darwin contains three local government areas.

The Northern Territory's Department of Lands and Planning provides an integrated approach to land-use planning, infrastructure planning and service delivery of transport. The department, rather than local councils, is responsible for determining development applications.

In terms of regional governance, regional council meetings have input into regional management plans which are required under the *Local Government Act 2008*. The plans are developed from consultation between local councils in the region and the Department of Local Government and Housing. The plans address key issues relating to local government, resource sharing and regional development.

Local government acts only as a service authority in commenting on development proposals and has no statutory role in determining development applications. Individual councils are collaborative partners with the Territory Government in developing strategic planning for their local communities.

The Northern Territory uses Project Control Groups coordinated through the Department of Lands and Planning to develop and implement plans for infrastructure and services to greenfields sites. Cabinet is regularly briefed on the activities of the Project Control Groups and provides strategic direction and priority to the implementation of government policy.

The Northern Territory government, through the Minister for Lands and Planning, is responsible for administering the *Planning Act (NT)*. The *Planning Act* establishes the development consent authority that is responsible for determining development proposals in accordance with the Northern Territory Planning Scheme. Development of the strategic planning framework, area plans and zoning maps are the role of the Territory Government. Councils are 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 initiated a range of strategic planning documents to inform its planning decisions:

- The *Territory 2030 Strategic Plan*, released in November 2009, is for the whole of the Northern Territory including greater Darwin. It is a government and community-based plan built from grassroots consultations.
- A land-use plan for greater Darwin — *Greater Darwin Region Land-Use Plan –towards 2030*. In February 2011 the government published a discussion paper for public consultation which ended in June 2011. The paper outlined a 30-year plan with specific land-use targets for the next 15 years. The Greater Darwin Region Land-Use Plan was being drafted as a result of the consultation.
- A 10-year Infrastructure Strategy for Greater Darwin and the Territory is currently under consideration by government.
- Two long-term transport strategies are in preparation. One focuses on planning principles for Territory-wide delivery of transport services, including for greater Darwin, the other on requirements for integrated transport delivery in remote regions.
- A Managing Darwin's Growth Steering Committee considers the range of planning issues for greater Darwin. The committee comprises heads of relevant Northern Territory agencies such as the Department of Chief Minister (chair), Treasury, departments of Lands and Planning, Housing, Education, and Health and Families.
- A Major Projects Group, comprising heads of agencies and senior officials, manages all strategic-level investment projects through project-based task forces.
- A Housing Task Group, comprising senior officers of relevant agencies, is responsible for managing implementation of housing and land release strategies for Greater Darwin. It reports to the Managing Darwin's Growth Steering Committee.

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 the Darwin and Alice Springs. The area plans are regularly reviewed after public consultation. The consent authority, when determining development applications, must take into consideration any area plan and planning principles applicable to the locality. Reference documents to the scheme include *Land Use Objectives and Planning Concepts* and the *Capital City Charter*.

## Australian Capital Territory

### Governance

The Australian Capital Territory (ACT) has both State and local government functions and is based on a leasehold system. There is no formal regional organisation of councils within the Territory given its sole jurisdiction. However, the Canberra-Queanbeyan statistical district also contains the City of Queanbeyan. There is an informal collection of regional councils (New South Wales with the ACT) which seek to share information and resolve issues that are common to their interests.

A Chief Executive's Land Supply Committee has been established to support the delivery of the 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.

The ACT Government is the State/local authority that has full responsibility for the urban management of Canberra. However, given the unique role of the National Capital Authority in safeguarding aspects of "national significance" in Australia's national capital, there are some overlaps. The interrelationships between the ACT Government and the Australian Government in planning and managing Canberra are currently under review by the Federal Minister for Home Affairs. A variety of formal and informal processes are in place to coordinate and manage Territory/Commonwealth interests.

Planning policy advice is given to the ACT Government through the Environment and Sustainability Development Directorate, which also has independent statutory approval powers for applications. The Minister for Planning reserves call-in powers for development applications under certain circumstances.

### Metropolitan Planning

The *Canberra Spatial Plan* (and companion *Sustainable Transport Plan*) was adopted in 2004. This is a whole of government document that sits under the umbrella of the *Canberra Plan*, which incorporates the *Economic Plan*, *Social Plan* and *Climate Change Plan*. It is a strategic planning document that in 2008 was made a statutory instrument (the Planning Strategy) under the *Planning and Development Act 2007*. It is currently being comprehensively evaluated as part of the *Sustainable Future Program*. Public consultation of revised drafts of the planning strategy will be undertaken towards the end of 2011 with a view to finalising in 2012.

Given the unique role of the National Capital Authority in the ACT, there is also a Metropolitan Structure Plan contained within the *National Capital Plan*. This plan exerts significant influence over the planning of Canberra as a statutory (less so strategic) document under the *Federal Planning and Land Management Act 1988*. It is not currently under review.

## Conclusion

The feature that makes the governance of Australia's cities quite different from most other countries is the historically strong role of State governments in planning and the correspondingly lesser role of local government.

In recent years the Australian Government has given greater weight to the role of cities in the future prosperity of the nation. It recognises the impact of its policies and programs on cities and has become actively involved in national leadership in urban policy.

## Chapter 6 References

Australian Bureau of Statistics (ABS) 2009, *Regional Population Growth, Australia 2007-2008* cat. no. 3218.0, Canberra.

Productivity Commission 2011, *Performance Benchmarking of Australian Business Regulation: Planning, Zoning and Development Assessments*, Productivity Commission Research Report Volume 1, Commonwealth of Australia, Canberra.





# Appendix A:

## Goals, objectives and principles of the National Urban Policy

Goals	Objectives	Principles
Productivity	To harness the productivity of Australia's people and industry, by better managing our use of labour, creativity and knowledge, land and infrastructure	Efficiency
	1. Improve labour and capital productivity	Value for money
	2. Integrate land use and infrastructure	
Sustainability	3. Improve the efficiency of urban infrastructure	Innovation
	To advance the sustainability of Australia's natural and built environment, including through better resource and risk management	Adaptability
	4. Protect and sustain our natural and built environments	
	5. Reduce greenhouse gas emissions and improve air quality	Resilience
Liveability	6. Manage our resources sustainably	
	7. Increase resilience to climate change, emergency events and natural hazards	Equity
	To enhance the liveability of our cities by promoting better urban design, planning and affordable access to recreational, cultural and community facilities	Affordability
	8. Facilitate the supply of appropriate mixed income housing	
	9. Support affordable living choices	Subsidiarity
Governance	10. Improve accessibility and reduce dependence on private vehicles	
	11. Support community wellbeing	Integration
	To progress the goals of productivity, sustainability and liveability through better governance, planning and management	
	12. Improve the planning and management of our cities	Engagement
	13. Streamline administrative processes	
	14. Evaluate progress	



# Appendix B:

## Local government in Australia's major cities

### Major cities in New South Wales

City	Local Government
Sydney	Ashfield
	Auburn
	Bankstown
	The Hills Shire
	Blacktown
	Blue Mountains
	Botany Bay
	Burwood
	Camden
	Campbelltown
	Canada Bay
	Canterbury
	Fairfield
	Gosford
	Hawkesbury
	Holroyd
	Hornsby
	Hunters Hill
	Hurstville
	Kogarah
	Ku-ring-gai
	Lane Cove
	Leichhardt
	Liverpool
	Manly

City	Local Government
	Marrickville
	Mosman
	North Sydney
	Parramatta
	Penrith
	Pittwater
	Randwick
	Rockdale
	Ryde
	Strathfield
	Sutherland Shire
	Sydney
	Warringah
	Waverley
Newcastle	Willoughby
	Wollondilly
	Woollahra
	Wyong
	Newcastle City
	Lake Macquarie City
	Cessnock City
	Maitland City
	Port Stephens Shire
	Wollongong City
Wollongong	Shellharbour City
	Kiama Shire

## Major cities in Victoria

City	Local Government
Melbourne	Melbourne City
	Port Phillip City
	Maribyrnong City
	Hobsons Bay
	Bayside City
	Stonnington City
	Glen Eira City
	Kingston City
	Monash City
	Boroondara City
	Yarra City
	Brimbank City
	Moonee Valley City
	Moreland City
	Darebin City
	Banyule City
	Manningham City
	Whitehorse City
	Knox City
	Maroondah City
	Wyndham City
	Melton Shire
	Hume City
	Whittlesea City
	Nillumbik Shire
	Yarra Ranges Shire
	Cardinia Shire
	Greater Dandenong City
	Casey City
	Frankston City
	Mornington Peninsula
Geelong	Greater Geelong City
Albury– Wodonga	Albury City
	Greater Hume Shire
	Wodonga City
	Indigo Shire
	Towong Shire

## Major cities in Queensland

City	Local Government
Brisbane	Brisbane City
	Ipswich City
	Logan City
	Redland City
	Moreton Bay Region
Gold Coast	Gold Coast City
	Tweed Shire
Sunshine Coast	Sunshine Coast Region
Toowoomba	Toowoomba Region
Cairns	Cairns Region
Townsville	Townsville City

## Major cities in Northern Territory

City	Local Government
Darwin	Darwin City
	Palmerston City
	Litchfield Shire

## Major cities in Australian Capital Territory – Queanbeyan, New South Wales

City	Local Government
Canberra	ACT Government
Queanbeyan	Queanbeyan City
	Palerang

## Major cities in Western Australia

City	Local Government
Perth	Perth City
	Subiaco City
	Nedlands City
	Claremont Town
	Vincent City
	Cambridge Town
	Bayswater City
	Bassendean Town
	Belmont City
	Victoria Park Town
	South Perth City
	Canning City
	Melville City
	Fremantle City
	East Fremantle Town
	Mosman Park Town
	Peppermint Grove Shire
	Cottesloe Town
	Stirling City
	Gosnells City
	Cockburn City
	Joondalup City
	Wanneroo City
	Swan City
	Mundaring Shire
	Kalamunda Shire
	Armadale City
	Kwinana Town
	Rockingham City
	Serpentine-Jarrahdale Shire

## Major cities in South Australia

City	Local Government
Adelaide	Adelaide City
	Unley City
	Norwood Payneham St Peters City
	Walkerville
	Prospect City
	Burnside City
	West Torrens City
	Charles Sturt City
	Port Adelaide Enfield
	Campbelltown City
	Holdfast Bay City
	Marion City
	Mitcham City
	Onkaparinga City
	Adelaide Hills
	Tea Tree Gully City
	Salisbury
	Playford City
	Gawler Town

## Major cities in Tasmania

City	Local Government
Hobart	Hobart City
	Clarence
	Glenorchy
	Sorell
	Brighton
	Kingborough
	Derwent Valley
	Launceston City
Launceston	West Tamar
	George Town
	Northern Midlands
	Meander Valley



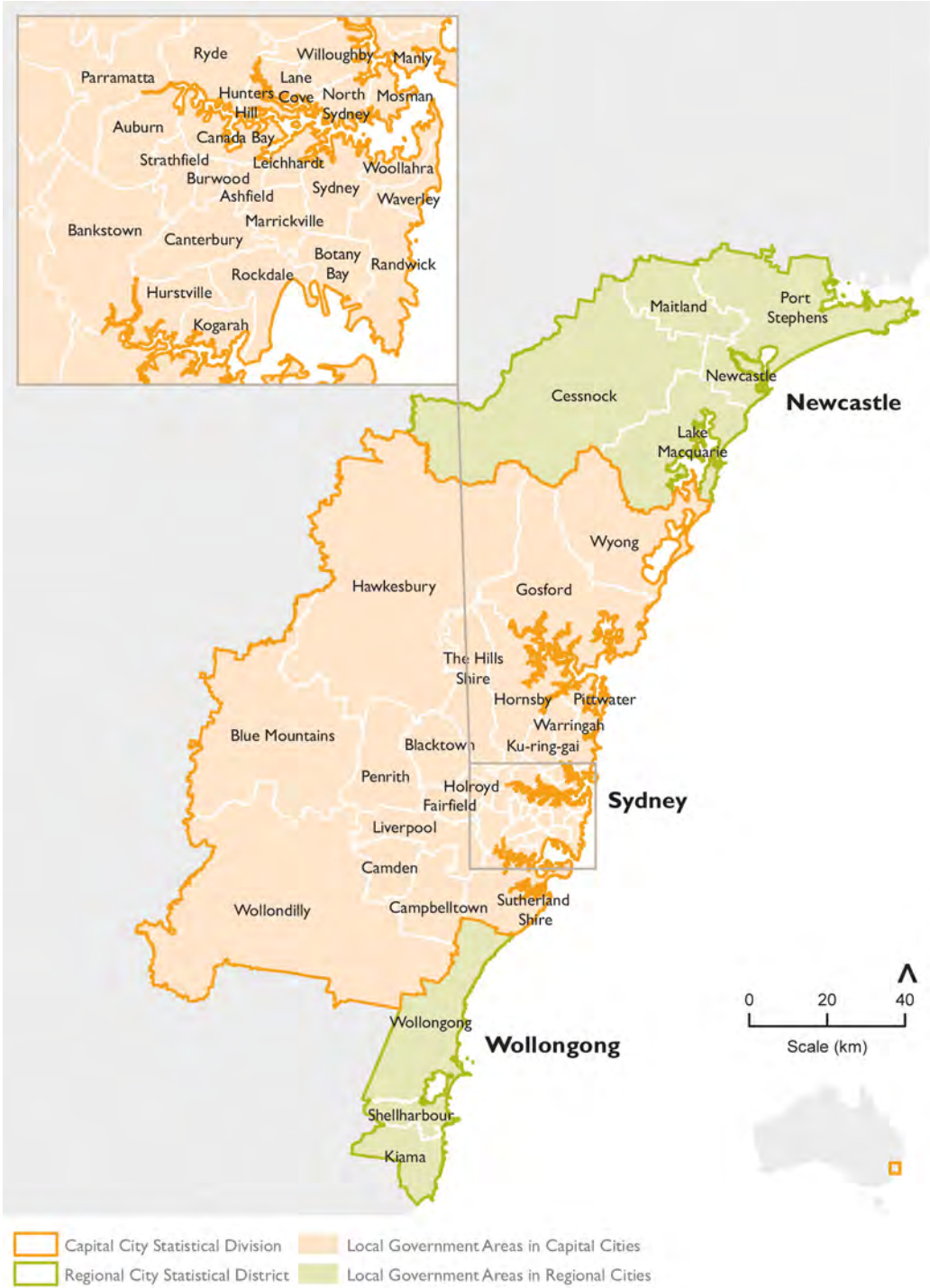
# Appendix C:

## Maps of major cities and local government areas

The following maps depict the 18 major cities based on their ABS geographical boundaries. The maps illustrate:

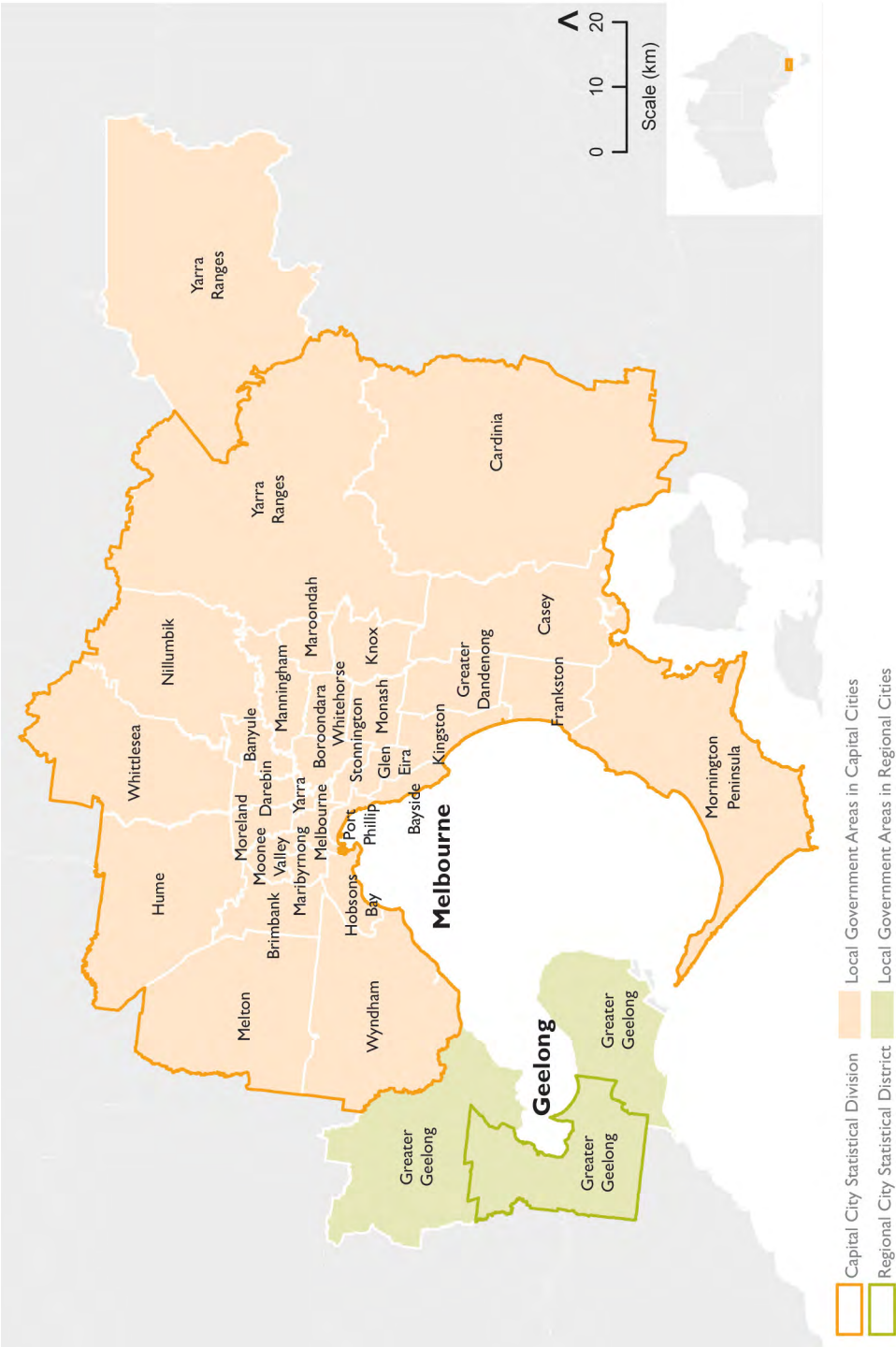
- Capital City Statistical Divisions
- Regional City Statistical Districts
- Local Government Areas.

# Local Government areas in Sydney, Newcastle and Wollongong

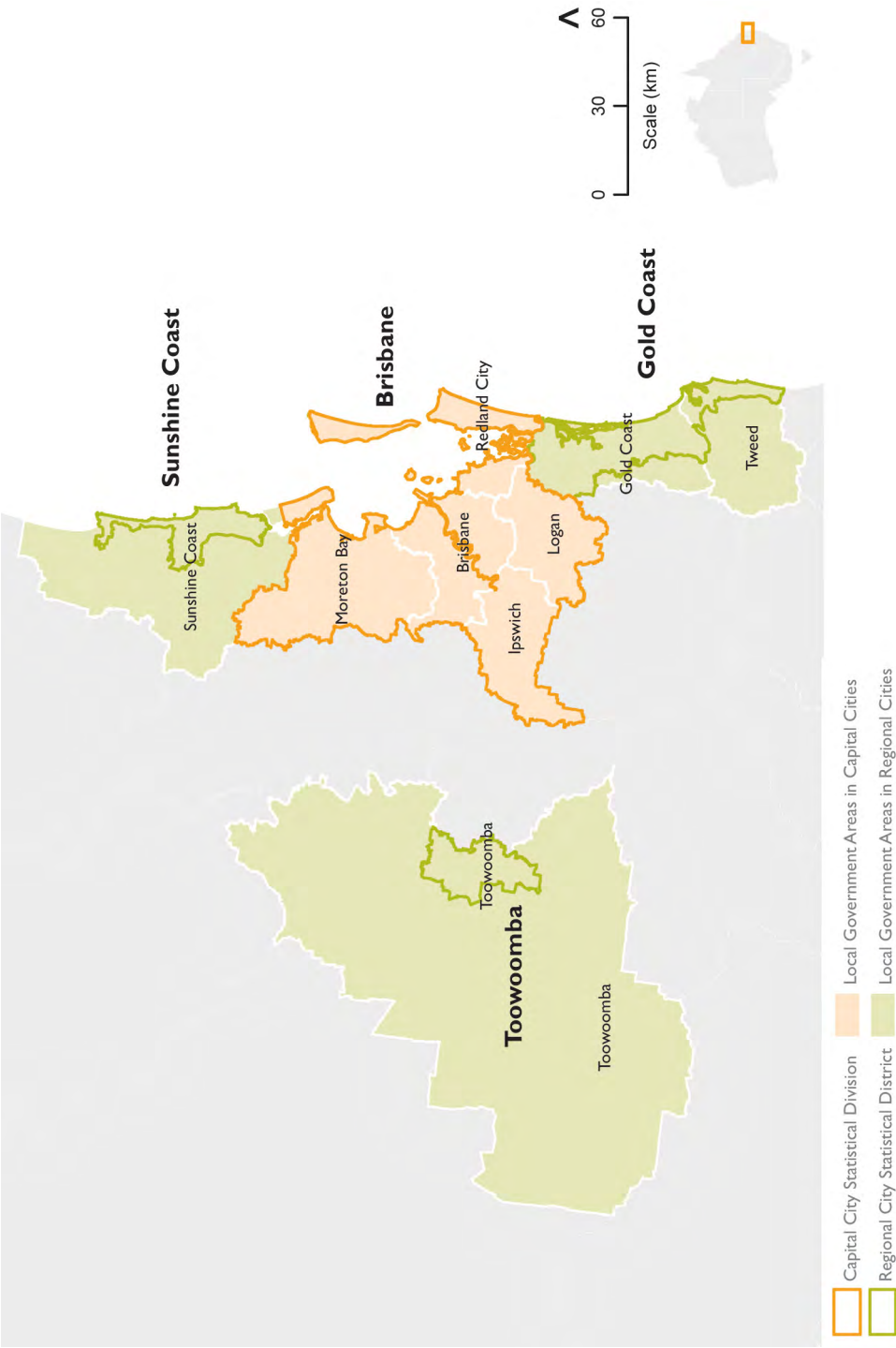




# Local Government areas in Geelong and Melbourne



# Local Government areas in Toowoomba, Sunshine Coast, Brisbane and Gold Coast



## Local Government areas in Perth



# Local Government areas in Adelaide



## Local Government areas in Canberra – Queanbeyan



# Local Government areas in Launceston and Hobart



## Local Government areas in Cairns and Townsville



# Local Government areas in Darwin





## Local Government areas in Albury – Wodonga



The background of the page is a solid dark blue. Overlaid on this are several light blue, wavy, horizontal lines that sweep across the lower half of the image. Interspersed among these lines are three dashed light blue circles of varying sizes. Each dashed circle has a solid light blue dot at its center. The overall aesthetic is modern and minimalist.

INFRA1220 November 2011  
ISBN 978-1-921769-50-4