

# Strategic foresight for regional Australia

Megatrends, scenarios and implications

CSIRO and the Australian Government Department  
of Infrastructure, Regional Development and Cities

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December 2017



## ISBN

PRINT 978-1-4863-0952-8

ONLINE 978-1-4863-0953-5

## CITATION

Taylor, B, Walton, A, Loechel, B, Measham, T & Fleming, D 2017, *Strategic foresight for regional Australia: Megatrends, scenarios and implications*, CSIRO and the Australian Government Department of Infrastructure, Regional Development and Cities, Canberra, Australia.

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## ACKNOWLEDGEMENTS

The project team acknowledges and sincerely thanks the many individuals and organisations who contributed expertise, time, data, information and insight to the identification of trends, the development of scenarios and the exploration of policy implications. We thank the members of the project advisory group and the project reference group; the government and non-government experts who participated in the megatrends workshop in Canberra in December 2016 and the scenario development workshop in Brisbane in March 2017; and the industry and business experts we interviewed in mid-2017.

Cathryn Geiger, Maxine Loynd, Vidisha Carmody and Adi Smith from the Australian Government Department of Infrastructure, Regional Development and Cities made significant contributions throughout the design, delivery and communication of the project, and helped prepare this report, which the authors gratefully acknowledge. Stefan Hajkovicz (CSIRO) contributed expert advice on the use of the strategic foresight methodology employed in the research. Lavinia Poruschi, (CSIRO), sourced and analysed data in preparing several figures to support the trends analysis in this report.

See Appendix 1 for the list of project advisory group members, project reference group members and scenario workshop contributors.

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# Foreword

**Australia is a vast and varied country and this diversity is reflected in its regions. There will be no single future for regional Australia, which means that we will need to consider multiple plausible scenarios to help prepare our regions for 2040 and beyond.**

This CSIRO publication *Strategic foresight for regional Australia* presents a set of plausible future scenarios for living, working and investing in regional Australia. It is an important resource to help anticipate the economic and social trends likely to affect regional Australia over the coming years.

It demonstrates that social, economic and technological changes will continue to challenge the existing structures in our regions. These changes will affect the way in which people live, work and invest in the regions. Change can also drive opportunity. In the future, people will be employed in enterprises yet to be imagined, generated by technology yet to be invented.

This publication is the outcome of work undertaken by the CSIRO, government, academics and stakeholders. It is informed by data and robust analysis of the megatrends influencing regional Australia. The scenarios will help us to determine how best to connect regional Australia through investment in infrastructure, communications and trade relationships. They will also help us to consider the training and education needs for the jobs and industries of the future.

Department of Infrastructure, Regional Development and Cities has been an enthusiastic collaborator in this work. I look forward to working with my colleagues across government and with other regional stakeholders to consider how we can best grow our regional economies to continue to make a solid contribution to national wellbeing and deliver high quality jobs and strong communities.

**Dr Steven Kennedy PSM**

*Secretary, Department of Infrastructure,  
Regional Development and Cities*



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# Executive summary

Using a strategic foresight approach, this study identifies megatrends and plausible future scenarios for living, working and investing in regional Australia in 2040. We analysed in detail the social, economic, environmental, technological and institutional trends that have played out in Australia, and internationally, in past decades and which affect the regions and their development. These individual trends, presented in Appendix 1 of this report, are grouped as five megatrends – major influences that have driven change in the past and are expected to shape change into the future.

## Five megatrends

### DEFEATING DISTANCE

Overcoming long distances has shaped development in the regions and continues to be a major influence on the way people live and work in regions, and on the performance of regional businesses. Improvements in physical transport and telecommunications infrastructure along with emerging digital technologies have converged to improve connectivity and to defeat the effects of distance.

### GLOBAL EXPOSURE

Global markets will continue to shape economic activity in Australia's regions as communities and businesses become increasingly exposed economically, politically and culturally. In the Asia-Pacific region, the growing market for goods and services produced in regional Australia offers significant opportunities, and demands higher educational attainment and cultural engagement.

### DIVERGING PLACES

Larger towns and cities and high amenity areas continue to draw population growth and economic activity away from many smaller towns. Rising income inequality within and between places and declining trust in 'distant' decision-makers are challenging governance arrangements. New land owners and land managers are recognising a more diverse suite of environmental, cultural and lifestyle values in regional places.

### NEW ECONOMIES

The Australian economy, like other economies globally, is in transition. Two major aspects of the transition are the generation of value through knowledge, innovation, and new services; and the changing mix of energy demand and sources of energy generation. Together, these changes could energise new forms of regional development.

### ENVIRONMENT AS RISK

Regional Australia's communities and businesses have long known the environment as a source of both livelihood and risk. However, the declining condition of natural assets, loss of biodiversity, global climate change, extreme events, and biosecurity risks are presenting new or expanded challenges for our regions.

## Trend drivers

As part of the strategic foresight process, we selected key drivers of the five megatrends on which to build four scenarios that describe plausible futures for Australia's non-metropolitan regions. The scenarios are portrayed as a quadrant, with each axis of the quadrant representing the key drivers of change for regional Australia but where the outcomes are uncertain – in terms of how and where people will live and work, the competitiveness and sustainability of businesses, and how investment will occur.

The scenarios are simple models of complex realities from which we can explore and understand inferences for living, working, and investing. In the final step of the strategic foresight process, we identify implications for decision-makers.

## **TECHNOLOGICAL PROGRESS AND CONNECTIVITY – THE VERTICAL AXIS**

The vertical axis relates to the extent of technological progress and connectivity in the regions, covering everything from the adoption of new technological platforms, materials, and automation through to transport systems and digital access and capability. Both ends of the axis describe a future where technological progress and connectivity has changed from today. However, at one end of the axis is a future where technological progress and improvements in connectivity have been vast, while at the opposite end is a future where change has been limited, with technology and connectivity being somewhat similar to today.

## **ECONOMIC DIVERSITY AND HUMAN CAPITAL – THE HORIZONTAL AXIS**

The horizontal axis relates to the regions' human capital and the diversity of their economic engine. It includes population size and demographic profile, the labour market, levels of educational attainment and skills, the type and mix of regional industries, enterprise ownership, business models, and the character of supply chains. Human capital includes those attributes that contribute to earning a living and strengthening a community, as well as people's capacity to adapt to social and economic change.

Both ends of the axis describe a future where human capital and economic diversity changes over the next 25 years. At one end of the axis is a future where regions enjoy a diverse economic base, with wide-ranging job opportunities, and a human capital that is skilled, both in breadth and depth. However, at the opposite end of the axis is a future where economic diversity and human capital is limited. In this future, regions rely heavily on one main economic sector and specialise in its development; the labour force uses a skill set that is narrower in focus; and the population is at risk of decline.

## **Four scenarios**

With the two axes, we have created four quadrants representing four scenarios:

- Global niche
- Fast and flexible
- Natural advantage
- Holding ground.

Each scenario describes what it would be like to live, work, and invest in regional Australia. The scenarios can also be read as futures that different types of regions in different parts of the country may experience.

In addition to describing different outcomes associated with vast and limited technological progress and connectivity, and diverse and limited human capital and economic diversity, other important trends are interwoven into each storyline and are described as 'risks' within each scenario.

## **OTHER TRENDS AND UNCERTAINTIES WOVEN INTO EACH SCENARIO**

- Increasing risk from long-term climate change
- Increasing scarcity of natural resources
- Continuing flow of people to cities and towns
- Global factors influencing stability, trade, and migration
- People's capacity to cope with and respond positively to major change
- Institutional responses including government, civil society, and industry initiatives
- Societal norms and attitudes including attitudes towards diversity, immigration and technology.



### SCENARIO 1: Global niche

- One main industry
- High levels of industry automation, robotics, productivity and efficiency
- Value adding in the supply chain
- Global leaders in the industry sector
- Decline in face-to-face service delivery
- Wealth resides in industry owners
- Population shift to larger centres
- Globally connected to markets
- Strong sense of industry and regional identity
- Resistant to land use change
- Highly skilled but narrowly focused labour force
- Highly dependent on physical assets

**RISK:** Stable but vulnerable - potential for lock in, unemployment, widening wealth inequality, declining population

### SCENARIO 2: Fast and flexible

- Growth in high tech knowledge and service sectors
- High business efficiencies and productivity
- Innovative development of products and services
- High amenity
- Diverse job opportunities & employers
- Broad and high level skills
- Socially and culturally diverse
- Growing population
- Always in a state of flux, adaptive capacities mixed

**RISK:** Rapid change, industry displacement, unemployment in certain sectors, wealth inequality, ad hoc development with missed opportunities, high cost of living pressures, increased environmental burden from population growth

### SCENARIO 4: Holding ground

- One main traditional industry sector
- Real and perceived 'remoteness'
- Strong cultural and heritage values
- High dependence on natural assets
- Stable employment but no growth
- Declining population, particularly youth
- Low human capital - including skills, and innovation

**RISK:** Vulnerable to changes in climate, global economy, and Asian instability, out-migration of youth, rural poverty, growing sense of rural-urban inequity, declining population

### SCENARIO 3: Natural advantage

- Successful multi-purpose land use
- Growth into new carbon and energy markets
- Corporate investment
- Strong sustainability values and lifestyles
- Cohesive community
- Varied employment opportunities
- Regional education institutions constrained
- Growing population - employment and amenity
- Adaptive capacities mixed
- Growing marginalised segment

**RISK:** Businesses unable to compete on productivity and efficiency, reducing long-term viability and opportunities to expand and grow, increasing cost of living pressures from population growth, growing low-income segment

The four plausible future scenarios for regional Australia

## Key messages for decision-makers

As part of the final phase of the foresight process, we described eight key messages to inform policymakers and decision-makers about the possible futures facing regional Australia. These messages focus on enabling or securing future benefits and opportunities for regions, given the influence of the megatrends and the future realities explored in the four scenarios. The messages also focus on reducing the likelihood of risks to regional

livelihoods and infrastructure, which we identified through the strategic foresight process. These messages, described in detail in Section 4, are intended to encourage further deliberation among the multiple stakeholders involved in determining the future of Australia's regions, including local communities, regional entities, higher levels of government, and international stakeholders.



The implications of regional Australia's possible futures for policy and decision-makers

# 1 Introduction

## 1.1 A snapshot of regional Australia

In the decade to 2016, many parts of regional Australia experienced a growth in population, including regions in very remote, remote, outer and inner regional areas. However, in recent years, the decline of the mining boom has seen this growth slow somewhat in places. While Australian population growth has for many decades been concentrated in larger urban centres, we are also seeing counter-trends such as the migration of people from cities to high-amenity and well-connected regional areas. Improvements in technology, transport and communications have facilitated these trends, contributing to increasing personal and workforce mobility. Agriculture and other traditional regional industries such as forestry, fishing, mining and energy continue to contribute significantly to the value of Australia's merchandise exports, and to national prosperity. However industries such as agriculture are continuing to experience a decline in terms of their share of employment, nationally.

Unfolding changes are also likely to have a significant impact on regional Australia, but how they will manifest in different places, for different industries and communities, is uncertain. These changes include, but are not limited to:

- the disruptive potential of increasing automation in regional industries
- the growing significance of the Asia-Pacific region as a market for regional Australia
- the increasing global demand for more and cleaner energy
- the demand for higher educational attainment, and the growth in the knowledge and enabling services economy.

Many of these changes intersect with new information, new communication technologies and new transportation technologies, such as autonomous vehicles, with



implications for cost, travel time and safety. However, the benefits of these changes are not being spread evenly between communities, places or industries, creating both opportunities and challenges for regional Australia.

While there is nothing new about change, the pace and quantum of the current change suggests the need for the Australian community, policymakers and decision-makers to explore the future in a way that does more than simply extrapolate from past trends. The value of the scenarios described in this report lies in imagining futures underpinned by the sound evidence used to construct a series of megatrends. Together, the megatrends and scenarios offer insights into the possible future directions for one of the nation's greatest assets – its regions.

## 1.2 Strategic foresight for regional Australia

The then Australian Government Department of Infrastructure and Regional Development collaborated with the CSIRO in undertaking a strategic foresight project for regional Australia. The project examines how the major trends that have shaped regional, non-metropolitan Australia may continue in the future and identifies a set of scenarios to help guide thinking about regional development policy in Australia.

Given the diversity of Australia's regions and inherent uncertainty about the future, it can be more useful to explore multiple plausible futures rather than looking to predict the most likely. Strategic foresight methods offer a valuable way of constructing and debating these multiple futures.

The following questions guided the strategic foresight process that we used in this study:

- What will it be like to live, work and invest in regional Australia in 2040?
- What forces are changing the face of Australia's regions over this time?
- What are the implications of these trends for regional development policy and decision-makers?

The strategic foresight process is based on scenario planning, which allows the Department and its stakeholders to explore both the trajectories of change and the plausible operating environments which may result by the year 2040 or later. This scenario-based foresight method is described in more depth in Appendix 2. Broadly, however, it consists of four key stages:

1. identify issues
2. analyse trends and verification
3. draft scenario development and deliberation
4. finalise scenarios and identify implications for decision-makers.

Below, we present the five megatrends, followed by the four scenarios, before discussing their implications. Appendix 1 presents the 34 sub-trends that underpin the megatrends and scenarios.



# 2 The megatrends

In this study, we identified five megatrends that have shaped, and will continue to shape, the development of regional Australia. Individually, they present a particular lens on the future; together they offer a sometimes more complex, overlapping or contradictory trajectory. These megatrends have informed the scenario development process.

**Defeating distance** – Improvements in physical transport and telecommunications infrastructure along with emerging digital technologies have converged to improve connectivity and to lessen the impacts of distance on communities and businesses.

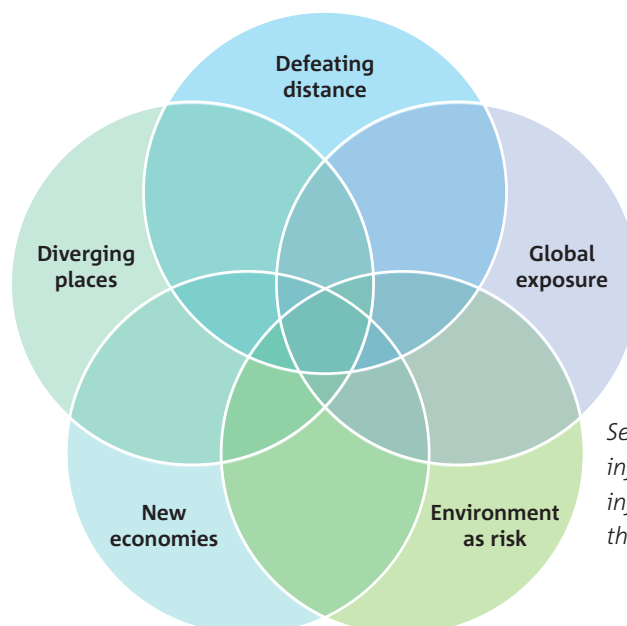
**Global exposure** – Global markets will continue to shape economic activity in Australia’s regions as communities and businesses become increasingly exposed economically, politically and culturally. The growing significance of the Asia-Pacific region as a market for goods and

services produced in regional Australia demands higher educational attainment and cultural engagement.

**Diverging places** – Larger centres, major cities and high amenity areas continue to draw people and business away from many smaller towns. Growing income inequality within and between places, and declining trust in ‘distant’ decision-makers is challenging governance arrangements. New land owners and land managers are expressing a more diverse set of values in regional places that relate to environment, culture and lifestyle.

**New economies** – The Australian economy, like other economies globally, is in transition. Two of the more significant aspects of this are the generation of value through knowledge, innovation and new services in the economy, and the changing mix of energy demand and sources of generation. Together, these changes have the potential to energise new forms of regional development.

**Environment as risk** – Regional Australia’s communities and businesses have long known the environment as a source of both livelihood and risk. However, the declining condition of natural assets, the loss of biodiversity, global climate change, extreme events and biosecurity risks are presenting new or expanded challenges for regional development.



*See Appendix 1 for detailed information and data sources informing these megatrends and the sub-trends that constitute them.*



## 2.1 Megatrend 1: Defeating distance

This megatrend focuses on two convergent drivers of significant improvements in connectivity: improvements in physical transport and telecommunications infrastructure; and emerging digital technologies.

The long distances between regional communities and major urban centres have shaped the development of regional Australia. Indeed, the challenge of moving goods, people and ideas more efficiently, and improving access to services, has led to major improvements in material infrastructure such as roads, railways, airports and telecommunications over the last 100 years. These improvements have reduced travel times and freight costs, cut the cost of doing business, and improved access to services and consumer goods. With infrastructure improvements, people and households have become more mobile, travelling for both employment and leisure. They have also contributed to significant changes in the population and settlement patterns (see the 'Diverging places' megatrend below). People in country areas commute, on average, twice as far as people in larger urban centres, though the gap in commuting times may be closing. In the mining regions of Australia, many workers are fly-in, fly-out or drive-in, drive-out. During 2010–11, for instance, 26.2 million passengers moved through the non-capital-city airports (BITRE 2012). The high dependence on freight moving through and between regional areas and cities will continue, with road-, rail- and port-based freight movements expected to double between 2010 and 2040 (BITRE 2014b). The development of autonomous vehicles may significantly reduce freight costs and improve safety.

Recent advances in digital information and communication technologies are accelerating and diversifying these trends in greater connectivity. More Australians are connecting to the internet every year, the use of smartphone devices is growing (with 13.7 million adult users in 2016 (ACMA 2016)), and data download volumes are increasing rapidly. Social media is creating opportunities for individuals, communities and businesses to reach new audiences,

customers, collaborators and investors, and is reducing the sense of social and/or cultural isolation for people in regional and rural areas. Nationally, digital inclusion has increased over the last three years. There are, however, still some pressing concerns that the benefits of digital participation are not being realised by all Australians. While the digital access gap between country and city areas has narrowed, affordability and digital ability are still major gaps, with some rural and regional areas 'well behind' the cities. This divide, if left unchecked, means that some regional communities will be unable to participate fully in opportunities in the emerging digitally-enabled economy, and will be unable to access professional, health, financial, educational and other services delivered online.

## 2.2 Megatrend 2: Global exposure

Global markets will continue to shape economic activity in Australia's regions as communities and businesses become increasingly exposed economically, politically and culturally. The growing significance of the Asia-Pacific region as a market for goods and services produced in regional Australia demands higher educational attainment and cultural engagement.

Recent decades have seen increased liberalisation of economic and trade policy within and between many countries around the world. The expansion of the market economy, trade agreements and globalisation have translated into significant growth in world trade, and the incorporation of billions more consumers and workers into the global market economy. The combination of increased productive capacity overseas and reduced government protection of local producers and industries in Australia has created enormous competitive pressures for many Australian businesses. Offsetting this have been the development of new export markets and the growth of old ones, driven increasingly by the growing affluence of consumers in the Asia-Pacific region. Asia and Oceania now take nearly 90 per cent of our exports (DFAT 2014). Indeed, the key trade agreements, and those now under

negotiation, are with countries in these regions. Key exports of iron ore, coal and agricultural commodities are sourced from regional Australia. Major natural assets that support tourism exports are located in regional Australia. Australian educational institutions, mainly universities but also the vocational sector, are hosting an increasing number of Asian students, with incentives for international students to study in regional institutions linked to migration schemes. As a result, changes in commodity prices, and international tourism and education markets are having a significant impact on economic vitality in regional Australia. Capital investment from overseas is also growing in sectors important to regional economies, including in mining, agricultural businesses and supply chains, and ex-government-owned utilities and infrastructure networks.

With the modernisation of emerging economies in Asia and other regions of the world, such as Eastern Europe, South America and Africa, to compete globally, Australia needs a highly educated and skilled workforce to understand, apply and develop innovative technologies and business models. This applies as equally to businesses located in the regions as it does the cities.

While more and more migrants are choosing to live in major cities and large centres in inner regional areas, with the high overseas migrant intake levels in recent years, the absolute number of overseas migrants moving into regional areas has been growing. In some regions, such as wheat-sheep belt areas, migrants have arrived in sufficient numbers to offset, to some extent, the ongoing drain of working-age people, while increasing ethnic and cultural diversity. International travel has grown markedly, with Australia receiving over 16 million inbound passengers every year (ABS 2017a). While this travel creates economic opportunities, it also grows our cross-cultural experience, knowledge exchange and exposure to different worldviews.

## 2.3 Megatrend 3: Diverging places

Larger centres, major cities and high amenity areas continue to draw people and business away from many smaller towns. Growing income inequality within and between places and declining trust in 'distant' decision-makers is challenging governance arrangements. New land owners and land managers are expressing a more diverse set of values in regional places. These expand on agricultural or development values to include environmental, cultural and lifestyle-related values.

The share of Australia's population living in the capital cities has grown from around 35 per cent at the start of the 20th century to around 63 per cent, while the share of the population living in large regional centres has tripled from about seven per cent to 21 per cent (BITRE 2014a). Locations with high amenity values, such as coastal areas and scenic areas close to the major cities, have seen strong growth over recent decades. In contrast, net migration loss areas are predominantly in the wheat-sheep belt and in remote areas that do not have substantial mining activity. The share of the national population living in northern and western parts of Australia is growing (Hugo et al. 2015).

Nationally, the number of people aged 65 years and over is expected to double in the next two decades (Hugo et al. 2015), putting considerable pressure on aged-care and health services. Parts of regional Australia will feel this change more acutely, particularly locations experiencing the loss of young people and adolescents, and coastal amenity locations which are a focus of retiree migration. Counter to this, people in the early years of forming a family often return to regional areas and smaller towns. The population of Indigenous Australians is expected to double by 2036, reaching 1.2 million (Wilson 2016). Around two-thirds

of Indigenous Australians live outside the major cities, and they make up an increasing share of the population of smaller regional and remote towns. A growing number of relatively young Indigenous people in these towns presents positive future opportunities for social and economic development; however, these communities often face considerable health, social and economic challenges.

Against a backdrop of growing income inequality in OECD countries, and in Australia, income inequality across most rural regions has increased in recent decades, except in some mining regions. Disparities in income and wealth between rural and remote areas and the capital cities have also grown considerably in this time (OECD 2011; NRHA 2014; Fleming & Measham 2015a).

The ownership and management of lands, and the governance of regional places is changing. Up to half of the agricultural properties in southern Australia have changed hands in the last 10 years and many new owners in the inner regional areas are favouring environmental and recreational values over agricultural production (Mendham et al. 2010). Legal recognition of Indigenous rights and interests in land and water resources has presented new economic and social development opportunities for regional communities. There are fewer, larger local governments in regional Australia but they cooperate more. The private and non-government sectors are participating more in service delivery, and governments are expecting communities to be more self-sufficient. Communities are looking towards models of place-based collaboration to address their development needs. While public trust in government institutions is increasing in major cities, it is falling in regional and remote areas.

## 2.4 Megatrend 4: New economies

The Australian economy, like other economies globally, is in transition. Two of the more significant aspects of this are the generation of value through knowledge, innovation and new services in the economy, and the changing mix of energy demand and sources of generation. Together, these changes could energise new forms of regional development.

The global demand for more and cleaner energy has triggered the rapid development of new energy sources such as unconventional natural gas, and significant technical improvements in diverse types of renewable energy generation including solar, wind and geothermal. The transformation of the electricity sector has been driven over the last 20 years by responses to international commitments to reduce emissions, the emergence of new technology, and changing consumer preferences. Regional Australia has a relatively high comparative advantage for supplying almost all these new sources of energy, including the three main biofuel sources – sugar cane, maize and vegetable oils. The southern Queensland region has the country's largest reservoirs of coal seam gas. Government support, falling costs of photovoltaic technologies and rising electricity prices has seen solar technologies installed in more than 30 per cent of households in rural areas and regional centres in the last decade or so. Some communities have established local wind turbines for energy self-sufficiency.

Like the energy mix, the mix of economic activity generating value to the Australian economy is also in transition. Services such as scientific and technical services, health care, social assistance and education now contribute 60 per cent of GDP, 80 per cent of employment, and a significant, growing share of our exports (ATC 2016; DIIS 2015a). Enabling, or 'business-to-business' services, such as professional services, ICT, logistics and utilities services, are especially valuable to regionally-important sectors such as advanced manufacturing; food and agribusiness; and oil, gas and energy (DIIS 2015a).

Knowledge-, information- and technology-intensive activities are critical to this growth. The presence of research organisations in a region has a positive impact on business creation in that region. Digital work hubs in regional communities that provide collaborative workspaces and opportunities for co-working and teleworking are drawing attention. Robotics and automation will play a role in this transformation as nearly 40 per cent of the jobs in Australia have a high probability of being substituted with computing in the next few decades (CEDA 2015). Regions with high dependence on mining are particularly susceptible. These developments will, however, reduce routine, remote, dirty and dangerous work. While venture capital funding has been in decline in Australia, overall, there are signs of promising growth in the health care, life sciences, energy and environment sectors, all of which are important in regional Australia. Knowledge- and information-intensive skills will also be required to capitalise on emerging new markets; for example, by 2050 the carbon market could account for over \$40 billion income in the land sector, with particular opportunities for the Indigenous estate and agricultural lands (CSIRO 2015; Robinson et al. 2016).

## 2.5 Megatrend 5: Environment as risk

Regional Australia's communities and businesses have long known the environment as a source of both livelihood and risk. However, the declining condition of natural assets, the loss of biodiversity, global climate change, extreme events and biosecurity risks are presenting new or expanded challenges for regional development.

Continuing pressure on global and regional biodiversity, on natural assets and on the ecosystem services these resources provide for our well-being and economic activity will be most readily experienced by people in regional Australia, where communities and businesses are more directly dependent on the environment and natural resources. The stresses of prolonged drought and changed river flows in the Murray–Darling

Basin and the growing concerns about the social and economic consequences of threats to the Great Barrier Reef are salient examples of the link between livelihood outcomes and environmental condition.

Changes to Australia's climate are mirroring global measurements of change, with air and sea surface temperatures increasing by around 1°C since 1910 (CSIRO & BOM 2016). Trends are showing more frequent and intense extreme heatwaves, increases in extreme fire weather, longer fire seasons, changed rainfall patterns, and coastal flooding, and these trends are projected to continue. They pose significant risks for coastal and inland regional communities and are likely to change existing patterns of land use. The costs of extreme weather events include psychological distress, injury and death; damage to public and private assets; damage to the environment; and disruption to water, power, transport and communication services (Infrastructure Australia 2015; SCOTI 2012). They are likely to add to the challenges of water security, and of providing health and emergency services in regions. Other sources of risk from the environment include the spread of pests and diseases that can seriously affect agricultural productivity, market access for regional produce, regional biodiversity and human health. These risks are exacerbated by increased movement of goods and people, nationally and internationally (Simpson & Srinivasan 2014).

While these risks for regional Australia are significant and growing, our capacity for resilience can also grow. Building resilience to any type of risk requires that we improve our capacity to plan, manage and decide under conditions of uncertainty. New technologies that enhance predictive capacity of managers are being used more widely. Practices for managing risk and uncertainty are increasingly being mainstreamed into enterprise-level decision-making and in major infrastructure and planning decisions. There is also an increasing policy emphasis away from disaster recovery or emergency management towards preparedness, community resilience and adopting a principle of 'shared responsibility' between households, businesses and governments for improving regional responses to these risks (COAG 2011; PC 2015b).



# 3 The scenarios

Through the scenario development process, we identified two continuums, or axes, of possibilities in 2040 which capture critical uncertainties and driving forces embedded in the megatrends that will impact regions in terms of liveability, work, and investment:

- the extent of technological progress and connectivity (from limited to vast)
- the level of human capital and regional economic diversity (from limited to diverse).

The trends and megatrends identified numerous sources of uncertainties and factors that will drive change; however, the axes cannot capture everything that matters in determining regional futures. Rather, additional important influences are embedded in the detailed description of each scenario. Even so, each scenario models a simplified version of a more complex and interconnected reality.

In addition, we have woven four other influences into our scenarios. These influences are based on trends that we expect will continue to play out in regions over the next 25 years:

- increasing risk from long-term climate change and related extreme events
- increasing scarcity of natural resources
- continuing flow of people to urban centres and high amenity areas
- global factors that influence stability, trade, and migration.

A further three influences are also important in determining how regions will respond to the changes described in the scenarios, though there is less certainty in how these influences might unfold in the scenarios:

- the adaptive capacities of individuals and communities to cope with and respond positively to significant change
- institutional responses including government, civil society, and industry initiatives; and changes to forms of governance
- societal norms and attitudes, including attitudes towards diversity, immigration and technology.

To address these uncertainties, we have embedded a ‘downside’ and described risks for each scenario. These risks represent the uncertainty in how a region will respond to the future described in the scenario. The risks also have implications for policy, programs, and initiatives that support and enable change towards a more desired outcome.

Below is a brief overview of the two axes and four scenarios, followed by a deeper discussion of each.

## 3.1 Overview of axes and scenarios

The **technological progress and connectivity axis** reflects the extent to which regions are embracing new and emerging technologies and have overcome the limiting effects of distance. It ranges from little change at one end of the spectrum to vast and profound change at the other end, which caters for the uncertainty of the breadth and depth of technological development, digital adoption, transport infrastructure (and social connectedness). It also caters for the uncertainty about the speed of change, and the way industries and people will respond. There is a future where the benefits of vast technological change and connectivity have come to fruition – all industries are connected to global markets; regional businesses, regardless of their location, operate as efficiently and productively as in any capital city; and residents do not feel isolated or feel that they are missing out. In this future, flows of knowledge-based, financial, and material capital are unhindered by infrastructure constraints. However, there is a risk of displaced industries and rapid economic change, as people’s ability to cope and adapt to change is mixed. There is another future where technological progress has been more limited and the tyranny of distance persists. Here, regions have been unable to fully realise the opportunities of doing business in a world that is now

fast-tracking its resources to those places that can add value at the most efficient rate, with new and emerging products and processes. At this end of the axis, youth and working-age residents continue to leave, and there is a growing sense of a rural-urban divide.

The **human capital and economic diversity** axis reflects the extent to which regions have incorporated a diversity of industries, and have managed to support a broad and robust labour force. The degree to which regions embrace new growth sectors, seize opportunities, diversify their industry base, and develop, attract and maintain human capital is subject to considerable uncertainty. At one end of the spectrum, there is a future where regions have relied heavily on one main economic sector and specialised in its development. Residents remain largely dependent on one principal employer group, creating persistent vulnerability for the region, particularly in the context of increasing climate risks and the potential instability of overseas markets. At this end of the axis, the skill set of the labour force is narrow in focus and the population is at risk of decline. However, there is an alternative future where regions enjoy a diverse economic base, provide wide-ranging job opportunities, and its human capital has broad and deep skills. Despite extensive and sometimes rapid change, by diversifying into service- and knowledge-based sectors and other emerging markets, regions have become more resilient. Moreover, land use is multi-purpose and landholders have successfully integrated agriculture with energy production. However, population growth has increased the cost of living and the demand for scarce resources such as water.

Together, the two axes create four quadrants and four scenarios (Figure 1) entitled:

- Global niche
- Fast and flexible
- Natural advantage
- Holding ground.

The title of each scenario represents the overall essence of the future for that scenario even though multiple aspects of change are incorporated into each storyline. Within each scenario, we discuss what it would be like to live, work, and invest in a region, and we describe each future from the perspective of a hypothetical future resident.

Perhaps unusually for axes selection in scenario planning, each axis refers to two dimensions rather than one – technological progress and connectivity, and human capital and economic diversity. Our discussions through the workshop and scenario development process highlighted the importance of describing the two dimensions of each axis explicitly, since they were seen to be mutually dependent. For example, diversification of economic activity is dependent on the presence of a diverse suite of human capital. Similarly, widespread diffusion of new technologies will co-evolve with greater connectivity.

### 3.1.1 A NOTE ON READING AND USING THE SCENARIOS

Scenarios, as narratives of plausible, alternative futures, are a useful device for stimulating discussion and deliberation about actions that might mitigate or stimulate a desired outcome or, alternatively, that might constitute a robust response to a future condition in regional Australia.

Importantly, the scenarios cannot describe the full range of possible futures, replete with numerous examples of possible combinations of economic activity, actors or settings – in doing so, a scenario would become overly complex and detailed, and lose the usefulness of a tool that, through its simplicity, can promote dialogue among a wide audience. Instead, the value of the scenarios lies in encouraging decision-makers and stakeholders to consider broader patterns of change and to explore, question and critique the scenarios as a way of surfacing other assumptions, preferences or knowledge about the future. Put simply, they are intended to open a conversation and encourage questions, rather than provide the answers.

It is also helpful to read or use the scenarios in the context of the regional megatrends as these megatrends provide an overview of the broader more empirically-based ‘winds of change’ that influence, but are not confined by, the scenarios themselves which, by their nature, are partial.

The scenarios can be read as a way of exploring plausible futures for regional Australia, broadly. Alternatively, and perhaps more fruitfully, the scenarios can be read as futures that different types of regions in different parts of the country may experience.



FIGURE 1 The four plausible future scenarios for regional Australia



### 3.2 Vertical axis: Extent of technological progress and connectivity

The quadrant’s vertical axis reflects the extent of technological progress and connectivity in regions, covering everything from the adoption of new technological platforms, materials, and automation through to transport systems and digital access and capability. Both ends of the axis describe a future where technological progress and connectivity has changed from today.

The impact of the fourth industrial revolution has heralded new ways of doing work, providing services, increasing wellbeing, and meeting the needs of a growing global population. However, technological progress and unforeseen new levels of digital connectivity can also facilitate disruption and displacement of existing industries, and new forms of power to extreme groups. It also presents new ethical considerations. It is unclear how technological progress and connectivity will change the way regions function – the impacts on population flow and demography; who will benefit; how it will be sustained; and the extent to which opportunities will be realised and economic benefits distributed.



FIGURE 2 Technological progress and connectivity – a snapshot of each end of the spectrum

### **3.2.1 VAST TECHNOLOGICAL PROGRESS AND CONNECTIVITY**

In 2040, regions are experiencing the effects of unparalleled technological progress and transport connectivity. Service delivery models and business processes have changed extensively, and there has been broad-ranging product innovation. This has affected all aspects of work and business, health and education, and how people live their lives. Residents are engaging with the demand economy in terms of how they work and how they 'own' expensive commodities such as cars and houses. Business leaders are taking up opportunities and conducting their businesses in ways that are improving efficiencies and lifestyles. Private investment is helping to maintain services. Regions are leveraging their reach and tapping into markets that bring value to many people in the region. Enterprises are working in coalitions, taking on new opportunities together and minimising their individual risk. Sensor technology has increased efficiencies in the use of resources, especially water and energy, and is paying dividends in the savings to both enterprises and citizens. Large-scale investment in utilities is not required because of the reduced demand resulting from the efficiencies and the now mainstreamed decentralised technologies that can meet consumption needs.

Social media and virtual technology has helped to promulgate new ideas, connect people, and reduce feelings of isolation. Citizens enjoy a strong sense of empowerment and voice in decision-making, and have demanded and secured high transparency in government and corporate dealings. However, respect for alternative views has diminished in the online world and polarised positions on most ideas for regional change. This has spilled over into a more fragmented and less socially inclusive society, with public decision-making prone to reactive populism.

The risk here is that regional development rests in the hands of a vocal and powerful minority. Industry disruption and displacement, created through high levels of automation and artificial intelligence (AI) technology, is increasing the risk of higher unemployment and widening wealth inequality. These disruptions are also contributing to population and workforce churn as some people are unable to keep pace with change.

### **3.2.2 LIMITED TECHNOLOGICAL PROGRESS AND CONNECTIVITY**

In 2040, a future with less technological progress and connectivity than today is unlikely, so the lower end of the axis still encompasses a degree of technological change, improved transport efficiencies, and digital adoption. However, the technological revolution has not brought major efficiencies to businesses, and has delivered only incremental benefits to decision-making for regionally-based enterprises such as farm businesses. While service delivery providers have integrated newer digital platforms and automation into their models, face-to-face interactions continue to underpin many health, educational, social and cultural services.

Social cohesion and inclusion is robust and, although social media has continued to connect people over long distances, virtual experiences have not proved to be the substitute for face-to-face interaction in communities and business dealings. Traditional ways to meet up socially persist, with strong support for local culture- and recreation-based activities and events.

The risk here is that the technological progress occurring internationally is putting pressure on the efficiency and productivity of regional businesses, who are less able to compete in global and national markets. The migration of youth and a growing sense of rural-urban inequality are also ongoing concerns.

### 3.3 Horizontal axis: Level of human capital and economic diversity

The quadrant's horizontal axis reflects the level of human capital of a region and the diversity of its economic engine. It includes population size and demographic profile; labour market; levels of educational attainment and skills; the type and mix of regional industries; enterprise ownership; business models; and the character of supply chains. It includes attributes that contribute to earning a living and strengthening a community, and people's capacity to adapt to social and economic change. Both ends of the axis describe a future where human capital and economic diversity have changed from today.

Already this century, some regions have experienced changing economic conditions with the rapid expansion

of mining industries into agricultural regions, while others have lost long-term manufacturing or mining industries, which in turn has created changes in regional human capital. Workers and business owners have had challenges and opportunities as a result of industry disruption and displacement from socio-technological innovations; increasingly significant sectors, such as the knowledge economy; the transition of the energy market; and value-adding through the supply chain of goods and services. Increasing automation will also affect regions, as will different business models arising from the need to improve efficiencies; an increasingly variable and harsh natural environment; and increasing competition for natural, human and financial resources. However, it is unclear how fast, how far, how smooth, and how successful economic transitions will be across regional Australia, and how human capital in regions will respond.

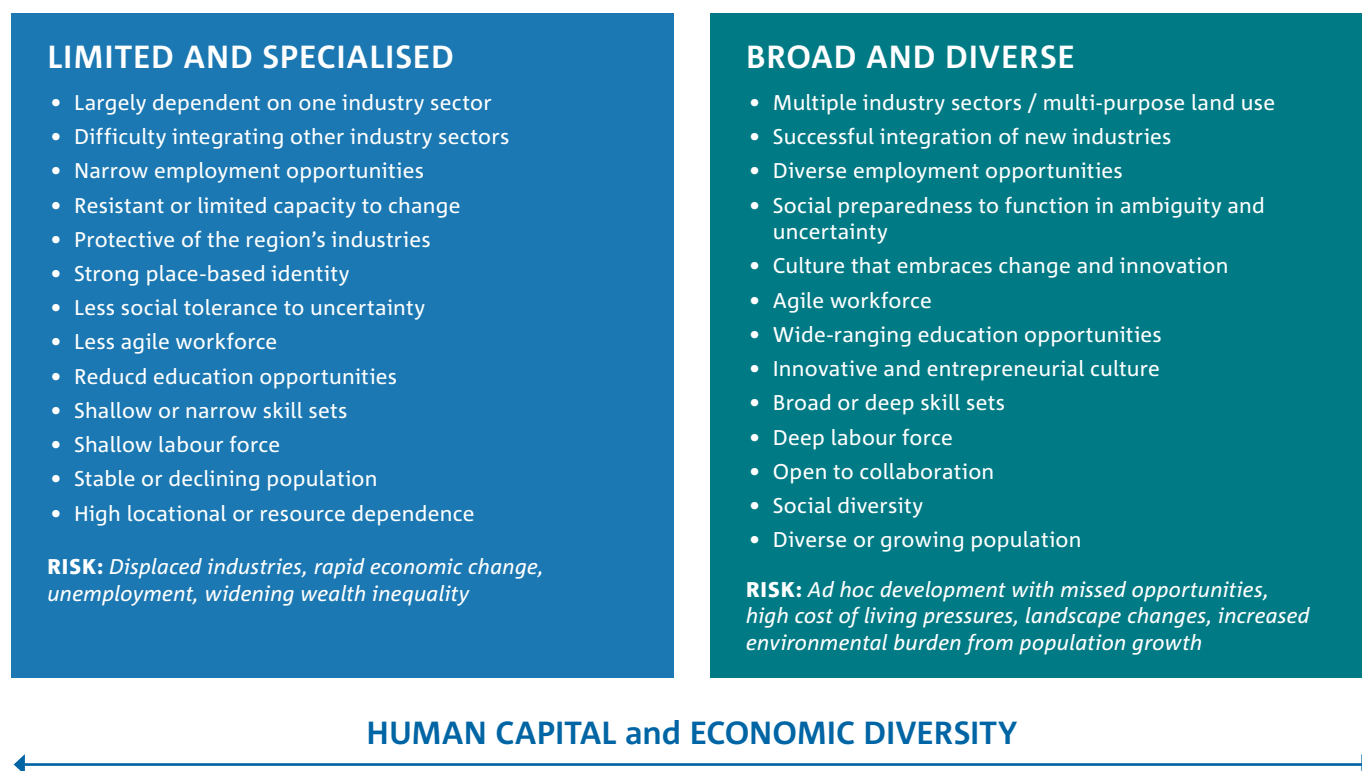


FIGURE 3 Human capital and economic diversity – a snapshot of each end of the spectrum

### 3.3.1 LIMITED HUMAN CAPITAL AND LOWER ECONOMIC DIVERSITY

In 2040, regional economic activity is largely specialised or lacks a broad base, and there has been difficulty integrating industries that are not complementary to the core industry. Focus has remained on one sector and improvements within the industry have helped to deliver high value products. The shift beyond traditional and previously successful ideas of development has been minimal. Two main sets of issues contribute to the lack of economic diversity. First, a lack of desire or perceived need to broaden the economic base because of the competitive advantage that the specialised industry has created and upholds. Maintaining a singular focus has been actively pursued and attempts at integrating other industries have met with strong local opposition or integration has been difficult due to the lack of appropriate human capital. In contrast, the second set of issues contributing to a lack of economic diversity relates to people's perceptions of limited alternatives and capability. A lack of natural assets or depleting physical resources, combined with a shortage of human capacity, particularly skills and innovation, has restrained significant diversification into other industries.

Employment opportunities are increasingly narrow and the labour force is shallow, with narrowly focused skill sets. The workforce is less agile and there is less capacity for introducing change. Place-based identity is strong and closely linked to the deep-seated heritage value of the mainstay industry and connection to the landscape. Residents are fiercely passionate and protective of their region. They are cautious about, or even resistant to encroachment of new or different industries, competing industries, and conflicting land uses that may put their economic engine at risk.

Risks are the regions' vulnerability in maintaining a singular economic base, the declining population, and the potential for 'lock-in' with an inability to transition the social and economic base when key markets fail or new opportunities present themselves.

### 3.3.2 BROAD HUMAN CAPITAL AND HIGHER ECONOMIC DIVERSITY

In 2014, regions have diversified their economic engine and expanded into new industry sectors. Land use is multi-purpose and, wherever possible, resources are being shared. The scarcity of resources such as water and energy has resulted in industries co-locating for mutual benefits. Diversification into service- and knowledge-based sectors, new forms of energy production, and the successful development of carbon and ecosystem service markets has increased the economic resilience of regions.

The wide economic base has created new job opportunities in new industries. Diverse employment opportunities have resulted in population growth and regions are viewed as socially diverse, with high amenity. The labour force is broad and deep with wide-ranging skills, a largely entrepreneurial culture, and a preparedness to function in ambiguity and uncertainty. The rate of change has been mixed, with some regions experiencing rapid and unexpected change, while for others change has been slower and more gradual. Place identity is more service-sector-based and, in the main, people have retrained and adjusted to industry changes.

The risk for diversified regions is the lack of a planned and coordinated platform to take full advantage of the regions' assets and capability, and to successfully scale up. Without this platform, an ad hoc development of multiple industries occurs, minimising any collective or collaborative advantages. Furthermore, rapid population growth creates cost-of-living pressures through increased demand for housing; it changes the landscape through increased density or urban sprawl; and it places a greater burden on the environment and potentially scarce resources with the need for more water, energy, and waste management.

## 3.4 Scenario 1: Global niche

### 3.4.1 THIS REGION IN 2040

With a vibrant regional centre, a hub for excellent transport and digital networks, and being surrounded by high quality agricultural land and knowledge industries, this region has gained a reputation that has allowed it to export its expertise and products around the globe. It is recognised as one of a small number of regions worldwide that can compete in high-value, value-added, agriculture production. Innovation is humming along, with farmers finding ways to improve their productivity through increases in yield and more efficient use of resources. Automation has resulted in improved lifestyles for farmers, many of whom are working remotely from places that offer increased amenity and quality of life. Smarter farming practices have also translated into longer working lives for farmers, who now enjoy improved physical and mental health. Scarce water resources are being managed through remote-sensing and automated water-efficiency technologies, state-of-the-art water-reuse systems, and highly accurate seasonal climate forecasting. Regional businesses have become more competitive with lower freight costs and freight efficiencies. Enterprises are connecting to global market opportunities and, even though most are linked in some way to the region's main industry of agriculture, they are adding value with complementary products and services, and contributing to some diversification in the regional economy while maintaining a clear national and global reputation for the region's specialisation.

Although automation and robotics are helping productivity, the diversity of jobs for people in the region is narrowing, and fewer new kinds of jobs are available. The rural sector has continued to employ a relatively low share of the region's workforce, with new technologies driving down labour costs, but the skill mix is shifting to a demand for individuals with 'mechatronic' skills to run increasingly digitised and mechanised farms and other rural businesses. Employers are prepared to pay premium prices for new ideas and for people with 'talent'. However, many young people are leaving the region. Despite having been a great place to raise families, with state-of-the-art schools and health services, teenagers want to move away. They feel there are no jobs for them unless they are seeking training and employment connected to the main industry. Young people are moving to regions with more diverse employment opportunities and are enjoying the social vibrancy of a more socially diverse community.

The risk to the region is its reliance on one main industry sector. New initiatives to bring in other industries not connected in some way to adding value to the main industry face political opposition from stakeholders whose interests are closely aligned with the core economic activity of the main industry, and who want to avoid potential negative impacts from any new economic activity. However, some locals are feeling exposed because, though the main industry is going strong, if global market conditions change rapidly or other risks unfold, people will look elsewhere and possibly migrate from the region.

## 3.4.2 PERSPECTIVES FROM A RESIDENT IN 2040

### LIVING IN THE REGION

With improvements in technology and better connectivity, service delivery has become more accessible and all products are being delivered via a 'smart' service component. We have better access to health services, education, and shopping, mostly through the Cloud. Even though there is less face-to-face delivery, virtual technology has made service encounters almost as good, and we can shop and consume services 24/7.

Opportunities to access cultural experiences have widened because getting places is easy and fast. I don't mind living in regional Australia because location doesn't seem to matter anymore in terms of getting everything we need and running our businesses. Compared to our major cities, we have the benefit of a less crowded living environment and being closer to nature. As citizens, we feel much more empowered, with access to all types of information, and it's easier now to have a say on matters with greater opportunities to be heard and listened to. This has even enabled us to turn away new industries that we feel may threaten our livelihoods. We are fiercely loyal to our region and proud of the products we produce, and we are not prepared to risk another industry coming in and jeopardising our region's reputation.

### WORKING IN THE REGION

Our globally-connected regional university has contributed to the growth of our main industry and helped us become world leaders. Not only are we the leaders in production rates and yields of our agricultural commodities, we are also renowned for the fine quality of our products and the technologies we've developed locally to produce and process those goods. People all over the world want quality and don't mind paying for it.

As a region, we are extending our capability and 're-shoring' the manufacturing of our products,

producing sought-after garments locally. This has all been made possible through new production systems that link all aspects of the supply chain through the Cloud. Data analytics has taken us to new levels of efficiency, and local utility companies have helped industry keep their energy and water costs down. As a result, we have been able to compete with Asian countries and have succeeded in bringing manufacturing that complements our core industry back into our region without having to pay low wages to match overseas production prices.

The only downside is that new jobs are still scarce due to the high levels of automation, robotics, and driverless vehicles used in the supply chain. People with entrepreneurial and high-tech skills have done well. However, we are all acutely aware that our regional livelihood hangs on the ongoing success of our main industry. If we stay at the forefront of our field and keep abreast of what's happening, we should be able to switch our technological know-how to a new sector if needed. The key will be being prepared to adapt and, for many in our region, this will be difficult.

### INVESTING IN THE REGION

Early public-sector investment in our transport and digital infrastructure has laid the foundations for ongoing private and public-private partnership investment. This further investment has been used to tailor and augment infrastructure to meet regional needs. Superannuation funds have poured money into developing those aspects of agricultural production that help clothe and feed the world, provided the enterprises can also demonstrate improvements to the environment and total transparency in their business dealings. Green investment has been a big boost to our local agribusinesses but it all hinges on ethical practices – in everything from reducing total energy input through to reusing waste. Any hint of poor performance in environmental management places markets and financial security in our region at risk.

## 3.5 Scenario 2: Fast and flexible

### 3.5.1 THIS REGION IN 2040

Innovation has flourished in the region and it has become known as the place to go to launch a new business. With its large urban centre, the region is a base for many diverse industries, all of which have incorporated the efficiencies of cutting-edge technology and extraordinary transport infrastructure. Service sectors, particularly human and financial services; knowledge industries, especially health and pharmacy; online education centres catering for all levels and types of education; and online recreational businesses have all located their hubs in the region.

The region's hospital and health service has developed unique service delivery models for rural and outback Australia, and are exporting their ideas around the globe. The region is home to large companies that provide engineering and technical support to construction and mining services throughout the Asia-Pacific region. The demand economy is also thriving, and many residents work in these service-related fields. As a result, job opportunities are wide-ranging and the region has a growing population, with culturally diverse communities. Business activity in the region is constantly evolving and this brings a vitality to living and working in the area. The region is the envy of many, who consider it one of the best places to live, work, and invest in Australia.

However, ongoing and sometimes rapid changes have made life uncertain for residents. Industries and markets are being disrupted and displaced, and businesses in the region are in a constant state of flux. Fortunately, regional enterprises have adopted a pre-emptive approach and are planning for 'when' major change affects their industry, not 'if' change will occur. Similarly, workers are proactively preparing for the future, with many anticipating and pursuing up-skilling and retraining for alternative or changing work domains, which often necessitates learning to work alongside, or with, robots and AI. Some workers are sufficiently multi-skilled and are more easily able to augment their skill set and switch sectors. Most up-skilling

is done through the now ubiquitous virtual training nodes, with relatively minimal financial cost, so these workers find it easy to embrace change. In contrast, a minority of workers are finding it far more difficult to adjust. Even though industries in the region support re-skilling, not everyone can take advantage of new work opportunities, and for some there is substantial cost involved if entirely new professional qualifications are required. Another drawback to the success of the region is the increasing cost-of-living pressures that have emerged, with people from surrounding and distant locations drawn to the region's economic and employment opportunities, driving up the price of housing. Furthermore, households in the region pay top dollar for utilities and waste management because of the increasing demand from a rapidly growing population. In the case of drinking water, the region has not resolved worsening water scarcity issues exacerbated by frequent droughts and extreme heatwaves.

Three main risks to the region have appeared. The first is the development of a marginalised segment of the population, living in the cheaper residential areas, who are unemployed or underemployed, and largely welfare-dependent. Living in a high cost region has become increasingly difficult for these residents. The second concern is the growing wealth inequality within the region, combined with a call for smaller and less interfering governments. Residents now look increasingly towards the private and corporate sectors as providers of services that were previously supplied by governments. National level policies have increasingly devolved, and are now implemented through new forms of collaboration and investment among corporations, civil society and local government. Thirdly, rapid growth has changed the landscape and put a greater burden on scarce natural resources that are increasingly under pressure from harsh climatic conditions.

### 3.5.2 PERSPECTIVES FROM A RESIDENT IN 2040

#### LIVING IN THE REGION

Many residents of this region commute long distances to work; in fact, there is a large mobile workforce that base themselves here but work elsewhere. They live here for the wonderful services, education, and diverse work opportunities that are on offer for their partners and families. We also attract many newcomers to the region because of the wide-ranging business opportunities and the services and facilities we have available. We particularly get young people who want to make a start with their new business ventures, and they usually do well, especially if it's a business focused on data analytics, innovative service delivery, or cutting-edge products. Many of the older locals feel like they are a dying breed, hardly recognising the changes and growth that have taken place in the region. At times, this can be problematic and cause for social tension when the views and values of longer-term residents don't align with newcomers.

Our communities are diverse and residents become passionate if there are attempts to change the pace and social fabric underpinning the region's progressive way of life. Citizens feel empowered, with access to all types of information, and having a say on matters is now easy and accessible to most. With more transparency of data in real-time, people are more trusting of governments and corporations.

#### WORKING IN THE REGION

Technology is constantly providing workers with new opportunities to do things better. Many of our small businesses have developed major breakthroughs in how people eat, dress, go to the doctor, get an education, and manage their affairs such as banking, shopping and paying bills. The region boasts state-of-the-art systems for travel, and local farmers or managers of other land-sector industries now live in our larger towns and run their farms remotely.

However, the biggest risk to businesses and workers is that of being suddenly displaced by new business models. We live in a state of business flux, employment instability and population churn. The new normal is constant change and people who don't stay on top of it quickly become displaced. This situation works fine for the professional health service providers, knowledge workers, 'creatives' and people with high tech backgrounds but it is leaving some workers behind. Even though there are opportunities for retraining, some people are reluctant to take on education debt, especially if they are being retrained in entirely new professions and sectors that require long and expensive courses. These people also lack confidence that they have the necessary skills and persistence required to retrain. They may have to consider leaving the region to find somewhere that offers a cheaper way of life.

#### INVESTING IN THE REGION

Investment comes from a mix of sources. Many new businesses rely on international investors who are attracted to new ideas and the potential of ground-breaking service delivery models that can be used globally. The housing market is buoyant and land values in the region are very robust, making entry difficult. However, the diverse regional economy provides stability in that market.

Investors have access to all types of information about the region's businesses and are able to make quicker and more accurate decisions. There is no tolerance for corrupt practices, and funds are quickly withdrawn if environmental guidelines are breached. With increased monitoring and sophisticated data analytics, infringements are immediately detected; businesses have opportunities to rectify problems but only if they do so quickly.



## 3.6 Scenario 3: Natural advantage

### 3.6.1 THIS REGION IN 2040

With many industries based within its boundaries, this region is a thriving centre. The near universal reach of embedded sensing technologies and ICT in homes and businesses has improved efficiencies and reduced waste in production and consumption, but the impact of robotics and other AI platforms has been limited. Nonetheless, farming enterprises have extended their activities and combined their agriculture land use with new energy-related industries, functioning as mixed agriculture-carbon or agriculture-energy farms. Indigenous and non-indigenous landowners successfully manage these combination farms, translating benefits from co-locating an additional industry into improvements in their agricultural production. Carbon markets opened up in this region on the back of corporate and sovereign investment in carbon abatement programs. This was followed with the establishment of a range of knowledge services linked to the management, aggregation and marketing of carbon credits. The ag-energy farms are now providers of all regional energy needs, both domestic and commercial, and this has attracted high-energy-consuming manufacturing businesses to the region. Food production chains have shortened with downstream components relocating their businesses close to the source of farm production. This has evolved due to ongoing increases in logistics costs, which reflect the significant inefficiencies in the region's transport networks. The region boasts a prolific creative capacity, which adds to its diversity and vibrancy. This sector has produced many successful local artists and created a reputation for the arts in the region.

The attitudes of citizens have become strongly aligned with the resource-efficient, climate-resilient, and sustainable development values reflected in the region's industries and boutique entrepreneurial businesses. Homes and businesses are linked to the regional energy grid and, collectively, they manage peak demand issues if problems arise. Regional water scarcity issues that had threatened liveability in the region some decades ago have been largely resolved through a mix of smart engineering

and social acceptance of all alternative water sources, which are now integrated into the regional water supply. Wherever possible, water, waste, and energy hubs are set up among users and producers to create zero net consumption zones. The region has an enviable reputation for sustainability and many people are choosing to come and live here, not only for the lifestyle that is on offer but also for the varied employment opportunities available.

Two main risks affect this region. The first is the persistent low income levels of some local residents who have not been able to find well-paid work in the region, combined with increasing cost-of-living pressures. Working in the new sustainability industries has required up-skilling and new skill sets. The regional university has traditionally made a major contribution to education and innovation in the region but has struggled to remain agile and internationally competitive under less-than-optimal digital connectivity conditions. Courses are expensive and lack the low-cost online and virtual options that other regions with better digital services are offering. Consequently, school leavers and some workers who are looking for retraining have been deterred from getting higher qualifications – they are finding it hard to take full advantage of the better paying jobs on offer in the region and are settling for the lower-paid, less skilled occupations. The better paying jobs have been filled by newcomers who have received their education outside the region. The second risk is to the enterprises in the region that need to improve productivity to become truly competitive on the world stage and open up broader markets for the future. Competing with more efficient and productive businesses is hard when the region is unable to support better transport and logistic hubs, and a relative digital divide persists. This further creates a negative flow-on effect to the technological solutions that the region can employ to improve its productivity and efficiency. Both of these risks threaten the long-term viability of the region's businesses, and their ability to expand and grow.

### 3.6.2 PERSPECTIVES FROM A RESIDENT IN 2040

#### LIVING IN THE REGION

People move to our region from neighbouring regions and from all over Australia due to the combination of affordability and rural amenity values. The population, while ageing, is relatively stable and supports a cohesive community with a shared identity, despite the mix of economic activity. Many residents work part-time and have extensive resources, both in terms of skills and time, to commit to community programs that supplement service delivery in our schools and health services, and that develop and maintain our natural environments. Social capital is deep and our region boasts an innovative volunteer network that has won awards for the programs it delivers to young people, and for the citizen-based science we contribute to the sustainable production and living knowledge base of our region. Some years ago, parts of our community lacked the finances to take up opportunities offered by decentralised power generation based on new technologies; they are still dependent on older forms of more costly energy supplied through the traditional utilities.

#### WORKING IN THE REGION

Residents work in a diversity of industry sectors but the cross-cutting theme in our region is sustainable industries. This even extends to our local artisans who have become well known for their recycled art and craft, and reprocessing of timbers, plastics, and iron into highly valued furniture. The region also

manufactures and develops many products linked to decentralised water and energy systems, which are now starting to be used in all parts of the world. However, the region is still finding it hard to compete with overseas producers even though it is an exemplar in sustainable living and our products are at the forefront of environmental science. The region's limited infrastructure and logistics cannot support high demand export potential for these products internationally. Tourism is emerging as a significant market segment, with many domestic and international tourists keen to visit and learn from our climate-resilient and sustainable industry sectors and businesses.

#### INVESTING IN THE REGION

Multinational corporations, particularly financial institutions, agribusiness companies and renewable technology companies, are large investors in carbon-, energy- and water-related businesses and industries. Working in close partnership with these institutional investors are Indigenous landowners and land managers who have extensive land assets in the region. They are re-investing profits from land-sector businesses back into Indigenous-owned and led enterprises, producing economic and social improvements for local people. Many self-funded small business owners are collaborating closely through well-developed SME networks to create synergies in our innovative land-energy and creative sectors.

## 3.7 Scenario 4: Holding ground

### 3.7.1 THIS REGION IN 2040

With transport technologies and digital diffusion only incrementally better than today, this region is relatively isolated, by global standards for developed countries. The effects of technological change have not penetrated the region extensively, the result being a steady decline in competitiveness of existing industry and limited attraction for new economic activity. Transport options have slowly improved but residents are always fighting to keep what rail and air services they have. The costs of maintenance of road infrastructure, and of road travel, is rising markedly – extreme weather accelerates the frequency of maintenance, and many roads lack the necessary technology for driverless vehicles, which are only available on the major roads. Cloud access is still relatively inconsistent and expensive, limiting some of the education opportunities and health services on offer elsewhere. It's always a numbers game – if there were more people who could use the services, the government would look at extending them.

The region is home to iconic Australian locations and residents value the untouched nature of the rugged landscape. Even though the array of local industries is limited, the region has stuck to its strong traditions and identity which, combined with landscape character, brings people seeking to experience the 'real Australia'. The tourism industry, while small, is still important, and businesses are able to leverage some seasonal work related to it. Employment has been fairly stable, but with no real growth. The problem is that young people don't want to live

here, so regional businesses still rely heavily on overseas workers. The region's sense of identity is strong; however, ongoing property amalgamations and land ownership by absentee landowners have created a division and feelings of marginalisation among some long-term residents.

The risk to the region is ongoing population decline and the longevity of its industry. The hotter climate is reducing liveability in the region and threatening to take more domestic tourists to popular coastal regions for their holidays. As a result, the tourism sector has become highly dependent on overseas travellers, but any changes to the global economy or instability in Asia has a big impact on the sector. Agricultural enterprises are also finding it difficult, with more extreme heatwaves and diminishing water resources making them more likely to have poor-production years. Advanced technologies that harvest water from deep underground, from saline sources and even from the air offer some hope. Communities feel vulnerable. There is mining but as an industry it no longer offers many local jobs – this type of work is all being done remotely, with driverless trucks and automation; highly skilled mechanics and technicians are flown in when needed, which is increasingly seldom. Financial capital, suitable infrastructure, and the people with skills to develop new industries are in short supply. Residents often think of moving but the cost to move is daunting – it's easy to feel trapped.

## 3.7.2 PERSPECTIVES FROM A RESIDENT IN 2040

### LIVING IN THE REGION

Housing is cheap and we can keep our cost of living down with our local solar farm and water-recycling plant, which the government subsidises. It's been hard to maintain our local services but we have become used to travelling to larger centres to do our shopping and to connect remotely to health and education services, which works well most of the time. The tyranny of distance and the digital divide still apply here and some residents are jealous of other regions where they can get everything online, and where groceries are delivered as part of the service offering. Even though tele-health has provided some preventive programs, it is limited. We still have problems with obesity and diabetes, and getting treatment online is difficult with the lack of digital connection. We still largely rely on face-to-face delivery for a lot of our health care. Older people stay and retire here because they can't afford to move to the coast or larger centres, but the elderly eventually move into nursing homes in the larger centres because home-care services are inadequate, even with sensor technology. There are some social problems with young people who face reduced education opportunities and few job prospects. Some have fallen into substance abuse and crime. Young people want to move away as soon as they can, and they seldom return. For those that don't leave, it's very easy to end up in low-paying jobs, and this is reflected in our incomes, which are low compared to other regions.

### WORKING IN THE REGION

The nature of work has changed across the region, yet retained many similar attributes of decades ago. The biggest change is the hours of work. Because many work-related activities are done outdoors, most people work split shifts to avoid the hottest part of the day. Temperatures have continued to rise making it necessary to work into the night. The work is still largely physical or operating large machinery. The impact of digital and robotic technology has been limited – robotics are costly and lack of reliable connectivity is

hindering the ability of businesses to introduce automation to reduce the dependence on manual labour for certain tasks. This makes it hard for workers who need to work well into their seventies but are unable to find suitable employment. Health and education jobs are available but the use of technology in our hospitals and schools has been modest at best, so the region is not seen as a cutting-edge place to work. As a result, attracting and retaining staff is a key issue for the region, which has a flow-on effect to our services. In contrast, large mining companies can afford the cutting-edge technology that provides seamless connectivity in remote areas, which enables them to use robotics, driverless vehicles and other advanced labour-saving machinery. However, most of these machines are controlled remotely from cities and maintained by fly-in, fly-out technicians, with few local jobs. Our modest but important tourism industry has grown in recent decades and has become the primary, reliable economic activity leveraging other economic activities related to it, including our agricultural sector and town services. Employment has been fairly stable in the last decade or so – no real growth but stable. The problem is that young people don't want to live here, so we still rely heavily on overseas workers.

### INVESTING IN THE REGION

Investment in infrastructure, services, and facilities is dependent on government. The region attracts minimal new local business investment and overseas investors in traditional industries are only interested in purchasing large agricultural properties or mines. Agricultural properties along the river systems have been converted to national parks and other conservation estates, creating a network of rivers, lakes and wetlands whose management and protection is funded nationally and by international organisations. While this has affected regional agricultural production, these natural assets underpin the crucial flow of visitors through our towns, and support the maintenance of local services and economic activity for our tourism sector. Other opportunities seem few and far between.



# 4 Implications for policymakers and decision-makers

The diversity across regional Australia means that one suite of policy settings or interventions is unlikely to fit all regions. However, through the strategic foresight process we have identified some common or consistent themes relevant to policy development and decision-making that can be applied broadly. We also identified more tailored considerations that relate to, or stem from, each of the four future scenarios. These considerations relate to enabling or securing benefits and opportunities for regions, and reducing the likelihood of risks to regional livelihoods and infrastructure. The megatrends and scenarios also highlight the importance of forging and maintaining productive dialogue among local communities, regional entities, higher levels of government and, increasingly, international stakeholders. The considerations described below are not prescriptive. Rather, they are intended to guide future deliberation among stakeholders, managers, and influencers of regional development in Australia.

## 4.1 Tailoring policies to regional communities, conditions and advantage

The contemporary character of regional Australia has been shaped by strong historical drivers of development that have played out differently in different regions. This means that regional Australia is already on multiple and potentially divergent development trajectories, often with distinctive challenges and opportunities. Policy settings for regional development, while informed by national and global contexts, should also be tailored to the circumstances of regional communities and industries. This entails considering the current and future regional advantage and preferred development paths. Encouraging greater economic diversity is generally desirable. However, place-based approaches can attract specialist investors or develop unique regional investment partnerships. For example, the Hunter region in New South Wales is pursuing a smart specialisation strategy – a regional innovation framework endorsed by the OECD. This strategy suggests that there will be cases when building upon regional strengths rather than fostering diversity is a sound economic development strategy. Regions are also increasingly exposed to global competitive forces and this means there needs to be increasing policy consideration given to enhancing competitiveness around key industries, building out regional supply chains, and providing services to support the labour force working in the key industries.

## 4.2 Enhancing planning and foresight for regions

A diverse array of business and work opportunities, many of them currently unknown, will develop in regional areas, propelled by changing values, new technologies and shifting demand profiles. Significant changes associated with the transition to new service, knowledge and low-carbon economies, combined with the beneficial and disruptive effects of automation, will affect segments of the rural and regional workforce. The capacity to anticipate and prepare for the opportunities and risks that changing global and national economic circumstances present is crucial for regional Australia. Planning that engages communities, industries and government stakeholders in meaningful dialogue about their current strengths and future opportunities can mobilise a shared vision and resources, and prepare regions for future development pathways. These activities can occur alongside ongoing research and development to maintain market and product leadership in a region's area of strength. In regions characterised by a narrow skill base, shallow labour markets, transient populations and a narrow industry base are particularly vulnerable to changes in circumstances and, therefore, the act of planning with foresight is arguably even more important in these regions than in other parts of the economy.

## 4.3 Investing in human capital and adaptive capacity

Investing in education, training and knowledge strategies will be key to meeting changing economic demands. This investment will enable the regional workforce to improve competitiveness and build the capacity of individuals and industries to adapt to potentially rapidly changing employment and market opportunities. Regional and other tertiary educational institutions will need to be catalytic players in the delivery of flexible, accessible and ground-breaking training initiatives, and be innovators in the

knowledge and service economies in regions. Furthermore, regional businesses and industries will need to be more reflexive, making use of their skilled or specialised people to help redesign, diversify and upskill their workforces. Encouraging attitudinal change and supporting life-long learning, cultural exchange, skilled immigration, and diversity in regions will be vital to building the adaptiveness of regional communities, and creating the bridging social capital required for collaboration and innovation.

Market and policy framings that encourage venture capital in the fields of biosciences, environmental efficiency and agronomic technologies are also likely to benefit regions. In addition, high-school education must link to and support the changing needs of the adult workforce. For example, supporting skill development in creative thinking, problem solving, emotional intelligence, digital learning, and STEM subjects will be important to assist adults cope with and adapt to change.

The role of governments may shift away from supporting established businesses or industries to investing in knowledge and data generation. This is likely to inform new or value-added investment and underpin the education, training and innovation infrastructure required by a wide range of industries. Areas of investment could include research and development of services, modes of service delivery, or products designed for regional and remote areas. These investments could apply to aged care, health, education, market access, and remote and Indigenous enterprise development.

As fertility rates decline (see section A.3.3), not only will it be important to invest in education, it will be necessary to examine strategies to attract migrants with the right skills to regions. Deepening educational attainment is likely to change income levels. It will be necessary to provide feasible means and sufficient incentives for households to continue investing in education to maintain the supply of skills and knowledge required to compete in an increasingly knowledge-intensive economy.

## 4.4 Investing in connectivity and infrastructure

Cities and regions are becoming more connected than ever before. However, the patterns of interaction are more complex. Greater physical connectivity has historically driven migration to larger centres. In some cases, digital connectivity may accelerate this trend through the replacement of local service providers with digital services, and through automation in the resource sector and parts of the agricultural workforce. This same connectivity may also facilitate ‘returners’ and new activity in regions as part of broader changes to workforce mobility that allow service, creative or professional roles to operate from the regions. Connectivity is also likely to continue the growth of female participation in the regional workforce. Public investment in providing digital accessibility to the regions will become a universal service obligation. However, doing so will require investments in improving the digital ‘ability’ of and ‘affordability’ for regional communities, to close the digital divide, particularly for Indigenous, older, and socio-economically disadvantaged regional residents.

Lowering the costs and improving the safety of road transport is critical to maintaining and expanding business and meeting commuters’ expectations. For example, investing in fast rail may reduce commuting times from regional centres to capital cities and facilitate decentralised growth in some locations. Efficiency of regional-global transport logistics will continue to underpin the competitiveness of regional business. This efficiency will benefit from the bundling of investments for transport hubs, and quarantine and related export-market services, incentivising private-sector investment and cooperation across jurisdictions.

Key future areas of capital-intensive development in some regions are likely to be agriculture and agricultural processing, packaging, logistics, and related sensing and information technologies underpinning point-to-point contracting. As this type of investment is unlikely to generate population growth, a major challenge will be attracting and maintaining the skilled people to manage these systems.

## 4.5 Institutional reform for development

Regulation is often cited as an impediment to development. Accordingly, some forms of economic growth in regional Australia will require new policy and institutional frameworks to support their development. Market-ready institutions that encourage broad-based participation in emerging land-sector carbon and ecosystem-service markets, or more efficient operation of water markets are some examples. Work regarding safety issues for automated vehicles is already underway. National trial guidelines explicitly seeking to balance safety and innovation were agreed by the Transport and Infrastructure Council in May 2017.

Other areas of institutional or regulatory reform would address current areas of perceived risk for investors. Key to greater security for private-sector investment, particularly in northern regions, are: better rules and processes around investor coordination in regions; identification of growth zones; and addressing land-tenure-related constraints that reduce opportunities for economic diversification and development on Indigenous land, in particular to support public and private investment in Indigenous enterprises and industries.

Similarly, perceived investment risk could be reduced with improved processes for major projects that more efficiently and equitably resolve ‘contested’ landscape issues between conservation and development values, agriculture, urban encroachment and energy projects. In these cases, through bilaterally agreed and regionally negotiated development and strategic land-use policies, governments can act as facilitators of a common vision for regional development to provide certainty for communities and for investors. Improving community acceptance in new or contentious industries can be assisted by the provision of transparent, real-time, accessible, and high quality information and by ensuring community expectations for a say in the decision-making process, and appropriate public governance and oversight arrangements. Furthermore, information sources that integrate environmental, social and economic data will be needed to address cumulative impacts and to maximise the benefits of development as regions potentially deal with concomitant and multi-faceted changes.



## 4.6 Managing risk

For regional towns and businesses, affordability and security of energy and water are critical risks, with considerable potential for future benefit. Energy policy that provides a secure, competitively priced energy supply will be required as will water policy that provides water security and/or flexibility for regional businesses and primary producers. Investment in biosecurity that protects Australia's reputation and brand for safe and 'clean' food in emerging global markets will also be required. Novel and sometimes contentious technologies (and associated product life cycles) also present risks that need to be understood from market, social, ethical and legal perspectives.

Regional livelihoods are more closely tied to natural assets and resources. Accordingly, there are also significant imperatives to minimise the impacts of land and water degradation; biodiversity loss; and climate-related risks to productivity, infrastructure and liveability. Building the resilience of core physical (energy, water, transport and digital) infrastructure and disaster preparedness will be crucial. Moreover, climate change will affect the amenity value of many regional areas, potentially exacerbating depopulation of some locations and increasing the frequency and/or severity of extreme weather events in others. These extreme events will increase the vulnerability of residents with less mobility, whether due to age, connection to place, or disadvantage. They also have important implications for the provision of emergency, health and related services

Workable models for shared responsibility in disaster preparedness between public and private sectors and new investment models that share risks fairly for the maintenance of long-lived infrastructure are needed. New insurance products, enabled by data and technology, may free up the flow of capital, strengthening rural industries in lower risk areas. They may also produce greater

inequality of outcomes (for example, for small rural towns and settlements). There are likely to be considerable benefits from improving current understanding of the likely spatial and temporal footprint of climate risks and related insurability, vulnerability, land suitability and liveability risks for regions. This knowledge will also facilitate collaboration and improved investment decisions for cutting-edge production processes, new locations, or new market niches that accommodate challenges from an altered climate or exploit the opportunities it presents.

## 4.7 Supporting collaboration

The current discourse on regional self-sufficiency could create internal competition at the expense of collaborative advantage. In highly connected and rapidly growing regional centres, there is considerable opportunity for SME networks to supply business-to-business and other services to both the domestic and global energy markets, and to the agriculture, food, logistics and health markets. These types of collaboration, working in concert with regional educational institutions, can contribute to globally recognised hubs of innovation. Encouraging and rewarding self-organisation and SME collaboration in regions with more traditional land-sector or resource-based economies can help identify synergies or value-adding in local value chains. Experiences from research on SME cluster development would be informative here. Investment in digital collaboration hubs for communities and local businesses can reduce entry costs and improve accessibility for local businesses and residents; create spaces for collaboration and incubation of ideas; and reduce social isolation. Adopting place-based collaborative development approaches also improves alignment of government and community aspirations, leading to more efficient and productive allocation of resources.

## 4.8 Supporting inclusion and liveability

A key challenge will be managing the ongoing social and economic dislocation of regional communities who experience rapid structural change due to technology, global markets and competition. Addressing the challenge will require both a national and a regional response that can support industries and communities to transition in an equitable way, drawing on the anticipatory capability described above. Regional unemployment and related health, social and economic problems will become a greater challenge if robotics and automation displace significant parts of the regional workforce. The effects may be exacerbated if accessible and affordable digital services, and other health, social or financial services, are not realised for everyday residents. Increasing congestion and commuting times, and poor housing affordability in cities will continue to push people to the regions. However, this liveability-based counter-migration is likely to be limited to amenity regions or larger regional centres with comparable services, and employment opportunities and accessibility to the major cities.

Lifestyle and wellbeing outcomes in different parts of regional Australia may continue to diverge, with relatively affluent and growing settlements in higher amenity locations and larger regional centres, and contrasting declining outer regional and remote towns. This type of growing inequality between regions, and between cities and regions, contributes to a loss of social cohesion and a loss of trust in public institutions and decision-making. In these regions, government will have an important role encouraging inclusive, socially cohesive, and vibrant communities, particularly by providing affordable housing and transport options; employment and educational opportunities; public safety; and contemporary levels of, and access to, health and human services. Providing social and economic opportunities for younger and older residents who may feel isolated will be particularly important. The balance will be difficult to strike for communities, between the benefits that stem from feeling pride in their shared past and identity, and creating optimism about a future that will require a shift in how they see themselves and the opportunities that the future presents.



# APPENDIX 1

## Trend analysis

Here we present the major trends that have historically shaped, and are likely to continue to shape, the future of economic and social development pathways in Australia's regions over the next three decades.

The 34 discrete trends presented here were used as the evidence base to develop the megatrends and inform the scenario development process. To show the connection between the trends and the megatrends, we have grouped the trends under the megatrend that best fits, though not all trends have carried through to the same extent.

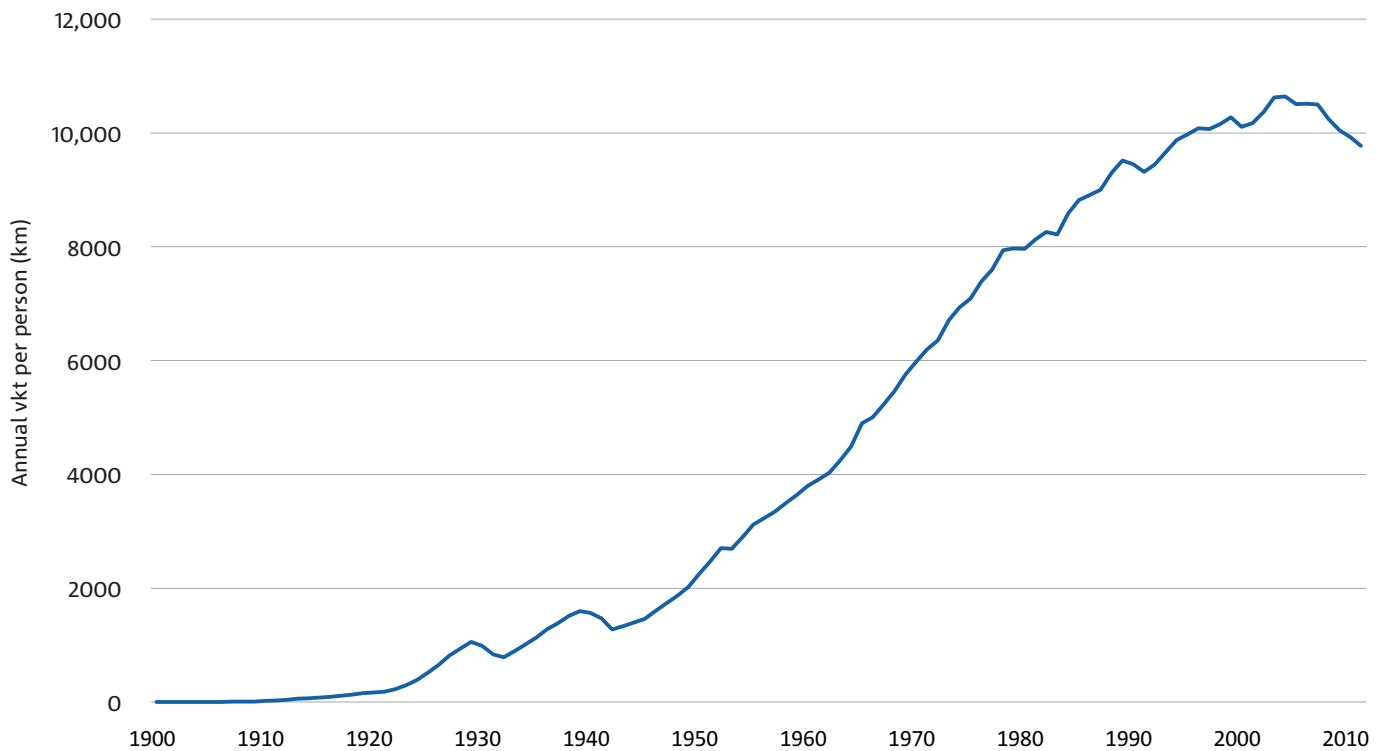
There have been several inputs into the identification and presentation of the trends in this report. During October 2016, a short issues paper was prepared by the CSIRO team which identified some initial potential trends or issues related to social, economic, institutional, environmental and technological change, and related datasets. The paper was then reviewed by the Project Advisory Group and during November 2016 semi-structured interviews were conducted with members of the group to help verify these proposed issues and datasets. In December, a small workshop was organised by the Department, with state and territory government representatives and other stakeholders. The purpose of that workshop was to 'road test' the early thinking on the major trends and sub-trends presented in this report, and the narratives around those major trends. This report reflects inputs from these activities and decisions by the project team and contributors about which trends to include and at what level of detail.

### A.1 Defeating distance

#### A.1.1 THE CAR, MOBILITY AND LOCATIONAL DECISIONS

The development of relatively cheap and convenient transport in the form of the motor vehicle has had a profound effect on the pattern of development and economic activity in Australia's regions (BITRE 2014a). The average annual vehicle kilometres travelled per person in Australia (Figure 4) increased by five times, from 2000 kilometres in 1950 to 10,000 kilometres in 2010 (BITRE 2014a). This capacity to travel further created opportunities for people to access larger markets and social networks, often located in cities and regional centres. It also gave people access to a wider range of cheaper consumer goods, and the possibility of better job prospects. In particular, it gave rise to an increase in female participation in the workforce in rural areas, with improved ability to access jobs and training in the larger regional centres. Greater accessibility, underpinned by improved road networks and affordable vehicles, significantly expanded the catchment areas of regional markets. It also allowed these larger regional centres to expand (BITRE 2014a).

In the past, our decisions about where to live were driven by the locational needs of industry (access to land, labour, capital, resources, markets). However, in the past 50 years, households and individuals have been increasingly making decisions about where to live based on a much wider array of amenity-related factors beyond the location of employment opportunities. This is a result of increasing wealth, greater capacity to move, and access to income streams such as welfare payments and retirement incomes independent of location. The balance of locational decision-making has shifted from companies and governments to individuals and households (BITRE 2014a). This trend is likely to intensify as women's rates of participation in the workforce continue to increase. In turn, this will expand households' range of options for income and employment. We will also see improvements to workforce flexibility, such as work-from-home options, through telecommuting and co-working (see sections A.1.2 and A.4.6).



**FIGURE 4 Average annual vehicle kilometres travelled per person in Australia, 1900–2010**

Source: Adapted from Figure 6.10, BITRE 2014a, p.157

### A.1.2 A MORE MOBILE WORKFORCE

Workforce mobility includes people in the labour force changing where they live for work, or moving for other reasons that see them entering a different regional labour market. These movements include relocating interstate; regular, long-distance commuting between where people live and work; and telecommuting that involves working from a distance, in any location other than the usual workplace (PC 2014). Since the 1990s, fewer people are moving interstate for work in Australia (likewise in the United States and Canada). However, international mobility of Australian workers has increased (PC 2014). On average, commuting times in the inner regional areas and outer suburbs of metropolitan centres has remained fairly stable in recent years. Whereas people commuting from their homes to their place of work in coastal country regions and remote regions in Australia travel twice as far as people in coastal urban areas above 30,000 people (BITRE

2015). While it is still a small part of the labour force (just over 2% in 2011), the number of people commuting long distance on a regular basis is increasing (PC 2014). The most significant increase is in the resources sector, mainly due to the growth of that sector and fly-in, fly-out (FIFO) workers in mining regions such as the Pilbara and drive-in, drive-out workers in other regions. FIFO is also used, though less commonly, in providing police, and educational and health service workers to regional and remote Australia (PC 2014). Improvements in transport technologies have reduced the cost and dis-amenity of long distance commuting. Therefore, this may have reduced the need for people to change where they live to access labour markets (PC 2014).

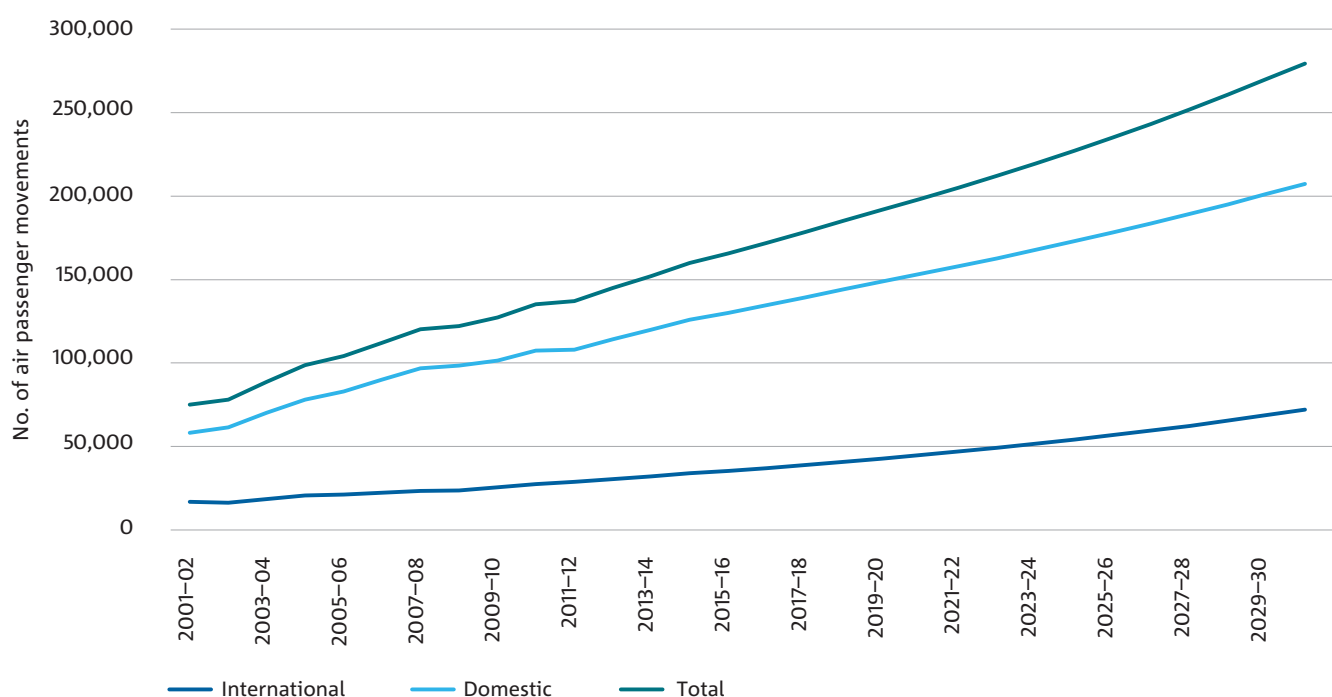
Improvements in communications, especially internet connectivity, have changed how people access markets, including labour markets. ICT-based employment or non-conventional work arrangements are enabling greater

flexibility in work practices and location. Around a quarter of Australians engage in some form of teleworking from their home and other locations (ABS 2008; Wooden & Fok 2013). However, it is evident that the vast majority of this work from home is by self-employed workers rather than employees. A much smaller proportion of people (5–6%) do most of their work from home (Wooden & Fok 2013). Nevertheless, these figures reflect the potential, at least, for ICT to enable greater separation between the location of work and residence described above. This gives people more freedom to choose where they want to live based on amenity (BITRE 2014a). Downsides of telecommuting, however, include social isolation of workers, reduced motivation, longer working hours, and employee costs of establishing suitable work environments away from the main office (PC 2014). While improvements in telecommunications and internet infrastructure has undoubtedly increased the scope of the type of work that can be done remotely, interestingly, between 2001 and 2010 in Australia the proportion of

employees working from home and the hours worked at home decreased (Wooden & Fok 2013). This decrease may be due to management cultures and practices of employers, and employee concerns about job security.

### A.1.3 MOVING BY AIR

The ability to move people between major cities and regional areas by air has grown rapidly and in 2011 made up 90 per cent of all passenger flows in the regional aviation market. For instance, over the last 19 years the total number of passenger movements through all non-capital city airports increased by 5.4 per cent a year, from 9.6 million in 1991–92 to 26.2 million in 2010–11 (BITRE 2012, p. 61). More broadly, the number of passenger movements through all Australian airports is forecast to increase from 135.1 million in 2010–11 to 279.2 million in 2030–31. International and domestic passenger movements are projected to increase by 4.9 and 3.3 per cent a year over the same period to 72.1 and 207.1 million, respectively, by 2030 (Figure 5) (BITRE 2012).



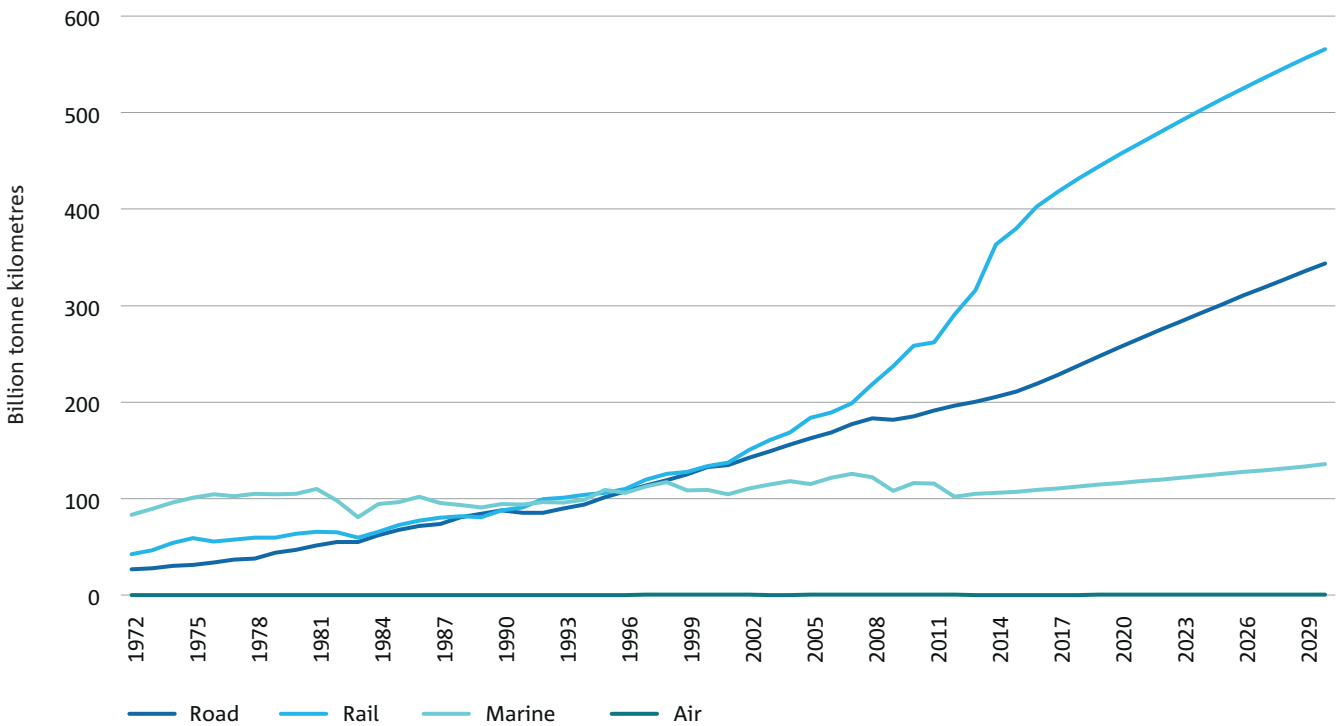
**FIGURE 5** Air passenger movements through Australian capital city airports, actual (2001–2012) and projected (2013–2030)

Source: Adapted from Figure 4.9, BITRE 2012, p. 42.

### A.1.4 MOVING GOODS

Technological change and improvements to infrastructure have made transporting people cheaper, faster, safer and more comfortable (PC 2014). These changes have also increased the efficiency with which goods can be transported. In Australia, over the past four decades total freight volumes have quadrupled. A large contributor to this has been the growth in road freight and, more recently, mining-related rail freight (BITRE 2014b). These increases have required significant improvements in the efficiency with which goods are moved between cities, through regional areas, and between metropolitan and regional areas. In 2011–12, nearly 20 per cent of road freight moved between capitals, and 50 per cent of road freight moved between cities and regional areas and other inter- and

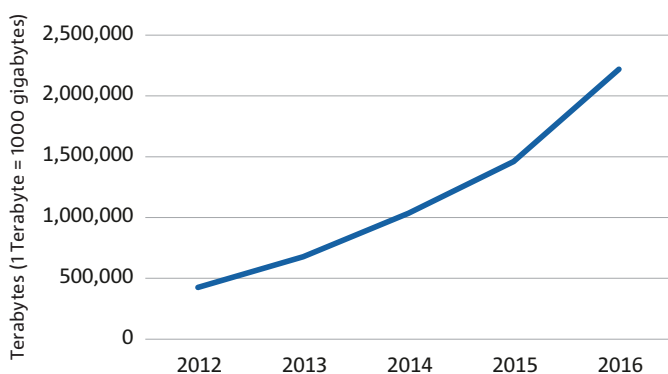
intra-state freight (BITRE 2014b). Road-, rail- and port-based freight movements are expected to double between 2010 and 2040 (Figure 6). Risks related to this dependence include increasing oil price volatility; a growing push for decarbonisation; future impacts of extreme weather (e.g. heatwaves) on road and rail infrastructure; the potential for changing spatial priorities for infrastructure due to shifting patterns of agricultural production resulting from climate change; and reduced demand from manufacturing centres due to structural change in the economy (SCOTI 2012; BITRE 2014b). The development of autonomous vehicles may significantly reduce freight costs, increasing material connectivity and access to goods.



**FIGURE 6 Freight task by mode of transport, actual and projected**  
 (Air freight comprises less than 0.01 per cent of total domestic freight movements)  
 Source: Adapted from Figure 8, BITRE 2014b, p. 9.

### A.1.5 GROWING INTERNET AND MOBILE CONNECTIONS

The growth in the uptake of information and communication technology has continued steadily worldwide in the last five years (Hajkowicz et al. 2016). By mid-2016, there were over 13 million internet subscribers in Australia (Figure 7). Fibre continues to be the fastest growing type of internet connection in both percentage terms and subscriber numbers. The number of fibre connections more than doubled between June 2015 and June 2016 to 960,000 subscribers (ABS 2016a). The rate of increase of the volume of data downloads is rapidly accelerating. From June 2015 to June 2016 alone, the volume of data downloaded over fixed-line broadband increased by over 50 per cent. The trend data download volumes is shown in Figure 7 (ABS 2016a). In 2015, subscribers in Australia downloaded over 2 million terabytes of data, and by 2035 it is predicted that some 15 billion terabytes of data will be downloaded semi-annually (ABS 2016a).



**FIGURE 7 Volume of data downloads, Australia (Terabytes)**

Source: Compiled by authors from ABS 2016a

The global growth in internet-connected devices is both enabled by and contributing to these trends. Smartphones are increasingly becoming a mainstream device for most Australians. At June 2016, an estimated 13.75 million Australian adults (76 per cent) used a smartphone, compared to five years ago when just under 50 per cent of adults reported using a smartphone (ACMA 2016).

### A.1.6 NEW CONNECTIONS THROUGH SOCIAL MEDIA

Another way that digital technologies are transforming connections between people is through the increasing use of social media, supported by increased internet access and the prevalence of smart devices. In 2016, about 69 per cent of Australians were using social media, with 57 per cent doing so at least once a day, a jump from 30 per cent just six years previous (Sensis 2016). About 48 per cent of small-to-medium-sized businesses and 69 per cent of large businesses in Australia now have a social media presence (Sensis 2016). Social media allows the near-instantaneous sharing of experiences, images and ideas across large distances, with global reach. This has connected individuals and created new communities of interest, practice and identity that extend beyond people's physical locality. Moreover, social media provides communities and individuals with opportunities for greater visibility. This enables them to reach a range of audiences, potential supporters, customers or investors, and potentially access and mobilise otherwise distant human and financial capital. Social media also has the potential to reduce people's sense of social or cultural isolation. The group in Australia with the highest level of digital participation, higher than the national average, is people with a first language other than English (Thomas et al. 2016). Social media also presents opportunities for more cooperative and collaborative working across geographically distant locations and between different professions such as journalists, scientists, business owners, and the public more broadly (Hajkowicz et al. 2016).

### A.1.7 THE DIGITAL DIVIDE

Nationally, digital inclusion in Australia has increased over the last three years (Thomas et al. 2016). There are, however, still some pressing concerns that the benefits of digital participation are not being realised by all Australians. Lower levels of digital inclusion are experienced by Indigenous Australians, older Australians, people with a disability, the unemployed and people with lower levels of educational attainment (Thomas et al. 2016). Geography also plays a role, with significant

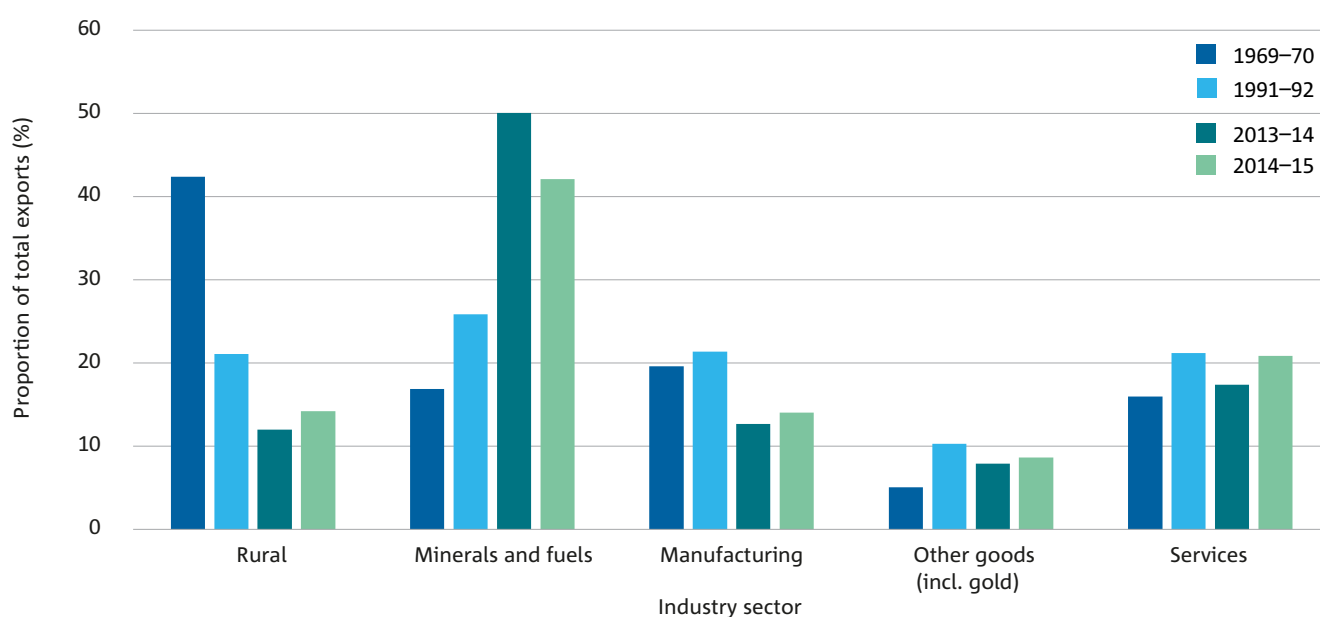


regional variations. While the digital access gap between country and city areas has narrowed, major gaps remain on affordability and digital ability, with some rural and regional areas ‘well behind’ the cities (Thomas et al. 2016). These regions include the Hunter, Eyre, Northern Victoria, Southern Tasmania, North West Queensland and much of regional Western Australia. Though some regional centres, such as Wollongong, have higher participation than other similar centres (Thomas et al. 2016). These differences have significant economic and social implications for people’s access to a range of professional, health, financial, educational and other services that are likely to be increasingly delivered online. It means that some communities will not be able to participate fully in opportunities in the emerging digitally-enabled workforce and economy. However, it is important to note that, while these technologies improve connectivity between distant communities and businesses, they can also contribute to the centralisation of services, employment and economic activity in larger urban centres and major cities. This is due to the clustering of some knowledge-intensive industries and service providers seeking efficiencies by replacing on-ground staff with online delivery.

## A.2 Global exposure

### A.2.1 GLOBAL MARKETS AND FREE TRADE

Globalisation and the expansion of world trade since the Second World War has been strongly linked to the shaping of regional Australia. Most of Australia’s exports have come from the natural-resource-based industries, particularly agriculture and mining. Services, mainly in the form of in-bound tourism, which also benefits and shapes regional communities, have become increasingly important. Changing overseas market demands over the past 50 years have seen the majority share of Australian exports shift from agriculture to mining, with tourism also providing an increasing share, although all sectors have expanded considerably in value in this period (DFAT 2014). Figure 8 displays these shifts over time, with the ‘Rural’ (agriculture, forestry and fishing) export value share halving over the 22-year period from 1969–70 (dark blue bar) to 1991–92 (light blue bar) and halving again over the following 22-year period to 2013–14 (dark green bar) (DFAT 2014). However, the more recent data displayed (dark and light green bars) clearly shows that there can be significant swings over much shorter time periods. For instance ‘Minerals & fuels’ drops from a 50 per cent share to just over 40 per cent in a one-year period due to falling commodity prices (DFAT 2016).



**FIGURE 8** Change in Australia’s export value share by industry sector, 1969–70 to 2014–15

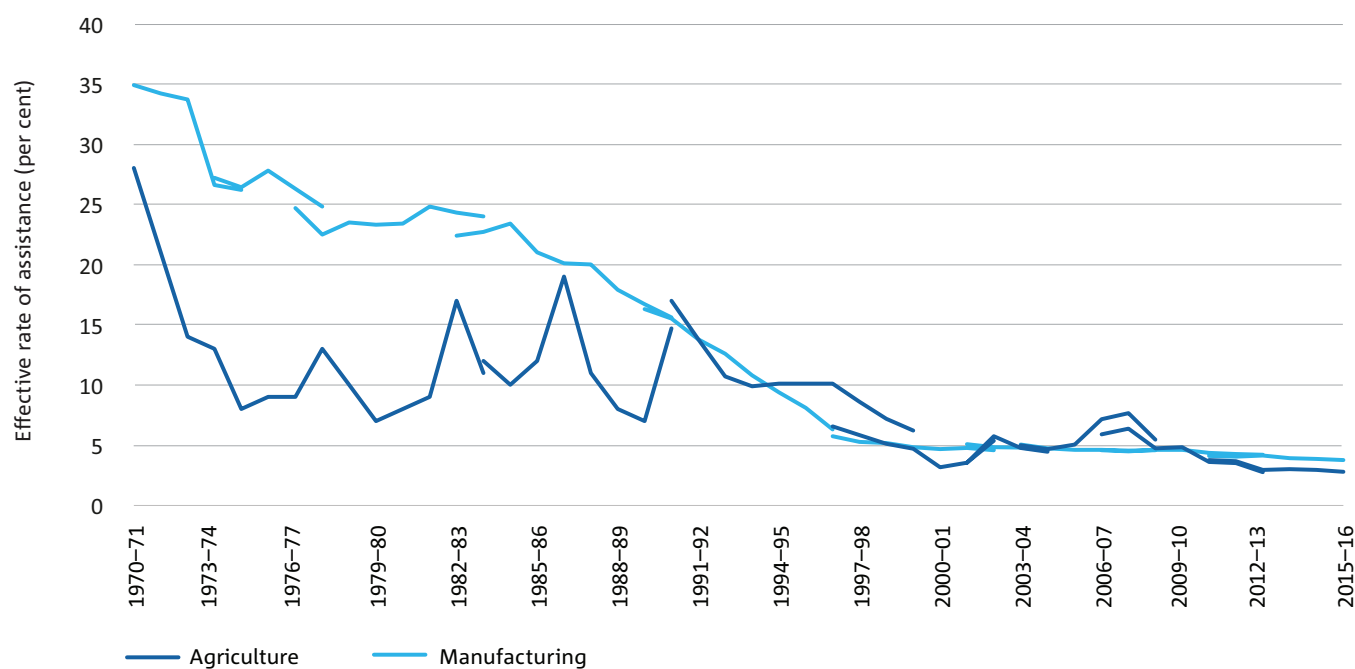
Source: Compiled by the authors from DFAT 2014, 2016

The geography of Australia's overseas trade, both for imports and exports, has also shifted profoundly over the last 50 years. In the early 1960s Australia had a relatively even spread of exports across a number of regions (e.g. UK 24%, Japan 22%, USA 13%, other Europe 12% and Oceania 9%). Now, Asia and Oceania dominate with 87% of 2013–14 exports (including China 37%, Japan 18%, and other Asia 28%). Likewise, Asia and Oceania have greatly expanded as a source of imports, from 25% in 1963–64 to 62% in 2013–14 (DFAT 2014).

Most of our exports to Asia are minerals and energy, notably iron ore and coal, and services (inbound tourism and education). Agricultural exports to Asia are growing, although they form a shrinking proportion of total exports (DFAT 2014). Australian educational institutions, mainly universities but also the vocational sector, are hosting an increasing number of Asian students, with incentives for international students to study in regional institutions linked to regional migration schemes (DIBP 2016; GEG 2016).

Australian government policies, at both federal and state levels, have sought over recent decades to liberalise the

domestic economy and grow our export markets. The dismantling of a range of direct and indirect protections and subsidies (Figure 9), the floating of the dollar and other changes have tended to expose businesses more directly to global market price signals, but also to the extremes of price volatility. The negotiation of preferential free-trade agreements has expanded some market opportunities, while introducing greater competition from imports to our industries. These changes result in different outcomes for different sectors, and for individual businesses within sectors. Some have experienced severe adjustment pressures, while others have benefitted from new or expanded opportunities. All of the key trade agreements have been with Asia-Pacific countries, including New Zealand, Singapore, Thailand, USA, Chile, Malaysia, Korea, Japan and China, with negotiations continuing with India and Indonesia. However, with mixed reports on the overall benefit of these preferential free-trade agreements to Australian industries (PC 2015a). With the potential geopolitical challenges to proposed multi-lateral agreements (e.g. the Trans-Pacific Partnership), the future of free-trade arrangements is uncertain.



**FIGURE 9 Effective rates of assistance to manufacturing and agriculture, 1970–71 to 2015–16**

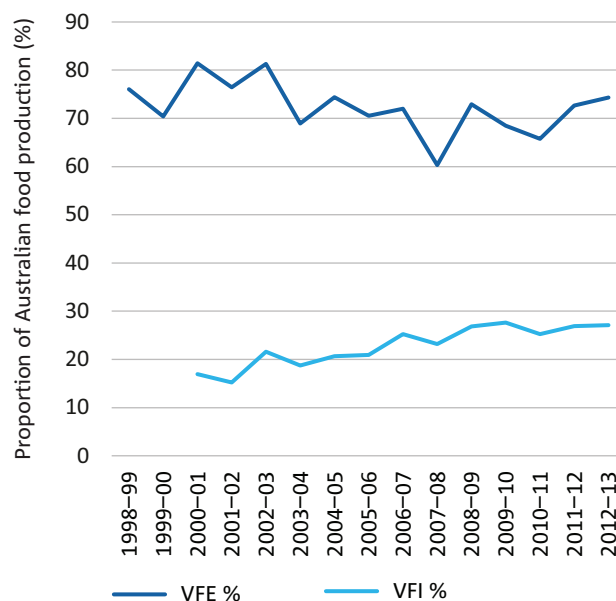
Source: Productivity Commission, *Trade and Assistance Review 2015–16*

NB: Broken lines or gaps in the graph lines indicate different measures of assistance, changes or overlaps in methods to collect this information over the time period by the respective agencies.

## A.2.2 FOOD EXPORTS AND SECURITY

The global population is expected to reach almost 9.7 billion by 2050 (UN 2015). Commensurate growth in the middle class will see the demand for food grow enormously, particularly in the higher value food categories such as fresh fruit and vegetables; protein sources such as meat, fish and dairy; and processed foods. Most of this growth in demand is expected to come from Asia (DAFF 2013). Australia's geographical proximity to Asian markets, our reputation for high quality and safe food produce, and a relatively open and stable investment climate should stand us in good stead to grow our supply into these markets (Di Nunzio 2014b).

Substantial growth is expected in exports of bulk commodity or 'minimally transformed' foods (grains, oilseeds, fresh fruit and vegetables, seafood, live animals), as well as for 'value-added' foods – those that have had a degree of processing (DAFF 2013; AFGC 2016). The 'substantially or elaborately transformed' categories include frozen meat, dairy, sugar, and processed products of grains, fruit, vegetables and seafood. The relative growth rate in exports of bulk commodity versus processed sectors will depend on a number of factors that affect the relative advantage of producing them in Australia over the Asian economies themselves producing them (Watson 1993; Watson & Merton 2013). Australia tends to enjoy a comparative advantage in producing bulk commodity products, both at the low- and high-value ends, largely due to our large land and marine resources relative to our population size. The industrialising Asian countries possess a comparative advantage in manufacturing, primarily due to lower labour costs (ACIL Allen 2014; CIE 2015). Thus, Asian countries tend to import Australia's commodities for processing in their own country. However, the advantage in doing this is dependent on the specific nature of the processing requirements (e.g. wine, dairy) and other economic and institutional factors, such as the exchange rate and food quality assurance. Overall, however, export growth is expected to be greater for commodities than for processed food products. The higher value commodities (e.g. fresh fruit and vegetables, seafood) are expected to have the greatest demand growth, due to changing diets



**FIGURE 10 Value of food exports (VFE) and value of food imports (VFI) as a proportion of Australia's food production**

Source: Compiled by the authors from 'Australian food statistics' report series data (DAWR 2000–2014)

in Asia (Gulati et al. 2005). Reflecting these influences, the five-year period 2011–12 to 2015–16, saw the export value of Australia's 'minimally transformed' fresh food products triple, while exports of 'substantially and elaborately transformed' food products doubled in value (AFGC 2016).

While Australia's food exports have grown strongly over recent decades (170% from 1998–99 to 2012–13) (DAFF 2000, DOA 2014), so too has our domestic consumption of food due to a growing population and increasing affluence. Because of this, the proportion of Australia's food production that is exported has declined slightly (about 10 per cent over this period) while food imports have almost doubled (Figure 10) (DAFF 2000, DOA 2014). Australia's contribution to world food supply will no doubt increase into the future. However, our growing domestic population and, therefore, consumption demand may constrain the rate of expansion of future food exports. A range of other challenges facing agriculture may also affect future productivity and export growth. These challenges

include: impacts of climate change, future water supplies, availability of high quality agricultural land, other input constraints (e.g. energy, labour, crop nutrients), ageing of the farm workforce, high rural debt, and reduced public RD&E spending (Di Nunzio 2014a, 2014b; Rees 2015).

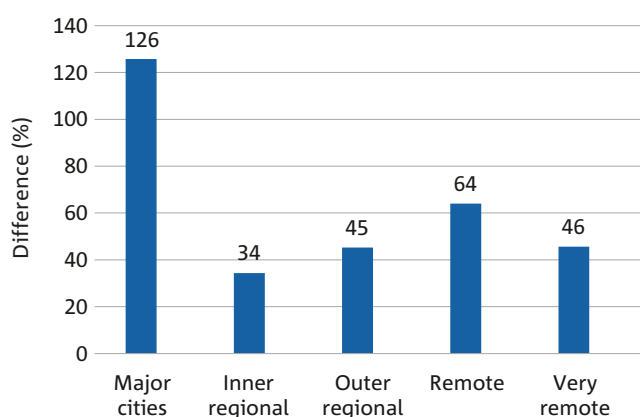
### A.2.3 EDUCATIONAL ATTAINMENT TO COMPETE GLOBALLY

The number of countries capable of sophisticated production processes in the resource-based industries, manufacturing and services is growing. The latter half of the 20th century saw rapid industrialisation in Asian countries, including, notably, Japan, the ‘Asian Tiger’ economies (Singapore, Hong Kong, Taiwan, South Korea) and China. Emerging economies in Asia and other regions of the world, such as Eastern Europe, South America and Africa, have also been modernising. To compete globally, Australia needs a highly educated and skilled workforce to understand, apply and develop innovative technologies and business models. This applies as equally to businesses located in the regions as it does the cities. Unfortunately, Australian student rankings in international educational attainment indices are falling (Thomson 2013, 2016). Also falling is the share of students undertaking maths and

science courses at school and university (Wilson 2015; Kennedy et al. 2014). However, recent poor employment outcomes for graduates with STEM (science, technology, engineering and mathematics) degrees, suggest that a broader skill set and/or further specialisation is required to meet industry needs (PC 2016; Norton & Cakitaki 2016).

### A.2.4 IMMIGRATION, SKILLED LABOUR, AND CULTURAL AND ETHNIC DIVERSITY

Australia is a country built on immigration and will likely remain so for the foreseeable future. The contribution of overseas migration to Australia’s population growth has increased from around 40% in the 1950s to up to 60% in recent years. Natural increase (births over deaths) supplies only about 40% of population growth (ABS 2013a; Spinks & Koleth 2010). However, a disproportionate and growing share of immigrants settle in Australia’s capital cities, particularly Sydney and Melbourne, which take about half of all immigrants (ABS 2014a). While 70% of Australia’s overall population resided in the major cities in 2011, 86% of recent overseas arrivals chose to live there (DIRD 2015). This trend has increased dramatically since the post-WWII period, with the share of overseas-born population residing outside the major capital cities halving, from about 38% in 1947 to 19% in 2011 (Hugo et al. 2015, p. 70). Further, the proportion of overseas-born people in the population also shrinks further out from the major cities, with an 11% share in inner regional areas, falling to 0.6% of the population of very remote areas (Hugo et al. 2015, p. 71). Figure 11 shows the locational differential between overseas-born recent arrivals and the Australian population overall by remoteness category. The proportion of the overseas-born population residing in major cities (88%) is 126% greater than the proportion of the overall Australian population residing there (70%), whereas this differential is reversed in regional areas. Nevertheless, with the very high overseas migrant intake levels in recent years, there has been growth in the absolute number of overseas migrants moving into regional areas (30% increase between 2001 and 2011) (Hugo et al. 2015).



**FIGURE 11** Difference in location of overseas-born recent arrivals compared to Australian population overall, 2011

Source: Compiled by the authors from Table C 1.1.4.a in *Progress in Australian Regions Yearbook 2015* (DIRD 2015) and ABS Census 2011

Continuing a long tradition that has included the gold rushes of the late 1800s and the Snowy Mountains hydro schemes of the 1950s, the vast majority of immigrants who move to the regions do so for the work opportunities. Under current arrangements, they are generally on some form of work visa, such as a short-stay working holiday visa, or multi-year Regional Sponsored Migration Scheme visa. The recent mining boom created widespread labour shortages, enticing many skilled workers away from other regional businesses. Both mining and non-mining organisations have been enthusiastic sponsors of overseas migrants into regional areas to fill skills gaps. Net overseas migration to Australia has fallen since the winding down of the mining boom (down about 30% from 2012–13 to 2014–15; ABS 2016b). Future movements of overseas migrants to regional areas are likely to follow the fluctuations of employment opportunities in these regions.

The growth of temporary foreign labour in recent years has been somewhat controversial. There are currently about two million temporary visitors in Australia and about two-thirds of these have work rights (DIBP 2016), equivalent to about 10% of the Australian workforce. Criticisms have been made of apparent exploitation and poor treatment of temporary workers (SEERC 2016) and ongoing industry reliance on temporary workers to meet labour needs across a broad range of skill levels, despite a context of high regional unemployment (Birrell et al. 2016). The development of Australian society over the past century to become relatively equal and harmonious has been in part due to largely avoiding, or quickly curtailing, the use of ‘guest worker’ programs that embed exploitation and inequality (McLean 2012). A challenge for the future will be to balance the legitimate needs of rural industries for scarce labour, where those conditions exist, while ensuring working conditions are maintained and Australian workers are not excluded from much needed employment.

Asian countries, particularly India, China and the Philippines, now comprise the main source countries for Australia’s immigration program. These countries have overtaken the traditional source countries of the UK, Ireland and Europe (Hugo & Harris 2011, p. 170). However, only a small proportion of immigrants move beyond the major capital cities and, of those that do, most move to a large regional centre in an inner regional area. Overall, most of the recently arriving overseas migrants who do move to regional areas are from the mainly English-speaking countries (MES). Around 16.7% of this group move outside of the major cities compared to only 7.8% of those who speak a language other than English (LOTE) at home (Hugo & Harris 2011, p. 164). In fact, longer-term analysis has shown that the internal migration patterns within Australia of migrants from MES countries tend to mirror those of the Australia-born population. That is this group tend to move from the major cities and outer regional and remote areas to inner regional and coastal locations (Hugo et al. 2015). Australia’s recent high levels of overseas migrant intake, has seen migrants arrive in sufficient numbers to ‘offset’ to some extent the traditional, ongoing drain of working-age population from some regional areas (Hugo et al. 2015). As such, increasing numbers of overseas migrants with LOTE backgrounds in regional areas with a stable or declining Australian-born population have increased the ethnic diversity of these regions in recent years (Hugo et al. 2015).

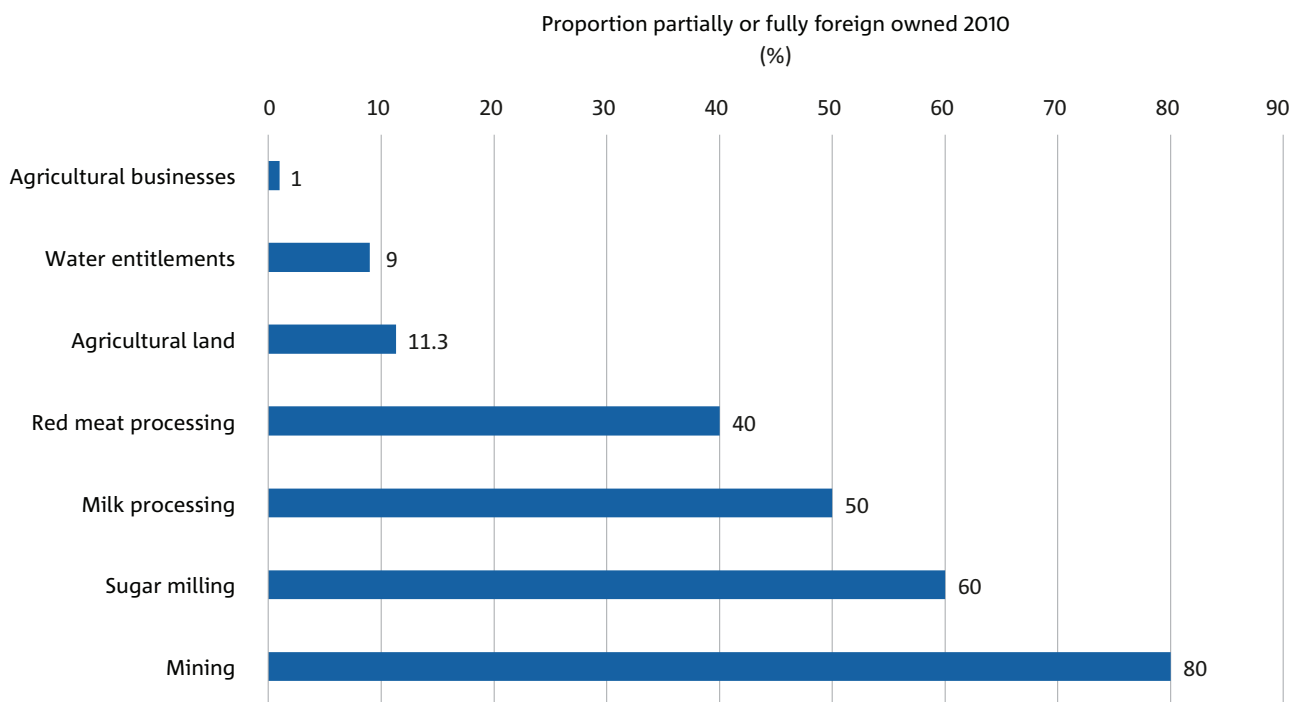
In a nutshell, only a minority (about 10 per cent) of overseas migrants move to the regions and three-quarters of these are from an English-speaking background. This is despite two-thirds of recent migrants to Australia being from non-English speaking backgrounds, as the vast majority of these migrants remain in the capital cities (DIBP 2014; Hugo & Harris 2011, p. 164).

### A.2.5 INTERNATIONAL INVESTORS IN SUPPLY CHAINS, LAND MARKETS AND FOOD SUPPLY

Market liberalisation has seen growth in capital investment in Australia from overseas. This includes investment into agricultural properties and processing facilities, as well as many previously government-owned transport, energy, water, telecommunications and other utilities and infrastructure. As a result of this, a greater proportion of these properties, facilities or utilities that underpin primary and secondary industries, have become partially or fully foreign owned (Lockie 2015; Treasury 2016). The level of foreign ownership of agricultural businesses and land is somewhat unclear due to varying approaches to methodology, although overall it appears to be rising from a relatively low base. Only 1% of agricultural businesses were estimated to be partly or wholly owned by foreign entities in 2010. Foreign land ownership rose from 5.9% in 1984 to 11.3% in 2010 (Lockie 2015).

In addition, 9% of Australia’s water entitlements are partially or fully foreign owned (Lockie 2015). Estimates for the food processing sector are much higher: 60% of sugar milling, 50% of milk processing, and 40% of red-meat processing enterprises were controlled by foreign businesses in 2010 (Moir 2011) (Figure 12).

Foreign investment in agricultural assets, whether by businesses for short- or longer-term financial reasons, or by foreign states to secure future food supplies, is expected to grow (Hajkowicz & Eady 2015). However, overall, foreign ownership of the agricultural sector pales in comparison to that of the minerals and energy sector. For example, recent Treasury (2016) analysis has noted that of the 26 largest mining projects in development in 2016, less than 10 per cent were fully Australian owned. Foreign ownership of the mining sector has been estimated at around 80% (Gregory 2012, citing Edwards 2011).



**FIGURE 12** Proportion of agricultural and mining assets partly or wholly foreign-owned in 2010

Source: Compiled by the authors from Moir 2011, Gregory 2012

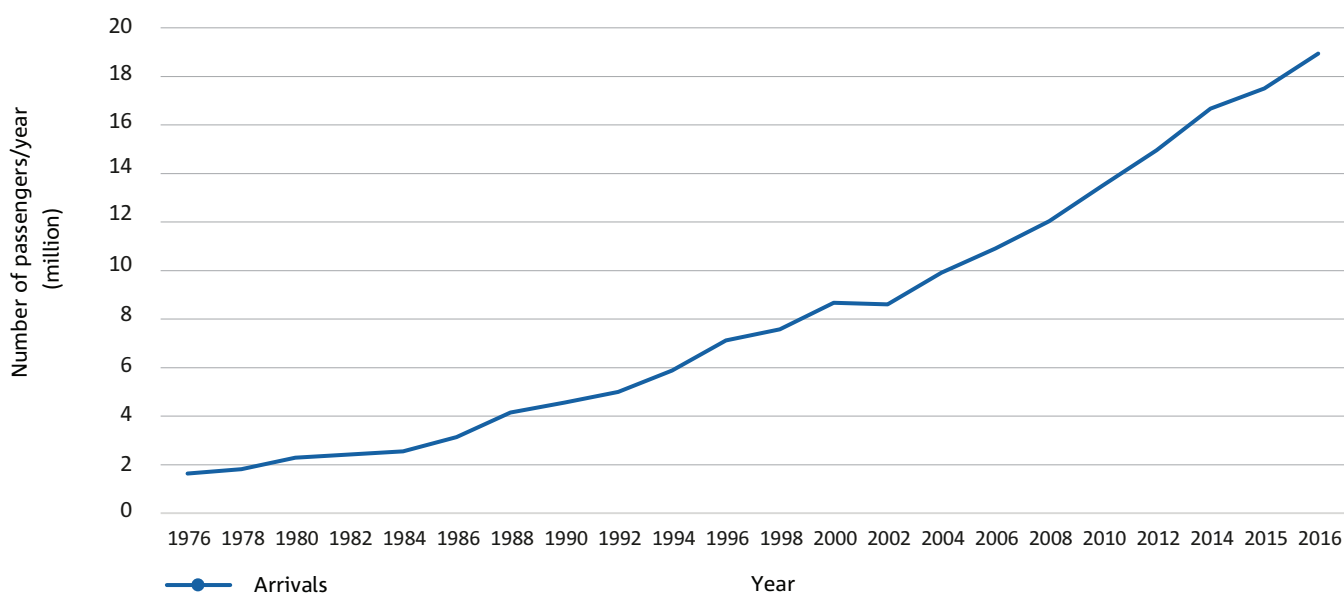
## A.2.6 INBOUND PASSENGER MOVEMENTS TO AUSTRALIA

Other trends that highlight the increasing global connectivity in recent decades are the number of inbound passengers to Australia every year (Figure 13). The global movement of people has steadily increased over the last 60 years (ABS 2017a) and, with it, the opportunity for international travel, which was once available only to the very wealthy. This, in part, has been helped by fewer restrictions on the movement of people across borders, associated with the opening up of trade and markets around the globe (Hajkowicz et al. 2016).

This travel creates economic activities and opportunities. It also encourages cross-cultural experience, knowledge exchange, exposure to different world views, and greater awareness of the connections between nature, society and economic activity.

## A.2.7 A GROWING GLOBAL ENVIRONMENTAL CONSCIOUSNESS

Over the past half-century, community expectations and international engagement on environment and development issues has grown enormously. Concepts such as ‘sustainable development’, ‘corporate social responsibility’, and ‘social licence to operate’ are increasingly prominent. These are reactions to past poor practices and concerns about the future of many ecosystems and human communities in the face of exploitative, unjust or unsustainable types of development or production. Companies are also seeking to demonstrate environmental credentials to gain access to international markets, meet consumer and investor expectations, and meet expectations of local residents where their operation is located. Improved educational levels and the development of global media and communication



**FIGURE 13 Millions of inbound passengers to Australia, 1976–2016**

Source: Compiled by the authors from ABS 2017

networks have contributed to this environmental awareness, given communities voice, and helped the creation of environmental rules and agreements within and between countries. The environmental and cultural values of World Heritage-listed areas, for instance, make increasingly significant contributions to regional and state economies in Australia. These 'global' resources, located in regional and rural areas, bring interstate and international visitors and contribute to a local and national sense of wellbeing and identity (CSIRO 2014). Australia has also expanded its participation in environment and development agreements in recent decades with the emergence of international climate mitigation treaties and related multi-country commitments. Countering these trends, however, are claims by some local communities and industries that environmental regulation, and activism – which often originates outside the community (and is thus not reliant on local economic opportunities – is unnecessarily impeding development and much needed employment. These changes and contestations can and do have a profound effect on national and international debates about what constitutes desirable forms of economic activity and development in Australia's regions. They are likely to become increasingly significant in development decision-making.

## A.3 Diverging places

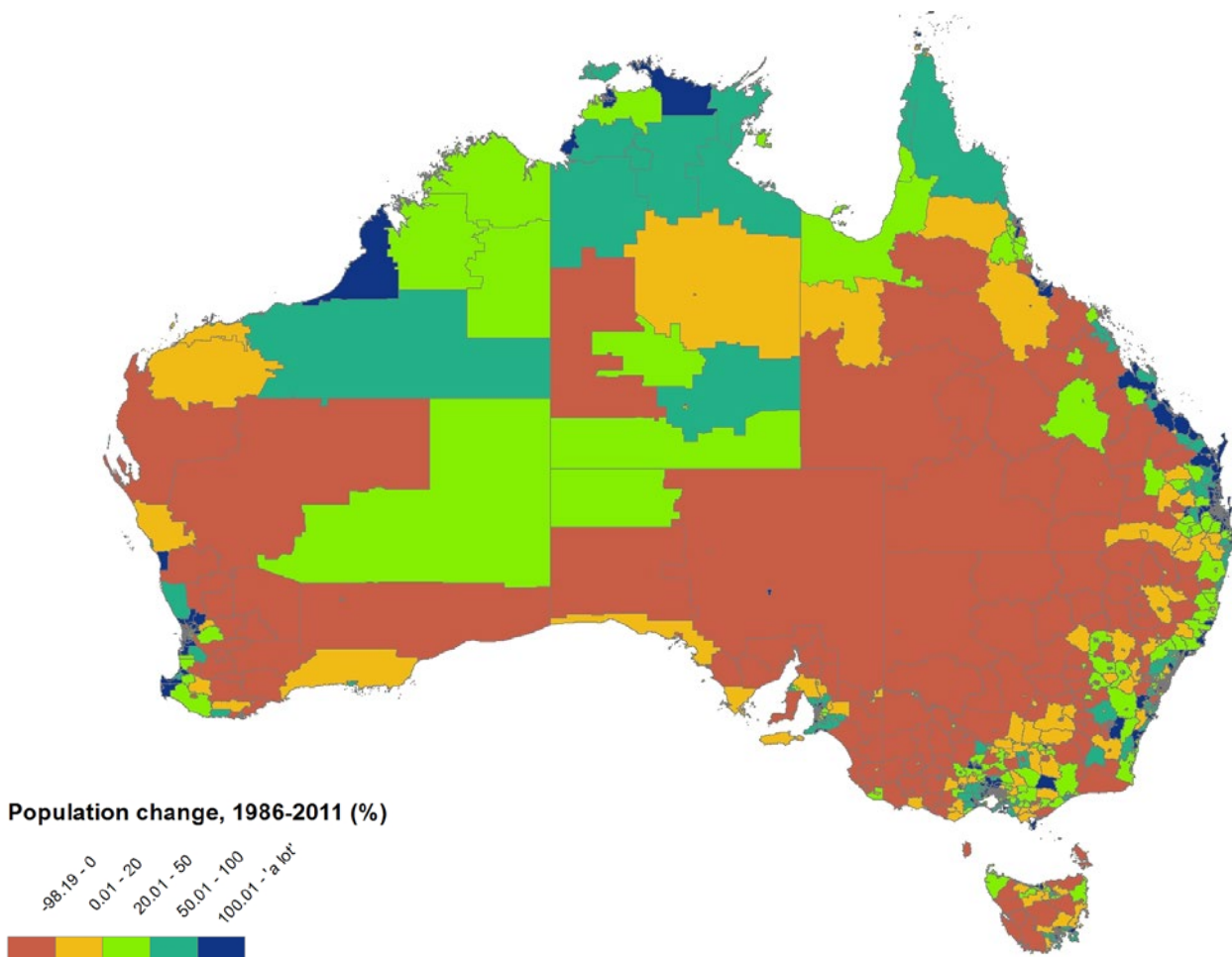
### A.3.1 LONG-TERM POPULATION FLOWS: THE PULL OF CITIES AND LARGER CENTRES

Well over a third of the Australian population live outside of the major capital cities (ABS 2017b). Australian settlement patterns over the 20th century and into this century show a long-term decline in the number of people living in rural areas and small towns (those with 200–1000 people). They also show growth in the number of people living in larger centres, particularly the larger regional centres (16,000–32,000) and cities (over 128,000 people) (BITRE 2014a). Increasing numbers of people have also located to coastal areas near these larger centres.

The share of Australia's population living in the capital cities has grown from around 35% at the start of the 20th century to around 63% currently. The share of those living in large regional centres has tripled, from about 7% to 21% (BITRE 2014a).

Several factors have been driving these changes in settlement patterns (BITRE 2014a). Improvements in technology, transport and communications have tended to reduce the need for labour in rural industries, while making travel to and from larger centres easier. The end result of this favours centralisation of many businesses and services in these larger centres. An increase in the number of women in the workforce has also favoured centralisation. With the greater abundance of employment opportunities in the larger centres, households have made location decisions based on where both partners are more likely to gain work. Countering these centralisation forces to some extent, increasing wealth and life expectancy have given retirees greater capacity to choose the location of their retirement. This has typically been in high amenity areas, such as scenic coastal and rural locations. Superannuation and other income support systems have also made it easier for certain groups to reside outside the capital cities where housing costs are typically lower. While larger centers have generally prospered compared to smaller towns, areas with high natural amenity and mining regions have often been the exception to this trend.





**FIGURE 14 Population change (%) in Australia, 1986–2011**

Source: Compiled by the authors from ABS data

Looking at the pattern of population growth nationally, northern and western parts of the nation comprise a rising proportion of the population (Hugo et al. 2015). The share of the population living in Queensland, Western Australia and the Northern Territory has increased from 21% in 1947 to 32% in 2011. The share in the south-eastern states of New South Wales, Victoria, South Australia and Tasmania has declined somewhat from 78% to 67%. Figure 14 shows the change of population between 1986 and 2011 for regions across Australia.

### A.3.2 AMENITY-DRIVEN MIGRATION AND LIVEABILITY

Amenity value is related to scenic beauty and climate (natural amenities) and the provision of a broad range of goods and services, and of recreational, social and cultural opportunities (social amenities). Locations with high amenity values, notably coastal locations and scenic areas close to the major cities, have seen strong growth over recent decades. In contrast, net migration loss areas are predominantly in the wheat-sheep belt and in those remote areas that do not have substantial mining activity (Hugo et al. 2015).

Amenity has had an increasing influence on household settlement patterns, as improvements in transportation infrastructure and technology allow people to live in one place and commute to work elsewhere. Increasing wealth has also allowed people to access amenity locations, either for holidays or more permanent moves, such as the ‘sea-change’ and ‘tree-change’ phenomena, and for retirement (BITRE 2014a).

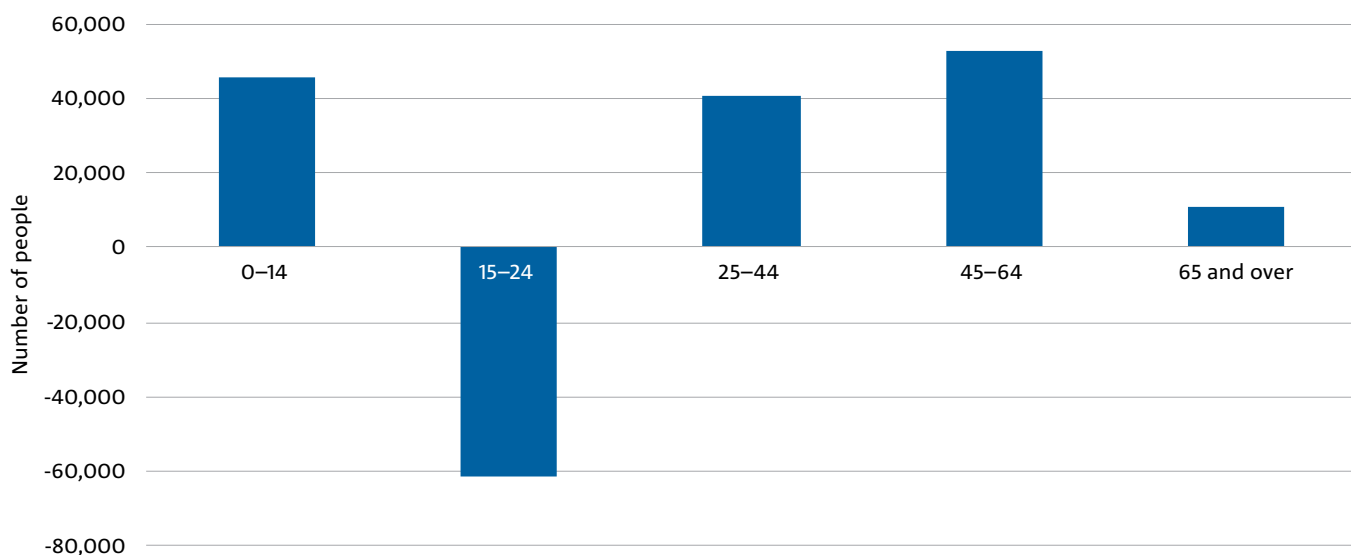
Changes, such as the future retirement of the large ‘baby boomer’ segment of the population, who hold the largest portion of the nation’s wealth, are expected to result in an even greater flow of people to coastal areas over the next 20–30 years (Hugo & Harris 2011).

Liveability is not just amenity – it also relates to the availability of essential facilities, goods and services that people need to maintain quality of life. When we consider the ageing population in settlements outside the major cities, providing aged-care healthcare facilities will become an increasingly important issue.

### **A.3.3 PATTERNS OF AGEING, AND RETIREE AND YOUTH MIGRATION**

Australians are living longer than ever before. Increases in life expectancy are likely to continue due to improvements in healthcare. Fertility rates are declining as women have become more educated, and have gained greater control over their fertility with contraception, and societal attitudes have changed. Women are joining the workforce in ever greater numbers, and delaying having children until a later age, which is reducing the number of larger families (DFACS 2001). Together, these trends show that the Australian population is ageing. With the movement of the baby boomer cohort through the population age structure, the number of people aged 65 years and over is expected to double in the next two decades. This will put considerable pressure on aged-care and health services (Hugo et al. 2015). At the same time, the working-age cohort, while it will be larger due to an overall population increase, will form a smaller share of the population. This increases the number of non-workers who need to be supported by the working-age population. It is partly for this reason, but also for the policy goal of a larger Australian population overall, that successive governments over recent decades have encouraged the settlement of skilled, working-age migrants and families to Australia (Hugo et al. 2015).

The ageing of the population of regional areas is exacerbated by the long-standing phenomenon of young people (mainly 15–24 year-olds) leaving smaller settlements to move to larger centres for education, work and social opportunities (Hugo et al. 2015). This youth exodus takes a significant ‘bite’ out of the age profile of smaller centres, and starves them of much of the energy, skills and ideas of this age group, as well as a source of relatively inexpensive labour. However, for a number of reasons, policymakers avoid trying to counter the ‘youth exodus’ phenomenon (Hugo et al. 2015). First, the education of youth in the specific career they desire, and the broadening of their work and social experiences (opportunities which are often



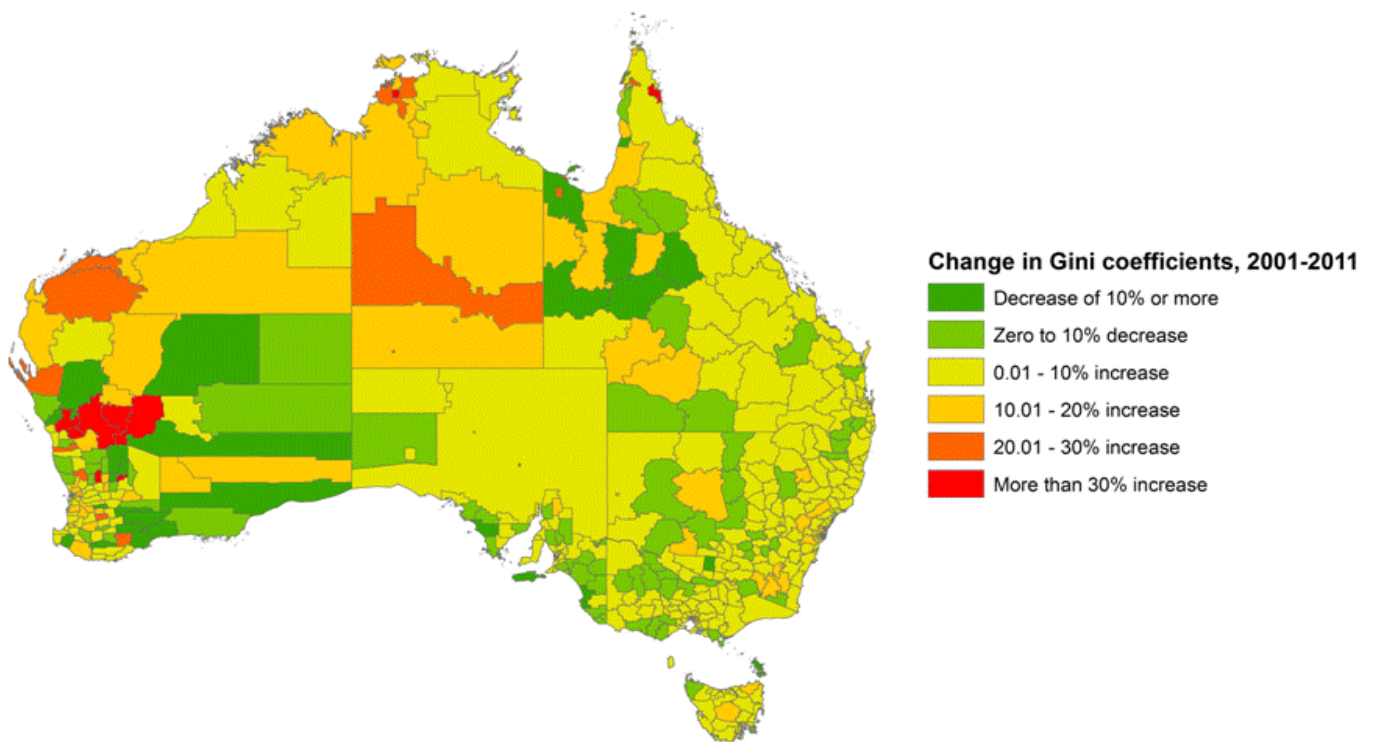
**FIGURE 15 Net migration regional areas (areas excluding Australian capital cities) between 2006–2011 for different age classes**

Source: 3412.0 - Migration, Australia, 2015–16

not available in their hometowns) is important in terms of human capital and personal development. Second, the age groups above them (25–39 year-olds) return to these smaller areas anyway, following their education and early-career experiences in the larger centres. While often not the same individuals, they are usually in the early years of forming a family and they arrive in sufficient numbers to more than fully compensate for the departures (Figure 15) (Hugo et al. 2015). This process is related to the overall increase in the educational attainment and skill levels in rural populations (ABS 2014b). There is also evidence that this process makes social and cultural connections between rural and urban areas stronger.

#### A.3.4 RISING INCOME INEQUALITY

There has been a consistent pattern of rising income inequality, measured using the Gini coefficient, across most jurisdictions in Australia in recent decades (Fleming & Measham 2015a). Although income inequality tends to be higher in cities than in regional Australia, it has increased across most rural regions over the period 2001–11 (Figure 16). The disparities in income and wealth between rural and remote areas and the capital cities has also grown considerably (NRHA 2014). Income inequality has also risen in most OECD countries in recent decades (OECD 2011); however, the rate of increase in Australia has been higher than most, as we have increased our ranking among OECD countries from the average level in 1995 to among the top third of nations in 2010 (Fletcher & Guttmann 2013).

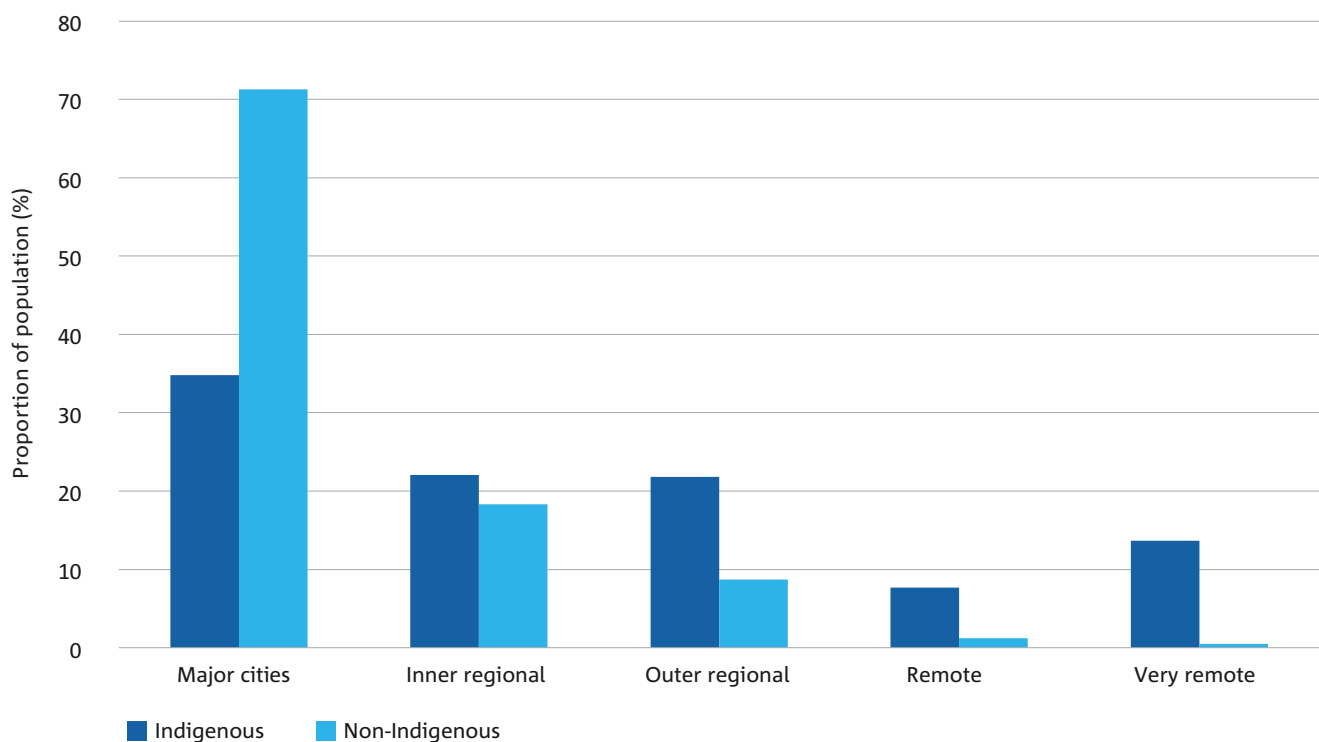


**FIGURE 16 Change in income inequality in different regions of Australia, as measured by the Gini coefficient, 2001–11**  
 Source: Compiled by the authors from Fleming & Measham (2015a) from ABS data

Generally, income inequality is closely associated with the level of educational opportunities and attainment in a population. The level of educational attainment then contributes to future income-earning prospects of the labour force. The causes of increases in income inequality are multiple (Fleming & Measham 2015a; Reeson et al. 2012). These drivers include access to education; increasing concentration of farmland ownership; the out-migration of skilled workers in some areas; and, higher rates of adolescent childbearing in parts of the population. There is also the tendency for financial capital to flow to larger centers and cities. Interestingly, in the last 10 years, income inequality has not risen as much in mining regions compared to other regions (Fleming & Measham 2015a). Figure 16 shows that while some mining regions saw rises in income inequality, others saw a fall in income inequality as a consequence of the boom. Taken together this meant the increase was small relative to non-mining regions and, especially compared with urban areas (Fleming & Measham 2015a).

### A.3.5 INDIGENOUS DEMOGRAPHY AND CONNECTION TO PLACE

The Indigenous population is projected to increase from 670,000 in 2011 to 1.2 million by 2036 (Wilson 2016). Indigenous Australians (Aboriginals and Torres Strait Islanders) compose 3% of the Australian population; however, their population growth rate at 2.3% is substantially higher than for the total Australian population (1.5%) (ABS 2014c, 2014d). This difference is even more notable given that the high immigration levels that boost the total Australian population growth rate, by definition, make no contribution to the Indigenous share of the population. In 2011, about two-thirds of the Indigenous population lived outside the major cities, compared to less than one-third (29%) of the non-Indigenous population (AIHW 2015). While more Indigenous people live in inner and outer regional areas, the proportion of Indigenous people who live in remote (7.7%) and very remote (13.7%) areas is very high compared to the non-



**FIGURE 17 Proportion of Indigenous and non-Indigenous populations by remoteness area**

Source: Compiled by the authors from NRHA 2015; ABS 2013b

Indigenous population (1.2% and 0.5% respectively) (see Figure 17). In fact, while Indigenous people comprise only 1% of the population of the major cities, they comprise 16% of remote areas and 45% of very remote areas (AIHW 2015). Over time, the Indigenous population is gradually becoming more urbanised, with more people living in larger regional centres and fewer people living in remote towns and settlements. Nevertheless, due to the slower rate of out-migration of Indigenous people compared to non-Indigenous people from many outer regional and remote towns, the proportion of Indigenous people in these towns is rising (SCRGSP 2014; Taylor & Biddle 2008). Other important factors influencing Indigenous mobility and locational decisions include the deep connection Indigenous people hold with their traditional lands or country. Cultural reasons include a sense of obligation to remain connected and to manage their country and the sacred sites of their ancestors. There can also be economic and social barriers to them leaving their country.

The Indigenous population structure is dominated by young people, with 57% of the Indigenous population aged under 25 years in 2006 compared to 33% for the non-Indigenous population (Biddle et al. 2015). This youthful population partly reflects the higher birth rate of Indigenous women compared to the national average, but also reflects higher mortality and lower life expectancy, with the result that there are fewer older people. Across a broad range of socio-economic and personal wellbeing indicators the Indigenous population generally fare worse than the non-Indigenous population (SCRGSP 2014; AIHW 2015). Looking within the Indigenous population, outcomes tend to be worse in the remote areas compared to the major cities and regional areas (SCRGSP 2014). These rapidly growing and structurally young communities with diverse social and health needs make up a growing share of the population particularly in smaller regional and remote towns.

### A.3.6 NEW MODELS OF LOCAL AND REGIONAL GOVERNANCE

Each of the three tiers of government – federal, state and local – plays an important role in administering regional spaces. However, over the last three decades, in Australia and globally, the character of how local and regional places are governed is changing. These changes are part of a globally observed shift from ‘government to governance’. Governance is the tendency for an increasing number of non-government stakeholders to be involved in what might previously have been considered ‘public’ decision-making and discussion. There has been a persistent desire among local and regional communities to exercise more control over their own affairs. They are seeking greater levels of decision-making autonomy or self-determination from ‘distant’ decision-makers in capital cities, including a greater say in investment priorities and the capacity to tailor higher level policies and decisions to local conditions and needs. In addition to new local governance models that seek to empower local communities and residents, the shift to ‘governance’ has also seen the private sector and NGO entities partnering with governments or communities in planning, decision-making or service provision in regional areas (Cheshire et al. 2011).

State and national governments have shown varied levels of interest in investing in and encouraging different forms of regional governance (Brown 2005). There has been a rise in regional level consultative and collaborative processes that involve diverse interests. These are driven by needs such as: ideas about ‘sustainable regional development’; attempts to manage natural resources in integrated ways; local participation in health services; and regional economic development. The last 30 years has seen growing levels of voluntary cooperation between neighbouring local governments, the development of shared services agreements, and the formation of ‘regional organisations of councils’. These arrangements try to capture the benefits of sharing technical, managerial and financial resources. However, while these changes have been widespread, some councils have also undergone forced amalgamation, resulting in fewer councils with larger areas to represent

and manage, particularly in regional areas. For instance, since 1910 the number of local councils in Australia has halved (Dollery et al. 2012). While some of these changes are consistent with trends of fewer residents in some rural areas, others are due to policy pressures seeking greater levels of economic efficiency from councils by scaling-up operations. As a result, there are ongoing and competing imperatives in Australia to provide meaningful, locally relevant participation for regional residents, while being more efficient in making decisions about regional development and investment. One trend, however, that appears to have persisted is the shift in policy discourse away from ‘government as provider to the emergence of the economically self-sufficient citizen and, in turn, self-sufficient community’, tied to the re-emergence of localism as a model for economic and social participation in rural and regional Australia (Hogan & Young 2013).

### A.3.7 RISE OF LOCALISATION AND DECLINING TRUST

While local communities and businesses are becoming more globally exposed and connected, there is also a significant counter-trend internationally (including in New Zealand, Canada and Australia) towards the ‘local’. This has been a reaction to what rural and regional communities often see as the undesirable consequences of globalisation (such as the loss of protected industries), or changes in government policy. Communities often see these changes as affecting local service provision or ‘outside’ agendas being imposed (Cheshire 2006; Taylor 2012). Particularly in rural areas, communities can put greater importance on, and identify more strongly with local places as a way of resisting these global changes (Castells 1997). This rise in ‘the local’ around the world, is happening also at a time when public trust or sentiment in national political processes, governance systems and institutions is in decline. Measures of generalised trust taken between 2006 and 2014 in Australia show that while trust, previously quite stable, is increasing moderately in major cities, it fell notably in regional and remote areas of Australia over the same period (DIRD 2016).

### A.3.8 CHANGING LAND OWNERSHIP

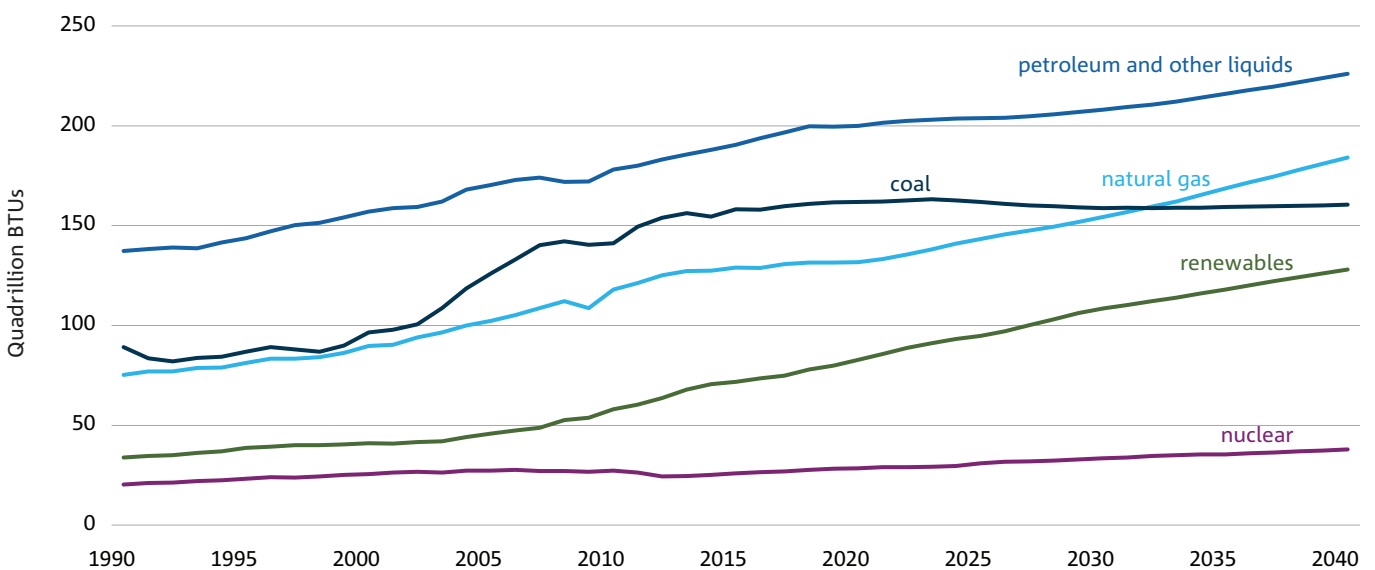
Analysts estimated there may be up to 50% turnover in agricultural property ownership in some regions in southern Australia in the decade 2006–16, a doubling of previous rates and consistent with trends in comparable regions of the United States (Mendham et al. 2010). With high turnover of agricultural land ownership, the ‘new’ owners to the area tend to favour environmental and recreational values over agricultural production. This trend is changing the character of regions, towards regional landscapes that contain several different values and meanings. The changing mix of activities and values in these regions can make it harder for governments and communities to identify shared economic and social development goals. In many parts of Australia, but particularly the northern jurisdictions, significant changes in land ownership and related rights and interests in the last 50 years have ongoing implications for new regional development opportunities. These changes have occurred through: legal recognition of Indigenous rights and interests in land and water resources, including native title; desires to intensify and

diversify agricultural production; and the conversion of crown land or pastoral leasehold to other tenures and the establishment of the conservation estate (CSIRO 2013a).

## A.4 New economies

### A.4.1 DEMAND FOR MORE AND CLEANER ENERGY

The increasing global demand for more and cleaner energy has triggered the rapid development of new energy sources, such as the extraction of unconventional natural gas, and dramatic technical improvements in diverse types of renewable energy generation, including solar, wind and geothermal. With government policies and incentives promoting the use of non-fossil energy sources in many countries, renewable energy is the world’s fastest-growing source of energy, at an average rate of 2.6% per year. Nuclear energy use is increasing by 2.3% per year, natural gas use is increasing by 1.9% per year, while coal is the world’s slowest growing form of energy (Figure 18) (EIA 2016).



**FIGURE 18 World energy consumption by energy source (historical and projected), 1990–2040 (quadrillion BTU)**

Source: Adapted from Energy Information Administration. 2017. *International Energy Outlook 2017*

NB: A BTU is a British Thermal Unit (a measure of energy consumption). A quadrillion BTU is about equal to the amount of energy in 45 million tons (US) of coal.

## A.4.2 GROWTH IN GAS

The production of unconventional natural gas has grown exponentially in Australia. In 2015, we became the second largest exporter of liquefied natural gas (LNG) after Qatar, and are expected to be the world leader in the international supply of this non-renewable energy source by 2020.<sup>1</sup> This large supply of LNG has been generated from the recent extraction of coal-bed methane, also known as coal seam gas (CSG) in Australia, an unconventional type of gas found in coal shales around the country. The largest reservoirs of CSG (economically demonstrable) are in south-east Queensland, with the Western Downs region in the Surat Basin experiencing an unprecedented growth of natural gas well-drilling in recent years. CSG extraction has had several socioeconomic impacts for these areas, including: increases in local incomes compared to non-CSG regions; a decrease in agricultural jobs as a consequence of job expansion in the CSG industry; higher youth in-migration in regional towns hosting CSG activity; and a reduction in local poverty (Fleming & Measham 2015b). CSG extraction has, nevertheless, become highly controversial in some areas due to perceptions of detrimental impacts on air and water quality, on human health and on the environment (Walton et al. 2014). Significant resistance from some sections of the community, as reflected in the 'Lock the Gate' protest movement, has seen some states, such as NSW and Victoria, introduce legislation restricting CSG activities. However, research in the Western Downs region of Queensland has shown that while a minority of respondents held strong views either for or against CSG extraction, most people had only a moderately strong opinion on the issue (Walton et al. 2014, 2016). If other regions decide to enter into the generation of natural gas, more communities will face the wave of energy extraction and the potential social and economic benefits and costs involved with these developments.

While gas production has increased massively in eastern Australia, the domestic gas price has risen greatly. This calls into question whether CSG expansion will necessarily be beneficial for those regional businesses and communities highly reliant on gas as an energy source. The apparent conundrum of increased supply occurring

simultaneously with higher prices is largely explained by the development of the LNG export industry in eastern Australia (Finkel 2016). While this has, for the first time, seen the eastern Australian gas market link with the generally higher priced international market, the volume of gas exported has exceeded the new supply, resulting in domestic shortages, and driving up the price (Robertson 2017). Looking to the future, modelling by the Australian Energy Market Commission (AEMC 2016) suggests that gas-fired generation will play an important role in meeting energy demand under targets to reduce greenhouse gas emissions, increasing to around 30% of the generation mix by 2030, or 23% under a scenario with assumed higher gas prices (Finkel 2016). A range of factors could influence these trajectories, most of which are mediated through the future gas price, which is expected to ultimately converge with the international gas price (AEMC 2016; Frontier Economics 2016). Influential factors are likely to include: the ability to further expand domestic gas supplies; market, industry or technological developments that support switching into or out of gas from other energy sources; government policy related to emission reduction targets and mechanisms; gas exploration and development restrictions; and reserving gas production for domestic use (AEMC 2016; McKinsey & Company 2016).

## A.4.3 BIOFUELS AND RENEWABLES

Renewable sources of energy have dramatically increased their capacity across the globe. Many countries are already generating large proportions of their electricity from renewable sources, while others have ambitious targets for 2020. The transformation of the electricity sector has been driven over the last 20 years by responses to international commitments to reduce emissions, the emergence of new technology, and changing consumer preferences (Finkel 2016). In Australia, this transformation is testing existing market arrangements, and generation and energy infrastructure (Finkel 2016).

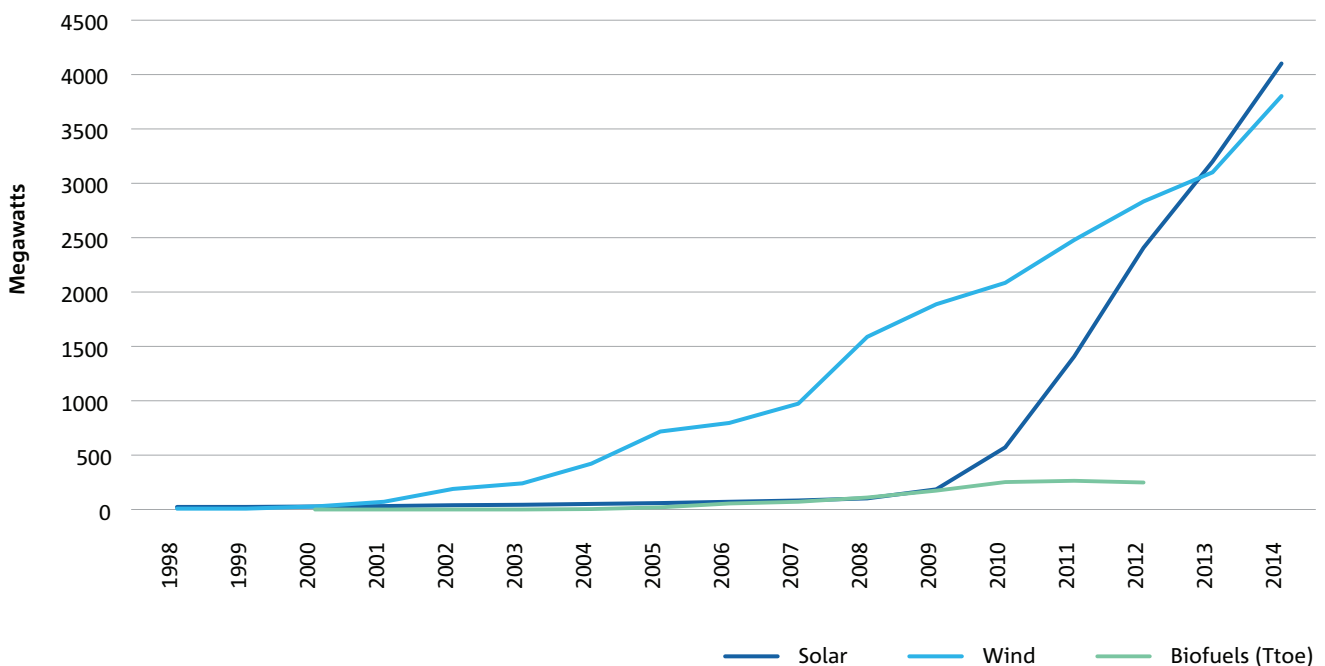
Biofuels are also increasingly in demand, as vehicle engine technologies become more compatible with mixed fuels combining traditional petrol and ethanol. Internationally,

<sup>1</sup> <http://www.appea.com.au/oil-gas-explained/benefits/benefits-of-lng/export-revenue/>





biofuels currently use 16% of the total US maize crop production (the US is by far the largest maize producer in the world), 54% of Brazilian sugar cane (Brazil is by far the largest producer of sugar cane in the world) and nine million tonnes of vegetable oils – proportions that are predicted to keep growing over the next decade (Hajkowicz & Eady 2015). Regional Australia has a relatively high comparative advantage for producing practically all of these new sources of energy, including the three main biofuel sources: sugar cane, maize and vegetable oils. As part of the Renewable Energy Target (RET) legislation, Australia has set a target of 33,000 gigawatt hours (GWh) of electricity to be generated from renewable sources by 2020. This will be provided by large-scale power stations as well as small-scale systems commonly provided by household roof-top solar panels. In the case of large-scale generators, wind and large solar farms will be key players in reaching the target. This is resulting in the expansion of these sectors across the country and setting millions of dollars in investments and maintenance across regions. Figure 19 reflects this increase in electricity capacity coming from solar and wind sources for the whole country.



**FIGURE 19** Growth in Australia's renewable energy capacity  
 Source: Compiled from APVI 2017 and Steggel & Osmond 2014

The adoption of photovoltaic (PV) roof-top panels has also grown due to a reduction in the cost of solar panels, improvements in battery technologies, and government programs to support and incentivise these technologies. In 2016, more than 1.5 million houses in Australia reported having PV systems installed on their roofs, representing more than 16% of all houses in the country, and placing Australia on top of the list of countries with PV (units) installations per capita (Bruce & MacGill 2016). The combination of government support for PV growth across regional Australia, the cost reduction in PV technologies, and rising electricity prices have contributed to consumers investing in electricity self-generation from solar energy. Although in absolute numbers there are more PV systems installed in urban houses, the penetration in rural areas is much higher, reaching more than 30% in 2014. In regional areas, large regional centres such as Bundaberg and Toowoomba in Queensland, and Alice Springs in the Northern Territory, roof-top PV has been installed on more than 30% of houses, signalling the importance of this resource, not just in isolated communities, but in economic centres across the country.<sup>2</sup>

#### A.4.4 GETTING OFF-GRID

With improved technologies and reduced costs for solar energy generation and storage, the use of PV panels and batteries is becoming a common approach to self-generate electricity in houses, communities and entire towns. Some rural communities in Australia, such as Daylesford in Victoria, are self-organising to establish local wind turbines for energy self-sufficiency. The idea of 'getting off-grid' has been identified as a potential future scenario by the energy industry in Australia (CSIRO 2013b). While baseload power capacity from the existing grid may continue to be important for communities supporting large industrial users, opportunities may arise for more self-sufficient communities. Self-generation could make energy available for production activities beyond traditional uses. Communities that are less dependent on external providers for their electricity supply can become more economically resilient and diversified, potentially triggering the development of new industries

in regional areas. These changes may also lead to an increase in the knowledge economy in regional towns which, so far, has been monopolised by large cities. The option of developing more, and more complex, industries outside the networks of metropolitan areas, could increase specialisation and encourage development coming from non-primary sectors in regional areas.

#### A.4.5 THE KNOWLEDGE AND SERVICE ECONOMIES

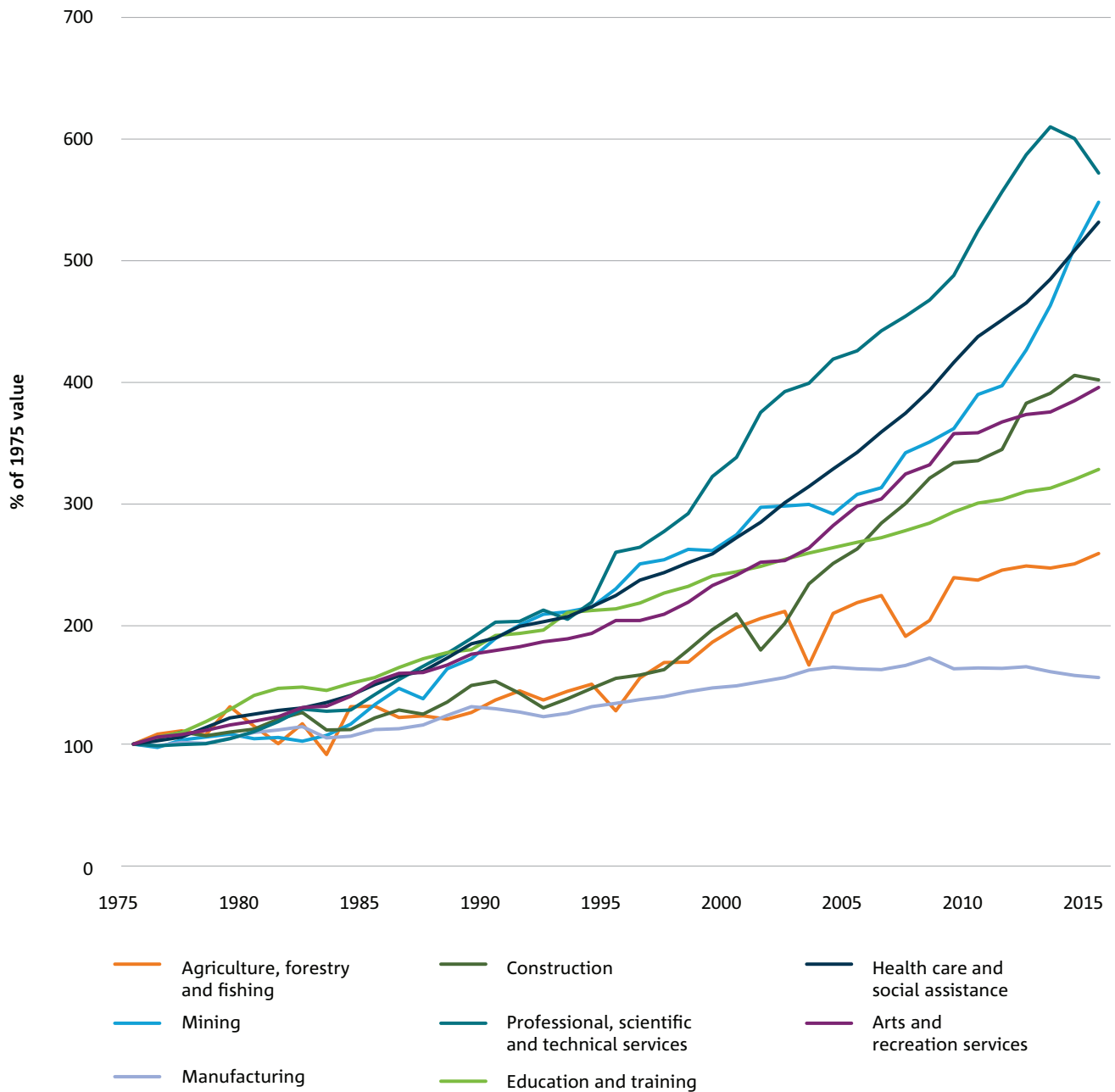
Services provide an increasing contribution to Australia's economy, comprising 60% of GDP and 80% of employment in 2014–15, with growth of 3.3% per annum for the past 13 years (ATC 2016; DIIS 2015a). Services also comprise a growing share of our exports (20% of exports, growing at 8% per annum for the past 10 years (DIIS 2015a)). Figure 20 highlights the increasing contribution over time of professional, scientific and technical services; health care and social assistance services; education; and arts and recreational services against more traditional sectors of the economy such as construction, mining, manufacturing and agriculture.

A group of services that is growing strongly and viewed as especially beneficial to the economy is the 'enabling' services. These are business-to-business services to support the production, sale and delivery of final products (DIIS 2015a, p. 52). The types of functions include: technical advice and know-how; specialist skills and services; access to vital infrastructure (both physical and digital); supporting communication with a business's customers and with other businesses; and enabling economies of scale (DIIS 2015a, p. 51). There are four broad groups of enabling services (DIIS 2015a, p. 52):

- professional & support services
- ICT and the digital economy
- trade, transport & logistics
- utilities services.

Enabling services are provided to all types of businesses, but are viewed as especially valuable to advanced manufacturing; food & agribusiness; and oil, gas and

<sup>2</sup> <http://www.recagents.asn.au/wp-content/uploads/2014/04/GET-Postcode-report-for-RAA-April-2014.pdf>



**FIGURE 20** Gross value added by industry (indexed, 1975 = 100%)  
 Source: Compiled from Table 37, ABS 2014e

energy resources, with significant but somewhat lower benefits to mining equipment, technology & services (DIIS 2015a, p. 62). Given the importance of the latter three industry categories to regional Australia, enabling services can be expected to play an increasingly vital role in the economic development of regions into the future. Because enabling services generally require a highly skilled workforce and are research-intensive (DIIS 2015a), the new economy could bring a range of flow-on benefits to regional communities. However, it does not follow that these services, given their knowledge-intensive nature, will necessarily be located in regional centres, providing employment opportunities for those communities. This is because when capital is freed up from locational ties, it tends to centralise in larger centres (BITRE 2014a) as do the knowledge workers in the economy.

#### **A.4.6 DIGITAL COLLABORATION, REGIONAL HUBS AND CO-WORKING**

ICT and the digital economy are having profound impacts on the way businesses operate. They are particularly crucial to the growth and productivity of regional businesses and the liveability and wellbeing of regional communities (Keogh & Henry 2016; RAI 2016a, 2016b). One effect is the opportunity for telecommuting, or working away from the central office (discussed in Megatrend 1: Defeating distance). A second is the growth in co-working, where independent or frequently travelling professionals share a collaborative workspace, such as a shared office environment. In these workspaces, there is often 'a focus on building innovation and connection within the community with an emphasis on technology, entertainment, design businesses and freelancers' (RDA 2013). Co-working has become very popular worldwide. The number of co-working venues has roughly doubled each year since 2006 (Pasquier 2015). Digital work hubs are also being proposed as a way to achieve community and regional development. These collaborative workspaces co-locate a number of activities, including co-working (freelancers, entrepreneurs, start-ups), and teleworking (public and private-sector employees) (RDA 2013).

#### **A.4.7 AUTOMATION AND UN-CREWED VEHICLES**

The past and future changes to workforces around the globe as a result of automation, robotics and computerisation are well-documented. Current estimates are that nearly 40% of the jobs in Australia have a high probability of being substituted with computing in the next few decades. A further 18% have a medium probability, with the remaining jobs unaffected (CEDA 2015). These changes have historically affected jobs that are routine or mundane. However, improvements in machine-learning algorithms mean these trends will encroach on roles previously seen as skilled jobs such as the health sector (CEDA 2015). Early analyses of future patterns of job loss due to computerisation and automation show that regions that heavily rely on mining (Western Australia and Queensland, in particular) will suffer a bigger impact (CEDA 2015).

However, benefits are also likely from computers and robotics replacing labour in routine, remote, dirty or dangerous work environments. This could lead to better safety and productivity outcomes in mining operations and some agricultural applications, for example. Unmanned aerial vehicles (UAVs) and new remote-imaging technologies are improving efficiency of biosecurity surveillance, and monitoring in remote locations over vast distances (requiring long travel times), or when inspection is labour intensive (Hajkowicz et al. 2016). The next 20 years is likely to see growth in the number of jobs for operators of remote-controlled vehicles (Hajkowicz et al. 2016). In 2012, 14 businesses applied for a drone licence from the Civil Aviation Safety Authority; in 2014, there were over 200 approved operators in Australia.<sup>3</sup>

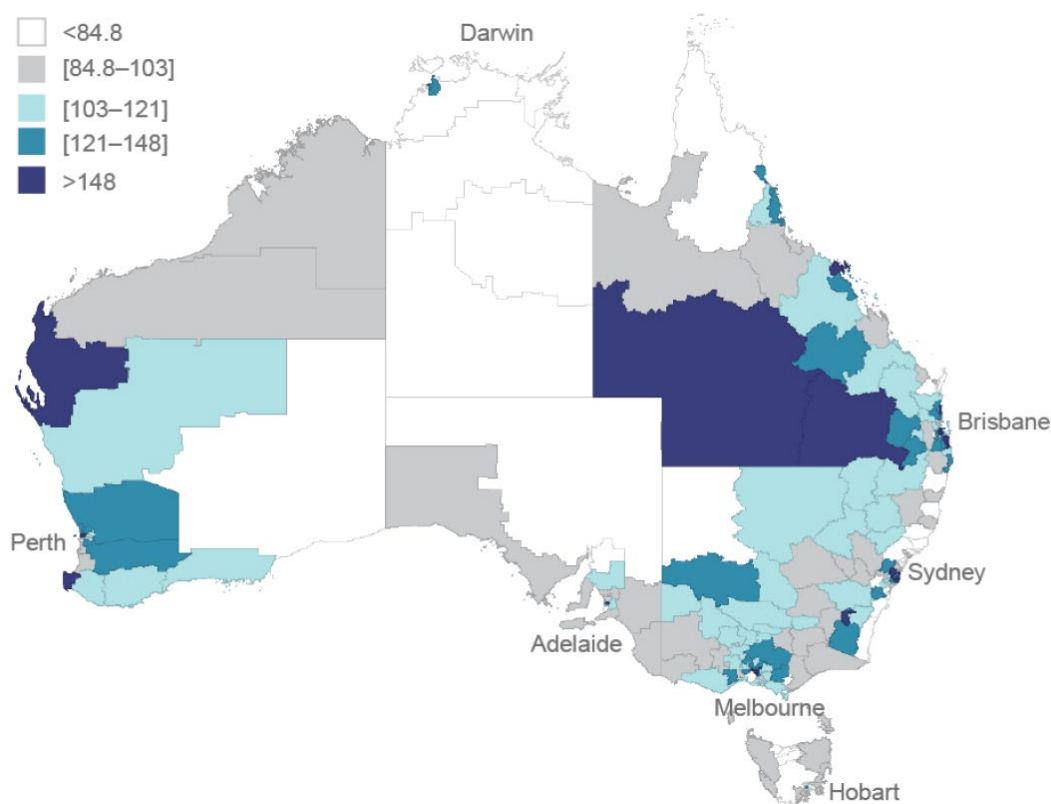
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<sup>3</sup> <http://www.abc.net.au/news/2014-09-22/drones-use-increasing-hefty-licence-cost-australia/5761726>

### A.4.8 INNOVATION AND ENTREPRENEURIAL REGIONS

Developing into a diverse and progressive economy requires investment in innovation and growth of new businesses, and commercialisation of innovative ideas (Hajkowicz et al. 2016). Between 2009 and 2014, some 53,000 patents and over 235,000 trademarks were applied for or granted by businesses across Australia and over 1.7 million businesses were created (DIIS 2015b). Innovative entrepreneurship is mostly concentrated in larger metropolitan centres. However, there are pockets of innovation in some regions of New South Wales (the Richmond-Tweed and Southern

Highlands regions) and Queensland (Sunshine Coast and Gold Coast). The presence of research organisations in a region has a positive impact on business creation in the region, especially in professional services (DIIS 2015b). New business entries are a useful proxy measure of entrepreneurial activity. A regional distribution of annual new business entries around Australia (Figure 21) shows that, while Sydney and Melbourne have the highest rate of entries per capita, regional areas of Queensland and Darwin also performed well over this period.



**FIGURE 21 Business entries per 10,000 inhabitants, averaged 2009–2014, by region**

Source: Adapted from Figure 4.4, DIIS 2015b, p. 73

Other sources of growth and diversification in Australia's economy and overseas is venture capital funding. These sources are particularly important in the context of a maturing mining boom and the declining contribution of manufacturing (Hajkowicz et al. 2016). Venture capital funding in Australia for start-ups and early stage businesses has been in decline since 2008. However, there are signs of promising growth in industries such as health care, life sciences, energy and environment sectors. These are all industries with a strong past and an important future in regional Australia (CSIRO 2016). Supporting innovation within and for Australian regions is gaining traction among regional development stakeholders and practitioners who are seeking to promote regional advantage (Kinnear et al. 2012). The idea of regional advantage runs counter to the trend of Australian regions becoming less specialised over time due to changes in traditional manufacturing sectors (Dixon & Freebairn 2009). There are also significant shifts in thinking away from traditional forms of welfare and economic development. For example, some Indigenous communities are actively looking to encourage Indigenous enterprise development and entrepreneurialism (KPMG 2016). One of the key opportunities here is unlocking the economic potential of the Indigenous estate (KPMG 2016).

#### **A.4.9 NEW LAND-SECTOR MARKETS**

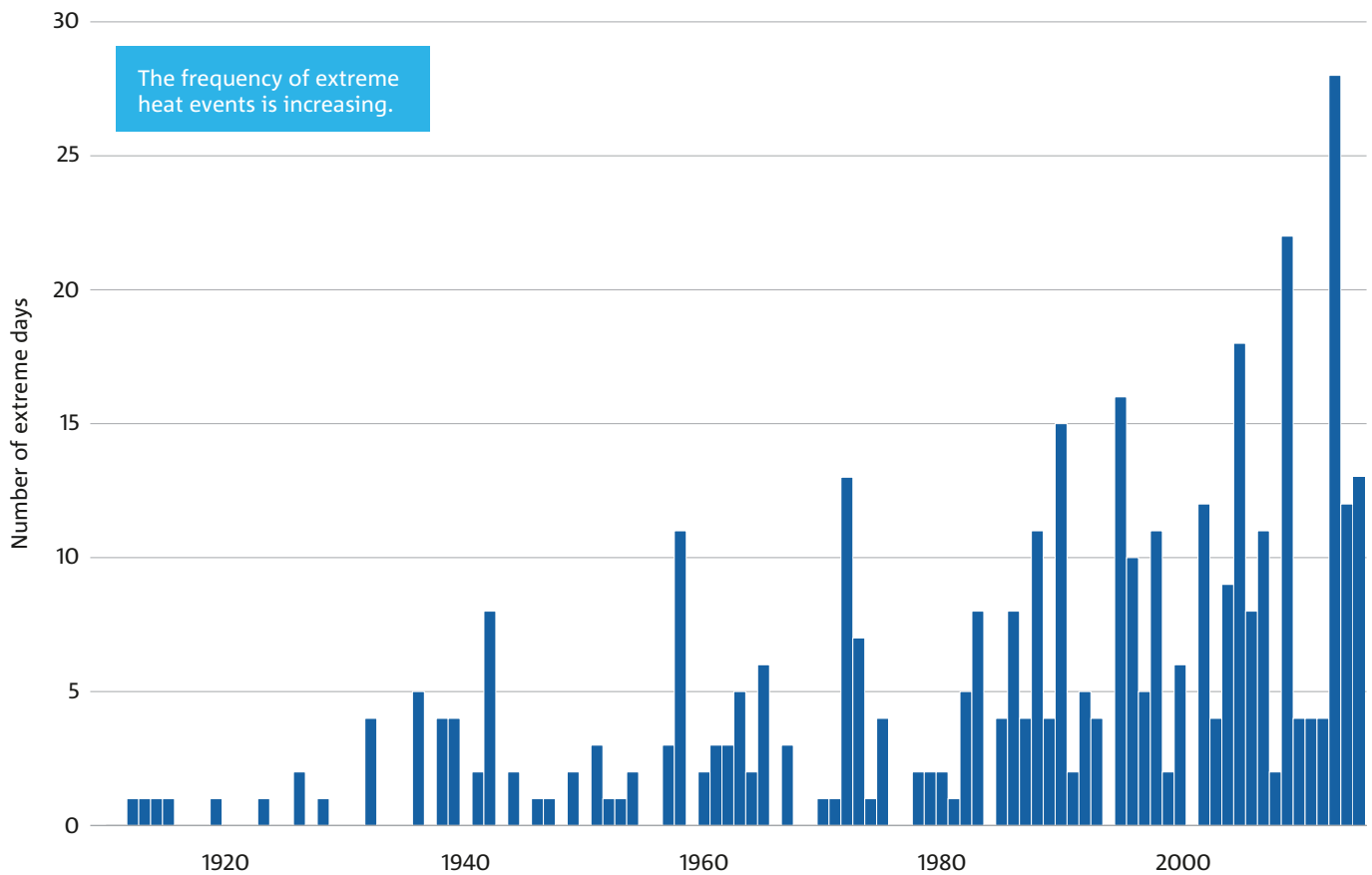
There is growing interest among governments, landholders and investors to seek benefits from emerging ecosystem-service-based markets in regional landscapes, in particular for carbon. New markets and policy settings that support carbon farming would allow many rural landowners to diversify their incomes, particularly from less productive land, even while they benefit from the projected higher prices for agricultural commodities (CSIRO 2015). Even in scenarios where food production is giving ground to bioenergy and plantings for carbon sequestration, this is not expected to come at the expense of agricultural production volumes, which are projected to rise by at least 50% by 2050 (CSIRO 2015). Modelling has suggested that by 2050 new carbon markets could account for over \$40 billion in income in the land sector, even under

scenarios of high agricultural production, strong abatement incentives and new markets (CSIRO 2015). Tied to the development of the knowledge economy in regional Australia are opportunities for banking, mitigation and market-related knowledge services (e.g. buyers, brokers, partners and information providers) for emerging carbon markets. Benefits of developing these new markets will also extend to Indigenous Australians as cultural and natural resource managers of large parts of the landscape. Research in Australia is pointing to the future contribution Indigenous land managers could make to providing carbon offsets. There are also possible economic benefits to those managers if payments for managing carbon-related ecosystem services occur (Robinson et al. 2016).

## **A.5 Environment as risk**

### **A.5.1 CLIMATE CHANGE AND EXTREME EVENTS**

Global average annual carbon dioxide (CO<sub>2</sub>) levels are steadily increasing, creating warming in the Earth's atmosphere and oceans (CSIRO & BOM 2016). 2015 was the warmest year on record for the planet since reliable global surface air temperature records began in 1880. Globally-averaged sea level has risen over 20 cm since the late 19th century, with about one third of this rise due to ocean warming and the rest from melting land ice and changes in the amount of water stored on the land. Australia's climate mirrors these international changes, with air and sea surface temperatures rising by around 1°C since 1910 (CSIRO & BOM 2016). The duration, frequency and intensity of extreme heat events have increased across large parts of Australia (Figure 22). Since the 1970s, there has been an increase in extreme fire weather, and a longer fire season, across large parts of Australia. While rainfall has increased across parts of northern Australia since the 1970s, there has been less winter rain in the southwest over the same period, and less rainfall during the growing season in the continental southeast since the 1990s. Rises in mean sea level amplify the effects of high tides and storm surges (CSIRO & BOM 2016). These trends are projected to continue (CSIRO & BOM 2016).



**FIGURE 22** Frequency of extreme heat days in Australia, 1910–present

Source: Adapted from CSIRO & BOM 2016, p. 7

These trends pose significant risks for coastal and inland regional communities and major centres in terms of the future suitability of agricultural land, declining yields, and water security (FDI 2014). They even present risks to domestic food security, with projected future domestic population growth and climate change exacerbating climate variability (PMSEIC 2010). They will also affect current settlement patterns, particularly in coastal regions (DCC 2009). These changes may also affect transport and communication infrastructure and the costs of maintaining it (Infrastructure Australia 2015; SCOTI 2012). National

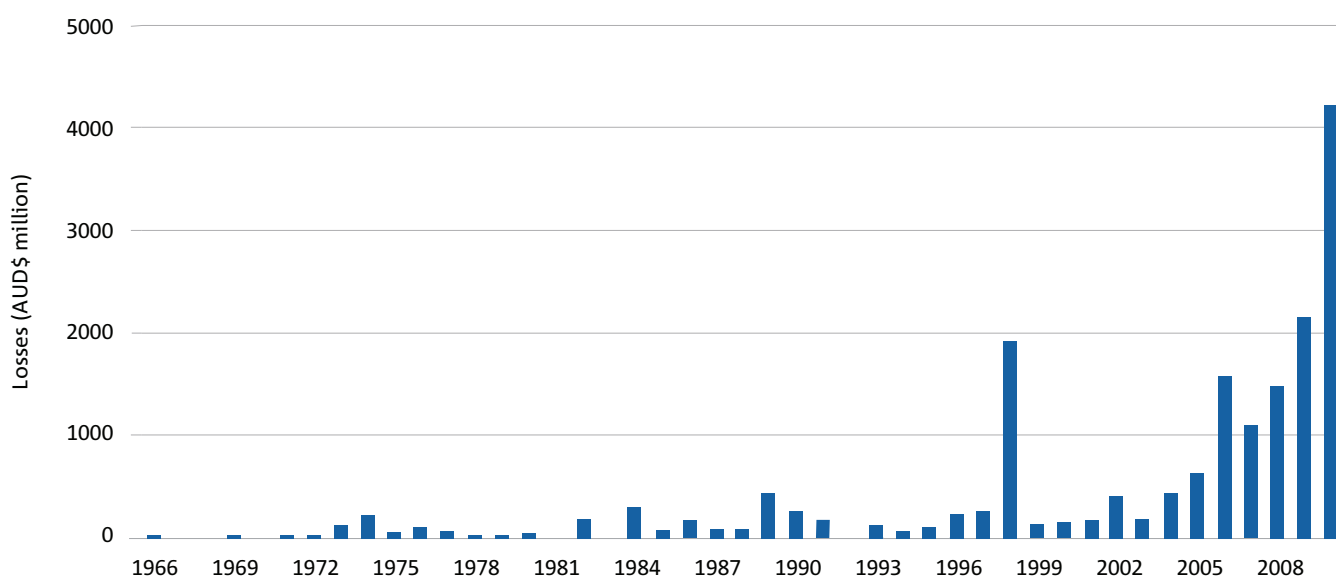
water use is expected to double by 2050 and agricultural water use is projected to increase by 80% (CSIRO 2015). Impacts on water security will be geographically diverse due to the different impacts of climate change on rainfall, as noted above, and create the need for alternative water supplies. Coastal cities will be able to access desalinated water, and water recycling will be a potential option for many urban areas and some agricultural enterprises. However, these strategies are unlikely to be feasible for many inland, broad-scale agricultural areas.

## A.5.2 DISASTER RISK

Natural disasters such as storms, floods, and bushfires have wide-ranging impacts, including psychological distress, injury and death; damage to public and private assets; damage to the environment; and disruption to water, power, transport and communication services (PC 2015b). Figure 23 shows the financial costs of weather-related disasters in terms of aggregate insured losses between 1967 and 2011 in Australia (Crompton 2011). The expected increase in the frequency of extreme heat days and bushfire days has implications for the provision of health and emergency services in regional Australia.

Community expectations of government assistance following a natural disaster are rising (PC 2015b). In the last decade or so governments have shifted their thinking from focusing on disaster recovery to improving society's capacity to anticipate and prepare for disaster events

(COAG 2011). There is now a greater focus on building the resilience of communities and infrastructure and encouraging cooperation between different levels of government, private and non-government organisations (Chen et al. 2013). Nationally, the principle of 'shared responsibility' between households, businesses, industries and government is replacing an 'emergency services only' focus (COAG 2011). The Productivity Commission's 2015 report into funding arrangements for natural disasters in Australia highlights the pattern in recent decades of funding by the Australian Government being directed primarily to post-disaster recovery as opposed to pre-disaster mitigation. Figure 24 shows large government post-disaster expenditures that may be able to be reduced considerably by relatively small increases in pre-disaster expenditure on key mitigation measures (PC 2015b).



**FIGURE 23 Annual aggregate insured losses (AUD\$ million) for weather-related events in the disaster list Australia, 1967–2011**

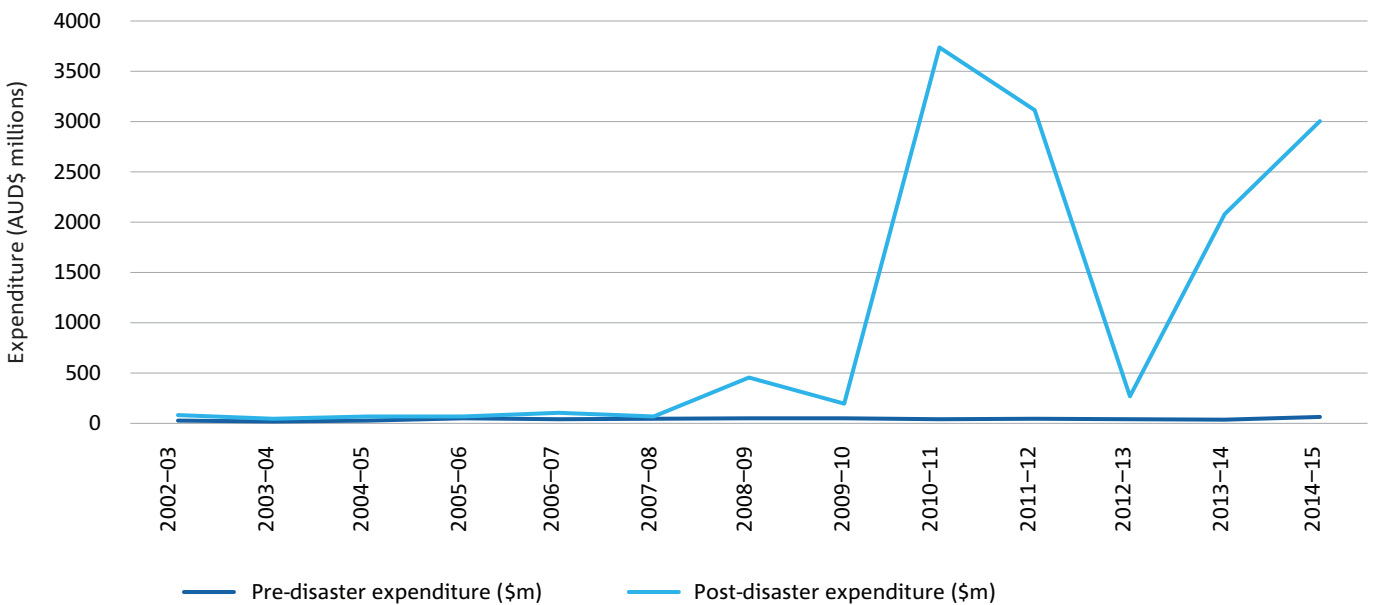
Source: Adapted from Figure 1a, Crompton 2011, p. 6



### A.5.3 BIODIVERSITY LOSS AND NATURAL-ASSET CONDITION

Globally, there is ongoing major pressure on biodiversity due to deforestation, other forms of habitat destruction, fragmentation and pollution. These trends are expected to continue to increase until at least the year 2020 (SCBD 2014). As a result, the area of different habitats, plant and animal species populations, and species diversity will continue to decline until at least the year 2020 (SCBD 2014). Communities and governments are increasingly aware of these pressures, and are improving the conservation estate, and developing policy, planning and incentives for biological conservation. The loss of

global and regional biodiversity, and the ecosystem services these resources provide to human wellbeing, including economic activity, will be felt by regional communities. The World Heritage-listed coral ecosystems of the Great Barrier Reef, for instance, provide a range of tourism, recreation, commercial fishing and scientific and management values. In economic terms, the Reef is estimated to have added \$6.4 billion in value to the Australian economy in 2015–16 and supported over 64,000 full-time jobs (Deloitte Access Economics 2017).



**FIGURE 24 Pre- and post-disaster funding by the Australian Government, 2002–03 to 2014–15**

Source: Compiled by authors from Tables 1.4 and 1.5, PC 2015b

#### A.5.4 BIOSECURITY

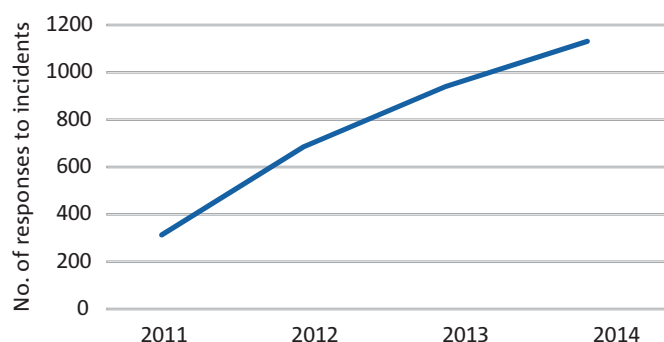
As an island nation Australia has, for the most part, been able to maintain an enviable biosecurity status, by international standards (Simpson & Srinivasan 2014). Maintaining this status, by limiting the spread of pests and diseases helps manage significant risks. These include risks to agricultural productivity, accessing global markets for regional produce, conserving biodiversity, and keeping people healthy. This status is challenged by increasing international, inbound passenger movement; vessel movements as part of global trade; expansion of areas of agricultural production in Australia's near neighbours; and increasing intensification of grazing and cropping production systems at home. Existing biosecurity processes and practices may not be sufficient to manage future risks (Simpson & Srinivasan 2014).



#### A.5.5 CYBERSECURITY

Cybersecurity systems are becoming more vulnerable due to more connected information technology networks, the speed of innovation, more complex internet-connected device ecosystems, cloud computing, and outsourcing to third-party suppliers (Arico & Srinivasan 2014; PWC 2016). Globally, nearly 40% of businesses rated IT security as their primary risk management issue, with larger businesses better prepared to manage the risks (IBM 2011). Australian governments and businesses increasingly rely on the internet to deliver products and services. Between 2011 and 2014, the number of cybersecurity incidents related to Australian Government networks and other networks of national importance, that were responded to by the Australian Signals Directorate, quadrupled from 313 to 1131 (ASCS 2015). See Figure 25.

Similarly, 2014 saw incidents directed at systems of national interest and critical infrastructure such as energy, communications, transport, water, banking and financial systems (ASCS 2015). Indications are, however, that Australian organisations are responding. In the previous 12 months, the number of reported security incidents in Australia increased by 109% compared to 38% globally in the same period (PWC 2016). This is attributed to the increase in spending on cybersecurity in IT budgets of Australian organisations, up some 59% from 2015, twice the global average (PWC 2016).



**FIGURE 25** Number of cybersecurity incident responses 2011–14  
Source: Adapted from Figure 1, ASCS 2015, p. 10

## A.5.6 GEOPOLITICAL INSTABILITY

There have been notable events in recent years that appear to run counter to the main global trend of greater cooperation between countries. These include instability in the European Union and moves towards isolationist economic policies in some of Australia's major trading partners in the Asia Pacific. This is occurring while other emerging global economies are pursuing regional security policies with the potential to contribute to instability in the Asia-Pacific region.

## A.5.7 MANAGING WITH UNCERTAINTY

Building resilience to any type of risk involves improving our capacity to manage and decide in conditions of uncertainty. In recent years, and in the foreseeable future, we are seeing significant, transformative advances in digital technologies such as ICT, cloud computing, remote and proximate sensing technologies, and predictive and big data analytics. Together, these technologies are being integrated into industry- and enterprise-level decision-

making processes that are subject to seasonal, market or other types of variability. These capacities improve the ability to detect, forecast, predict and inform business and public decisions in a range of sectors. These advances include the capacity to improve grain yield forecasts and productivity improvements on farms (of up to 15%) (Keogh & Henry 2016). They also include better decision-support and modelling capabilities that help public agencies anticipate climate, bushfire and biosecurity risks, and give communities early warning. These technologies are also revolutionising supply chain operations, transport and logistics. Other benefits stem from the greater levels of oversight, control and measurement that these technologies provide regional businesses in their production systems. These include improved traceability and specification that allow for niche market development, or a business's ability to demonstrate meeting requirements for market entry or government regulation for environment or safety.



# APPENDIX 2

## Strategic foresight process

Strategic foresight is an emerging field of research and a growing profession concerned with exploring and describing plausible future events to help people make wiser choices. It is often described as both an art and a science because foresight studies combine robust analysis of data, facts and theories with creative, compelling and engaging narratives of the future. There is no single established method for doing foresight. Many of the tools and techniques of strategic foresight are still under development by the research community.

CSIRO has developed a generic strategic foresight process pioneered through multiple projects delivered over the past six years in diverse industry sectors, including the Future of Work (Hajkowicz et al 2016) and Rural Industry Futures (Hajkowicz and Eady, 2015). The generic process is designed to be adaptable to meet different needs and contexts. The approach applied in this study comprises four main stages or sets of activities.

### STAGE 1: SCANNING THE HORIZON AND IDENTIFYING ISSUES

Once the scope, focal questions and timeframe for the study (the year 2040) are agreed, this initial stage is concerned with understanding the current status and historic conditions that have shaped contemporary regional Australia. In this scanning process we cast a wide net over all patterns of change that are potentially relevant to regional development policy, erring on the side of being overly inclusive rather than exclusive.

During October 2016, the CSIRO team prepared a short issues paper that identified some initial, potential trends or issues, grouped in categories of social, economic, institutional, geopolitical, environmental and technological

### WHAT ARE SCENARIOS?

Scenarios are evidence-based stories about the future, designed to inform both operational and strategic choices. Because the future is uncertain and unknown, a scenario planning exercise will typically identify multiple futures. In reality, there are an infinite number of possible futures. Scenarios represent an abstraction and generalisation of a more complex reality, which is necessary to inform decision-makers. Attempting to reproduce the infinite complexity of the real world is counterproductive and inimical to decision-making.

In the CSIRO approach (and many applications of standard scenario planning), the trends identified through a horizon scan are used to construct 1–3 axes (continuums of possibility). The axes represent continuums of plausible outcomes with uncertainty and impact on the focal issue. The end of each axis represents an extreme outcome based on how a megatrend plays out. Megatrends are used to inform the construction of axes.

A scenario exists for every quadrant (or sector) formed by combining two axes. One axis creates two scenarios, two axes create four scenarios, three axes create eight scenarios and so on. Most scenario studies use one or two axes (generating two or four scenarios). Using more axes runs the risk of making the results complex, hard to visualise and hard to interpret. A general rule of thumb is that people cannot easily handle more than seven objects simultaneously without losing track of what's happening (Hajkowicz 2015).

change. Datasets related to these issues and trends were also identified. Key inputs into the process here included, but were not limited to: *The evolution of Australian towns*; *Progress In Australian Regions – Yearbook series*; and *State of Regional Australia*. The issues paper was then reviewed by the Project Advisory Group (PAG) and during November 2016 the team conducted several semi-structured interviews with members of the PAG to help verify and expand on the initial issues and datasets.

## **STAGE 2: VALIDATING TRENDS AND DEVELOPING MEGATRENDS**

In December 2016, a small workshop was organised by the Department with 12 state and territory government representatives and other stakeholders with specialist knowledge in regional development and policy. The purpose of that workshop was to ‘road test’ the 34 discrete trends identified, described and collated in the Trends Report (see Appendix 1). The research team sought input on gaps, trend interpretation, and preliminary grouping and synthesis of the trends into megatrends. This involved a process of validation and screening to remove any unsubstantiated or irrelevant trends. The trends had to be supported by evidence showing that:

- the pattern of change is actually occurring and likely to continue occurring into the future
- the trend matters to the focal questions guiding the study.

Following the first workshop, the trends were synthesised to identify more salient patterns of change that have significant implications for decision-makers – these are the five megatrends affecting regional Australia (Section 3). Development of the megatrends was also guided by megatrends identified in other CSIRO foresight studies. This summary of megatrends was again circulated to the Project Reference Group members to seed thinking and discussion before a second, major scenario development workshop.

## **STAGE 3: DEVELOPING THE AXES OF CHANGE AND THE SCENARIOS**

In moving from identifying megatrends to identifying axes of change to frame the scenarios, we deliberated over and ranked the utility of potential axes using three criteria:

- the significance of their impact
- the degree of uncertainty
- the degree of alignment with the focal questions of the study (living, working and investing in regional Australia).

Other recent national and international scenario-planning studies for rural and regional areas, such as the EURARLIS study funded by the Dutch Ministry of Agriculture,

Nature and Food Quality (Weshhoek et al. 2006), were also reviewed for their selection of axes. Once we had selected the axes, we developed four scenario outlines which we took to a major, two-day participatory scenario-development workshop in March 2017. Participants included 22 members of the Project Reference Group and other invited experts, four DIRD representatives and five members of the CSIRO team. At the workshop, participants were asked, in four small working groups, to:

- discuss and develop narratives of what living, working and investing in regional Australia might look like in 2040 under their particular scenario
- discuss and identify the necessary planning, investment prioritisation, and collaboration or governance strategies that would be necessary to enhance benefits and mitigate potential risks associated with each of the scenarios.

The latter of these two tasks helped identify potential policy settings that would be advantageous for regional development and that would be robust under the alternative futures.

## **STAGE 4: REFINING THE SCENARIOS AND IDENTIFYING IMPLICATIONS**

The final stage involved crafting and communicating narratives about the future and then exploring implications for policy and stakeholder decision-making more broadly. In this stage, detailed descriptions of the two axes and the four scenarios were prepared and shared with the workshop participants for feedback. The workshop process revealed that additional perspectives from the broader business community were needed. A further 16 interviews were conducted by the project team with representatives and leaders of business and industry in the telecommunications, transport logistics, agriculture, agribusiness, mining, banking, finance, insurance and property development sectors. Further input was sought from four members of the PAG who had been unable to attend the workshop. This information was synthesised into the narratives to produce the final scenarios presented in Section 4 of this report and identify implications for decision-makers.

# APPENDIX 3

## Contributors

The listing of Project Advisory Group members, Project Reference Group members and workshop contributors below does not imply their agreement with the analysis or suggested implications of that analysis contained in this report.

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- AEMC—see Australian Energy Market Commission
- AFGC—see Australian Food and Grocery Council
- AIHW—see Australian Institute of Health and Welfare
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