



OPPORTUNITIES FOR GROWTH

Driving forces creating economic opportunities for Queensland companies over the coming decade

Claire Naughtin, John McLaughlin and Stefan Hajkowicz

December 2017

QFI PARTNERS ONLY
REPORT PLUS SUPPLEMENTARY RESEARCH

QUEENSLAND
FUTURES INSTITUTE



Principal Sponsor

The QFI particularly acknowledges the generous support for the development of the report provided by The Star Entertainment Group as Principal Sponsor.



Citation

Naughtin, C, McLaughlin, J, Hajkowicz, S. Opportunities for growth: Driving forces creating economic opportunities for Queensland companies over the coming decade (Report plus supplementary research). Brisbane, Australia: CSIRO; 2017.

Copyright

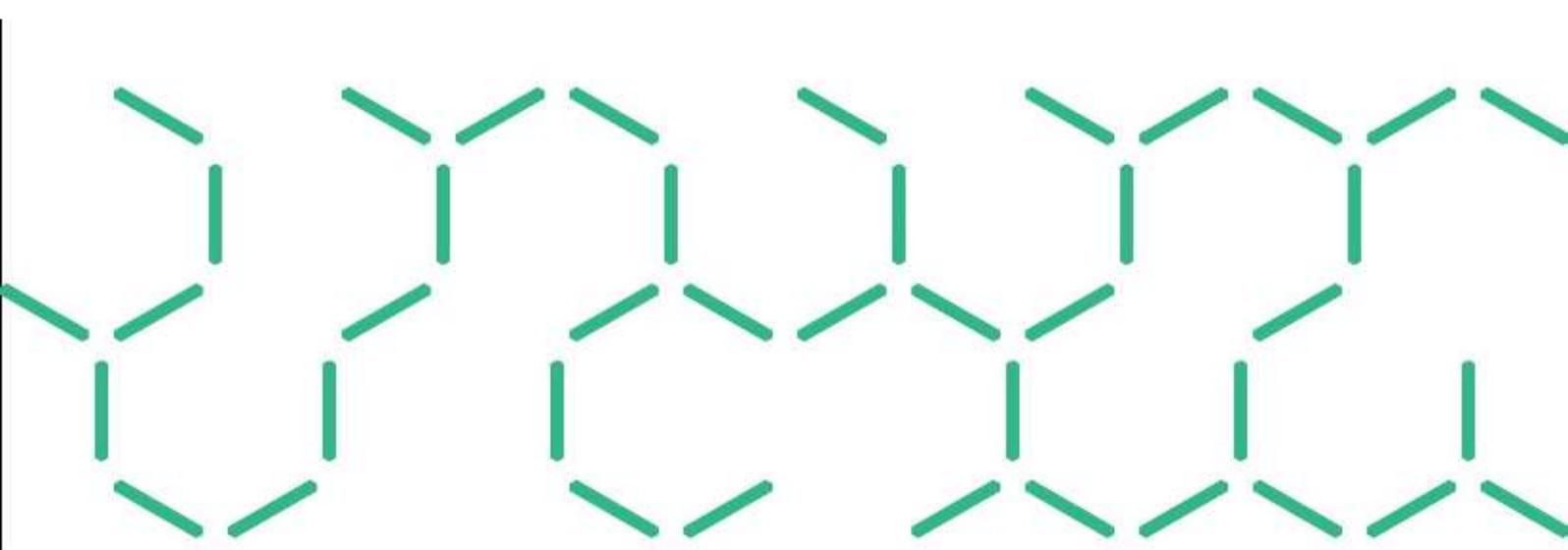
© Commonwealth Scientific and Industrial Research Organisation and Queensland Futures Institute 2017. To the extent permitted by law, all rights are reserved and no part of this publication covered by copyright may be reproduced or copied in any form or by any means except with the written permission of CSIRO.

Important disclaimer

CSIRO advises that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice. To the extent permitted by law, CSIRO (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

Acknowledgments

The project team would like to acknowledge the many individuals and organisations who kindly shared their time, resources and knowledge for the purposes of this work. The project team would particularly like to thank the industry leaders who participated in interviews and workshops as part of the research.



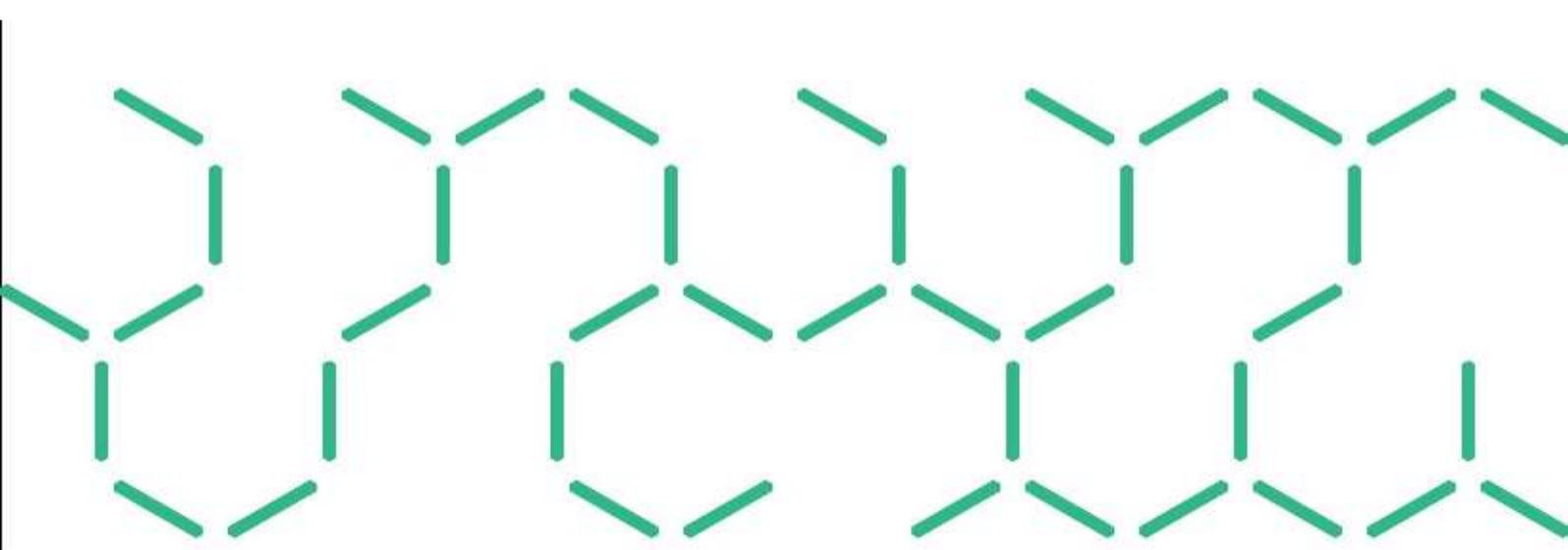
Opportunities for Growth

Driving forces creating economic
opportunities for Queensland
companies over the coming decade

Claire Naughtin, John McLaughlin & Stefan Hajkowicz

**QFI PARTNERS ONLY
REPORT PLUS SUPPLEMENTARY RESEARCH**

December 2017



Contents

Foreword	1
Executive Summary	4
1 Current Profile	8
How did we get here?	8
Our focus	12
2 Opportunities for Growth	13
A growing natural advantage	17
An ‘advanced’ advanced services sector economy	21
Using digital technologies to transform old into new	29
3 Strategic Foundations	34
Defining a shared narrative for Queensland’s future economy	34
Playing to Queensland’s strengths	35
Equipping Queensland with skills for the future	36
Managing environmental and social barriers to growth	36
Supporting inclusive growth in Queensland’s regions	37
4 Next Steps	39
5 Strategic Foresight Methodology	40
References	42

Table of Figures

Figure 1. Annual growth in gross domestic state and domestic product in Queensland and Australia	8
Figure 2. Annual growth in wage price index in Queensland and Australia.....	9
Figure 3. Multi-factor productivity in Queensland and the rest of Australia	9
Figure 4. Estimated residential population in Queensland (left axis) and Australia (right axis)	10
Figure 5. Net internal migration in Queensland from 2006-2007 to 2015-2016 by region	10
Figure 6. Percentage of the Queensland population aged 65 years and over and 15-64 years	11
Figure 7. Median price of residential dwellings by state and territory	13
Figure 8. Net interstate migrations in Queensland, New South Wales and Victoria	14
Figure 9. Net effective rent costs for office spaces across Australian capital cities in 2017.....	15
Figure 10. Total air passenger movements across airports in Australian capital cities in 2016-2017 and projected to 2030-2031.....	16
Figure 11: The percent of Queensland’s population who were born overseas in 2016	16
Figure 12. Participation rate in Queensland labour market by gender.....	17
Figure 13. Import demand for thermal and metallurgical coal across Asia Pacific regions	18
Figure 14. Solar photovoltaic generation capacity in Australia in 2017 by state and territory	19
Figure 15. Share of waste generation per capita in Australia in 2014-2015 across states and territories	19
Figure 16. Production of coal seam gas in Queensland in petajoules.....	20
Figure 17. Annual mean sea surface temperature anomalies in Australia	21
Figure 18. Change in employment across the top eight employing service industries in Queensland, indexed to 1984 values.....	22
Figure 19. Percentage of startup founders in Australia by state/territory and capital cities	23
Figure 20. Number of patent applications submitted via the Patent Cooperation Treaty (PCT) in 2014..	24
Figure 21. Percentage of higher education enrolments in Queensland by field of study.....	24
Figure 22. Share of gross domestic product (GDP) at purchasing power parity (PPP)	25
Figure 23. Share of global middle-class population by region	26
Figure 24. Top ten highest gross value service export destinations for Queensland	27
Figure 25. Number of higher education enrolments across Australia and in Queensland, New South Wales and Victoria	28
Figure 26. Percentage of Bachelor-degree graduates in Australia in full-time employment.....	29
Figure 27. Average internet connection speed across Asia Pacific countries in 2017	30
Figure 28. Ratings of telecommunication measures from respondents in rural and regional areas in Queensland and Australians in 2016.....	31
Figure 29. Australian Digital Inclusion Index (ADII) scores by state and territory in 2017.....	32
Figure 30. Total value of new investments across Queensland, New South Wales and Victoria	33
Figure 31. Overview of strategic foresight process	41

Foreword

The release of the 'Opportunities for Growth' report is a major milestone for the Queensland Futures Institute (QFI). It is the result of a significant investment by its partners and indicative of the strong belief that they have in a positive future for Queensland.

Moreover, and importantly, 'Opportunities for Growth' has been developed using evidence-based research, undertaken by CSIRO's Data61 – Australia's leading, independent research provider. The report's findings are based upon and backed by current data, trends and information.

This approach, along with engagement with a number of Queensland's academic, business, community, industry and research organisation leaders, provides many findings that are representative of issues common to a broad cross-section of the Queensland community. We believe that the robustness of the approach will see the findings more readily implemented.

The release of the report is the start of what we expect will be an ongoing discussion and the start of a range of subsequent initiatives further exploring growth opportunities. The evidence-based findings in the report will generate a variety of views, some supportive, some questioning, some opposed. It is this 'contention of policy ideas' that is sometimes lacking in Queensland's policy process and something that the QFI has strived to stimulate.

The Next Steps outlined in the report foreshadow a clear path forward. Queensland's growth will occur through clear prioritisation, coordination and the creation of a new independent, apolitical process to drive ongoing research, policy support and community engagement.

We commend the report to you and invite your participation in taking advantage of Queensland's Future Opportunities for Growth.



CEO
Steve Greenwood



President
Julieanne Alroe

About the Queensland Futures Institute

Established in 2014, the Queensland Futures Institute (QFI) is a unique partnership of academic, business, community, industry and research organisations that seek faster economic and social growth for Queensland. We seek to work alongside government and the community to create an innovative, robust and thriving economy to enhance the social well-being and quality of life of all Queenslanders.

Queensland Futures Institute Partners

The QFI would also like to acknowledge the support of its Partners:



QUEENSLAND'S NEW ECONOMY

OPPORTUNITIES FOR GROWTH

1

An increasingly differentiated investment package



Queensland's liveability, affordability and good conditions for doing business make it competitive on price and quality.

2

A growing natural advantage



Queensland's strengths in resources and energy sectors place it in a strong position to become the energy hub of Australia and meet rising global demand for resources.

3

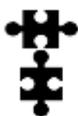
An 'advanced' advanced services sector economy



Queensland can further diversify its economy by growing its services industries, transforming existing industries and creating new ones.

4

Queensland's got what future Asia wants



Queensland is close to Asia and can meet its emerging consumer demands, but it is also competing globally for this market.

5

Using digital technologies to transform old into new



Queensland has grown and diversified some industries, but existing digital skill and infrastructure gaps hinder future growth and innovation.



Defining a shared narrative for Queensland's future economic opportunities



Using technology and leveraging Queensland's strengths to diversify its economy



Equipping Queensland with the skills and talent it needs to grow and diversify its economy



Managing environmental and social barriers to growing Queensland's sectors



Supporting regional growth through connectivity, digital literacy and education

STRATEGIC FOUNDATIONS - ENABLING QUEENSLAND TO GROW

Executive Summary

Queensland is in a strong position for growth. It is a great place to live, work and holiday, with its natural beauty, beaches, climate and attractive lifestyle qualities. And thanks to well-established industries in agriculture, resources, tourism and construction, Queensland has built a strong economy for current and future generations to enjoy. But Queensland, like many other economies, is operating in an ever-changing world impacted by factors such as technology, globalisation and changing business environments. To navigate these changes, it will be important for Queensland to position itself effectively for growth.

Informed by consultations with industry leaders across the private, not-for-profit and research sectors, this report explores the driving forces that are shaping Queensland's economy. It examines opportunities to leverage the state's competitive advantages, diversify traditional industries, and create new sectors that meet emerging global demand, while also flagging the potential for missed opportunities. Its findings aim to provide a narrative for Queensland's new economy and inform future strategic, business and policy decisions.

Opportunities for Growth

An 'Opportunity for Growth' is an overarching trajectory of change that is likely to impact supply and/or demand in a market, thereby creating opportunities to sell products and services to new consumer segments and/or to reach new markets through lower production costs or more efficient value chains. This report identifies five Opportunities for Growth for Queensland:

- 1. An increasingly differentiated investment package.** Queensland's natural beauty, diversity and cost of living have made it a go-to destination for people not only to holiday but to live and work, raise a family or retire. Its current competitive advantages over other destinations – in Australia and beyond – are likely to grow, presenting opportunities to:
 - Attract the next wave of interstate migration from New South Wales, which has recently seen its median house prices growing about four times as quickly as in Queensland.¹
 - Transform Brisbane into the new gateway into Australia for passengers travelling from China, Japan and India, and better connect Queensland's regions and the goods they produce globally.
 - Become a headquarters capital, as Queensland offers the lowest payroll tax in Australia, competitive rent prices in its capital city² and a highly skilled workforce.
- 2. A growing natural advantage.** Queensland is a resource-rich state with strong mining and renewable energy sectors and commodity export markets. There are great opportunities for Queensland to become the energy hub of Australia and the Asia Pacific, supplying in-demand resources and developing sustainable, low-carbon solutions for economies facing similar challenges:
 - Meet the rising demand in the Asia Pacific region for resources such as high-quality thermal and metallurgical coal, and renewable energy solutions.³
 - Diversify into rare earth elements such as scandium, tantalum, niobium and cobalt, for which future technology developments will create growing global demand.
 - Develop more innovative waste management processes, which have economic as well as environmental benefits – for every 10,000 tonnes of waste, 9.2 jobs are generated for the recycling sector compared to 2.8 jobs for landfill.⁴
- 3. An 'advanced' advanced services sector economy.** Queensland is refocusing its exports from commodities to advanced services, with recent growth in areas such as life sciences, health care and social assistance and mining equipment, technology and services (METS). This presents opportunities for Queensland to:

- Strengthen its transition towards a more knowledge-based economy, which is associated with enhanced economic growth and productivity.⁵
- Drive Australia's space industry, given its closer proximity to the equator than other Australian states. Growth in this industry could also help to diversify Queensland's higher degree enrolments.
- Become the capital of Australia's METS sector, in which Queensland already holds strong expertise and talent. As global demand for resources grows, innovative technology solutions and processes will be required for improved cost efficiencies.

4. Queensland's got what future Asia wants. Queensland is in a good position to meet emerging consumer demands from Asia's expanding middle class, given its geographical location and capacity in areas such as tourism, health, education and food. While these global markets are becoming increasingly competitive, they present opportunities for Queensland to:

- Expand its service exports to Asia: currently, Queensland accounts for less than 2 percent of China's total service imports,^{6,7} which suggests it is missing opportunities it can exploit in the future.
- Move from basic commodities to high-value nutrition products. Queensland's strengths in agriculture, particularly organic farming, place it in a strong position to meet demand from Asian consumers.
- Grow its international student enrolments, which are currently falling behind the national average. Employability will be a key factor in securing future international students and harnessing the benefits they bring, both direct (e.g. jobs, expenditure) and indirect (e.g. future tourism).

5. Using digital technologies to transform old into new. Queensland has demonstrated its ability to embrace digital technology and draw on its existing expertise to harness new markets and develop new products and services. Queensland will need to address connectivity gaps and build digital capabilities to capitalise on opportunities to:

- Lead Australia's AgTech sector, which is predicted to be worth \$100 billion by 2030,⁸ to meet rising global demand for innovative agriculture processes to improve efficiencies and crop yields.
- Drive growth through productivity gains from improved digital connectivity in regional communities that are currently least digitally developed and rate their telecommunication services poorly.⁹
- Improve economic resilience by building the digital capability of small businesses – the vast majority of all businesses in Queensland,¹⁰ which also tend to be the least digitally adept.

Strategic Foundations

How do Queensland companies harness these opportunities and mitigate the risks?

Defining a shared narrative for Queensland's future economy. Queensland needs a clear and powerful narrative that reflects its strengths and positions the state for new and emerging growth opportunities. A vision is important for communicating Queensland's future direction externally, to the rest of Australia and the world, and also internally within the state. It will be important for Queensland to:

- Attract talent and business, in a mutually reinforcing cycle: talent is a good incentive for businesses to relocate, and employment opportunities are good for attracting people to work and study.
- Address strains that a rising population is placing on existing infrastructure: traffic congestion, for example, is a growing problem and is expected to cost Brisbane \$3 billion by 2020.¹¹

Playing to Queensland's strengths. Queensland's strong traditional industries can be leveraged to diversify its economy and reduce economic reliance on a small selection of sectors. Transforming well-established industries can present new economic opportunities, particularly for regional areas which house much of the knowledge and experience in these industries. This could be enabled by:

- Digital technology, which has helped transform industries such as financial services (FinTech) and agriculture (AgTech). Technology could help Queensland diversify into emerging domains in food, education, energy, minerals, tourism and health.
- Tourism, which can also help to diversify industries such as agriculture, medicine and wellness. While Queensland might not be globally competitive on cost, the convergence between tourism and other industries could give rise to new niche premium markets, particularly in the Asia Pacific region.
- Access to cheap, reliable energy, which is important for keeping costs down in many industries, including agriculture and horticulture, and maintaining Queensland's competitive advantage.

Equipping Queensland with skills for the future. Access to talent with high quality skills is a prerequisite for growing Queensland's workforce and economy. To advance its knowledge-intensive industries, Queensland will need to get the skills balance right and provide appropriate education and training structures that help workers adapt to changing workforce requirements. This could be enabled by:

- Developing more flexible education models, offering 'micro-credentials', to allow workers to upskill and engage in active learning beyond the classroom.
- Identifying transition pathways for job seekers and workers, particularly those whose jobs are at risk of future disruption by automation or other factors.

Managing environmental and social barriers to growth. Queensland's rich supply of resources and strengths in the resources and energy sectors point towards a key role for the state in supplying Australia and the Asia Pacific with energy, research and expertise. For this to happen, key environmental and social barriers to growth need to be managed. This could be enabled by:

- A long-term, evidence-based energy strategy that aligns with Queensland's international environmental commitments. Future energy and resource supply will require a diverse resource mix that promotes emission reductions, meets consumer needs and incentivises investment.
- Strengthening Queensland's energy mix, growing its renewable energy sector and assisting workers in translating their skills to low-carbon jobs to ensure that the state keeps up with global shifts.
- A strong focus on maintaining community support and preserving the energy and resources sectors' social license to operate.

Supporting inclusive growth in Queensland's regions. Queensland's regional economies are at greater risk of disruption if they rely heavily on a single industry for growth. While the experience and expertise housed in these communities places them well for Queensland's future growth opportunities, they may struggle to diversify into unfamiliar areas. Regional communities could benefit from:

- Improved physical and digital connectivity of people and goods to international markets, which will encourage investment, both domestically and internationally.
- Greater capabilities in digital literacy to ensure regional communities can actively participate in the digital economy.
- Education opportunities, given that students who study in regional areas are more likely to stay in regional areas (65.7 percent) than move to an urban area (34.3 percent).¹²

Next Steps

While the opportunities identified in this report are there for the taking, harnessing them will require deliberate action and a shift away from business as usual. This will involve:

- **Prioritising opportunities for growth.** Global competition for emerging markets is increasing. To be competitive, Queensland needs to be specific in the areas it chooses to focus on.

- **Forming a coordinated approach to growth.** Many of Queensland's future opportunities are multisector. A coordinated approach is needed to provide strong industry leadership for smaller players, and a unified approach to capability development, implementation and investment.
- **Develop an independent, non-partisan process to drive future growth.** There is a need for an unbiased process that can provide ongoing research, policy support and community engagement. This will help ensure future strategies remain relevant to changing operating environments.

1 Current Profile

There are many things to love about Queensland: its natural beauty, climate and infectious ‘have-a-go’ attitude. Queensland also has a strong base of small businesses and good relationships between industry, government and local councils, while well-established industries, such as construction, agriculture, resources and tourism have provided strong sources of growth and employment for the state. These qualities, among others, make Queensland an attractive place to live, work and holiday.

But Queensland, like many other economies in Australia and overseas, is experiencing a period of uncertainty in the face of rapid disruption. Factors such as globalisation, advances in digital technologies, severe weather events and changes in population demographics are impacting Queensland’s economy and its key sources of future growth and job creation.

To ensure Queensland, its economy and its industries can thrive into the future, it is important to look long-term and consider plausible future trends, challenges and opportunities that may lie on the horizon. This report explores the driving forces that are shaping Queensland’s economy and its sources of competitive advantage over the next 10 years, and the ways in which Queensland can best position itself for these changes. By exploring the future trends impacting Queensland, industry, government and communities can identify areas where they can leverage Queensland’s competitive advantage, pursue new opportunities to grow and diversify its economy, and build greater resilience and adaptability in Queensland’s new economy.

How did we get here?

Queensland has had a good, but rocky run over the past couple of decades. Consistent with nationwide trends, the Queensland economy has shown positive and sustained growth in gross state product per capita, with construction, health care and social assistance, and mining among the biggest contributors to the strength of Queensland’s economy.¹³ Queensland’s traditional reliance on its four key economic pillars – agriculture, construction, mining and tourism – have generated a degree of volatility in the economy due to their dependence on factors such as population growth, the environment and global export markets. This has seen Queensland experience sustained periods of above national average growth at times (e.g. 2004-2007), but it has also led to some deep dives (see Figure 1).

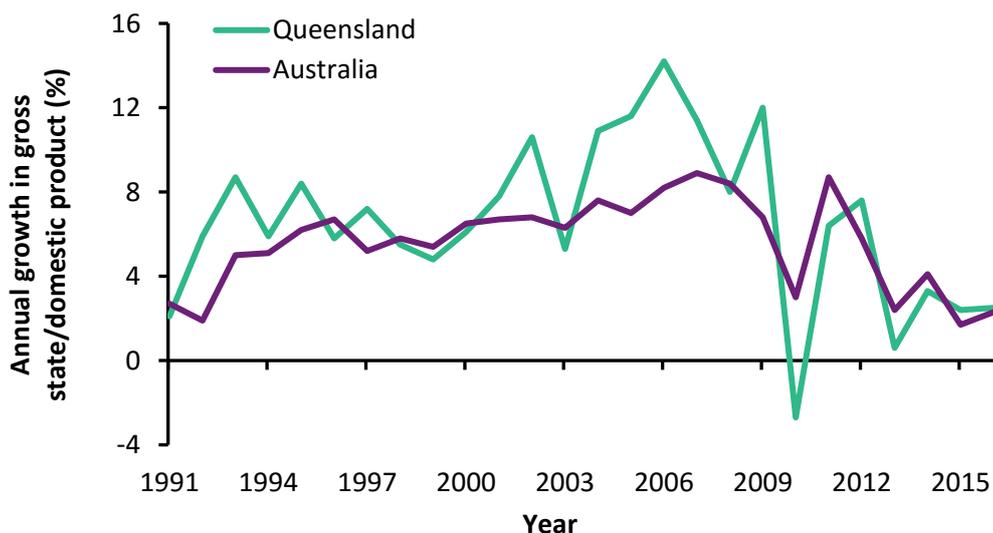


Figure 1. Annual growth in gross domestic state and domestic product in Queensland and Australia

Data source. Australian Bureau of Statistics¹³

Wage growth and productivity outputs in Queensland, and in Australia more generally, have been poor over the past decade. Annual growth in wage price index grew steadily up until the global financial crisis in 2007-2008, after which point wage growth took a dip and has continued to decline over the subsequent decade

(see Figure 2). A similar pattern can be seen in estimates of Queensland’s productivity. Multi-factor productivity in Queensland – a measure of real output that takes into account labour and capital inputs – showed a positive trend up until 2008 and has since been on the decline (with 2011-2012 being the most recent data point available; see Figure 3). The period following 2008 involved substantial investment in Queensland’s mining industry, which led to declines in productivity given these investments were not yet fully implemented or operational.¹⁴ Queensland’s dependence on Asian markets for coal exports, which were impacted by the downturn of the global financial crisis and the economic impact of extreme weather events (e.g. Cyclone Yasi) also contributed to this decline in productivity.¹⁴

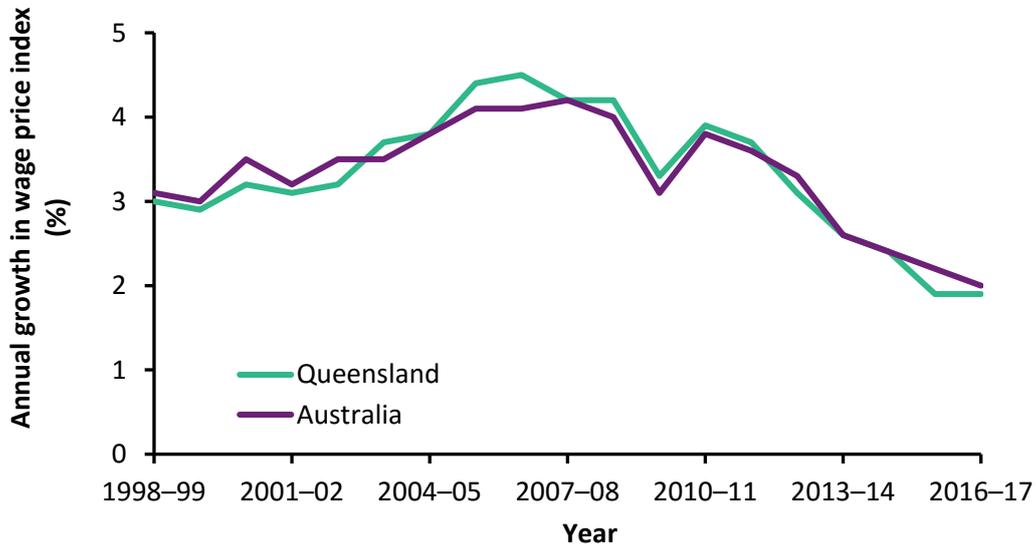


Figure 2. Annual growth in wage price index in Queensland and Australia
Data source. Queensland Treasury¹⁵

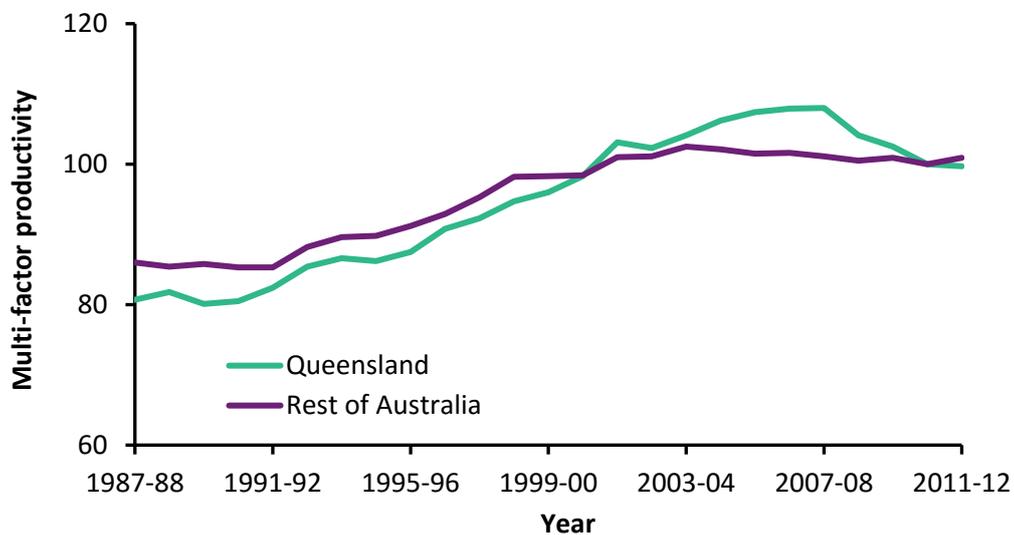


Figure 3. Multi-factor productivity in Queensland and the rest of Australia
Data source. Queensland Treasury¹⁴

Queensland’s population has been growing steadily over the past decade (see Figure 4) and it is forecast to reach between 6.2 and 7.3 million by 2036.¹⁶ The population of Queensland is geographically dispersed, with 51.3 percent of people living outside of the Greater Brisbane area.¹⁷ There are distinct differences between South East Queensland and the rest of Queensland, which can be a challenge for inclusive growth. For one,

unemployment in 2017 was higher in regional Queensland than South East Queensland,¹ with employment rates in Townsville (9.3 percent) and Fitzroy (7.2 percent) well exceeding both state and national averages (5.6 and 6.3 percent, respectively).¹⁸ Moreover, people are increasingly drawn from the regions to South East Queensland, with all regions outside of Brisbane, the Gold Coast, Sunshine Coast and Wide Bay showing net losses in their populations (see Figure 5). While growth in South East Queensland is a critical component for growing Queensland's regions, these trends suggest that the former does not necessarily guarantee the latter will be true.

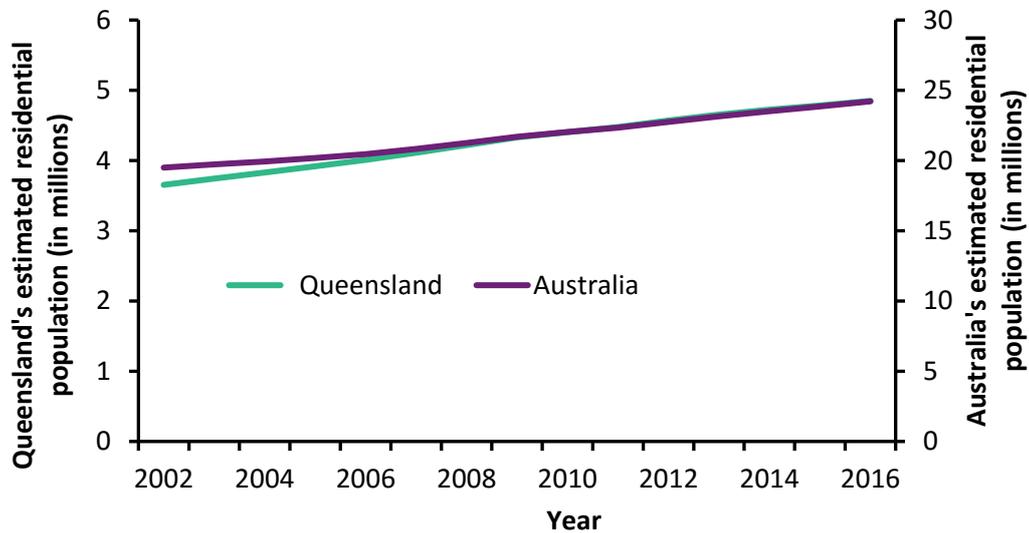


Figure 4. Estimated residential population in Queensland (left axis) and Australia (right axis)
Data source. Australian Bureau of Statistics¹⁷

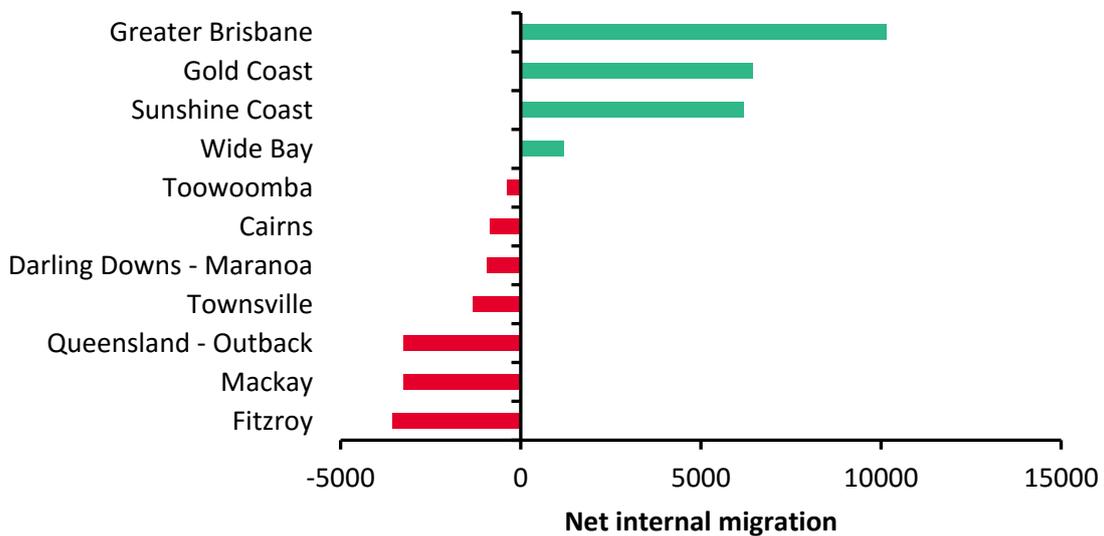


Figure 5. Net internal migration in Queensland from 2006-2007 to 2015-2016 by region
Data source. Australian Bureau of Statistics

¹ South East Queensland is defined here as Brisbane, Ipswich, Gold Coast and Sunshine Coast.

The geographically dispersed nature of Queensland has provided unique economic opportunities for industries that are place-specific, from coal mines in the Bowen Basin and cotton fields in the Darling Downs to the Great Barrier Reef in North Queensland. Regional centres are typically a hub for mining or agriculture, access to services, employment, education, transportation or logistics, or for their lifestyle options.¹⁹ Unfortunately though, the unipolar nature of some regions can place them at risk of economic disruption. Indeed Townsville, a previous transport hub for ‘fly in fly out’ construction and mining workers in Mount Isa, has seen a 19.8 percent drop in labour force participation and a 77.4 percent increase in unemployment from 2011 to 2017 following declines in employment in Central Queensland mines.

When it comes to dealing with changes in the economy, it is people in metropolitan areas and very remote areas that show the poorest capacity to adapt.¹⁹ In 2016, the Productivity Commission developed a metric of regional adaptive capacity that incorporated factors such as a region’s degree of economic dislocation/engagement, transitional friction and local economic sustainability.¹⁹ This measure showed that parts of Far North and the Western regions of Queensland have the lowest capacity to adapt due to limited access to infrastructure and services, lower education levels, reduced employment capacity and limited industry diversity.¹⁹ These findings illustrate potential at-risk regions of Queensland that warrant attention, but also highlight the capacity of other less remote areas to adapt and transition their economies.

Queensland, like the rest of Australia and many other advanced economies, is also facing significant demographic shifts over the coming decades. The population of Queensland aged over 65 years has been steadily rising (see Figure 6) and is expected to make up between 19.1 and 21.1 percent of the total population by 2036.¹⁶ Conversely, the number of people of working age (15-64 years) has been on the decline (see Figure 6) and is expected to shrink to 61.0 and 62.4 percent by 2036.¹⁶ With a lower ratio of working to non-working age Queenslanders comes potential risks around declines in productivity and tax revenue, and increases in health care expenditure.

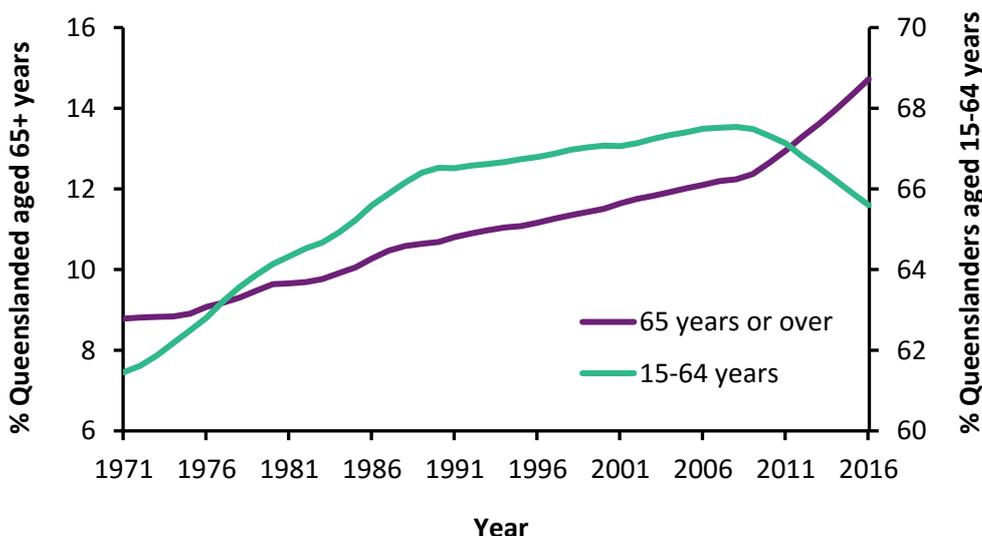


Figure 6. Percentage of the Queensland population aged 65 years and over and 15-64 years

Data source: Australian Bureau of Statistics²⁰

The short-termism of government has been a challenge to long-term socioeconomic progress in Queensland. In Australia, the median length of time between state elections in Queensland from 1947 to 2013 was 2.9 years,²¹ which is well below global median length of parliamentary terms of 5 years.²² Short political cycles are a challenge as they can lead to more frequent changes in the political party in power. While this can enable voters to vote out ineffective political leaders, it can be a challenge to establishing longer-term policy decisions and maintaining business confidence.²³ For instance, in 2014, the Liberal National Queensland Government established The Queensland Plan, which involved consultations with over 80,000 people to provide a 30-year vision for Queensland.²⁴ This plan was subsequently dropped in the change of government

in 2015 and many industry leaders consulted in this project felt this was a valuable piece of work that has been underutilised.

Our focus

The purpose of this report is to present plausible future directions for Queensland's economy and its sources of competitive advantage over the next 10 years. Chapter 2 presents a set of key *Opportunities for Growth* for Queensland, which capture the strengths of the Queensland economy and its external driving forces that place Queensland in a unique, competitive position to grow its existing industries, expand into new markets and generate employment for the state. Chapter 3 then explores the *Strategic Foundations* that the Opportunities for Growth present for Queensland and the key priorities for achieving these future opportunities. This report is designed to provide a future context for Queensland over the next decade and inform future policy, business and strategy decisions.

Using a strategic foresight approach, the Opportunities for Growth aim to provide a comprehensive account of Queensland's future economy, touching upon various political, social, economic, technological and environmental factors. This project was informed by trends research and consultations with key stakeholders of the Queensland Futures Institute, covering a broad cross-section of industry sectors. These included representatives from industry groups, private sector and non-for-profit organisations (see Strategic Foresight Methodology chapter for further details).

2 Opportunities for Growth

An 'Opportunity for Growth' is an overarching trajectory that reflects a cluster of smaller trends. Individually these trends might be specific to a particular issue, industry or point in time, but they are interrelated in ways that are likely to impact future supply and/or demand in a market. A shift in demand creates an opportunity to sell new products and services to new consumer segments. A shift in supply creates an opportunity to reach new markets through lower production costs or more efficient value chains. This report identifies five Opportunities for Growth that are set to shape Queensland's economy over the next 10 years.

An increasingly differentiated investment package

Queensland's reputation as a liveable state is arguably one of its key assets, putting it in a strong position to attract people and grow its population. Its natural wonders and beaches, good climate, diversity and affordable housing prices have made it a go-to destination for people not only to holiday but to live, whether for work, retirement or raising a family. A similar competitive edge exists for doing business in Queensland, relative to other capital cities in Australia. Aviation infrastructure developments in the pipeline look set to further strengthen Queensland's appeal for tourism and business, and could position Brisbane as the new gateway to Australia. The existing differentials in price and quality between destinations in Queensland and those elsewhere in Australia and the world are likely to widen.

Queensland's natural beauty and affordable housing enhance its liveability

Of Australia's 12 World Heritage natural sites, Queensland is home to five of them including the Gondwana Rainforests of Australia, the Great Barrier Reef, Fraser Island, the Wet Tropics of Queensland and the Australian Fossil Mammal site in Riversleigh.²⁵ This natural beauty and climate makes Queensland a popular tourist destination for international visitors,²⁶ and adds to the liveability appeal for its local residents.²⁷ Queensland's cost of living and housing also adds to the liveability of the state. Compared to its southern neighbours, Queensland has seen a much smaller increase in median housing price, up 16.4 percent from 2012 to 2017 relative to growth of 62.1 and 41.7 percent in New South Wales and Victoria, respectively (see Figure 7). But not all regions in Queensland are as liveable as others: a Deloitte analysis of liveability found Longreach and parts of Mackay and Fitzroy areas were among the few non-coastal areas with high liveability scores.²⁷



Figure 7. Median price of residential dwellings by state and territory

Data source. Australian Bureau of Statistics¹

Affordable housing could drive the next wave of interstate migration to Queensland

Affordable housing offers an important point of difference for Queensland. Queensland has struggled in recent times to attract and retain people from other Australian states, as indicated by a plateau in net interstate migrations following a sharp drop-off following the resources boom (see Figure 8). Victoria seems to have benefited from this change in migration patterns, with its net interstate migrations increasing over 11 times from 2012 to 2016 (see Figure 8). Recent research predicts that rising house prices could drive the next wave of interstate migration from New South Wales to Brisbane and South East Queensland, but this will depend on the availability of viable employment opportunities.²⁸ These people may be looking for employment in professional, scientific and technical services and health care and social assistance, given these are currently the top employing industries in New South Wales (9.6 and 13.3 percent of the workforce, respectively).²⁹

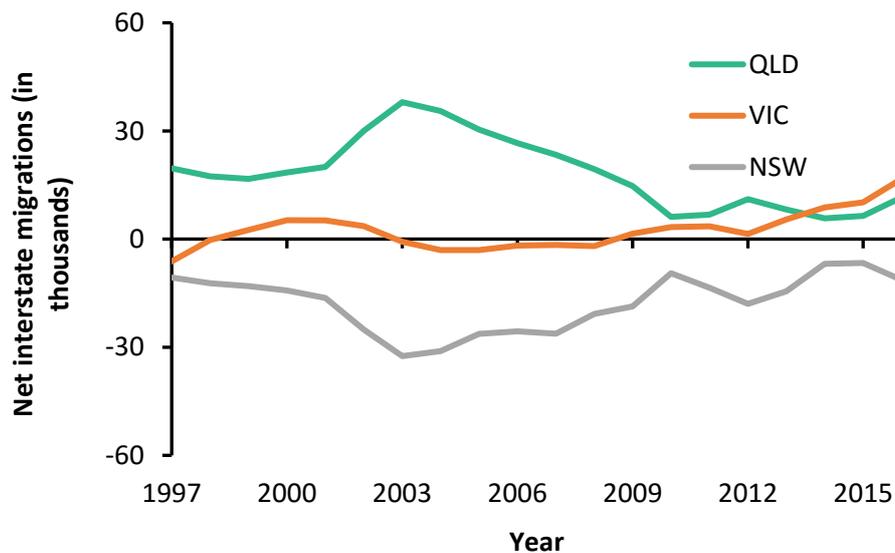


Figure 8. Net interstate migrations in Queensland, New South Wales and Victoria

Data source. Australian Bureau of Statistics³⁰

Brisbane is developing an attractive environment for big business

While Queensland has a number of positive lifestyle factors (see 'Queensland's natural beauty and affordable housing enhances its liveability' trend), it also has attractive business conditions. For one, Queensland offers the lowest payroll tax rate (4.75%) in the country, compared to 5.45% in New South Wales and 4.85% in Victoria.³¹ Brisbane also offers competitive rent prices for office spaces, well below that charged in Sydney and Melbourne (see Figure 9). Finally, Queensland's access to skilled workers, strong economic prospects and stable public policy environment creates a business-conducive environment. Brisbane is currently home to 138 companies listed on the ASX,³² and Aurizon and The Star Entertainment Group are set to relocate to their headquarters to Brisbane in the coming years. Medium and large enterprises are important for Queensland's economy, given they are more likely to engage in innovative activities than smaller businesses.³³ There is room for improvement, however, as Queensland is less competitive than other states in areas such as transfer duty and land taxes.³⁴

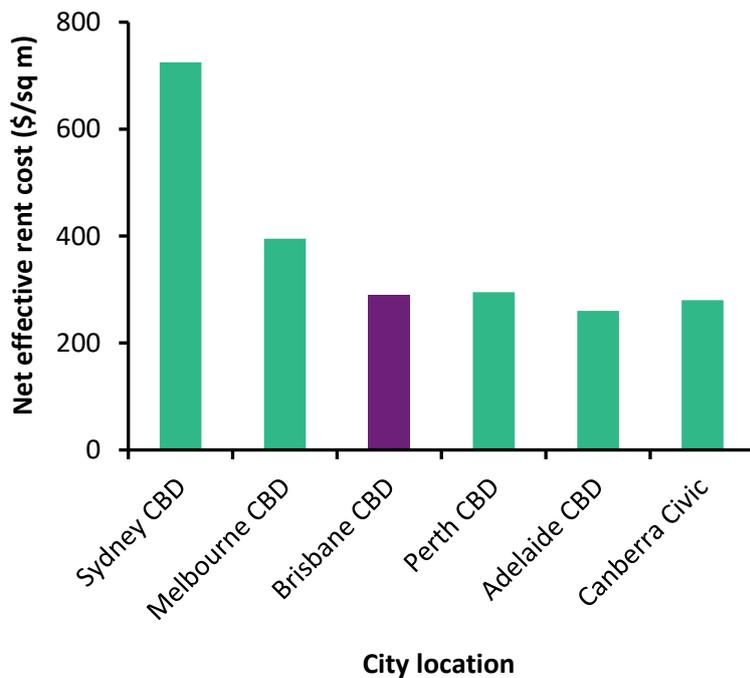


Figure 9. Net effective rent costs for office spaces across Australian capital cities in 2017
 Data source. Savills Research²

Airport developments are enabling greater flows of people and goods to Queensland

Brisbane is currently the third largest receiver of passengers in Australia, with 26.6 million people touching down in 2016-2017,³⁵ and this is projected to increase to at least 45.1 million by 2030-2031 (see Figure 10), not taking into account current infrastructure developments. A \$1.3 billion development is currently underway at Brisbane Airport to construct a third runway, which will be operational in 2020, ahead of similar aviation infrastructure expansions planned for Sydney and Melbourne.³⁶ This places Brisbane in a unique position to become the new gateway into Australia, particularly for passengers travelling from Japan, China and India.³⁶ Brisbane Airport's advantages also include its proximity to Asian markets, its curfew-free status, accessible transport links and its 12-kilometer distance from the CBD.³⁷ Outside of Brisbane, Wellcamp Airport in Toowoomba has also expanded, now offering international freight flights to Hong Kong, providing new opportunities for primary producers to access regional markets.³⁸ Expanding these services to passengers could better connect international visitors to the regions, whether it be to study or to holiday.

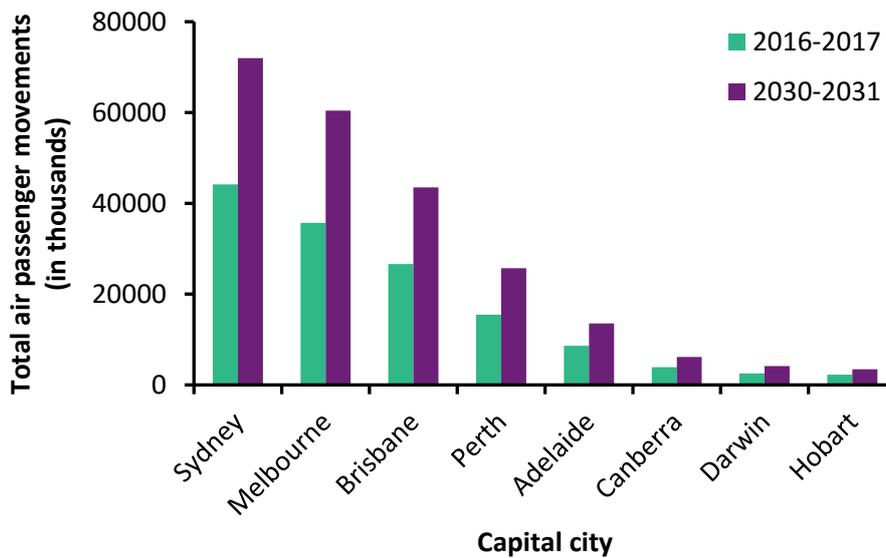


Figure 10. Total air passenger movements across airports in Australian capital cities in 2016-2017 and projected to 2030-2031

Data source. Department of Infrastructure and Transport³⁹

Queensland is quickly becoming more culturally diverse

As people move from one country to another, they bring with them a range of new skills and perspectives which nurtures technological innovation and stimulates economic growth.⁴⁰ Queensland has a rich mix of cultures, languages, faiths and traditions. In 2016, almost one in four Queenslanders were born outside of Australia, and this is rapidly increasing, up by 18 percent since 2006.^{41, 42} Cultural diversity is even higher in Queensland's urban centres, with 32.2 percent of the Greater Brisbane population born overseas compared with 25.8 percent of the population in the rest of Queensland.⁴¹ While the cultural diversity of Queensland has grown faster than any state or territory, with the expectation of the Northern Territory,^{41, 42} the state still falls behind in terms of its absolute level of diversity (see Figure 11). It will be important for Queensland to continue improve its cultural diversity, particularly given the positive impacts it can have on workforce participation, productivity, and per capita growth.⁴³

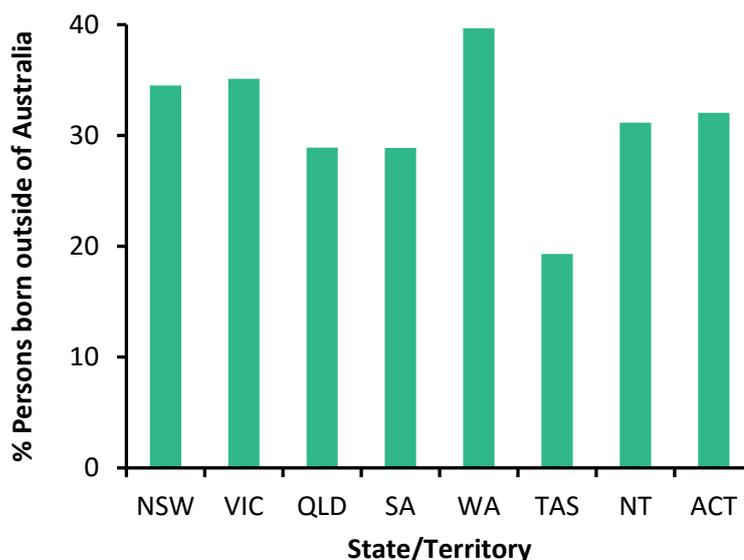


Figure 11: The percent of Queensland's population who were born overseas in 2016

Data Source: Australian Bureau of Statistics⁴¹

Queensland's labour market is attracting more female participation

Gender diversity is key to business, given a more diverse workforce is associated with enhanced creativity,⁴⁴ improved profits, increased sales and more customers.⁴⁵ In line with national trends, female participation in Queensland's labour market has increased gradually over the past few decades (see Figure 12). Australia has the highest level of gender diversity in corporate leadership in the Asia Pacific,⁴⁶ with 44 percent of new appointments to ASX 200 boards being women, compared to 22 percent in 2013.⁴⁷ As more women enter and re-enter the workforce, there could be an increased need for flexible work arrangements and access to childcare and paid parental leave. While this trend is promising, diversity in the workplace continues to be a challenge for employers, particularly those in technology fields. Indeed, the current gender split of males and females employed in the information media and technology industry in Queensland is 58 to 42 percent.²⁹ Rising female labour market participation has also coincided with declining male participation in Queensland (see Figure 12), which is another future challenge for Queensland's workforce.

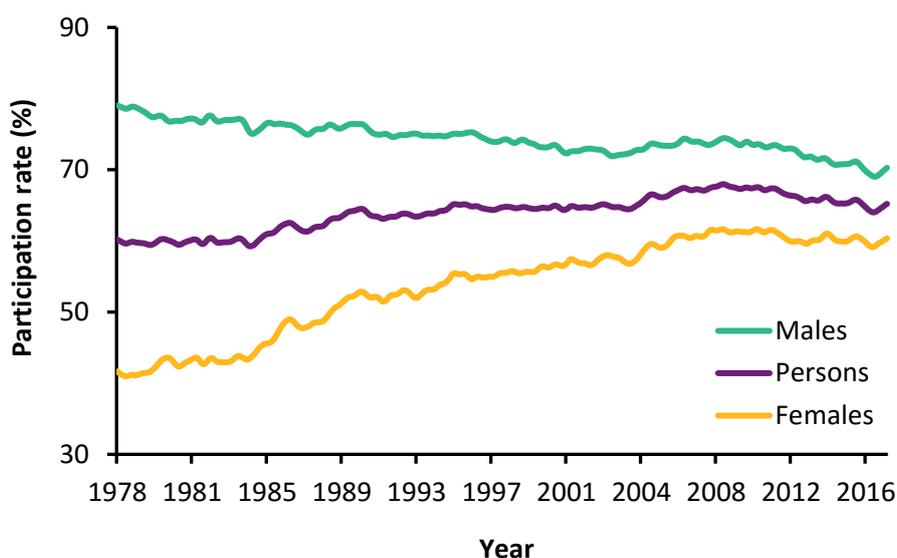


Figure 12. Participation rate in Queensland labour market by gender

Data source: Australian Bureau of Statistics⁴⁸

A growing natural advantage

In an increasingly resource-constrained world, Queensland is in a strong position to meet global demand for natural resources. Continued demand for steel and rising energy consumption in parts of the Asia Pacific look set to sustain demand for Queensland's high-quality thermal and metallurgical coal in the medium-term. However, like many parts of the world, Queensland faces significant environmental challenges – notably the rate of waste production and extreme weather events. These challenges create opportunities for Queensland to develop more sustainable, low-carbon solutions, and export its knowledge and products to other economies. There is potential for Queensland to position itself as the energy hub of Australia, with opportunities to grow its resources and energy sectors through diversification.

Rising regional demands for Queensland's high-quality thermal coal and metallurgical coal

A global divide has emerged for coal consumption: while coal consumption – including bituminous and anthracite (hard) coal, and lignite and brown (sub-bituminous) coal – is declining in Europe and North America, it is increasing in many developing countries in the Asia Pacific.⁴⁹ Predictions for thermal coal consumption, specifically, are mixed across the Asia Pacific, with China expected to decrease its import demand from 2016 to 2022, whereas India, Japan and South Korea look to increase (see Figure 13). A shift

towards coal-fired power plants that employ ‘super critical’ technologies and require higher grades of coal, could see increased demand for Queensland’s high-quality thermal coal.³ A similar picture emerges for metallurgical coal, with China’s import demand expected to decline from 2016 to 2022, whereas demand for steel production is expected to fuel demand across the Association of Southeast Asian Nations (see Figure 13). While demand for Queensland’s thermal coal will likely exist in the medium-term, there is a push to remove coal from the energy mix by 2030, particularly in developed countries.⁵⁰

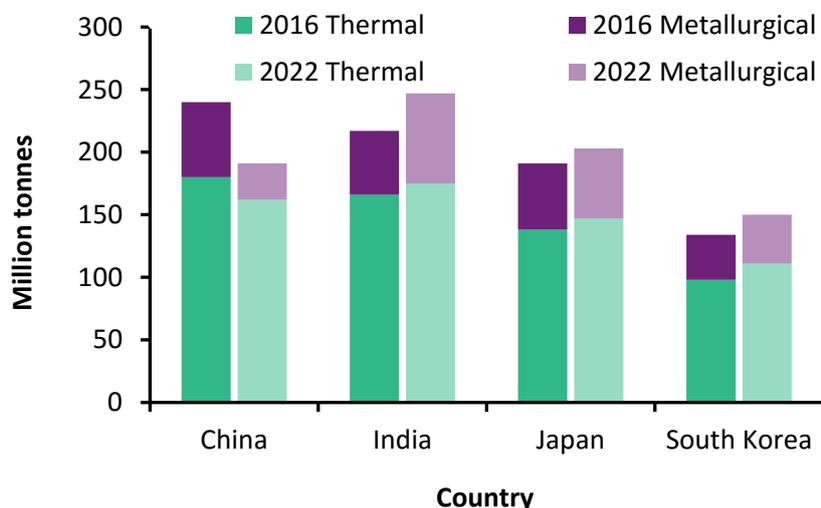


Figure 13. Import demand for thermal and metallurgical coal across Asia Pacific regions

Data source. Office of the Chief Economist³

Queensland’s minerals could fuel future technology developments

Recent explorations have identified sites in Queensland containing highly sought-after rare earth elements.⁵¹ Potential for new rare earth discoveries exist in North-West Queensland, the Georgina Basin in Western Queensland, Cape York Peninsula and the Diamantina region.⁵² These elements are commonly used in a range of advanced technologies, such as fuel cells (scandium), mobile phones (tantalum), super-conducting magnets (niobium) and hybrid vehicle batteries (cobalt).⁵¹ These and other rare earth elements could be a huge resource for Queensland’s economy, particularly given how global demand for these elements greatly exceeds what is being supplied.⁵² Rare earth elements are particularly important in ‘green’ technologies and will be important for Australia and many other countries in transitioning to a lower carbon economy.⁵¹ Queensland could be at the forefront in supplying these commodities to the world, and using these elements to develop innovative ‘green’ technologies.

Growing the Sunshine State could generate more net jobs for the energy sector

Queensland is well positioned to become the solar centre of Australia. Out of all Australian states and territories, Queensland has the greatest proportion of dwellings that are fitted with a solar photovoltaic system (see Figure 14). By 2035, Queensland is expected to generate 17 percent of annual energy consumption through rooftop photovoltaic systems.⁵³ Under both renewable energy scenarios modelled by the Climate Council of Australia (34 versus 50 percent renewables), employment is predicted to grow in renewable energy construction, operation and generation activities and compensate those jobs lost in industries such as coal-fired electricity generation.⁵⁴ Under a 50 percent renewable energy generation scenario, Queensland and New South Wales will benefit the most, with respective net increases of 6,000 jobs and 11,000 jobs from 2014 to 2030.⁵⁴ This net increase in jobs is driven by the fact that investment in renewable and energy is more job-intensive per unit of energy generated than that of fossil fuels.⁵⁵

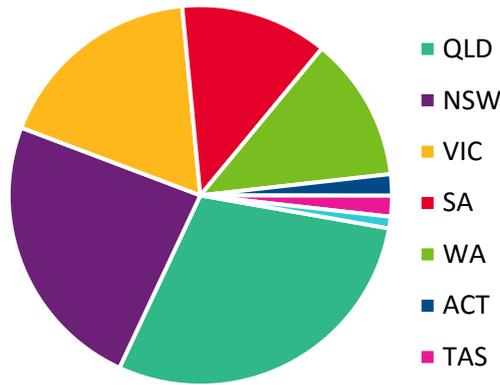


Figure 14. Solar photovoltaic generation capacity in Australia in 2017 by state and territory

Data source. Australian Photovoltaic Institute⁵⁶

Opportunities to turn Queensland’s waste into wealth

Waste management and minimisation can benefit both the environment and the economy. It is estimated that for every 10,000 tonnes of waste, 9.2 jobs are directly generated for the recycling sector compared to 2.8 jobs for landfill.⁴ Sustainable waste management is a significant issue for Queensland and many other economies around the world. In Queensland alone, waste production has increased at a faster rate (8.6 percent) than both population growth (1.3 percent) and economic growth (3.2 percent) between 2014-2015.⁵⁷ Compared to other parts of Australia, Queensland generated the greatest amount of waste per capita over this same period, with the majority of that waste going into landfill (see Figure 15). In addition to the environmental benefits, Queensland therefore has an opportunity to create jobs by developing innovative ways to encourage greater recycling behaviour and reuse of resources.

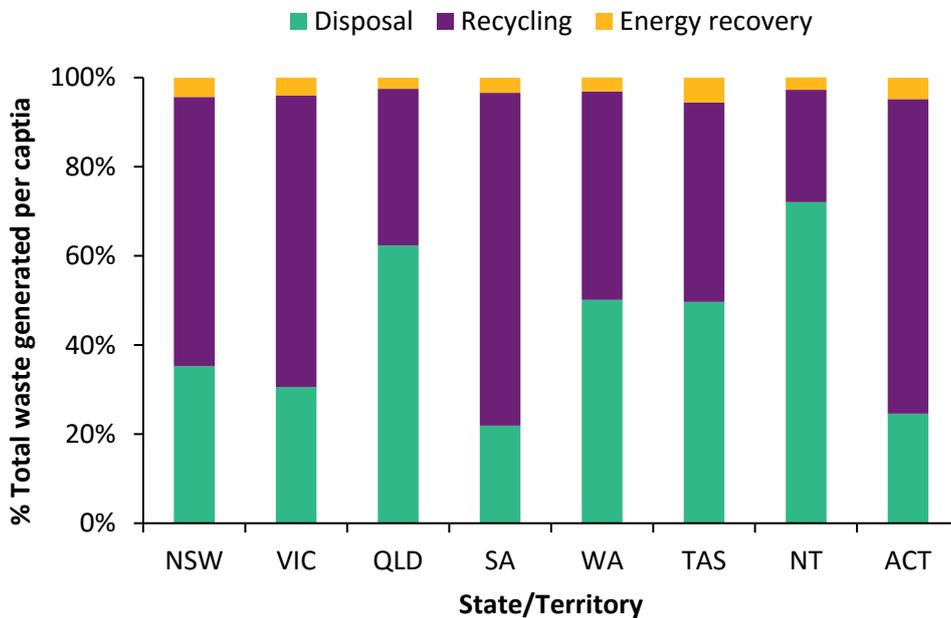


Figure 15. Share of waste generation per capita in Australia in 2014-2015 across states and territories

Data source. Pickin and Randell⁵⁸

Growing the coal seam gas industry’s exports and social license to operate

Coal seam gas production has grown exponentially in Queensland (see Figure 16) and is becoming increasingly important in Australia’s energy market as Australia moves to a lower carbon economy.⁵⁹ Over

the past decade coal seam gas has become Queensland’s dominant source of natural gas, making up over 95 percent of gas production and over 99 percent of remaining proved and probable gas reserves.⁶⁰ Coal seam gas is sourced from the Bowen and Surat Basins regions, which also supply for Queensland’s liquefied natural gas industry in Gladstone.⁶⁰ The industry has also been relatively successful in maintaining its social license to operate, with the majority of community members in the Western Downs region impacted by these developments reporting that they are accepting (35 percent) or tolerant (33 percent) of this development in 2016.⁶¹ There are opportunities to further improve public attitudes to this industry by fostering trust, community engagement in decision making, environmental management and perceptions of the community in adapting to the coal seam gas developments.⁶¹

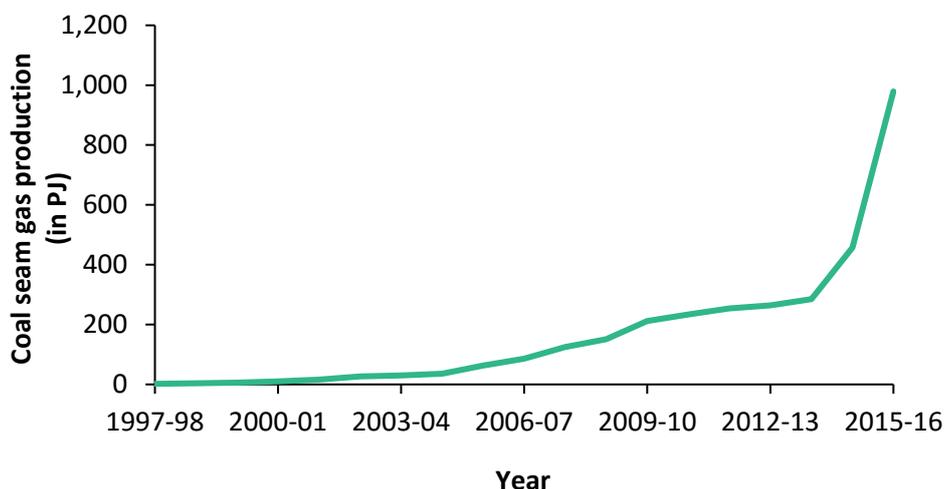


Figure 16. Production of coal seam gas in Queensland in petajoules

Data Source: Department of Natural Resources and Mines⁶⁰

Managing impacts of climate change on the Great Barrier Reef is key for sustainable tourism

Damage to the Great Barrier Reef and other iconic natural wonders from global warming poses potential future risks for Queensland’s tourism and fishing industries.⁶² Deloitte Access Economics estimated that the Great Barrier Reef contributed \$3.9 billion and 33,000 jobs to Queensland’s economy in 2015-2016, and \$6.4 billion and 64,000 jobs to the broader Australian economy.²⁷ But this natural asset is under threat: between 1985 and 2012, coral cover declined from 28 percent to 13.8 percent due to tropical cyclones, natural predators and coral bleaching.⁶³ Queensland has experienced steady growth in sea surface temperatures, and it is predicted that this could rise by a further 0.4-1.0 degrees Celsius by 2030 under a high emissions scenario.⁶⁴ Similar increase have been observed across Australia (see Figure 17). The declining health of the Great Barrier Reef has helped to fuel the number of tourists seeking a ‘last chance experience’ of this natural wonder, who tend to be concerned about the health of the reef.⁶⁵ There could be opportunity to leverage this tourism market to foster greater environmental awareness.

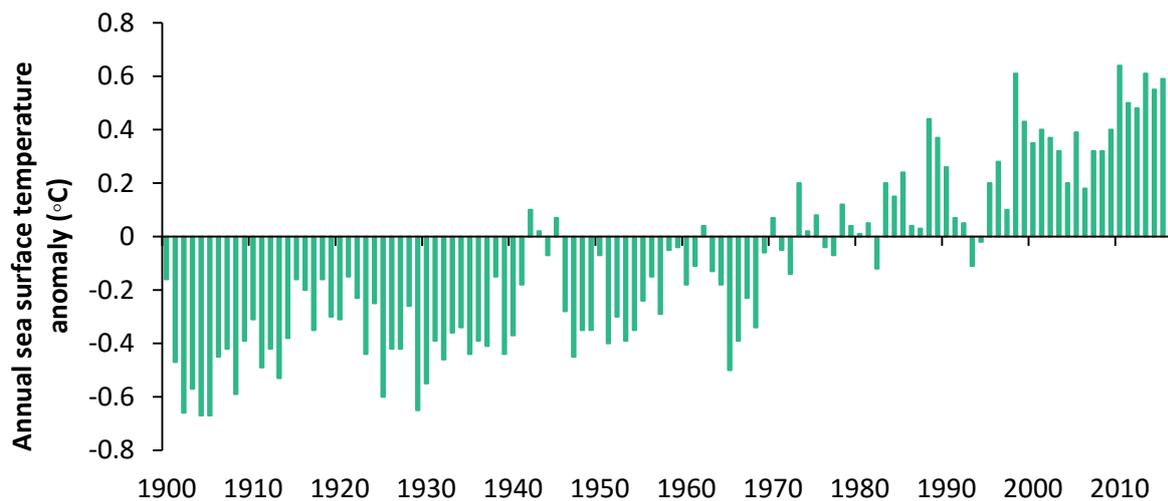


Figure 17. Annual mean sea surface temperature anomalies in Australia

Data source. Bureau of Meteorology⁶⁶

Developing better ways to manage extreme weather events could have huge savings for Queensland

Extreme weather events in Australia are predicted to become more frequent and intense as global temperatures continue to rise.⁶⁷ Under a high emissions scenario, it is predicted that the number of days over 35 degree Celsius in Queensland will rise to 18 per year by 2030 (relative to 12 days per year in 1981-2010 climate), maximum one-day rainfall will rise by 18 percent by 2100 (relative to 1986-2005 climate) and severe tropical cyclones will become more frequent, particularly in the Bundaberg/Fraser Coast regions.⁶⁴ Cyclone Yasi caused substantial damage and flooding to parts of North Queensland in 2011, and is considered to be one of Australia’s most costly natural disasters.⁶⁷ Queensland’s traditional industries were impacted greatly by this cyclone, with tourism and agriculture facing losses of \$600 million and \$1.6 billion, respectively.⁶⁸ Extreme weather events will continue to present significant threats to Queensland’s economy and its environment, driving the need to develop more effective risk management and crisis response strategies.

Australia environmental performance reflects a strong regulatory framework

Australia has strong environmental legislation, which is a unique point of difference in a world that is increasingly conscious of preserving its natural environment. In 2016, Australia has an Environmental Performance Index of 87.2 – a measure the environmental policy performance – which is an improvement from 82.4 in 2014.⁶⁹ These scores are based on high-priority environmental issues in two areas: protection of human health and protection of ecosystems.⁶⁹ Out of non-European countries, Australia is second only to New Zealand and performs significantly better than countries within the Asia-Pacific region.⁶⁹ Given Queensland’s heavy reliance on primary commodities, having a strong reputation internationally for its environmental performance will be an important competitive edge as countries and consumers increase their demand for products and services that reflect sustainable processes.

An ‘advanced’ advanced services sector economy

With the downturn of the resources boom, Queensland is transitioning from a focus on exporting commodities to exporting advanced services, capitalising on new growth and job creation opportunities in knowledge-intensive and services industries. Professional services have been a key driver of growth in the state’s services sector, and in the rising number of technology startups in the state, and its wide distribution of intangible outputs. Driven in part by its decentralised population, Queensland has the greatest proportion of startups and knowledge-intensive outputs outside of its capital city in Australia. If Queensland is to

continue to grow its knowledge-intensive industries, it will need to ensure its education system keeps pace with evolving skill requirements and provides sufficient access to talent.

Service industries are growing in Queensland

Among Queensland’s top growing industries for employment are those that rely on the provision of knowledge and services. Professional, scientific and technical services, administrative and support services and health care and social assistance are among those that have shown the strongest consistent growth (see Figure 18). Service industries also dominate as the fastest growing industries in Queensland in terms of the value they generate for the economy: financial and insurance services, health care and social assistance, and administrative and support services have shown the strongest growth in value added to the Queensland economy from 1990 to 2016 (742.3, 712.6 and 701.8 percent, respectively).¹³ This trend reflects a broader shift in the Australian economy towards a more knowledge-based economy, a trend which has been seen across many advanced economies. This transition is a positive sign for Queensland’s economy given that knowledge industries are positively associated with economic growth and productivity: regions that show greater patenting activity (an index of innovation) also demonstrate higher gross regional product.⁵

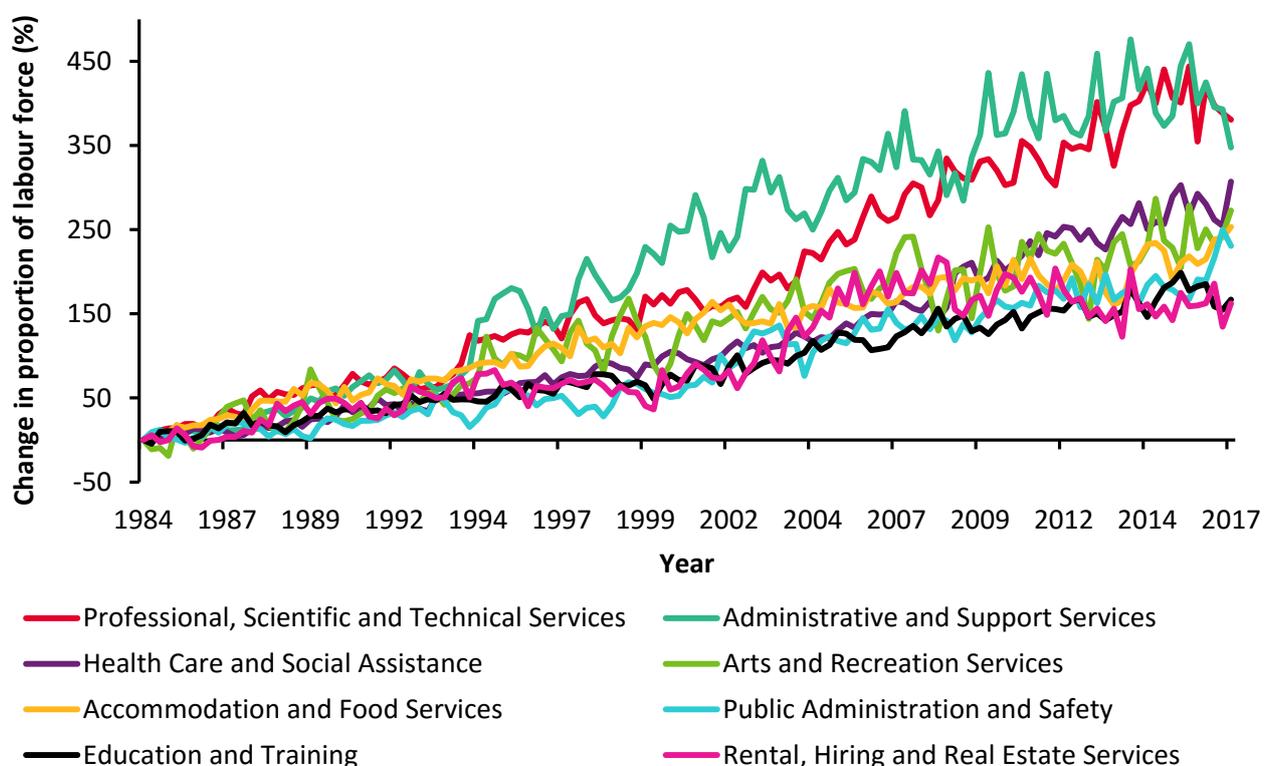


Figure 18. Change in employment across the top eight employing service industries in Queensland, indexed to 1984 values

Data source: Australian Bureau of Statistics²⁹

Queensland is well-positioned to become the capital of Australia’s METS (mining equipment, technology and services) sector

As global demand for natural resources grows, so too will demand for efficient and sustainable mining products and processes. Innovation and technology advancements are critical in keeping costs down and remaining competitive in the global resources sector. A strong focus on the commercialisation of products and collaboration between the mining sector, the mining equipment, technology and services sector and research institutions will be key in the resources sector’s new wave of growth.^{70,71} Queensland’s METS sector has a deep talent pool combined and is recognised globally for its expertise, making it well-placed to meet this future global demand.⁷⁰ In 2015, the Australian Government announced plans to establish a new

Australian METS Industry Growth Centre at the Queensland University of Technology – a signal of Queensland’s capabilities in the industry.⁷⁰

Queensland is moving up the technology startup ladder in Australia

In the 2015 Australian Innovation System Report, Queensland was positioned as the most entrepreneurial state in Australia.⁷² According to the 2016 Startup Muster survey, Queensland has overtaken Victoria to rank as the second largest hub for startups in Australia (see Figure 19), with agriculture, forestry, fishing and hunting reflecting the dominant market focus of Queensland’s regional startups (17 percent).⁷³ When it comes to all small businesses in Australia – not just technology startups – Queensland has the third largest share (19.6 percent), behind New South Wales (33.5 percent) and Victoria (26.3 percent).¹⁰ Reflecting the geographical spread of its population, Queensland has the greatest proportion of startup founders located outside of its capital city, with 51.8 percent located in areas other than Brisbane (see Figure 19). A similar geographical pattern exists for knowledge outputs, with Queensland also having the widest spread of patent filings out of all Australian states.⁷⁴ Continuing to foster innovation and entrepreneurialism in major cities and regional centres across Queensland will be important in growing and diversifying Queensland’s economy.

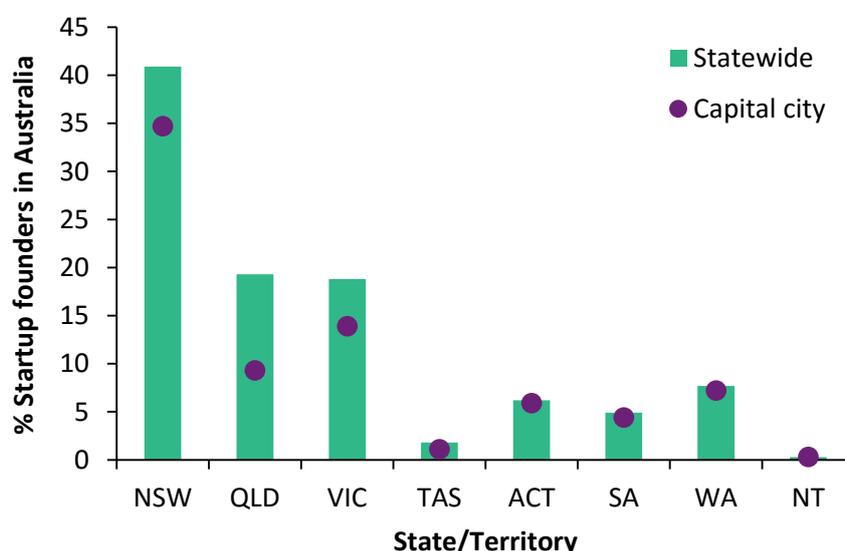


Figure 19. Percentage of startup founders in Australia by state/territory and capital cities

Data source. Startup Muster⁷⁵

Queensland’s biomedical and life sciences industry has potential to grow

Queensland has a rich and thriving life sciences industry and is home to leading institutes such as the Translational Research Institute and the Pharmacy Australia Centre of Excellence. Queensland’s biomedical industry employed 9,440 people and contributed \$1.4 billion to economy in 2015-2016, and this is predicted to increase to 12,420 employed people and \$1.9 billion gross value added by 2026.⁷⁶ Queensland’s strengths in this field are evident in its outputs, with the University of Queensland ranking as the top university in Australia for patents related to medical device technologies in 2014 (see Figure 20). In 2016, the Queensland Government prioritised growth in this industry as one of several knowledge-intensive industries it hopes will boost the economy and stimulate job creation.⁷⁶ A key challenge for the biomedical and life sciences industry is commercialisation of research, which will be important to address if Queensland is to leverage the full potential of this sector.

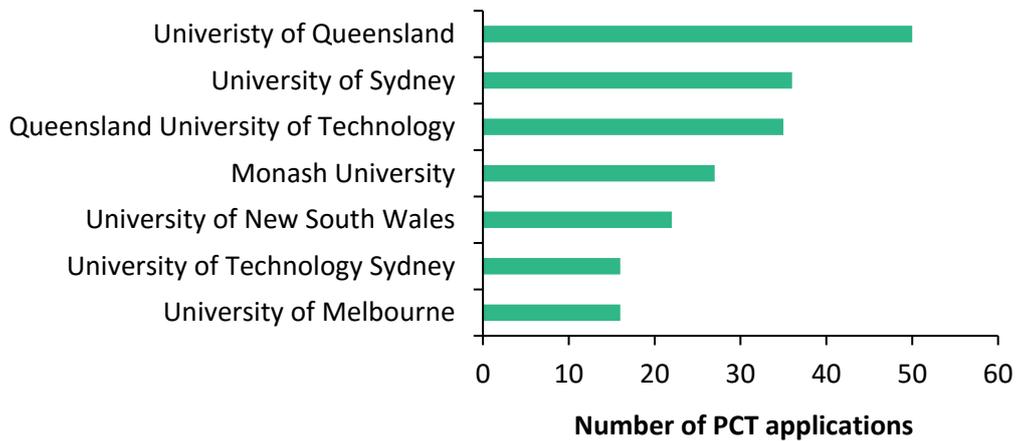


Figure 20. Number of patent applications submitted via the Patent Cooperation Treaty (PCT) in 2014

Data source. IP Australia⁷⁷

Queensland is the optimal location to kick-start Australia’s journey into space

Queensland’s proximity to the equator puts it in a strong position to drive Australia’s space industry. Heavier geostationary satellites can be launched at locations closer to the equator because it better benefits from the rotational of the Earth.⁷⁸ Cape York and Thursday Island have been proposed as possible candidate launch locations given their sparse population levels in the event of a rocket failure.⁷⁸ This opportunity aligns with the Australian Government’s plans to grow Australia’s space industry and establish a new national agency.⁷⁹ Access to skilled engineers could be a key challenge for Queensland growing its space industry, however: in 2015, only 8.0 percent of higher education enrolments in the state were in engineering and other related fields, with the bulk of enrolments were accounted for by management and commerce, health, and society and culture (see Figure 21). These challenges, as well as others around access to finance, industry leadership and collaboration will likely need to be considered in growing the space industry for Queensland.

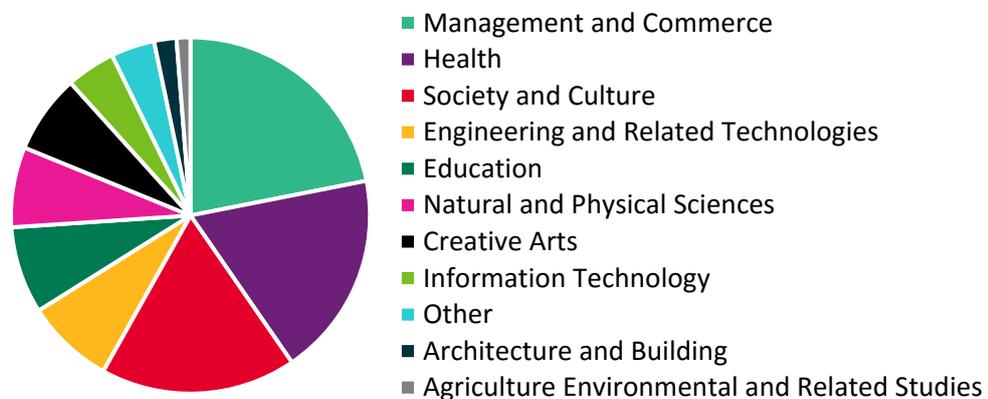


Figure 21. Percentage of higher education enrolments in Queensland by field of study

Data source. Department of Education and Training⁸⁰

Opportunities for education and training beyond the classroom

The need for flexible and adaptable forms of education and training is driven by several factors. First, like other advanced economies, the effective retirement age in Australia has been on the rise since the 1990s, with the average male retiring at 65.3 years of age and the average female at 63.0 years between 2005 and 2014.⁸¹ As people spend more years in the workforce, they must adapt to the changing education and training requirements of their work. Second, the requirements of traditional occupations are changing; what it means to be a lawyer, a famer or a construction worker looks wildly different today than it did in the past. For

instance, jobs in the AgTech sector requires people with traditional agricultural backgrounds and technical and entrepreneurial skills, yet this skills mix is not typically taught in Australia’s education system.⁸ The dynamic nature of Queensland’s, and indeed Australia’s, workforce point to the need for learning beyond the classroom. Research from the Office of the Chief Scientist found the ability to engage in active learning (i.e. learning on the job) was rated as the most important skill in a survey of employers in 2013.⁸²

Queensland’s got what future Asia wants

The Asia Pacific region continues to grow its share of the global economy, with more of its population moving from low- to middle-income brackets. The growth in Asian economies presents significant opportunities for Queensland to expand its market and meet emerging consumer demands in areas such as tourism, minerals, health, education and food. Queensland has existing capacity and a competitive advantage from its close proximity to Asian population centres, but it faces competition from other countries which are investing significantly in growth areas such as tourism and international education. If Queensland is to remain a dominant player in these markets, it will need to be competitive on cost or quality of products and services.

Asia continues to dominate the global economy

The world’s economic centre of gravity continues to shift east – having been over the Atlantic in 1980, it is predicted to fall between India and China by 2050.⁸³ Asia has experienced unprecedented economic growth over the past couple of decades (see Figure 22). A large proportion of this growth has been driven by China, which has rapidly become the world’s second largest economy.⁸⁴ India is following in its footsteps, currently in seventh place.⁸⁴ The Asia Pacific’s share of the global economy continues to climb, accounting for approximately two-fifths of the global gross domestic product in 2015 – an increase of around 11 percentage points since 2000.⁸⁵ As Asia continues to generate more wealth it brings great opportunities both for Australia and Queensland to meet emerging demands, as well as new sources of competition.

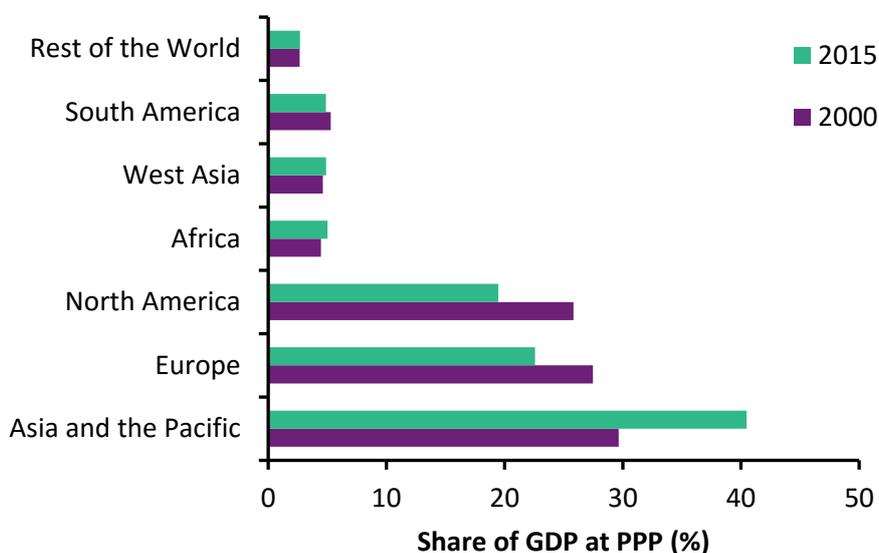


Figure 22. Share of gross domestic product (GDP) at purchasing power parity (PPP)

Data source. Asian Development Bank⁸⁵

The expansion of the Asian middle class remains strong

The population of middle-class citizens in Asia has been rapidly increasing, and is expected to account for 66 percent of the global middle-class population by 2030 (see Figure 23).^{85, 86} This has been accompanied by increases in the level of disposable income, from around \$3,600 per person in China in 2013 to approximately \$4,300 in 2015.⁸⁷ As more of the population in Asia moves up Maslow’s hierarchy of needs, they no longer need to focus on meeting their basic needs (i.e. food, water and shelter) and can afford to spend their money on meeting more advanced needs (e.g. social belonging and self-esteem).⁸⁸ This is consistent with the

backpacking pipeline from Asia, where backpackers from China, Taiwan and Malaysia have seen the greatest growth in expenditure from 2009 to 2017.⁸⁹ There are a wealth of opportunities for Queensland to meet these growing needs, likely in areas such as education, health, tourism and food, acknowledging that there will be immense global competition for these emerging markets.

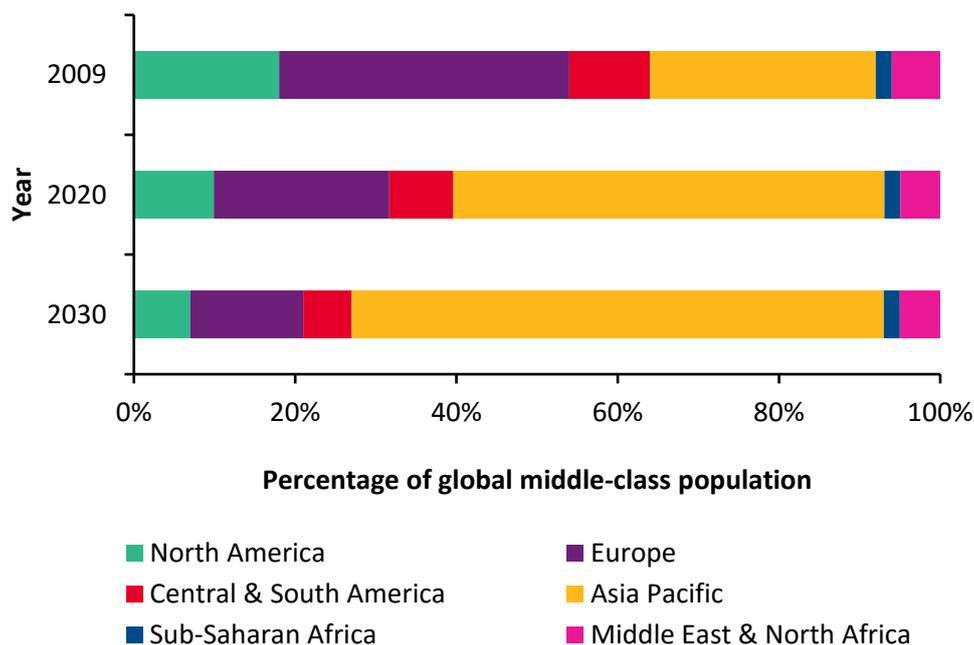


Figure 23. Share of global middle-class population by region

Data source: Kharas⁹⁰

There is room to expand Queensland’s service exports to Asia

Australia already has a close trading relationship with Asia, with Asian countries making up 6 out of its 10 top trading partners.⁹¹ These established partnerships and Queensland’s geographic position places the state in a unique position to grow and develop new export markets with Asia. China is Queensland’s strongest trading partner, accounting for 23.4 percent of all Queensland exports and 20.0 percent of all imports in 2015-2016.⁹² Queensland has typically relied heavily on primary commodity exports, with coal and beef being its top exports in 2015-2016 (34.6 and 9.9 percent of exports, respectively).⁹² Queensland has seen increases in the value generated by its service exports, with exports to China showing the fastest growth (see Figure 24). While this reflects a change in Queensland’s trade patterns, these exports only reflect a small margin of the total value generated by the service industry in China and other parts of Asia. For example, China’s service imports in 2016 were valued at approximately \$585.7 billion,⁶ whereas only \$11.2 billion of that came from Queensland.⁷ This finding suggests potential missed opportunities for Queensland’s services export market that could be exploited in the future.

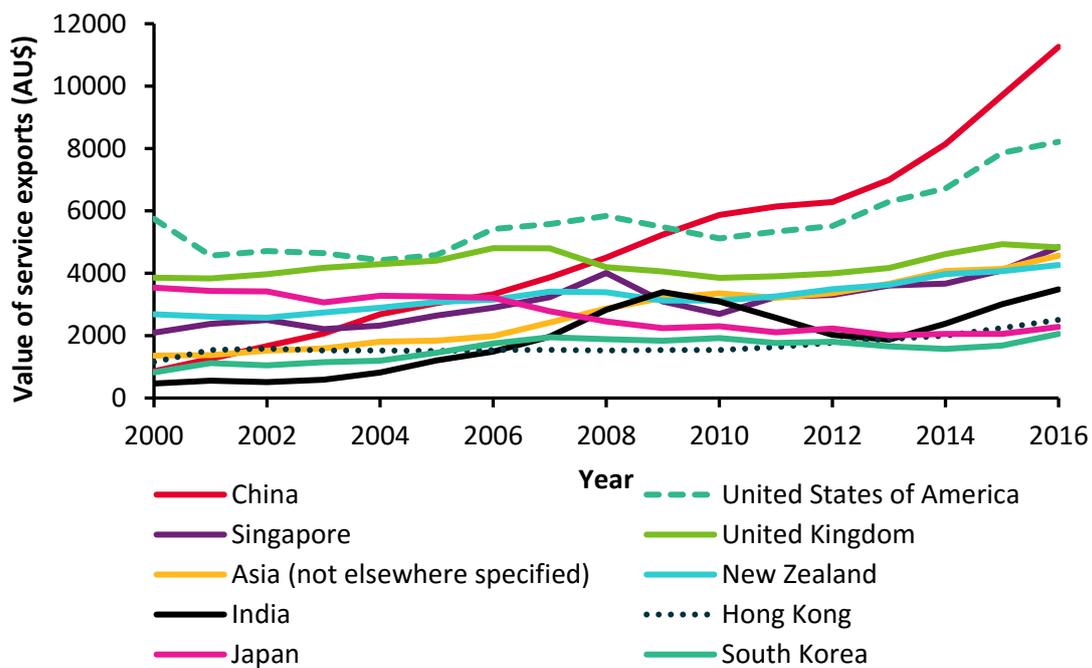


Figure 24. Top ten highest gross value service export destinations for Queensland

Data source. Australian Bureau of Statistics⁷

Regional opportunities for high-value nutrition products

As Asia’s middle class continues to grow, there will likely be increased demand for Australian beef, dairy, poultry, wine and seafood, among other food products.⁹³ Frequent food safety scares in China have increased consumer concerns around food safety and their willingness to pay for premium products that have strong traceability.⁹⁴ Second, the accelerated rate of chronic illnesses such as obesity and type 2 diabetes in both adults and children in Asia⁹⁵ and its rapidly aging population⁹⁶ has placed increased focus on the need for preventative health and lifestyle measures. The geographical location of Queensland gives it an advantage over other countries in the northern hemisphere in terms of cheaper transportation costs and access to seasonal produce.⁹³ Australia is also a world leader in organic farming, accounting for almost 45 percent of global organic agricultural land.⁹⁷ Queensland has key strengths in organic farming and is home to the second largest number of organic producers and certified organic farmland in the country.⁹⁸ Companies such as BeefLedger, which uses distributed ledger technologies to provide transparency and authenticity around the safety and origin of beef products, have already jumped on these opportunities for Queensland.⁹⁹

The global tourism market is evolving and becoming much more competitive

Emerging economies are becoming an increasing source of competition in the tourism industry and are predicted to overtake advanced economies in terms of global international tourist arrivals by 2030.¹⁰⁰ Much of this growth is driven by the Asia Pacific, which is forecasted to receive 535 million arrivals by 2030 – an increase from 331 million arrivals in 2010.¹⁰⁰ Many countries are investing heavily in tourism infrastructure to increase their share of the burgeoning international tourism market. China, for instance, will increase its tourism investment from \$172.6 billion to \$366.3 billion between 2016 and 2027,¹⁰¹ compared to Australia’s increase from \$21.7 billion to \$27.6 billion over that same period.¹⁰² Continuing to grow its tourism industry is important for Australia, and indeed Queensland, given that countries that have strong tourism industries experience higher GDP growth.¹⁰³ To grow its tourism industry, Queensland will need to address the estimated 5,144 skilled labour shortages predicted between 2015-2020,¹⁰⁴ and adapt with the changing nature of tourism, as tourists are increasingly looking for multiple experiences in a single holiday.¹⁰⁵

There is great value in growing Queensland's international higher degree enrolments

Queensland is falling behind other states in the number of international higher degree enrolments. While higher education enrolments have been increasing in Queensland, this has been largely driven by a rise in domestic enrolments (see Figure 25). Other states such as New South Wales and Victoria have continued to see positive growth in both domestic and international enrolments (see Figure 25). This is a missed opportunity given the positive economic benefits that international students can inject into the economy through their living expenditure and increased productivity from skilled labour, entrepreneurship and knowledge exchange.¹⁰⁶ The international education sector directly contributes over 20,000 jobs and almost \$3 billion in export revenue to the Queensland economy.¹⁰⁶ There are also indirect benefits to the future tourism pipeline: 64 percent of Chinese students who studied in Australia returned to the country one or more times in the five years after graduating.¹⁰⁷

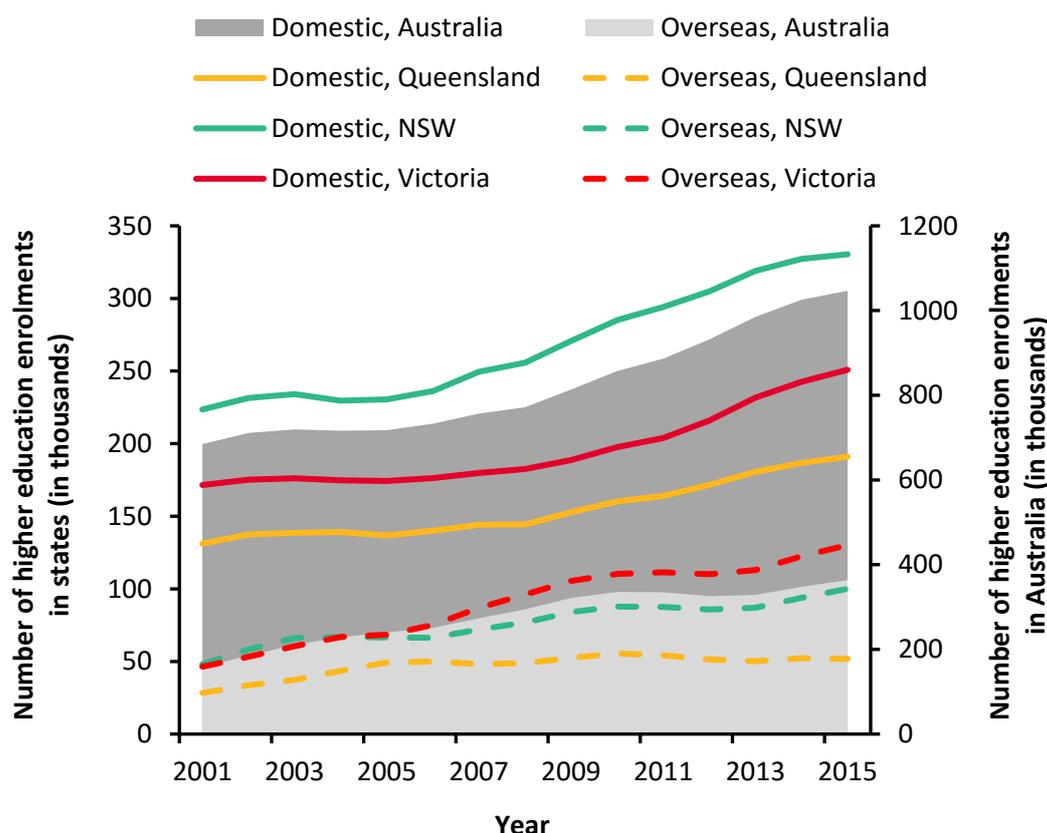


Figure 25. Number of higher education enrolments across Australia and in Queensland, New South Wales and Victoria

Data source. Department of Education and Training⁸⁰

Employability will be a key factor in securing future international students

The global education and training sector has become increasingly competitive and is likely to continue as demand for higher qualifications and skills remains strong.¹⁰⁸ There have been several waves of international student mobility over the past couple of decades, with the latest wave characterised by heightened expectations among students for education institutions in their host country to provide viable career and employment outcomes.¹⁰⁹ Indeed, Chinese students in the United States are beginning to question the value in travelling internationally for tertiary education if there are not strong employment prospects at the end of their degree.¹¹⁰ This is a challenge for Australia given its declining full-time employment rate among graduates (see Figure 26), and international students have less likely to find full-time work than domestic students.¹¹¹ Queensland universities also fall behind other states in global employability rankings: The University of Sydney, University of Melbourne, The University of Queensland are ranked 4th, 7th and 49th

respectively.¹¹² Assisting students in their transition into the workforce will be a key factor in securing Queensland's share of the international university sector.

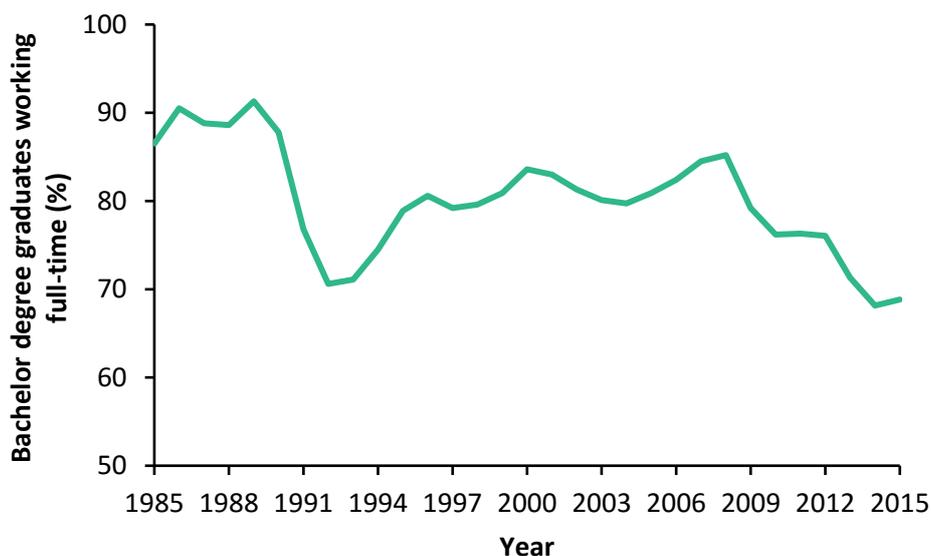


Figure 26. Percentage of Bachelor-degree graduates in Australia in full-time employment

Data source. Graduate Careers Australia¹¹¹

Using digital technologies to transform old into new

Queensland has embraced digital technologies to its benefit in several areas, including the AgTech sector: digital technologies have transformed traditional agriculture industry practices, making processes more efficient and improving their environmental impact. On broadband network coverage and speed, however, Australia fares poorly compared to other countries in the Asia Pacific. Queensland's regions tend to be especially disadvantaged, a problem exacerbated by poor digital literacy. This is a particular challenge for small businesses which need to embrace digital technologies to compete with larger players. Task automation will likely affect Queensland's future workforce in all industries, though there is much uncertainty about how and to what extent.

Queensland is leading Australia in the provision of digital health care services

Like many other economies, Queensland will face some substantial challenges for public health and the provision of health services in the coming decades. There will be significant changes in the demographic composition of the Queensland population, with persons aged 65 years and over expected to make up 19.1 to 21.0 percent of the population by 2036.¹¹³ Health care costs are also set to rise, with government funding for aged care expected to increase from 0.9 percent of GDP in 2014-15 to 1.7 percent in 2054-55.¹¹⁴ Queensland has invested heavily in its health care sector as part of its eHealth strategy, which aims to transform the delivery of health care services. Key milestones were the opening of Australia's first digital hospital in Hervey Bay¹¹⁵ and the transformation of Brisbane's Princess Alexandra hospital to become Australia's first large-scale digital hospital.¹¹⁶ Digital technologies will likely drive future health care services and Queensland has demonstrated its strengths and knowledge in this domain.

Queensland's AgTech industry is growing in line with global trends

The global agriculture industry is in the midst of a digital transformation. With the level of innovation and technological adoption that the sector has seen, the National Farmer's Federation predicts agriculture could become Australia's next \$100 billion industry by 2030, almost double the value generated by the sector

today.⁸ In support of this growing sector, global funding for AgTech has increased by almost 2,000 percent between 2010-2015.^{73, 117} Of 83 regional startups surveyed in the 2015, 17 percent of these were focused on agriculture, and these were distributed across seven regional centres including Toowoomba, Bundaberg, Rockhampton, Mackay, Ipswich, Townsville and Cairns.⁷³ With global food demand expected to rise by 70 percent by 2050, and current growth rates in agriculture simply unable to meet this demand,¹¹⁸ the need for innovative solutions to improve efficiencies and crop yields will fuel further growth in the AgTech sector.

Business information modelling could foster a more efficient construction industry in Queensland

Business information modelling has the potential to drive efficiency, value for money, productivity, innovation and safety,¹¹⁹ and help professionals in architecture, engineering and construction plan, design, construct and manage building designs and infrastructure more efficiently and effectively.¹²⁰ Because of these benefits, business information modelling is becoming increasingly popular in Australia.¹²¹ The Queensland Government has recognised the importance of this technology and has declared that all major state infrastructure will implement business information modelling by 2023.¹¹⁹ Despite this, the Institute of Public Works Engineering Australasia believes that these technologies are underutilised in the market.¹²¹ Given that construction is one of Queensland’s largest employing and value adding industries,¹²² huge time and cost savings could come from a greater adoption of these technologies. A key barrier limiting this opportunity is the current workforce’s capabilities and skills in using these new technologies.¹²³

Improving Australia’s broadband network would better connect Queensland globally

In an increasingly digital world, Australia’s ability to grow its economy and maintain its competitive advantage depends on access to fast and reliable internet. Australia has the fastest mobile internet connectivity speed in the Asia Pacific, with speeds on par with the United States (15.7 Mbps versus 10.7 Mbps, respectively).¹²⁴ By contrast, Australia has the poorest broadband internet: its average connectivity speed was ranked in 50th place worldwide in 2017, behind countries including New Zealand, Singapore and Thailand (see Figure 27). Reliable access to the internet is important for connecting regional areas to city centres, providing critical services over distance and enabling more flexible work models (e.g. teleworking). To address broadband network issues, the Australian Government has begun its rollout of the National Broadband Network, which aims to connect 8 million households by 2020.¹²⁵

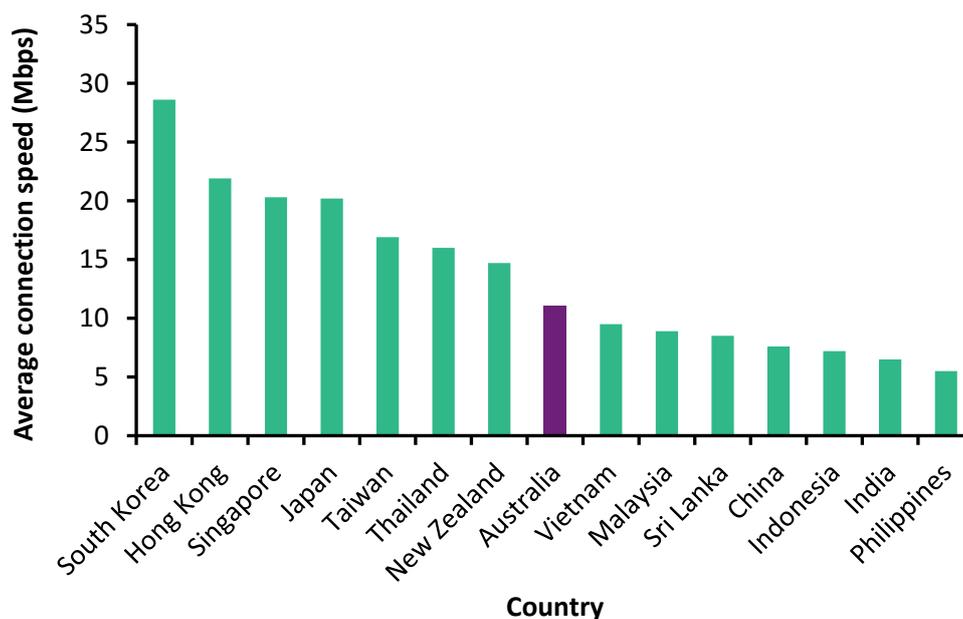


Figure 27. Average internet connection speed across Asia Pacific countries in 2017

Data source. Akamai¹²⁴

Improving mobile and internet services would drive productivity in rural and regional Queensland.

Good, affordable and reliable access to telecommunications services will be critical in driving economic productivity throughout Queensland and overcoming the state’s tyranny of distance. While internet access has improved across Queensland,¹²⁶ there are still significant gaps in its digital connectivity. Recent research found that rural and regional locations in Queensland perform worse on all telecommunication measures relative to other rural and regional locations in Australia (see Figure 28). Perceptions of high speed internet services in rural and regional areas have improved since 2015, where 51.7 percent of Queenslanders rated their high speed internet services as poor; however, mobile phone coverage has remained stable, despite improving by 12.2 percent in the rest of rural and regional Australia.^{127, 128} International studies have found that internet services yield the highest productivity gains in regional areas which are less digitally developed,⁹ providing a clear incentive to addressing issues of digital connectivity.

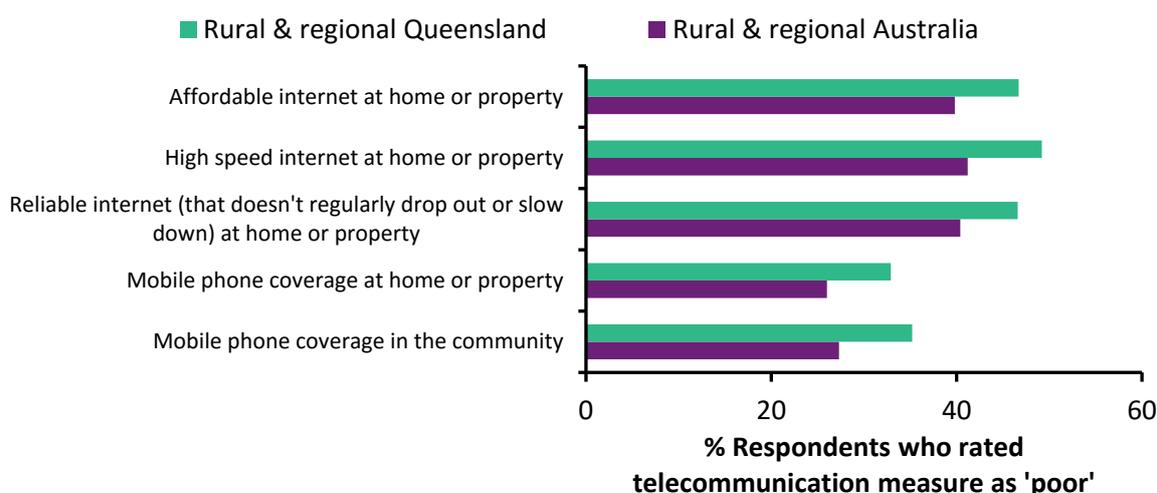


Figure 28. Ratings of telecommunication measures from respondents in rural and regional areas in Queensland and Australians in 2016

Data source. Centre for Research and Action in Public Health¹²⁷

Digital literacy needs to be improved to address digital inclusion

Digital inclusion is important because it is closely related to social and economic participation in the modern world.¹²⁸ The digital divide between Queensland’s regions and its capital city – as measured by the 100-point Australian Digital Inclusion Index – has lessened from 2014 to 2017, down from 6.3 to 5.1 points.¹²⁸ This decline was largely driven by improvements in digital accessibility.¹²⁸ Despite this, Queensland’s overall level of digital inclusion is poor relative to other Australian states and territories (see Figure 29). Queensland’s key weaknesses are in its level of digital ability including its attitudes, basic skills and level of engagement in digital activities.¹²⁸ There are notable exceptions to these state-level trends: Townsville, for instance, has seen significant improvements, greatly exceeding the Queensland average for digital access (11.6 versus 6.9 points, respectively) and affordability (3.4 versus 0.2 points, respectively).¹²⁸ Interestingly, these improvements were not matched for digital ability,¹²⁸ suggesting that this is a pervasive barrier that limits Queensland’s regions from fully embracing its digital potential.

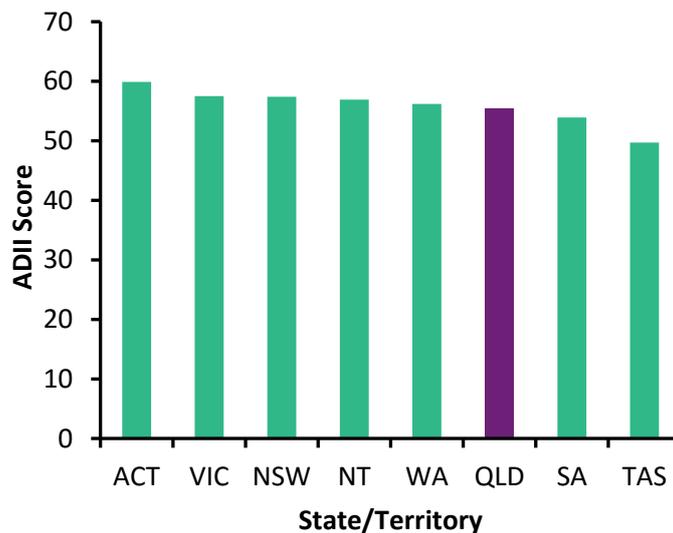


Figure 29. Australian Digital Inclusion Index (ADII) scores by state and territory in 2017

Data source. Thomas, Barraket, Ewing, MacDonald, Mundell & Tucker¹²⁸

Small businesses – the backbone of Queensland’s economy – need to be more digitally capable.

Small businesses in Queensland are less likely to engage in a number of online activities that aim to promote and enable them in doing their business. This is concerning given that 97.4 percent of all businesses in Queensland in 2016 employed 19 persons or less.¹⁰ While most businesses in Australia report having internet access regardless of their size, small businesses are less likely to have a web or social media presence compared to medium and large firms.¹²⁹ Moreover, only 57.5 percent of small business actively place orders online and only 37.6 percent receive online orders.¹²⁹ Small businesses are also less likely to have in-house IT support, with only 19.8 percent of small businesses reporting employing an IT specialist, compared to 46.1 percent of medium-sized businesses and 83.0 percent of large firms.¹²⁹ Building capacity among small businesses would be beneficial in enabling them to compete in a global market and show resilience in the face of disruption from large multinational organisations.

Skills in complex, non-routine problem solving will be safest from future automation

There are many uncertainties around the future impact of task automation on Queensland’s labour market. Initial research suggested that 47 percent of jobs in the United States¹³⁰ and 40 percent of jobs in Australia were at high risk of future computerisation.¹³¹ However, more recent research using a task-based modelling approach instead finds only 9 percent of jobs in the United States¹³² and Australia¹³³ are at high risk of automation. Automation is likely to impact a range of different jobs, including both ‘blue-collar’ industries (e.g. agriculture and manufacturing) and ‘white-collar’ service industries.¹³⁴ Advances in technology are predicted to impact a range of different work tasks, placing greater emphasis on human skills in the non-routine, complex and unstructured aspects of occupations.¹³⁵ It is these more complex skills that will be important for education and training providers to instil in the next generation of workers.

Attracting investment could help fuel Queensland’s culture of innovation and entrepreneurialism

Australia has significant barriers that prevent innovation and entrepreneurialism. Issues around the lack of a culture of innovative entrepreneurship and access to finance, particularly for startups at the early stages of development have been identified as key barriers to Australia’s propensity to produce commercially viable innovative outputs.⁷² Similar barriers are reported in Queensland, with small and medium business

owners reporting that a lack of money, low profitability and other financial pressures, and a lack of time and staff resources to seek out ideas rated as the top two factors that prevent them from being more innovative.¹³⁶ This has been in part driven by a paucity of venture capital and later stage private equity, which has remained stubbornly low in Australia following the global financial crisis.¹³⁷ In Queensland, this lack of growth in new venture capital and later stage private equity investments has existed for closer to a decade (see Figure 30). Attracting venture capital and private investment could help address some of the current barriers for startups and small businesses.

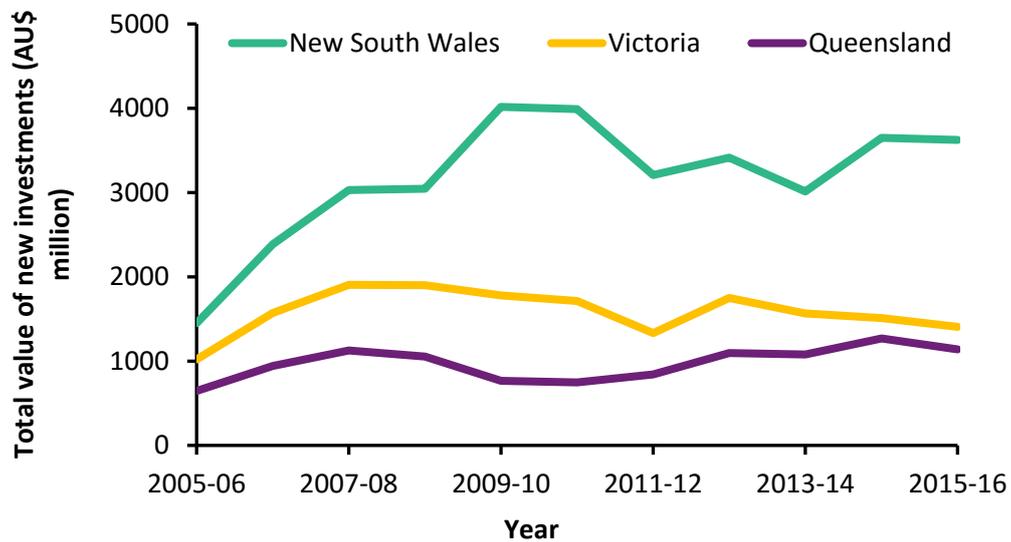


Figure 30. Total value of new investments across Queensland, New South Wales and Victoria

Data Source: Australian Bureau of Statistics¹³⁷

3 Strategic Foundations

The Opportunities for Growth point to many plausible future directions for Queensland, identifying areas of competitive advantage which could provide new sources of economic growth, encourage investment and generate jobs. But how do Queensland companies harness these opportunities and mitigate the risks? Informed by consultations with industry leaders, this section explores the strategic foundations that will enable Queensland to capitalise on these future growth opportunities, and how industry can drive change.

Defining a shared narrative for Queensland's future economy

Queensland has been marketed in a range of different ways over the years, but these campaigns have not provided a long-term vision. Taking advantage of the new and emerging growth opportunities presented in this report depends on creating a clear and powerful narrative that reflects Queensland's strengths and communicates its future direction both within the state and externally, to the rest of Australia and the world.

Future directions for growth

Attracting talent and business. Queensland's image could influence its ability to attract talent and grow its existing and new industries. *An increasingly differentiated investment package* highlighted the potential for Queensland to attract people to the state, provided it can also offer viable employment options to match the lifestyle appeal of living in Queensland. At present Queensland does not have a strong base of large businesses, with its companies making up only 6 percent of the ASX's \$1.7 trillion total market capitalisation.³² However, Queensland has multiple incentives for companies to base their headquarters in South East Queensland or other major regional centres, which would provide new sources of employment, or attract talent to those industries Queensland is looking to grow.

Attracting new employment options could also benefit Queensland's international student sector, where enrolments have stagnated for Queensland relative to positive growth seen across the country and in other states. As shown in *an 'advanced' advanced services sector economy*, employability is a key drawcard for students looking to study overseas. As global competition for international students intensifies, partnerships between industry and educational institutions to provide clear employment pathways and training opportunities for graduates could promote the appeal to study and then work in Queensland. A diversification of employment models could be another potential advantage. For instance, having a shorter core business hours period and flexibility around when workers perform their duties could reduce strain on infrastructure during peak times and further promote the lifestyle benefits of working in Queensland.

Encouraging businesses to invest more into social responsibility could also provide a competitive point of differentiation. For one, it's great for business: corporate social responsibility can improve a company's competitive advantage and reputation, which in turn leads to better firm performance.¹³⁸ Second, it's great for attracting talent: a survey of almost 1,700 higher education students around the world found that 92.1 percent felt it was at least fairly important for their employer to be socially and environmentally responsible.¹³⁹ When it comes to interstate migration patterns, the only age group for which Queensland shows net losses from 2012-2015 is those aged 25-29 years,³⁰ and it is likely that availability of viable and attractive employment options is a key factor weighing into their decision to live elsewhere.

Addressing traffic bottlenecks. Attracting more people to Queensland comes with the risk of increasing strain on existing infrastructure. Some industry leaders identified transportation as a key barrier that currently limits Queensland's ability for economic growth, given the significant productivity losses that can come with traffic congestion. The total social cost of congestion in Brisbane was \$1.3 billion in 2006, and this is predicted to rise to \$3 billion by 2020.¹¹ This has direct consequences for any industry that depends on mobility of people or goods, including agriculture, tourism and logistics, in addition to the indirect costs in many other industries in Queensland. Improving transportation systems can improve the productivity of a

range of different industries in Queensland – a collective benefit which could incentivise cooperative future investment.

Playing to Queensland's strengths

Queensland's economic strengths – notably resources, tourism, agriculture, construction, and education and training – have provided a strong foundation for its economy. However, many of these industries depend not only on population growth and the environment but also on global export markets, making them susceptible to 'boom and bust' patterns. Diversifying existing industries and creating new ones can help spread economic activity and reduce reliance on any one industry for growth. Transforming well-established industries can present new economic opportunities, particularly for regional areas which house much of the knowledge and experience in these industries. Queensland has been successful in building the knowledge-intensive components of mining (METS) and agriculture (AgTech), but can further leverage its strengths here.

Future directions for growth

Technological innovation. Technological innovation can transform existing industries. This has been seen through the transformation of industries such as financial services, medicine and regulation into new domains, such as FinTech, MedTech and RegTech. For example, Sydney is now home to 59 percent of Australia's financial and technology services companies.¹⁴⁰ Key drivers of Sydney's success included its access to financial services and technology talent, government and regulatory support for the FinTech sector, a robust financial services industry with a vibrant technology start-up network, broad availability and accessibility to funding for FinTech startups, and strong industry leadership for a FinTech hub which promotes collaboration and a culture of knowledge sharing together with entrepreneurship.¹⁴¹

Similar strengths exist in Queensland's agriculture (AgTech) and mining sectors (METS). *Using digital technologies to transform old into new* showed how technological innovation in agriculture has given rise to a thriving AgTech industry in Queensland and in Australia more broadly. Rising global demand for food and high-quality agriculture products, particularly in the Asia Pacific region, signal strong drivers to further develop and grow this industry. There are, however, key challenges that need to be addressed to realise the full potential of Queensland's AgTech industry and technological innovation in other traditional industries. These include availability of talent that possesses the relevant skills in technology and traditional industries, and industry collaboration to develop a global brand for these industries.^{8, 73} Strong industry leadership could help provide a clear vision and attracting talent and investment in Queensland's emerging industries.

Using tourism to diversify. Like technology, tourism also has the potential to transform Queensland's existing industries. Agri-tourism could help regional communities to diversify agricultural activities and provide new sources of employment.¹⁴² Farmers are under increasing pressure to find additional sources of revenue and there is rising demand from tourists and city dwellers to better understand rural life and the origins of their food.¹⁴³ Agri-tourism can also increase awareness of the need to protect its natural resources and amenities,¹⁴³ which could help to address key environmental challenges highlighted in *a growing natural advantage*. The desire for safety and security around food products from Asian markets and its ability to provide multiple experiences (*Queensland's got what future Asia wants*) suggest strong demand for agri-tourism in the future.

There could be further opportunities to use tourism to expand other existing industries into new markets, such as in wellness and medical tourism. *Queensland's got what future Asia wants* signalled the wealth of opportunities and new export markets that the Asia Pacific region presents. Similar to how the rise in chronic diseases has increased demand for preventative health measures, such as high-value nutrition products, it could also fuel demand for high-quality health services. There is already strong competition for health tourism globally and domestically (e.g. Melbourne).¹⁴⁴ While Australia, and indeed Queensland, will not be competitive on price, it could be competitive on quality, offering premium medical tourism services.¹⁴⁵ These new opportunities will require a collaboration between government and the private sector to ensure local health care capacity is not compromised and to provide a coordinated marketing strategy.¹⁴⁵

Energy costs. Cheap electricity used to be a key value proposition for Queensland, but this competitive advantage is diminishing. While rising energy costs affect all industries to some extent, they have a greater impact on energy-intensive industries such as agriculture and horticulture, as they rely heavily on pumping for irrigation, refrigeration and processing.¹⁴⁶ The role of technological innovation in agriculture (*Using digital technologies to transform old into new*) and emerging demand for Australian food products (*Queensland's got what future Asia wants*) point to future opportunities to grow Queensland's agriculture industry, but Queensland's level of competitiveness in global agribusinesses and other export markets will depend upon how well it can manage operating costs.

Equipping Queensland with skills for the future

Access to talent with high quality skills is a key barrier to innovation for Australian businesses.⁸⁰ Addressing this barrier relies in part on aligning the skills people gain from education and training providers with those being demanded by employers. If Queensland is to continue to advance its knowledge-intensive and services industries, it will need to get the skills balance right and provide education and training structures that allow workers to adapt their skills to changing workforce requirements.

Future directions for growth

More flexible education models. The vocational education and training (VET) and university sectors are key sources of further education and training, but industry leaders feel current education models are poorly focused on relevant skills development or were out of sync with business cycles. There is a need for more agile education models that can allow individuals to upskill in specific domains required for their work. Alternative education models such as 'micro-credentials' through which individuals can upskill in specific clusters of skills required for their work.¹⁴⁷ There could be an opportunity for the VET sector to fill this education need, and revert current stagnant enrolment levels in Queensland and other states in Australia over the past decade.¹⁴⁸

Transition pathways for workers. It will be critical that Queensland supports people in transferring their skills to meet employment needs being created by new and growing industries. This is particularly important given that displacement from work due to digital technologies is likely to impact some geographical locations more than others, which could exacerbate existing inequalities in regional areas.¹⁰⁸ Existing trends already point towards potential risks for the future workforce, such as the declining male participation rate in Queensland, and indeed Australia more broadly. With new sources of growth through industry and job creation, it will be critical that Queensland supports people in transferring their skills to meet these new employment needs.

There could be an increasingly important role for the not-for-profit sector in providing opportunities for people to develop skills and transition back into work if they find themselves displaced from their job. For instance, the not-for-profit sector currently plays a key role in the waste management sector through community recycling enterprises. While community recycling enterprises provide substantial environmental and social benefits, they also provide employment opportunities for disadvantaged or low-skilled members of the community.¹⁴⁹ The need for employment options that assist disadvantaged or low-skilled communities could become increasingly important as the National Disability Insurance Scheme comes online and as more people with a disability look for ways to transition back to work.

Managing environmental and social barriers to growth

A growing natural advantage illustrated the strengths of Queensland's resources and energy sectors and the opportunities that can come from addressing the state's key environmental challenges. These challenges are not unique to Queensland – many other states and countries are grappling with them, too. To leverage these new growth opportunities, Queensland needs to get the fundamentals right by developing a long-term strategy for the energy sector, managing its international environmental commitments and securing community support for industry developments.

Future directions for growth

A long-term energy strategy that aligns with environmental commitments. If Queensland is to become the energy hub of Australia and the Asia Pacific, it will require a long-term, evidence-based strategy for the resources and energy sectors. At present, industry leaders feel these sectors' strategic direction is disjointed. Short-term political cycles can be a challenge limiting the sector from moving forward with new developments, long-term industry planning and the ability to attract foreign investment. A long-term energy strategy will need to take into account Australia's international commitments to reduce its national emissions by 26-28 percent of 2005 levels by 2030.¹⁵⁰ Meeting Queensland's future energy demands will require a diverse energy mix and strong policy environment that promotes emissions reductions, meets domestic and global consumer electricity needs, and incentivises investment.¹⁵¹

Growing the energy mix. *Queensland's got what future Asia wants* envisaged promising medium-term prospects for Queensland's resources sector with rising electricity needs and urbanisation prolonging demand for high-quality thermal and metallurgical coal in Japan, India and South Korea. Over the next decade though, Australia will likely continue to experience the effects of climate change and will be under increasing pressure to reduce its greenhouse gas emissions to meet its international commitments. Beyond the medium-term, there is uncertainty around future thermal coal demands, particularly with many developing countries. This emphasises the importance of Queensland continuing to diversify its energy mix, growing its renewable energy sector and assisting workers in translating their skills to low-carbon jobs.

Preserving social license to operate. The success of Queensland's resources and energy sectors will depend upon public sentiment. Having a long-term energy strategy for Queensland's resources and renewable sector could help to ease community concerns around the long-term economic benefits of mining developments, which can sometimes put the community at risk of 'boom and bust' cycles.⁶¹ Queensland's resources industry is more than just thermal coal and coal seam gas: it also has a strong base in metallurgical (coking) coal and minerals, which both have promising growth prospects. Raising public awareness of the range of ways in which the resources sector contributes to the economy, as well as having a long-term energy strategy, could help improve the sectors' social license to operate.

Supporting inclusive growth in Queensland's regions

While focusing on a single industry has put regional economies at risk of 'boom and bust' patterns, it has also allowed many regions to develop strong expertise and experience in traditional industries – many of which feature in future growth opportunities for Queensland. It can be a challenge for regions to diversify their economies, however, and pursue new and unfamiliar growth opportunities. While there is a growing culture of entrepreneurship and innovation in Queensland's regions (*an 'advanced' advanced services sector economy*), this needs to be supported by investment in areas such as connectivity, digital inclusion and education to enable regional centres to leverage their existing strengths.

Future directions for growth

Connectivity, both physical and digital. Using drivers such as technology and tourism to diversify Queensland's existing industries relies on good digital infrastructure. *Using digital technologies to transform old into new* identified broadband speed, telecommunication services and the digital potential of regional areas and small businesses as key areas that need to be addressed for Queensland's industries to harness their digital potential. There are existing efforts to improve digital connectivity in regional Queensland through the provision of what will be Australia's largest public Wi-Fi network.¹⁵² This initiative, driven by six local government areas in Central Western Queensland, aims to enable businesses and tourism operators to better understand their visitor markets and anticipate future demands, and enable visitors to find tourist attractions and share their experiences online.¹⁵³

Physical connectivity is equally important. Lack of streamlined infrastructure between road, rail and ports is a significant pain point for many industries that rely on efficient logistics, limiting their ability to diversify and

access new markets. Some industry leaders feel that common industry benefits could come from investment in infrastructure such as cruise ship terminals and airports (e.g. job creation, attraction of skilled labour, transportation and logistics), but these might not be well communicated. Support for future developments could be gained by clear messaging about how people and businesses across sectors stand to benefit.

Improve digital inclusion. Examples such as FinTech and AgTech demonstrate the way in which technology can transform existing industries and provide new sources of growth. *Using digital technologies to transform old into new*, however, pointed to digital literacy as a key barrier for people in regional areas and small businesses adopting digital technologies. Having a socially inclusive Queensland depends upon having a digitally inclusive Queensland, given the strong ties between the two factors. In response to these challenges, the Australian Digital Inclusion Alliance was established in 2017 to raise awareness and drive collective action around issues of digital inclusion including digital access, affordability and abilities.¹⁵⁴ There could be a role for private and not-for-profit organisations in driving a similar initiative in Queensland.

Tertiary education in regional areas. Unequal employment growth across the state and high levels of unemployment are key pain points for Queensland regions. Where graduates complete their tertiary degrees is an important factor that weighs into this, as it can impact where people chose to work and live. The location of tertiary education can impact the prosperity of regional communities: students who study in regional areas are more likely to remain (65.7 percent) than move to an urban area (34.3 percent).¹² Conversely, of the graduates who study at an urban higher education institution, only 15.6 percent will be based in a regional location five years post-graduation.¹² These findings speak to the importance of providing higher education options to students in regional areas as a means of ensuring the economic sustainability in these communities.¹²

4 Next Steps

A multitude of factors shape plausible future trajectories for Queensland, from its ageing population, to the burgeoning consumer markets of the Asia Pacific. All trends point to a period of transformation for Queensland and its economy: over the coming decade, it will become increasingly important to adapt to change and identify new ways to grow and diversify Queensland's industries and its employment options. While opportunities are there for the taking, there is the need to shift away from business as usual and take deliberate action to ensure that Queensland is able to harness its new options to grow its economy. Queensland needs to:

- **Prioritise opportunities for growth.** Which of the many opportunities to diversify and grow its economy should Queensland pursue? Global competition for emerging markets is increasing, and to be competitive, Queensland needs to be specific in the areas it chooses to focus on. This is a direction that industry can champion. The chosen opportunities for growth will ultimately guide the broader vision for Queensland's future direction, and help to signal confidence for future talent, business and investment.
- **Form a coordinated approach to growth.** Many of Queensland's future opportunities do not rest on any single industry or sector. They will require collaboration between industry, research institutions, education providers and communities, and work with government to create the appropriate environment for growth. Such a coordinated approach can provide strong industry leadership for smaller players, and help encourage a unified approach to capability development, implementation and investment.
- **Develop an independent, non-partisan process to drive future growth.** There is a need for an unbiased process that can provide ongoing research, policy support and community engagement. Socioeconomic progress requires a long-term view, which can be a challenge given political and business cycles. An ongoing review of future strategies is important for adapting to political, social and economic changes and remaining relevant to changing operating environments.

The Queensland economy of 2027 will likely look different from today – and it is in a strong position for future growth. This report shows the intersections between different industry sector needs in Queensland and the opportunities for Queensland to harness its existing expertise and strengths to diversify its industries and make the economy more resilient. With new markets come new competitors and other challenges, emphasising the need to take calculated risks and investments. With a clear vision for growth, Queensland is well placed to succeed in the decades to come.

5 Strategic Foresight Methodology

Strategic foresight is an emerging field that aims to explore plausible futures and help people make wiser choices. It is a multi-disciplinary field that draws upon economics, management science, operations research and planning theory. CSIRO has developed its generic strategic foresight process, which incorporates international research and practical experience from working with clients across public and private sectors. This process was adapted for the present study to explore emerging trends and growth opportunities for Queensland (see Figure 31).

The first stage consisted of background study and scope definition. Rather than looking into the future, this phase is concerned with current status and historic conditions, where the scope defines the stakeholder groups, timeframes and issues to be investigated. This stage included a scoping workshop with QFI Partners to identify the strengths, weaknesses, opportunities and threats for Queensland.

The second stage consists of a horizon scan, which included desktop research and investigative interviews with industry leaders. The goal here was to cast a wide net over all patterns of change which are potentially relevant. In the third stage, these trends were classified, validated and prioritised. This screening process ensured that the remaining trends were supported by evidence and were relevant to the project's scope.

In the fourth stage, the trends were collated to identify Opportunities for Growth, as overarching trends and drivers emerging from the horizon scan (see right-hand textbox). These Opportunities for Growth were tested in a workshop with a new set of industry leaders (i.e. different to those who participated in the interviews) to ensure they were valid and relevant. In the final stage, the research findings were refined and presented to communicate the narrative.

What is an Opportunity for Growth?

An Opportunity for Growth is an overarching trajectory that reflects a cluster of smaller trends. These smaller trends might be specific to a particular point in time, industry or issue, and they are likely to impact either future supply or demand (or both) within the marketplace. Shifts in supply and/or demand can present new opportunities for start-ups, small and large businesses, or entire industries. A shift in demand creates an opportunity to sell new products and services to new consumer segments, whereas a shift in supply is an opportunity to reach new markets with a lower cost of production or more efficient value chains.

Expert interview outcomes

The project team interviewed industry leaders from private sector and not-for-profit organisations and research institutions. These interviewees represented a broad cross-section of industries in Queensland. Each interview was designed to explore emerging trends for the Queensland economy and its growth opportunities, and also test emerging hypotheses identified in earlier consultations, stakeholder workshops or desktop research. All consultations lasted 30 minutes and were conducted using the convergent interviewing technique,^{155, 156} in person or via phone. This research protocol was approved by the CSIRO Social Science Human Research Ethics Committee.

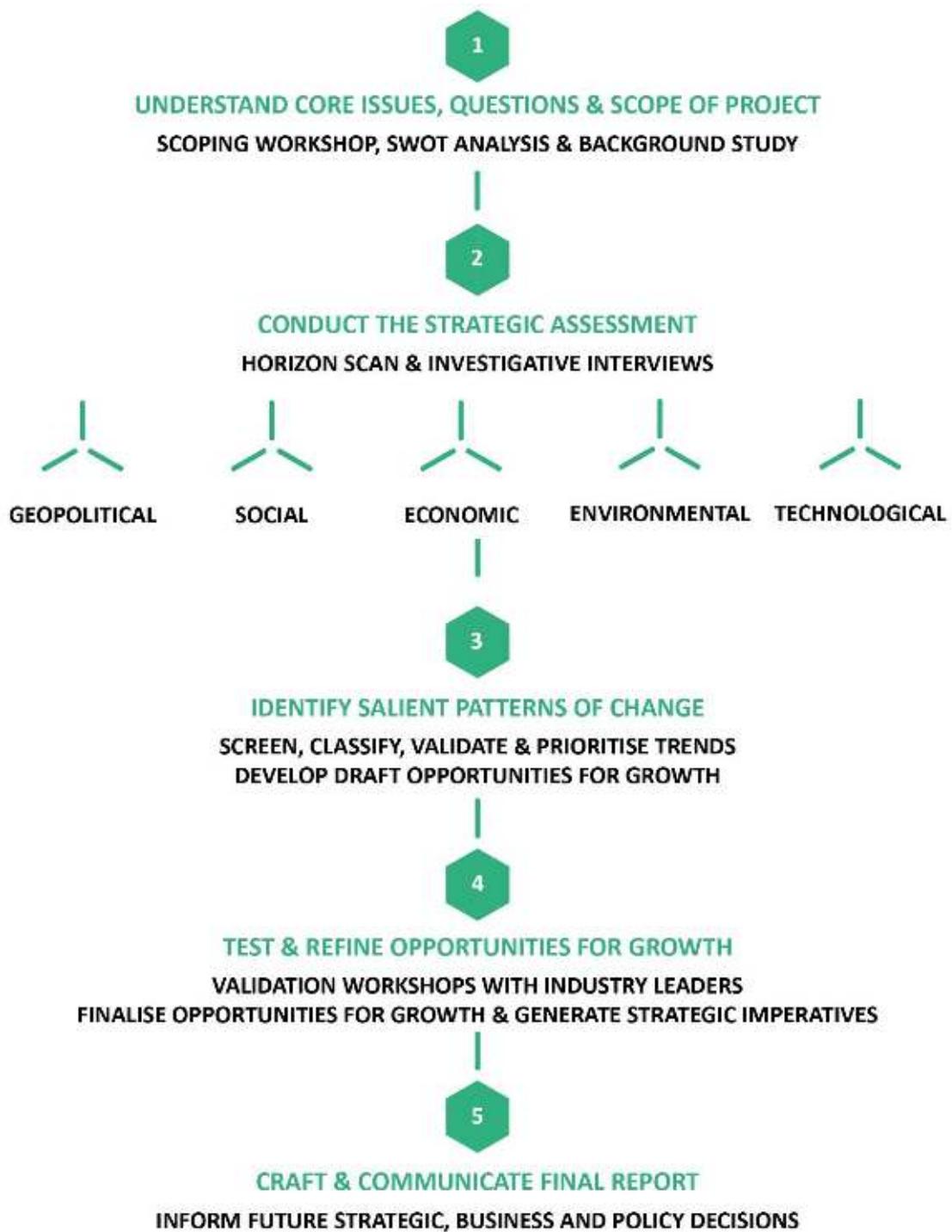


Figure 31. Overview of strategic foresight process

References

1. ABS. Residential property price indexes: Eight capital cities (Catalogue no. 6416.0). Canberra, Australia: Australian Bureau of Statistics; 2017.
2. Savills Research. Quarter time: National office. London, United Kingdom: Savills Research; 2017.
3. Office of the Chief Economist. Resources and energy quarterly. Canberra, Australia: Department of Industry, Innovation and Science; 2017.
4. Access Economics. Employment in waste management and recycling. Canberra, Australia: The Department of the Environment, Water, Heritage and the Arts; 2009.
5. Office of the Chief Economist. Australian industry report 2016. Canberra, Australia: Department of Industry, Innovation and Science; 2016.
6. World Bank. Service imports (BoP, current US\$). Washington D.C, United States: World Bank; 2016.
7. ABS. International trade: Supplementary information, calendar year (Catalogue no. 5368.0.55.004). Canberra, Australia: Australian Bureau of Statistics; 2016.
8. StartupAUS. Powering growth: Realising the potential of AgTech for Australia. StartupAus; 2016.
9. Jung J. Digital inclusion and economic development: A Regional analysis from Brazil. In: Dutta S, Geiger T, Lanvin B, editors. The Global Information Technology Report. Geneva, Switzerland: World Economic Forum, Cornell University and INSEAD; 2015. p. 101-9.
10. ABS. Counts of Australian businesses, including entries and exits, Jun 2012 to Jun 2016 (Catalogue no. 8165.0). Canberra, Australia: Australian Bureau of Statistics; 2017.
11. Department of Transport and Regional Economies. Estimating urban traffic and congestion cost trends for Australian cities (Working paper no. 71). Canberra, Australia: Department of Transport and Regional Economies; 2007.
12. Richardson S. Higher education and community benefits: The role of regional provision. Camberwell, Australia: Australian Council for Educational Research; 2011.
13. ABS. Australian national accounts: State accounts (Catalogue no. 5220.0). Canberra, Australia: Australian Bureau of Statistics; 2016.
14. Queensland Government Statistician's Office. Estimates of Queensland productivity performance. Brisbane, Australia: Queensland Government; 2017.
15. Queensland Government Statistician's Office. Wage price index (a), Queensland and Australia, 1997–98 to 2016–17. Brisbane, Australia: Queensland Government; 2017.
16. Queensland Government Statistician's Office. Projected population, by five-year age group and sex, Queensland, 2011 to 2061. Brisbane, Australia: Queensland Government; 2011.
17. ABS. Regional population growth, Australia (Catalogue no. 3218.0). Canberra, Australia: Australian Bureau of Statistics; 2016.
18. Department of Employment. Employment region data. Canberra, Australia: Department of Employment; 2017.
19. Productivity Commission. Transitioning regional economies: Initial report. Canberra, Australia: Productivity Commission; 2017.
20. ABS. Australian demographic statistics, March 2017 (Catalogue no. 3101.0). Canberra, Australia: Australian Bureau of Statistics; 2017.
21. Australian Electoral Commission. Federal, state, and territory election dates from 1946 to the present [cited 11 September 2017]. Available from: http://www.aec.gov.au/Elections/Australia_n_Electoral_History/Federal_State_and_Territory_elections_dates_1946_Present.htm.

22. Inter-Parliamentary Union. Parliaments at a glance: Term [cited 11 September 2017]. Available from: <http://www.ipu.org/parline-e/TermofParliament.asp?REGION=All&LANG=ENG&typesearch=1>.
23. Pickering H. Huff Post. 15 July 2016. [cited 13 September 2017]. Available from: http://www.huffingtonpost.com.au/health-pickering/three-year-parliamentary-terms-are-too-short_a_21378397/.
24. Queensland Government. The Queensland plan. Brisbane, Australia: Queensland Government; 2014.
25. United Nations Educational Scientific and Cultural Organization. World heritage list [cited 11 September 2017]. Available from: <http://whc.unesco.org/en/statesparties/au>.
26. Tourism Research Australia. Chinese resident perceptions of Queensland. Canberra, Australia: Tourism Research Australia; 2014.
27. Deloitte. Confidently Queensland: Liveable communities, diversified economy, inclusive growth. Sydney, Australia: Deloitte; 2017.
28. Macquarie Group. Australian equity strategy: Packing up stumps. Sydney, Australia: Macquarie Group; 2017.
29. ABS. Labour force, Australia, detailed, quarterly (Catalogue no. 6291.0.55.003). Canberra, Australia: Australian Bureau of Statistics; 2017.
30. ABS. Migration, Australia, 2015-16 (Catalogue no. 3412.0). Canberra, Australia: Australian Bureau of Statistics; 2016.
31. Payroll Tax Australia. Payroll tax rates and thresholds 2017 [cited 17 September 2017]. Available from: <https://www.payrolltax.gov.au/harmonisation/payroll-tax-rates-and-thresholds>.
32. Norris G. Brisbane attracts more corporate HQs but punching below weight. The Courier Mail. 16 June 2016.
33. ABS. Innovation in Australian business, in goods and services innovation (Catalogue no. 8158.0). Canberra, Australia: Australian Bureau of Statistics; 2016.
34. Department of Treasury Western Australia. Overview of state taxes and royalties, Western Australia. Perth, Australia: Government of Western Australia; 2016.
35. Department of Infrastructure and Regional Development. Airport traffic data. Canberra, Australia: Department of Infrastructure and Regional Development; 2017.
36. Wiggins J. Brisbane Airport's new runway takes off ahead of Sydney and Melbourne. Australian Financial Review. 6 July 2017.
37. Charles MB, Barnes PH. Transport sustainability and the airport city. In: Stoner JAF, Wandel C, editors. Global sustainability initiatives: New models and approaches. Charlotte, North Carolina, United States: Information Age Publishing; 2008. p. 138-58.
38. Madigan M. Cathay Pacific to operate weekly freight flights from Toowoomba's Wellcamp airport. The Courier Mail. 12 October 2016.
39. Department of Infrastructure and Transport. Air passenger movements through capital and non-capital city airports to 2030–31. Canberra, Australia: Department of Infrastructure and Transport; 2012.
40. Bove V, Elia L. Migration, diversity, and economic growth. World Development. 2017;89:227-39.
41. ABS. Census of population and housing: Reflecting Australia - Stories from the Census 2016 (Catalogue no. 2071.0). Canberra, Australia: Australian Bureau of Statistics; 2017.
42. ABS. 2006 Census of population and housing: Media releases and fact sheets, 2006 (Catalogue no. 2914.0.55.002). Canberra, Australia: Australian Bureau of Statistics; 2007.
43. MCA. The economic impact of migration. Canberra, Australia: Migration Council of Australia; 2015.
44. McLeod PL, Lobel SA, Cox Jr TH. Ethnic diversity and creativity in small groups. Small group research. 1996;27(2):248-64.
45. Herring C. Does diversity pay? Race, gender, and the business case for diversity. American Sociological Review. 2009;74(2):208-24.

46. Qian M. Women's leadership and corporate performance. Manila, Philippines: Asian Development Bank; 2016.
47. AICD. Appointments to ASX 200 boards. Sydney, Australia: Australian Institute of Company Directors; 2017.
48. ABS. Labour force, Australia (Catalogue no. 6202.0). Canberra, Australia: Australian Bureau of Statistics; 2017.
49. BP. Statistical review of world energy: June 2017. London, United Kingdom: BP; 2017.
50. ABC News. Powering past coal alliance: 20 countries sign up to phase out coal power by 2030 [press release]. ABC News, 17 November 2017.
51. Lynham A. Rare mineral discovery offers fresh frontier for Qld. Brisbane, Queensland: Department of the Premier and Cabinet; 2017.
52. Department of Natural Resources and Mines. Emerging strategic minerals in Queensland. Brisbane, Australia: Queensland Government; 2017.
53. AEMO. National electricity forecasting report. Melbourne, Australia: Australian Energy Market Operator; 2016.
54. Sinden G, Leffler Z. Renewable energy jobs: Future growth in Australia. Sydney, Australia: Climate Council of Australia Limited; 2016.
55. Blyth W, Gross R, Speirs J, Sorrell S, Nicholls J, Dorgan A, et al. Low carbon jobs: The evidence for net job creation from policy support for energy efficiency and renewable energy. London, United Kingdom: UK Energy Research Centre; 2014.
56. Australian PV Institute. Mapping Australian photovoltaic installations 2017 [cited 11 September 2017]. Available from: <http://pv-map.apvi.org.au/historical#4/-28.38/134.38>.
57. Department of Environment and Heritage Protection. Recycling and waste in Queensland. Brisbane, Australia: Queensland Government; 2016.
58. Pickin J, Randell P. Australian national waste report 2016. Canberra and Docklands, Australia: Department of the Environment and Energy and Blue Environment Pty Ltd; 2016.
59. NSW Department of Planning and Environment. What is coal seam gas. Sydney, Australia: NSW Government; 2016.
60. Department of Natural Resources and Mines. Queensland's petroleum and coal seam gas. Brisbane, Australia: Queensland Government; 2017.
61. Walton A, McCrea R, Leonard R. The 2016 CSIRO community wellbeing and responding to change survey: Western Downs region, Queensland. Brisbane, Australia: Commonwealth Science and Industrial Research Organisation; 2016.
62. Steffen W, Hughes L, Sahajwalla V, Heuston G. The critical decade: Queensland climate impacts and opportunities. Canberra, Australia: Climate Commission; 2012.
63. De'ath G, Fabricius KE, Sweatman H, Puotinen M. The 27-year decline of coral cover on the Great Barrier Reef and its causes. *Proceedings of the National Academy of Sciences*. 2012;109(44):17995-9.
64. CSIRO and BOM. Climate change in Australia: Information for Australia's natural resource management regions. Canberra, Australia: Commonwealth Scientific and Industrial Research Organisation and Bureau of Meteorology; 2015.
65. Piggott-McKellar AE, McNamara KE. Last chance tourism and the Great Barrier Reef. *Journal of Sustainable Tourism*. 2017;25(3):397-415.
66. BOM. Annual climate statement 2016. Melbourne, Australia: Bureau of Meteorology; 2017.
67. Steffen W, Hughes L, Alexander D, Rice M. Cranking up the intensity: Climate change and extreme weather events. Sydney, Australia: Climate Council of Australia Ltd; 2017.
68. Queensland Reconstruction Authority, The World Bank Group. Queensland recovery and reconstruction in the aftermath of the 2010/2011 flood events and Cyclone Yasi. Brisbane, Australia and Washington D.C,

- United States: Queensland Reconstruction Authority and The World Bank Group; 2011.
69. Hsu A, et al. Environmental performance index: Global metrics for the environment. New Haven, Connecticut, United States: Yale University; 2016.
 70. Austrade. Australian mining equipment, technology and services (METS) industry growth centre to be located in Queensland: Australian Trade and Investment Commission; 2017 [cited 11 September 2017]. Available from: <https://www.austrade.gov.au/local-sites/india/news/australian-mining-equipment-technology-and-services-mets-industry-growth-centre-to-be-located-in-queensland>.
 71. Department of State Development. Mining equipment, technology and services (METS). Brisbane, Australia: Queensland Government; 2017.
 72. Office of the Chief Economist. Australian innovation system report 2016. Canberra, Australia: Department of Industry, Innovation and Science; 2016.
 73. Markham N, Kruger M, Cacioppe J. Startup ecosystem report: Regional Queensland 2015. Brisbane, Australia: Department of Science, Information Technology, and Innovation; 2016.
 74. Hassan S, Bulic F, Bucifal S, Drake P, Hendrickson L. Australian geography of innovative entrepreneurship. Canberra, Australia: Department of Industry, Innovation and Science; 2015.
 75. Startup Muster. Startup Muster 2016 annual report. Sydney, Australia: Startup Muster; 2016.
 76. Department of State Development. Queensland biomedical and life sciences: 10-year roadmap. Brisbane, Australia: Queensland Government; 2016.
 77. IP Australia. Australian medical devices: A patent analytics report. Canberra, Australia: IP Australia; 2014.
 78. O'Chee B. Australia's journey into space must start in Queensland. The Sydney Morning Herald. 26 September 2017.
 79. Trask S, Baker E. Government announces creation of national space agency. The Sydney Morning Herald. 26 September 2017.
 80. DET. uCube: Higher education data cube. Canberra: Department of Education and Training; 2015.
 81. Organisation for Economic Cooperation and Development. Ageing and employment policies: Statistics on average effective age of retirement. Paris, France: Organisation for Economic Cooperation and Development; 2014.
 82. Prinsley R, Baranyai K. STEM skills in the workforce: What do employers want? Canberra, Australia: Office of the Chief Scientist; 2015.
 83. Quah D. The global economy's shifting centre of gravity. *Global Policy*. 2011;2(1):3-9.
 84. World Bank. GDP (current US\$). Washington, D.C: United States: World Bank; 2016.
 85. Asian Development Bank. Key indicators for Asia and the Pacific. Mandaluyong, Philippines: Asian Development Bank; 2016.
 86. Kharas H. The unprecedented expansion of the global middle class: An update. Washington D.C., United States: Brookings Institution; 2017.
 87. National Bureau of Statistics of China. Per capita disposable income nationwide. Beijing, China: National Bureau of Statistics of China; 2015.
 88. Maslow AH. A theory of human motivation. *Psychological Review*. 1943;50(4):370-96.
 89. Tourism Research Australia. International visitors in Australia: Results of the international visitor survey year ending June 2017. Canberra, Australia: Tourism Research Australia; 2017.
 90. Kharas H. The emerging middle class in developing countries (Working Paper No. 285). Paris, France: Organisation for Economic Cooperation and Development; 2010.

91. DFAT. Australia's top 10 two-way trading partners. Canberra, Australia: Department of Foreign Affairs and Trade; 2017.
92. DFAT. Australia's trade by state and territory 2015-16. Canberra, Australia: Department of Foreign Affairs and Trade; 2017.
93. Blagrove S, Hundloe T, Ditton H. Australia's role in feeding the world: The future of Australian agriculture. Clayton, Australia: CSIRO Publishing; 2016.
94. Zhang C, Bai J, Wahl TI. Consumers' willingness to pay for traceable pork, milk, and cooking oil in Nanjing, China. *Food Control*. 2012;27(1):21-8.
95. Yoon K-H, Lee J-H, Kim J-W, Cho JH, Choi Y-H, Ko S-H, et al. Epidemic obesity and type 2 diabetes in Asia. *The Lancet*. 2006;368(9548):1681-8.
96. UN DESA. World Population Prospects: 2017 Revision. New York, United States: United Nations Department of Economic and Social Affairs; 2017.
97. Research Institute of Organic Agriculture. The world of organic agriculture 2017. Frick, Switzerland: Research Institute of Organic Agriculture; 2017.
98. Australian Organic Ltd. Australian organic market report 2017. Nundah, Australia: Australian Organic Ltd; 2017.
99. Sister City Partners. BeefLedger [cited 10 October 2017]. Available from: <http://sistercitypartners.com.au/beefledger/>.
100. United Nations World Tourism Organization. UNWTO tourism highlights, 2016 edition. Madrid, Spain: United Nations World Tourism Organization; 2016.
101. WTTC. Travel & tourism economy impact 2017: China. London, United Kingdom: World Travel & Tourism Council; 2017.
102. WTTC. Travel & tourism economic impact 2017: Australia. London, United Kingdom: World Travel & Tourism Council; 2017.
103. Holzner M. Tourism and economic development: The beach disease? *Tourism Management*. 2011;32(4):922-33.
104. Deloitte Access Economics. Australian tourism labour force report: 2015-2020. Sydney, Australia: Deloitte; 2015.
105. Roy Morgan Research. The rise of multi-destination travellers in the experience economy [press release]. Roy Morgan Research, 19 April 2017.
106. Deloitte Access Economics. The value of international education to Australia. Canberra, Australia: Department of Education and Training; 2015.
107. Pyke J, Jiang, Delacy T, Smith E, Li G, Li A. The role and influence of China based Australia alumni on travel and tourism. Melbourne, Australia: Victoria University; 2013.
108. Hajkowicz S, Reeson A, Rudd L, Bratanova A, Hodggers L, Mason C, et al. Tomorrow's digitally enabled workforce: Megatrends and scenarios for jobs and employment in Australia over the coming twenty years. Brisbane, Australia: CSIRO Publishing; 2016.
109. Choudaha R. Three waves of international student mobility (1999-2020). *Studies in Higher Education*. 2017;42(5):825-32.
110. Choudaha, R, Hu, Di. With poor job prospects for Chinese students, is it still worth investing in a US education? [press release]. South China Morning Post, 5 February 2016.
111. GCA. Graduate destinations 2015: A report on the work and study outcomes of recent higher education graduates. Melbourne, Australia: Graduate Careers Australia Ltd; 2015.
112. QS. QS world university rankings 2017 [cited 25 October 2017]. Available from: <https://www.topuniversities.com/university-rankings>.
113. Queensland Government Statistician's Office. Queensland Government population projections: 2015 edition. Brisbane, Australia: Queensland Government; 2015.
114. Australian Government Treasury. 2015 Intergenerational report: Australia 2055. Canberra, Australia: Australian Government; 2015.
115. Griffith C. UnitingCare opens Australia's first digital hospital in Queensland. *The Australian*. 9 December 2014.

116. Mitchell-Whittington A. Princess Alexandra Hospital Brisbane pioneers digital rollout in Australia. *Brisbane Times*. 30 October 2016.
117. Agfunder Agrifood Tech. AgTech investing mid year review. San Francisco, United States: Agfunder Agrifood Tech; 2017.
118. FAO. Global agriculture towards 2050. Rome, Italy: Food and Agriculture Organization; 2009.
119. Department of Infrastructure Local Government and Planning. Building information modelling: Draft policy and principles for Queensland. Brisbane, Australia: Queensland Government; 2017.
120. Autodesk. BIM and the future of AEC [cited 17 September 2017]. Available from: <https://www.autodesk.com/solutions/bim>.
121. Institute of Public Works Engineering Australasia. What you need to know about BIM in Australia [cited 17 September 2017]. Available from: <http://www.ipwea.org/blogs/intouch/2016/08/01/what-you-need-to-know-about-bim-in-australia>.
122. Queensland Government. Queensland economy: Construction sector. In: Treasury Q, editor. Brisbane, Australia: Queensland Government; 2017.
123. CSQ. How will BIM impact future construction industry skills, capabilities and workforce profile? Brisbane, Australia: Construction Skills Queensland; 2014.
124. Akamai. State of the internet: Q1 2017 report. Akamai; 2017.
125. David R. Your survival guide to the NBN rollout across Melbourne. *Herald Sun*. 14 August 2017.
126. ABS. Census of population and housing: General community profile, Australia, 2016 (Catalogue no. 2001.0). Canberra, Australia: Australian Bureau of Statistics; 2016.
127. Centre for Research and Action in Public Health. 2016 Regional wellbeing survey data tables: Queensland natural resource management regions. Canberra, Australia University of Canberra; 2017.
128. Thomas J, Barraket J, Wilson C, Macdonald S, Tucker J, & Rennie E. Measuring Australia's digital divide: The Australian digital inclusion index report 2017. Melbourne, Australia: Swinburne Institute for Social Research & RMIT University; 2017.
129. ABS. Business use of information technology, 2015-16 (Catalogue no. 8129.0). Canberra, Australia: Australian Bureau of Statistics; 2017.
130. Frey CB, Osborne MA. The future of employment: How susceptible are jobs to computerisation. Oxford, England: Oxford Martin Programme on the Impacts of Future Technology; 2013.
131. CEDA. Australia's future workforce. Canberra, Australia: Committee for the Economic Development of Australia; 2015.
132. Arntz M, Gregory T, Zierahn U. Revisiting the risk of automation. *Economic Letters*. 2017;159:157-60.
133. Borland J, Coelli M. Are robots taking our jobs? Melbourne, Australia: University of Melbourne; 2017.
134. AlphaBeta. The automation advantage: How Australia can seize a \$2 trillion opportunity from automation and create millions of safer, more meaningful and more valuable jobs. Sydney, Australia: AlphaBeta; 2017.
135. Levy F, Murnane RJ. Dancing with robots: Human skills for computerized work. Washington D.C, United States: Third Way; 2013.
136. Chamber of Commerce & Industry Queensland. The ideas advantage: Queensland business innovation. Brisbane, Australia: Chamber of Commerce & Industry Queensland; 2014.
137. ABS. Venture capital and later stage private equity, Australia, 2015-16 (Catalogue no. 5678.0). Canberra, Australia: Australian Bureau of Statistics; 2017.
138. Saeidi SP, Sofian S, Saeidi P, Saeidi SP, Saeidi SA. How does corporate social responsibility contribute to firm financial performance? The mediating role of competitive advantage, reputation, and customer satisfaction. *Journal of Business Research*. 2015;68(2):341-50.

139. Haski-Leventhal D, Concato J. The state of CSR and RME in business schools and the attitudes of their students. Sydney, Australia and New York, United States: Macquarie University and UN Principles for Responsible Management Education; 2016.
140. KPMG. Scaling the Fintech opportunity: For Sydney & Australia. Sydney, Australia: KPMG; 2017.
141. KPMG. Unlocking the potential: The Fintech opportunity for Sydney. Sydney, Australia: KPMG; 2014.
142. Mitchell R, Sharples L. Consuming places: The role of food, wine and tourism in regional development. In: Hall CM, Sharples L, Mitchell R, Macionis N, Cambourne B, editors. Food tourism around the world. New York, United States: Butterworth-Heinemann; 2004. p. 25-59.
143. Ecker S, Clarke R, Cartwright S, Kancans R, Please P, Binks B. Drivers of regional agritourism and food tourism in Australia. Canberra, Australia: Australian Bureau of Agricultural and Resource Economics, Bureau of Rural Sciences; 2010.
144. West, K. Hi-tech healthcare on offer in growing Australian medical tourism market [press release]. ABC News, 6 February 2014.
145. Deloitte Access Economics. Medical tourism in Australia: A scoping study. Sydney, Australia: Deloitte; 2011.
146. Sapere Research Group. ACC 2017 inquiry into electricity prices. Wellington, New Zealand: Sapere Research Group; 2017.
147. Eggleton M. Robot technology could spur growth. Australian Financial Review. 4 September 2017.
148. NCVER. Historical time series of government-funded vocational education and training from 1981 to 2016. Adelaide, Australia: National Centre for Vocational Education Research; 2017.
149. Queensland University of Technology. A baseline study of Australia's community recycling enterprises (CRE). Brisbane and Bendigo, Australia: Queensland University of Technology and Community Recycling Network; 2012.
150. NRDC. The Paris agreement on climate change. New York, United States: Natural Resources Defense Council; 2015.
151. Finkel A. Independent review into the future security of the national electricity market: Blueprint for the future. Canberra, Australia: Commonwealth of Australia; 2017.
152. Phillips, A. Outback councils launch biggest free wi-fi network in Australia [press release]. ABC Western QLD, 11 August 2017.
153. RAPAD. Smart Central Western Queensland. Longreach, Australia: Remote Area Planning & Development Board; 2016.
154. Infoxchange. The Australian Digital Inclusion Alliance launches to reduce the digital divide [press release]. Infoxchange, 2 August 2017.
155. Dick R. Convergent interviewing. Brisbane, Australia: Interchange Publications; 1990.
156. Williams W, Lewis D. Convergent interviewing: A tool for strategic investigation. Strategic Change. 2005;14(4):219-29.

PROJECT TEAM

Claire Naughtin (Project Lead)

e Claire.Naughtin@data61.csiro.au

t +61 7 3833 5658

John McLaughlin

e John.Mclaughlin@data61.csiro.au

t +61 7 3214 2495

Stefan Hajkowicz

e Stefan.Hajkowicz@data61.csiro.au

t +61 7 3833 5540

WE DO THE EXTRAORDINARY EVERY DAY

We innovate for tomorrow and help improve today – for our customers, all Australians and the world.

WE IMAGINE

WE COLLABORATE

WE INNOVATE

