Anticipating Future Skills:

Jobs growth and alternative futures for Queensland to 2022

Jobs Queensland

Future skills. Future workforce.

Jobs Queensland acknowledges and thanks Dr Janine Dixon from the Centre of Policy Studies at Victoria University for her assistance in developing the data that is represented in this report.

Copies of this publication are available on our website at jobsqueensland.qld.gov.au

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WORD FROM THE INTERIM CHAIR

As the Interim Chair of the Jobs Queensland Board, it gives me great pleasure to present *Anticipating Future Skills: Jobs growth and alternative futures for Queensland to 2022*.

By 2022, it is projected that more than 2.5 million people will be employed in Queensland – an increase of 190,000 or eight per cent from 2017 figures. Anticipating Future Skills takes an approach that combines economic modelling with scenario planning to depict possible plausible futures. The modelling of different scenarios enables Queenslanders to identify the skills needed under a variety of different circumstances.

Informed by a wide range of industry, academic, government and community experts, this project represents a flagship element of the Jobs Queensland work program. It provides an authoritative, dynamic evidence base for consideration of Queensland's future skills needs that has been developed in consultation with industries and regions across Queensland.

The results of this project show that employment is projected to increase in Queensland across each of the four scenarios modelled. The rates of employment growth vary across regions, with the highest levels of growth projected to occur in the south east corner of the state.

More than 50 per cent of all new workers are projected to be employed in just three industries: Health Care and Social Assistance; Professional, Scientific and Technical Services; and Education and Training. This reflects a continuation of a trend towards high levels of growth in service-based industries and the occupations that underpin these industries.

This project also provides projections of future qualifications in the Queensland labour market. The workforce is projected to become more educated, with a clear shift towards higher levels of skill acquisition.

By 2022, there is projected to be an additional 206,000 qualified workers in Queensland, with more than one-third of these new qualifications being Bachelor Degrees. The vocational education and training (VET) system maintains its importance, with about one-quarter of the workforce (around 650,000 people) projected to hold Certificate Level qualifications as their highest qualification by 2022. Growth in higher qualification levels that are supported through the VET system is also projected to be significant, with 12 per cent of the workforce having Advanced Diplomas and Associate Degrees.

These projections can play a key role in informing decision making by government in VET investment, and skills and training policy more broadly. The outcomes from this project can also support industries and regions to consider and plan for the future workforce needs within their domains. A key priority of Jobs Queensland in undertaking this work has been to make this data publicly available. A suite of resources is available on the Jobs Queensland website to enable access to this data.

Jobs Queensland extends its sincere thanks to the many stakeholders who have generously provided their time and valuable input to support and inform this project.

Over the coming years, Jobs Queensland will continue to undertake research and provide authoritative advice to the Queensland Government in relation to skills, training and employment opportunities for all Queenslanders.

Peter Henneken AM

Interim Chair, Jobs Queensland

EXECUTIVE SUMMARY

Major findings:

- Employment in Queensland is projected to increase by between 7.6 and 9.3 per cent by 2022, regardless of the scenarios used in this analysis.
- More than 50 per cent of all new workers are projected to be employed in just three industries – Health Care and Social Assistance; Professional, Scientific and Technical Services; and Education and Training.
- It is projected that regions with the highest proportion of service industries will see the greatest growth in employment, with the majority of growth in the south east corner of the state.
- Professionals will remain the largest occupational grouping and are projected to grow strongly, as is the Community and Personal Service Workers group.
- Under every scenario, the workforce becomes more educated, with the number of workers without post-school qualifications falling by between one and 2.6 per cent from 2017.
- Under each scenario, the largest group of qualified workers is projected to possess Certificate Level qualifications and the smallest group is projected to be workers with Graduate Diploma or Graduate Certificate qualifications.

The economic reforms of the 1980s and 1990s, which reduced rigidities in the economy and increased international competition, contributed to the restructuring of the Australian economy that has seen employment in service industries increase while employment in traditional sectors, such as Agriculture, Forestry and Fishing and Manufacturing, has declined. However, this transition is not the only driver of change that will affect the future of work. Technological change, an ageing workforce and changes to the nature of employment all have implications for the future of work and the skills required to do that work.

Jobs Queensland has been tasked by the Queensland Government to undertake research and provide advice on future skills needs. The Anticipating Future Skills project, which entails the economic modelling of future scenarios, is one of the ways in which Jobs Queensland is performing this work.

While economic modelling is useful for simplifying and predicting economic trends, it is not necessarily useful for dealing with high levels of complexity and uncertainty. Scenario planning is one method of dealing with this uncertainty. Grounded in existing data and trends, scenarios do not generate predictions but depict plausible futures (although not necessarily 'the' future). When contrasted with a baseline or 'business as usual' scenario, alternative scenarios can be examined to measure their impact, and identify what factors may or may not influence outcomes.

The scenarios used in this project were devised after a series of workshops with Jobs Queensland stakeholders across the state and cover the following themes:

1. **Technological change:** increasing labour productivity of all industries in Queensland so that the productivity of each is 0.25 per cent higher than the baseline annually between 2017–18 and 2021–22.

2. **Changing workforce:** increasing interstate migration with a decreasing proportion of working-age population.

3. **External impact:** halving the price of coal and iron ore.

A baseline scenario to 2022 was also produced, based on 2017 labour market, population and economic data, and the Queensland Government's 2017–18 Budget Papers. The modelling produced data for industries, occupations, regions and qualifications, using Australian Bureau of Statistics (ABS) classification systems. Draft results and underpinning assumptions were tested with industry and regional representatives before modelling was finalised.

According to the baseline, there were 2,373,023 people employed in Queensland in 2017, and by 2022 employment is projected to increase by almost 190,000 people, or eight per cent. Total employment also increases under each scenario, by between 180,000 and 221,600, although employment in Mining and Information Media and Telecommunications is projected to fall across all scenarios. Since the baseline figures were prepared, employment in Mining has actually grown due to increased production arising from increased demand and prices. Whether production remains at these levels will impact the accuracy of the projections. This demonstrates both the cyclical nature of the Mining industry and also the importance of considering possible plausible futures when contemplating future job demand.

Employment in industries responds differently according to the scenario. A number of industries, such as Health Care and Social Assistance; Education and Training; and Professional, Scientific and Technical Services, are projected to experience above average employment increases across all scenarios, reflecting the importance of the services sector to the Queensland labour market. Employment in Agriculture, Forestry and Fishing is projected to expand due, in part, to recovery from Severe Tropical Cyclone (STC) Debbie.

Some industries experience above average employment under one or two scenarios but may grow more slowly under others. For instance, employment in Manufacturing benefits from a drop in the Australian dollar under Scenario Three but does not expand as strongly due to the productivity boost in Scenario One.

The growth of occupations also varies according to the scenario. For example, employment for Community and Personal Service Workers would grow most strongly under Scenario Two due to increased demand for Health Care and Social Assistance (driven by population growth) but growth would actually slow under Scenario Three as the economy is projected to contract compared with the 2022 baseline.

Regions that have relatively high proportions of the industries most impacted by each scenario are the ones which would experience the largest changes to employment. For instance, with large health, retail and construction sectors, the Gold Coast is projected to experience substantial employment growth under Scenario Two, which favours those service industries.

Scenarios also affect changes to qualifications. Under the baseline scenario, the number of people without post-school qualifications falls while those with Postgraduate Degrees increases by more than 40,000. The changes to qualification levels vary across scenarios and are often dependent on associated changes to occupations and industries.

Findings around qualifications include:

- The number of workers with a Certificate increases by between 7.4 and 9.8 per cent and remains the largest qualification group in the labour force.
- Bachelor-qualified workers are projected to constitute more than one-third of all new qualifications.
- The number of workers with Postgraduate qualifications is projected to increase by the greatest proportion across all scenarios.
- Management and Commerce is projected to remain the largest field of education in 2022.
- The proportion of the workforce with Society and Culture qualifications is projected to grow by the largest rate, followed by those with Creative Arts qualifications.
- Management and Commerce is projected to be the largest field of education possessed by those with Postgraduate, Bachelor and Advanced Diploma and Associate Degrees.
- Education is projected to be the largest field of education possessed by those with Graduate Diploma and Graduate Certificate qualifications.
- Under all scenarios, more than one-third of Certificate-qualified workers are projected to have an Engineering and Related Technologies qualification by 2022.

In addition to the major findings of this project, the modelling of these future scenarios has also revealed other issues for consideration. These include:

- Female-dominated industries are projected to grow at a faster rate than those employing a majority of men.
- An ageing workforce presents both challenges and opportunities for industry and workers.
- Industries that traditionally employ younger workers are projected to experience below average growth.
- The number of workers acquiring Science, Technology, Engineering and Maths (STEM) qualifications do not increase as quickly as other fields of education.
- The concentration of growth in the south east corner poses challenges for future training delivery and infrastructure.

The quantitative projections produced in this project are indicative and, given their speculative nature, it is more productive to focus on the trends that emerge rather than the numbers in isolation. The projections also do not take into account replacement demand as employees change jobs or leave the labour force. This means that future employment opportunities are understated. However, it is evident that employment changes in industries, occupations, regions and qualifications differ under different circumstances and these changes will have a variety of implications for the future skills needs of Queensland.

This report is intended to present an overview of the Anticipating Future Skills project and high-level modelling results. The data presented represents only a portion of the modelling that has been undertaken for this project. Summaries for each region and industry are published at the back of this document. For those wishing to explore regional, industry or occupational data in greater depth, Jobs Queensland has published a number of data tools at jobsqueensland.qld.gov.au/anticipating-future-skills.

INTRODUCTION

A series of reforms to the Australian economy throughout the 1980s and 1990s contributed to changes in the structure of economic activity, leading to a decline in Manufacturing and an increase in the service sector's contribution to the national economy (this grew from 51 per cent in 1963 to about 79 per cent in 2017).[1] These changes have affected the employment profile of Queensland.

In 2006, more than 180,000 people were employed in Manufacturing and almost 62,000 in Agriculture, Forestry and Fishing. By 2016, employment in Manufacturing had fallen by more than 51,000 people and there were 1100 fewer people employed in Agriculture.

By contrast, employment in service industries had increased significantly. Health Care and Social Assistance had gained more than 90,000 employees, an additional 53,000 people worked in Education and Training, and there was an extra 31,000 people employed in Professional, Scientific and Technical Services.

Table 1: Employment growth in Queensland by industry[2]

Industry	Number employed in 2016	Employment change between 2006 and 2016 (%)
Mining	49,997	62.7
Health Care and Social Assistance	276,948	48.6
Education and Training	192,147	38.1
Arts and Recreation Services	33,668	36.7
Administrative and Support Services	75,336	35.2
Professional, Scientific and Technical Services	133,652	30.5
Electricity, Gas, Water and Waste Services	23,884	28.8
Accommodation and Food Services	156,672	22.8
Other Services	83,470	22.1
Transport, Postal and Warehousing	108,084	16.7
Construction	191,338	16.0
ALL INDUSTRIES	**2,044,966**	**15.1**
Public Administration and Safety	140,169	14.5
Rental, Hiring and Real Estate Services	42,502	11.9
Financial and Insurance Services	54,290	4.3
Retail Trade	211,780	-0.3
Agriculture, Forestry and Fishing	60,608	-1.8
Information Media and Telecommunications	25,267	-4.1
Wholesale Trade	56,371	-21.8
Manufacturing	128,783	-28.5

Derived from ABS. (2016 and 2006). *Census of Population and Housing, Counting Persons, Place of Usual Residence, State and Industry*. TableBuilder.

1. Australia. Department of Industry, Innovation and Science. Office of the Chief Economist. (2018). *Industry Insights Flexibility and growth*. Retrieved from https://publications.industry.gov.au/publications/industryinsightsjune2018/documents/IndustryInsights_1_2018_ONLINE.pdf.
2. Excludes not stated, inadequately described and not applicable figures.

As the Queensland economy has become more service-oriented, the mix of occupations has also changed. As shown in Table 2 below, all occupational groupings have grown over the 10 years between 2006 and 2016; however, the increase in industries such as Health Care and Social Assistance; and Education and Training have seen the numbers of Professionals and Community and Personal Service Workers grow by more than one-third. By comparison, the numbers of Technicians and Trade Workers grew by less than 10 per cent and lower skilled-occupations expanded even less.

Table 2: Employment growth in Queensland by occupation[3]

Occupation	Number employed in 2016	Employment growth between 2006 and 2016 (%)
Community and Personal Service Workers	241,960	45.4
Professionals	423,919	35.5
ALL OCCUPATIONS	**2,101,862**	**17.2**
Managers	258,514	14.5
Machinery Operators and Drivers	147,639	11.8
Sales Workers	207,801	9.9
Technicians and Trades Workers	305,440	9.0
Clerical and Administrative Workers	291,318	8.2
Labourers	225,271	3.7

Derived from ABS. (2016 and 2006). *Census of Population and Housing, Counting Persons, Place of Usual Residence, State by Occupation.* TableBuilder.

The ongoing restructuring of the Queensland economy is not the only driver of change that will affect the future of work. Technological advances including automation, artificial intelligence and digital disruption will lead to the creation of new jobs, the restructuring/transformation of many others and the disappearance of some.[4] Besides increasing demand for particular types of services (e.g. Health Care and Social Assistance), an ageing workforce has implications for future labour supply. Some commentators claim that an emergent gig economy challenges businesses in terms of labour management.[5] Others argue that policy makers face challenges around dealing with precarious work and the risk of inequality inherent in employment models such as freelancing, labour hire and contracting.[6]

As work changes, so too will the skills required. According to one 2015 World Economic Forum survey, 35 per cent of the skills necessary for jobs across all industries will have changed by 2020.[7] Researchers suggest that while technical skills will remain important, digital literacy, social and collaborative skills (e.g. teaching others or persuasion) will also increase in value.[8] Skills mismatches and shortages are already a sporadic feature of the Queensland labour market and have a number of negative effects, including lower productivity, lower economic growth, lower wages and reduced career prospects for individuals.[9]

3. Excludes not stated, inadequately described and not applicable figures.
4. OECD. (2018). *Future of Work in figures.* Retrieved from http://www.oecd.org/employment/ministerial/future-of-work-in-figures.htm.
5. Schwartz, J. Bohdal-Spiegelhoff, U. Gretczko, M. Sloan, N. (2016). *The gig economy Distraction or Disruption?* Retrieved from https://www2.deloitte.com/insights/us/en/focus/human-capital-trends/2016/gig-economy-freelance-workforce.html.
6. Rawling, M., (2015). Regulating Precarious Work in Australia: A preliminary assessment. *Alternative Law Journal*, 40:4, 252-256. Retrieved from http://classic.austlii.edu.au/au/journals/UTSLRS/2015/41.html.
7. World Economic Forum. (2016). *The Future of Jobs*. Retrieved from http://reports.weforum.org/future-of-jobs-2016/.
8. OECD. (2016). *Skills for a Digital World.* Retrieved from https://www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf.
9. OECD. (2016). *Getting Skills Right: Assessing and Anticipating Changing Skill Needs.* https://doi.org/10.1787/9789264252073-en.

BACKGROUND

Jobs Queensland has been tasked by the Queensland Government to undertake research and provide advice on future skills needs in consultation with industry and key stakeholders. The Anticipating Future Skills project is one of the ways in which Jobs Queensland is performing this work.

As part of an Expert Forum convened in November 2016 by Jobs Queensland, about 50 experts from industry, academia, unions and government were asked to consider how Queensland can best anticipate emerging and future skills needs. Participants agreed that economic modelling could be one useful approach, especially to promote discussion with industry and regional Jobs Queensland stakeholders.

As one of several approaches, Jobs Queensland subsequently agreed to undertake a project encompassing modelling of a number of scenarios which would be developed in consultation with Queensland industries and regions.

This report is intended to present an overview of the Anticipating Future Skills project and high-level modelling results. The data presented in this report represents only a portion of the modelling that has been undertaken for this project. Summaries for each region and industry are published at the back of this document. For those wishing to explore regional, industry or occupational data in greater depth, Jobs Queensland has published a number of data tools at jobsqueensland.qld.gov.au/anticipating-future-skills.

SCENARIOS – Why use them?

Determining the type of skills necessary for work in the present is challenging. Demand for skills depends on the type and number of jobs available, which in turn is affected by factors such as economic growth, business investment, regulation and policy. Skills availability is affected by education, training, demographic changes and migration flows. When looking to anticipate the skills of the future, the interplay of this array of factors is further complicated by the unknown effects of technological change, globalisation and future government policies.

While economic modelling is useful for simplifying and predicting economic trends, it is not necessarily useful for dealing with high levels of complexity and uncertainty. Scenario planning is one method of dealing with this uncertainty.[10] Grounded in existing data and trends, scenarios depict plausible futures, although not necessarily 'the' future. Multiple scenarios can be used to present an arc in which the future may evolve and assist us to understand the underlying forces influencing the need for future skills.[11] When contrasted with a baseline or 'business as usual' scenario, the deviations of the alternative scenarios from the baseline can be examined to measure their impact.

Scenario workshops

The scenarios used in this project were developed after a number of workshops across Queensland in September and October 2017, covering the northern, central and southern regions of the state. Participants included representatives from industry, academia, regional authorities, community organisations and government. At the workshops, attendees discussed the effects of technological change, a changing workforce and different external impacts on their local industries, the broader regional economy and the local labour force.

10. Schoemaker, P.J. H. (2004) Forecasting and Scenario Planning: The Challenges of Uncertainty and Complexity. In D.J. Koehler & N. Harvey (Eds.), *Blackwell Handbook of Judgment and Decision Making (pp. 274 -296).* New Jersey: John Wiley & Sons.
11. Schoemaker, P.J. H. (1991). When and How to Use Scenario Planning: A Heuristic Approach with Illustration, *Journal of Forecasting*, 10:6, 549-564, Retrieved from ProQuest Central.

Other stakeholders were provided with the opportunity to contribute to the project via a survey. Participant feedback identified regional and industry differences, highlighting the diversity of the Queensland economy. For instance, participants in Cairns identified the importance of international visitors to hospitality and tourism, while Townsville participants spoke of young people leaving the region for education and employment opportunities.

While many potential scenarios around issues as diverse as climate change and finance costs were discussed, three scenarios were finally developed based on the consultations combined with desktop research. In addition, a baseline scenario was devised against which the scenarios could be compared.

Testing and validation

As a simplified framework for describing the workings of the economy, an economic model is a useful tool for modelling scenarios. Models rely on assumptions and agreed inputs, which were established as the scenarios were finalised. However, a model's reliance on assumptions means that the process of economic modelling will always be partly subjective.[12]

A series of workshops was conducted to validate the assumptions underpinning the modelling and to test the results of draft modelling. Employers and peak bodies representing numerous industries attended, as did community and local government representatives. Their feedback was provided to the modellers who then incorporated it prior to providing the final data.

Caveats

- While the modelling provides an estimate based on three plausible futures, the future is not guaranteed; the scenarios chosen are three out of a myriad.
- The model contains a large number of variables and a change in any of these, or a change in relationships between variables, may affect the modelling.
- Some industries or occupations are more subject to volatility or more exposed to external shocks than others (for instance, the impact of drought on agriculture or commodity prices on mining) and the impact of this volatility is greater at the regional level.
- The actions of government, such as budgetary changes or commitments to infrastructure, can alter the modelling outcomes.
- The number of workers with qualifications is affected by both demand and supply issues (the latter does not form part of this modelling). Changes in either of these will affect the outcomes of the modelling.
- The quantitative projections produced in this project are indicative and given their speculative nature, it is more productive to focus on the trends that emerge rather than the numbers in isolation.
- While the modelling is indicative of future employment, it does not take into account replacement demand as employees change jobs or leave the labour force. It is therefore likely that future opportunities are understated.

12. Denniss, R. (2012). The use and abuse of economic modelling in Australia Users guide to tricks of the trade (Technical Brief No. 12). The Australia Institute. Retrieved from http://www.tai.org.au/sites/defualt/files/TB%2012%20The%20use%20and%20abuse%20of%20economic%20modelling%20in%20Australia_4.pdf.

THE BASELINE

The baseline scenario, which includes assumptions about the economy, the labour market and population and productivity growth, was developed around the Queensland Government's 2017–18 Budget Papers and other state government data (see Appendix A). To manage sampling error and volatility, the modeller smoothed data for all industries and occupations. As Queensland Treasury forecasts do not extend beyond 2018–19, projections to 2021–22 were calculated by modellers.

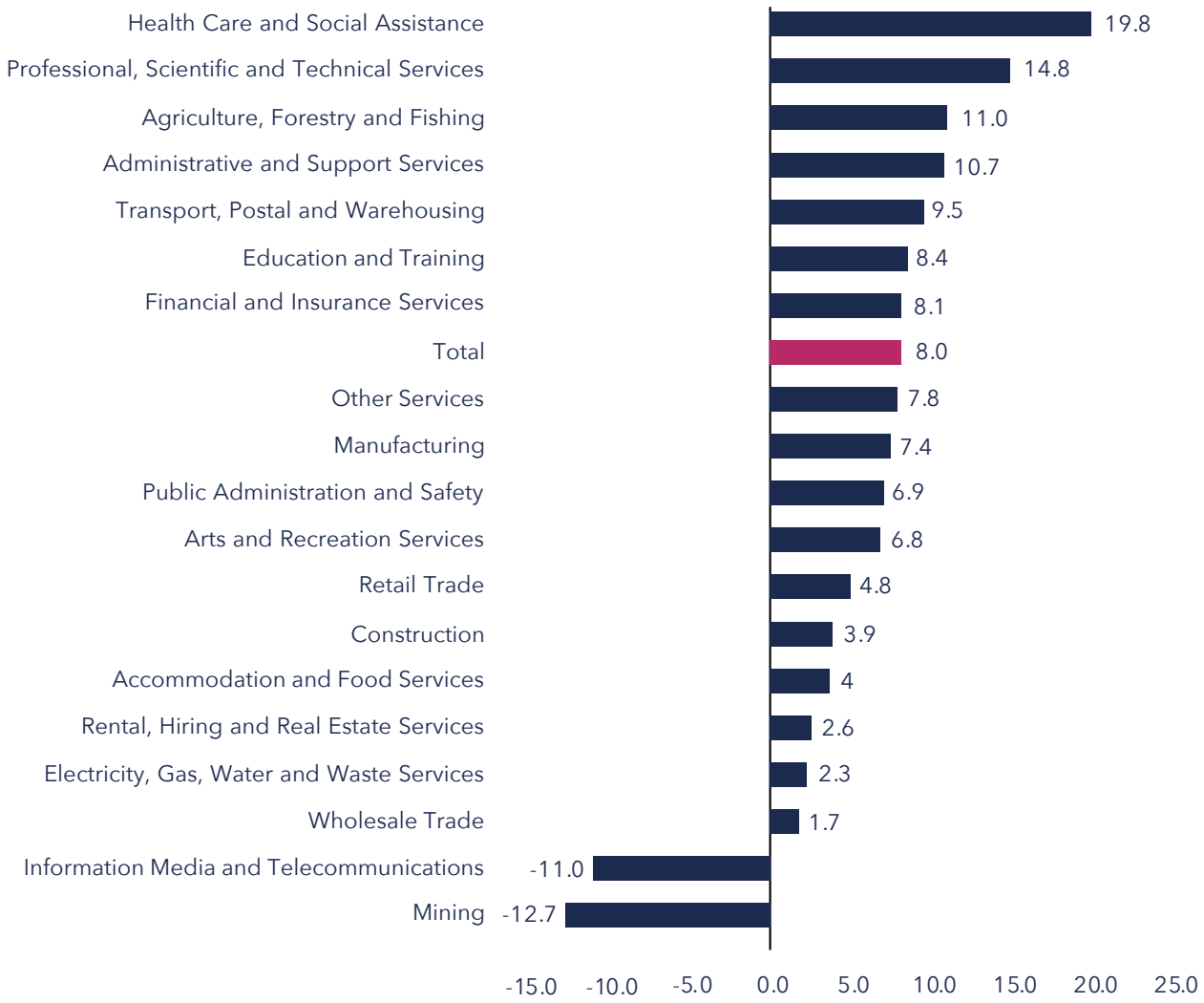
Final modelling was conducted using the Victoria University Employment Forecasts model, which is actually a family of models, centred on the Victoria University Computable General Equilibrium model of the Australian economy. It brings together a large body of demographic, employment and macroeconomic data, as well as forecasts from government and industry bodies, into a single set of detailed employment forecasts.[13]

Results

- It is projected that more than 50 per cent of all new workers will be employed in just three industries – Health Care and Social Assistance; Professional, Scientific and Technical Services; and Education and Training.
- Regions with the highest proportion of service industries are projected to see the greatest growth in employment, with the majority of growth in the south east corner.
- Professionals will remain the largest occupational grouping and are projected to grow strongly, as is the Community and Personal Service Workers group.
- Under the baseline scenario, the Queensland economy is projected to grow by almost 190,000 jobs between 2017 and 2022, resulting in almost 2.6 million persons employed.
- Growth in industry employment is varied. Employment in Health Care and Social Assistance is projected to grow strongly over the five years to 2021–22 and is projected to remain the largest employer, increasing its share of Queensland employment from 13 per cent in 2016–17 to 14.5 per cent in 2021–22.
- Employment in Information, Media and Telecommunications and Mining is projected to fall over the five years to 2021–22. Since the baseline figures were prepared, employment in Mining has actually grown due to an increase in employment in Coal Mining as a result of greater production arising from higher demand and prices. Whether production remains at these levels will impact the accuracy of the projections. This demonstrates both the cyclical nature of the Mining industry and also the importance of considering possible plausible futures when contemplating future job demand.

13. Dixon. Janine. (2017). *Victoria University Employment Forecasts 2017 edition*. CoPS Working Paper No.G-277. Retrieved from https://www.copsmodels.com/ftp/workpapr/g-277.pdf.

Figure 1: Industry employment growth between 2017 and 2022, Baseline Scenario (%)



Regions

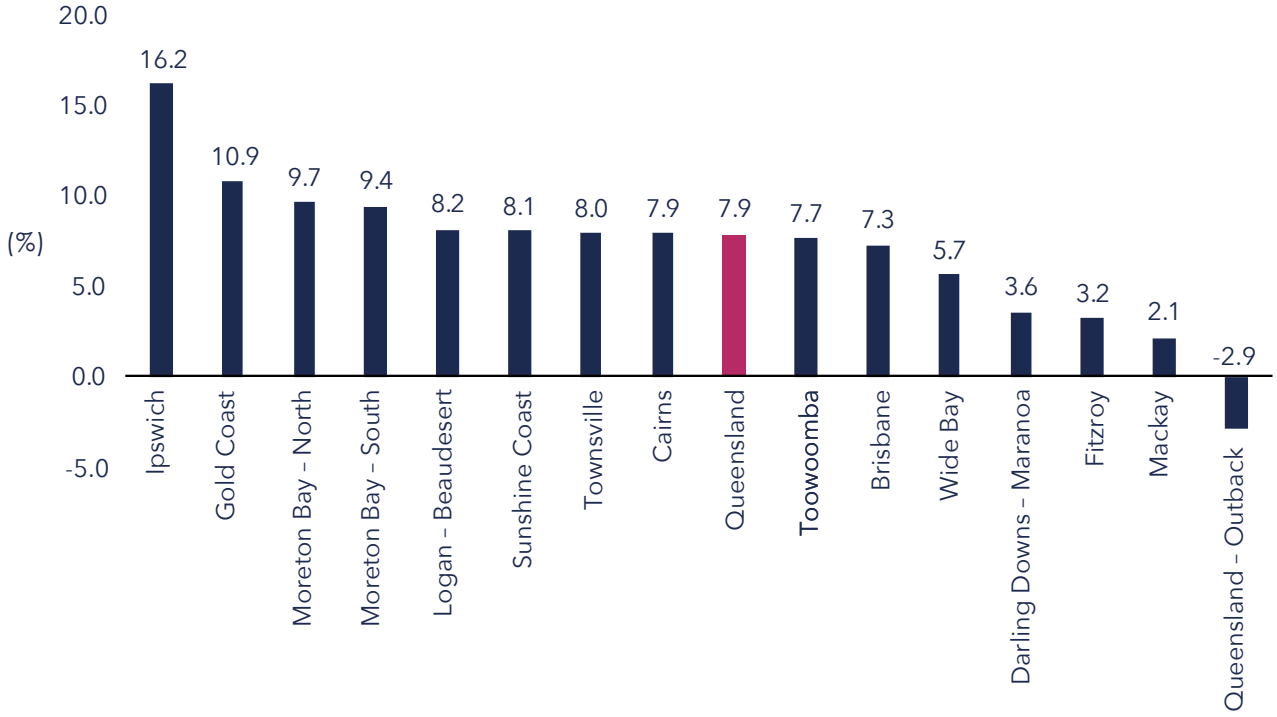
The regions used in this project are based on Statistical Area Level 4 (SA4) regions, as defined by the Australian Bureau of Statistics (see Appendix C). There are 19 SA4s in Queensland; the five Brisbane SA4s have been combined in this report to take into account the larger natural labour market.

Ipswich, the Gold Coast and Moreton Bay - North and - South are the regions with the fastest forecast employment growth. In these regions, employment is primarily in the service industries. For example, relative to national averages, Moreton Bay - North and - South and the Gold Coast have high proportions of employment in Construction and Accommodation and Food Services. Ipswich also has a high proportion of employment in Manufacturing, a sector that is forecast to perform relatively well. Employment forecasts correspond with strong population growth forecasts for these regions.

The regions with the highest reliance on Mining, and Agriculture, Forestry and Fishing employment (Queensland – Outback, Mackay, Fitzroy and Darling Downs – Maranoa) are also the four lowest-ranked regions in terms of the growth rate of employment. An overall decline in employment is forecast for Mining, while Agriculture, Forestry and Fishing employment is anticipated to recover from adverse weather conditions in 2017–18 but grow comparatively slowly thereafter. These regions also have relatively low employment in the fast-growing Health Care and Social Assistance sector. Population growth forecasts for these regions are also low, particularly for Queensland – Outback and Darling Downs – Maranoa.

Around 75 per cent of growth in employment is projected to occur in the major population centres of South East Queensland. Brisbane and Ipswich are forecast to account for employment growth of 75,000, with a further 34,000 on the Gold Coast, 21,000 in Moreton Bay - North and - South (combined) and almost 14,000 on the Sunshine Coast. Employment in Queensland – Outback is projected to decline under the baseline scenario but this result should be treated with caution as this very large region covers quite disparate regions with different economies and populations, making inferences from data for this region problematic.[14]

Figure 2: Regional employment growth between 2017 and 2022, Baseline Scenario (%)



Occupations

Given employment is projected to grow by eight per cent for the state between 2016–17 and 2021–22 under this scenario, it is useful to examine those occupations which increase at a faster rate than this.

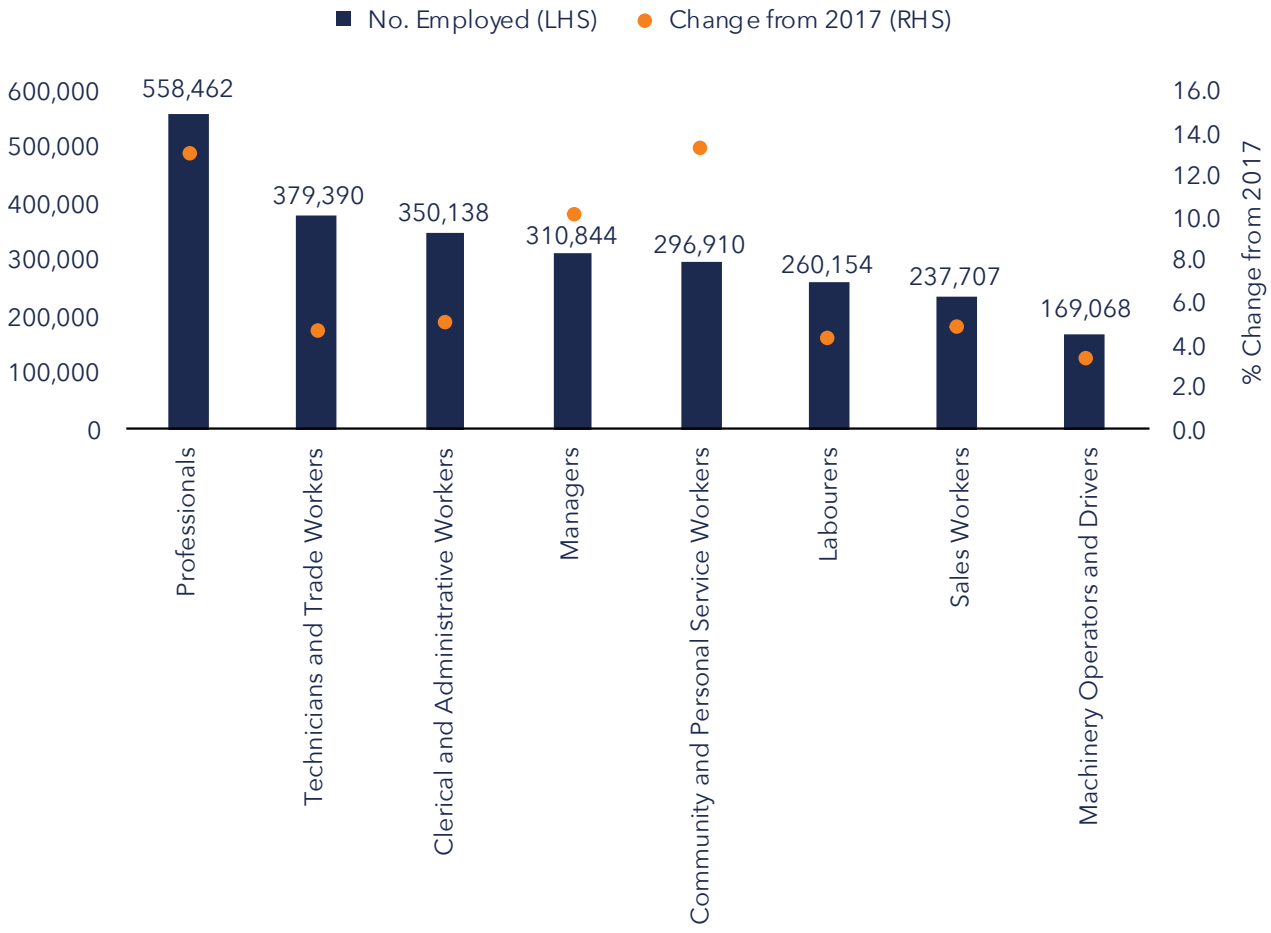
Unsurprisingly, the forecast growth in Health Care and Social Assistance between 2016–17 and 2021–22 sees employment in occupations related to this industry expected to expand. Employment for Community and Personal Service Workers is projected to grow by 13.4 per cent, with more than half of this growth attributed to Child Carers, Education Aides, and Aged and Disability Carers. Professionals, already the largest major occupational grouping, are projected to consolidate that position, accounting for more than 20 per cent of all employment and growing by more than 13 per cent in this scenario. School Teachers (84,000) and Midwifery and Nursing Professionals (80,000) are the largest occupational sectors in this grouping and are projected to grow by 15 and 14.4 per cent respectively.

14. For example, Outback – Queensland SA4 contains the SA3 regions of Outback – North and Outback – South. At the last ABS Census of Population and Housing, almost one-quarter of the workforce was employed in Mining in Outback - North compared with only one per cent in Outback South.

The other occupational grouping forecast to grow faster than average is Managers. This occupational grouping includes Farmers, and under this scenario, the number of Aquaculture Farmers is expected to increase by more than 90 per cent (although off a small base of around 530). Other occupations projected to expand rapidly include Health and Welfare Services Managers (up 30 per cent), Crop Farmers, ICT Managers, and Child Care Centre Managers (all increasing by around 20 per cent).

Under this baseline scenario, the number of Machinery Operators and Drivers is projected to increase by just over three per cent. Road and Rail Drivers make up around 45 per cent of this occupational grouping, and employment in this occupation increases by only 0.8 per cent over the five years to 2021–22. However, the number of Stationary Plant Operators (the next largest group) is projected to fall by 5.3 per cent over this same period, which is attributable, in part, to the decline in employment in Mining.

Figure 3: Occupation employment in 2022 and growth since 2017, Baseline Scenario (%)



SCENARIO ONE
TECHNOLOGICAL CHANGE

1

An increase in technological growth such that average labour productivity of all industries in Queensland is 0.25 per cent higher than the baseline each year between 2017–18 and 2021–22. The 0.25 per cent increment is applied uniformly to the individual baseline of each industry in Queensland.

Queensland is facing both challenges and opportunities due to technological innovation and advancements. Automation and the introduction of technologies, such as robotics, GPS-guided machinery, renewable energy and 3D printing, have already begun to change the way people work and the skills they need to do their job. For example, at Jobs Queensland's scenario workshops, employers in agriculture discussed the growing use of sensors and GPS machinery in the field, requiring them to develop digital and analytical skills. Many participants recognised that 'big data' presents opportunities for their industries but identified a lack of knowledge and skills to allow them to capture and capitalise on it.

Measuring technological change poses conceptual and practical problems and, due to this difficulty, a variety of proxy measures may be used which have varying limitations. As technological change is considered to be a contributor to productivity change, productivity is one of the proxy measures used, notwithstanding some of the complexity in quantifying the linkages between the two.[15,16] Productivity gains derived by the adoption of new technologies can have a number of effects on an industry. An industry may generate greater output with a given workforce or generate a given level of output with a smaller workforce.

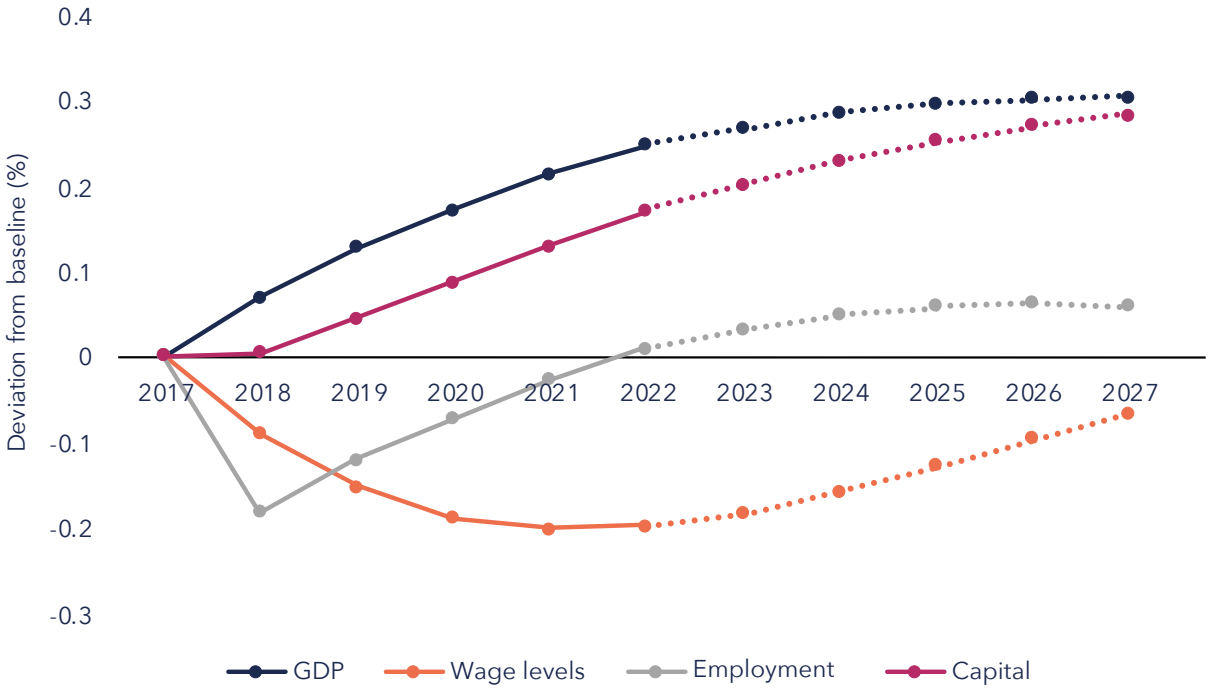
This scenario is designed to allow examination of the impacts of these potential technological advancements on the labour market in Queensland by imposing a permanent, unanticipated increase in labour productivity of 0.25 percentage points in all industries as a result of faster technological growth.[17]

Macroeconomic effects

The impact of this scenario on employment produces a small increase of 0.03 per cent by 2021–22 compared with the baseline. Two key economic effects help drive the employment result under this scenario – the initial fall in employment in response to the shock and the successive changes in growth of the elements[18] that make up the national Gross Domestic Product (GDP). The economic response to the increase in labour productivity in this scenario is illustrated in Figure 4 (page18).

15. Globerman S. (2000). *Linkages between Technological Change and Productivity Growth.* Occasional Paper Number 23. Retrieved from https://www.ic.gc.ca/eic/site/eas-aes.nsf/vwapj/op23e.pdf/$file/op23e.pdf.
16. In their publication, *6102.0.55.001 - Labour Statistics: Concepts, Sources and Methods*, the ABS defines productivity as referring to the amount of product (or output) produced given a certain amount of resources (or input). The factors of production, such as labour, capital or raw materials, may be measured individually or in combination.
17. For more information, see Appendix B.
18. These are household consumption, business investment, government expenditure, exports and imports (ABS. (2015). *5216.0 Australian System of National Accounts: Concepts, sources and methods).*

Figure 4: National macroeconomic effects of an increase in labour productivity compared with baseline[19]



Because the productivity improvement is not expected, business is unable to quickly adjust the assets it uses to produce its goods and services (capital stock) but it is able to adjust the workforce required to produce those goods and services. This leads to an initial drop in employment and also means that the average wage level declines as demand for labour weakens compared with the available workforce. The fall in wages leads to increased competitiveness among industries such as Manufacturing; and Agriculture, Forestry and Fishing, resulting in cheaper exports and leading to growth in volumes.

Business investment in capital then increases due to the cost savings made possible through the productivity shock. Generally, businesses become more productive due to the increased investment and, as they expand their output, increase employment.

The other components of GDP respond quite differently. Household consumption and imports decline due to the initial fall in employment and the lowering of average wages. However, as employment growth recovers over subsequent years through growth in investment and exports, growth in household consumption and imports eventually follows. For the purposes of this scenario, growth in government expenditure is assumed to remain unchanged from the baseline projections.

As these economic adjustments occur over a longer time period than the modelling period, this means that by 2021–22, the impact of the productivity shock on overall employment in Queensland is small. There are more notable differences between industries, regions and occupations.

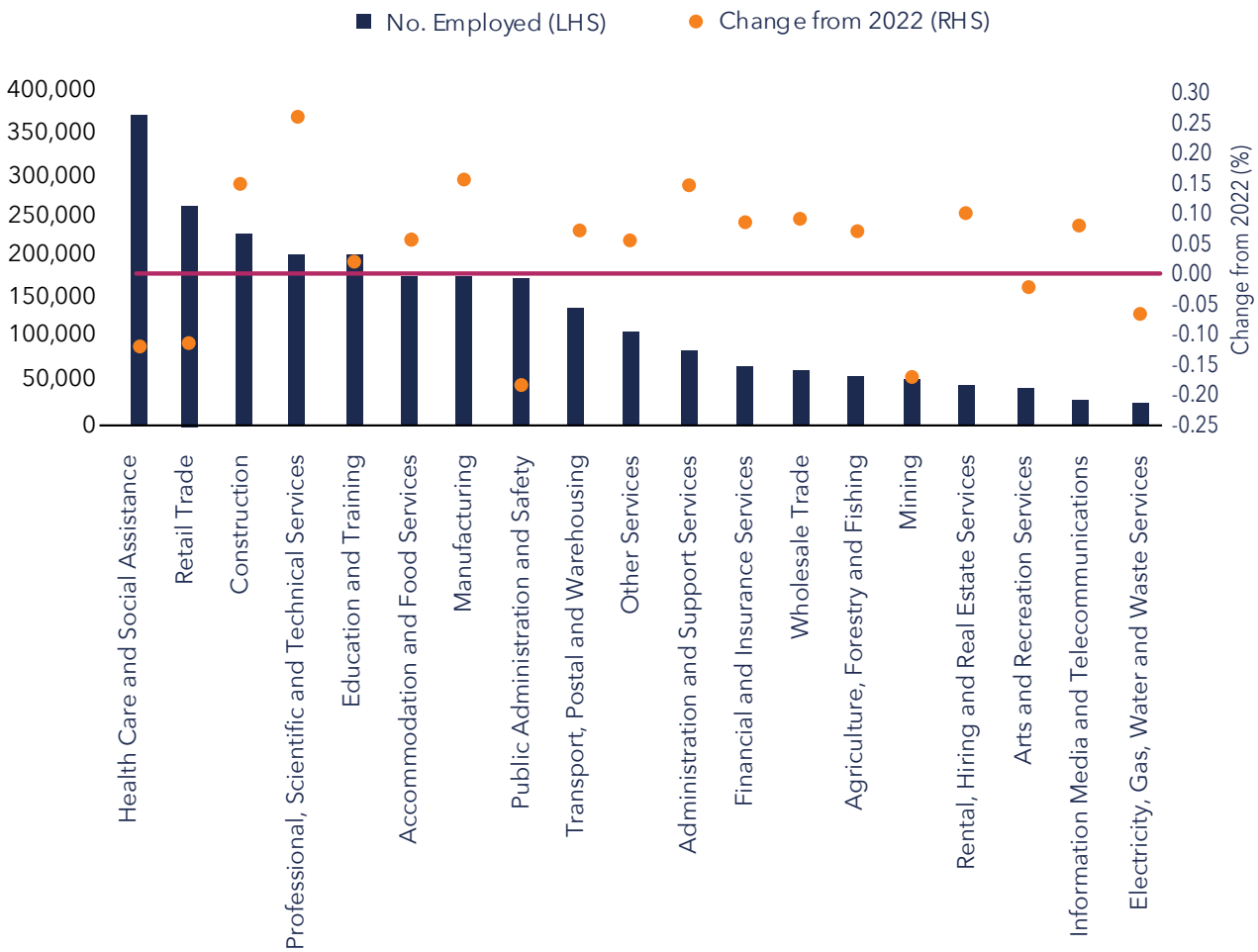
19. This productivity shock takes several years to work through the model, so results are shown to 2027, five years beyond the Jobs Queensland forecast period.

Results

- While this scenario is projected to cause an initial fall in employment, its impact is minimal over the five years to 2022.
- Trade-exposed industries (with the exception of Mining) experience above average growth under this scenario.
- One-third of all regions are projected to experience employment growth above the state average, due to the industry composition of those regions.
- The greatest occupational growth under this scenario is in Technicians and Trade Workers due to the expansion of industries such as Construction, Manufacturing, and Other Services.

Under this scenario, it may seem reasonable to assume that the initial impact of this productivity improvement might be that employment in each industry falls by 0.25 per cent. However, the impact of this scenario is minimal, although the impacts on industry employment vary, because an industry may use the productivity boost to expand output or to reduce employment. Figure 5 below illustrates the different responses of individual industries to the scenario.

Figure 5: Employment under Scenario One and change (%) from 2022 baseline



Trade-exposed industries such as Manufacturing; Agriculture, Forestry and Fishing; and even Education and Training, experience employment growth greater than the 2022 baseline figure due to the effects of increased exports described in the previous section. An exception to the expansion of employment in the trade-exposed industries is Mining (in this scenario, it is assumed that mining prices remain at the baseline level). Mining is a very capital-intensive industry, therefore any cost savings resulting from improved labour productivity would be minimal and have a smaller effect on the expansion of exports. Anecdotal feedback about technological developments in the Mining industry (e.g. autonomous vehicles) suggests that increased capital investment may reduce labour demand in this industry, which may be reflected in this result.

As the macroeconomic effects of this scenario wash through the economy and firms begin to invest in capital, employment in the Construction sector benefits from increased demand for building stocks such as offices and warehouses. The Professional, Scientific and Technical Services industry is more than 500 people larger under this scenario. This industry provides intermediate inputs, such as legal and accounting services, to almost every part of the economy, so it benefits from the general expansion in GDP, as well as its ability to absorb workers with suitable skills from similar sectors (in particular Public Administration and Safety). Administrative and Support Services and Financial and Insurance Services also seem to benefit from increased GDP.

Employment in the industries of Health Care and Social Assistance, Retail Trade, and Public Administration and Safety is largely influenced by household consumption and government expenditure. While government expenditure is assumed to remain at baseline levels throughout the modelling period, household consumption initially falls under this scenario and only gradually recovers, dampening employment growth. This does not mean that total employment falls within these industries compared with the 2016–17 baseline figure, but rather that employment growth is not as great as it would have been under the 2022 baseline scenario.

Regions

While the overall effect on total employment by 2022 is small, the projected productivity increase results in mixed fortunes for employment within regions, reflective of their industry composition and the impact of this scenario on various industries.

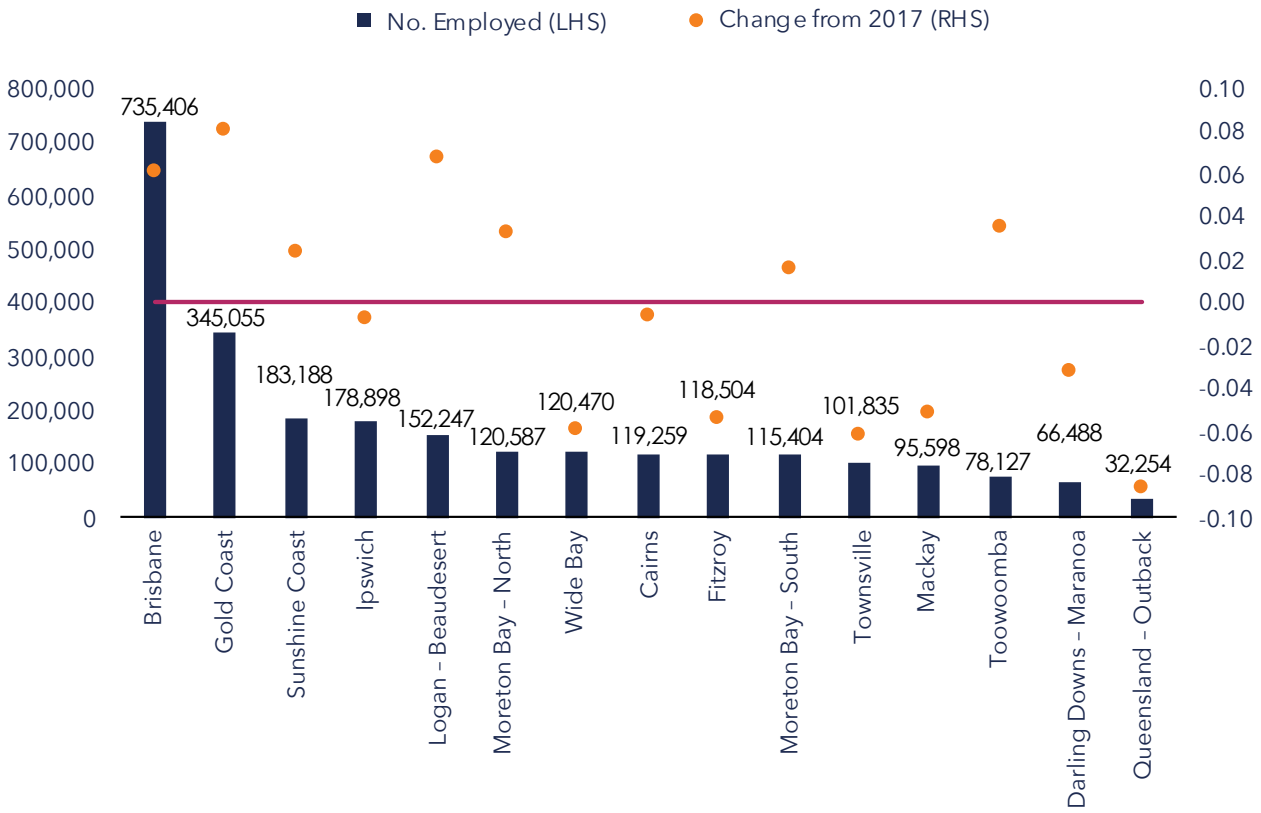
The Gold Coast would experience an employment increase above average (0.08 per cent), despite Health Care and Social Assistance and Retail Trade employing one-quarter of all Gold Coast workers. The slowing growth of these industries is offset by the expansion of employment in industries such as Construction; Manufacturing; Accommodation and Food Services; and Professional, Scientific and Technical Services, which employ about 120,000 people in this scenario.

Logan - Beaudesert would also benefit from the additional employment growth in Construction; Manufacturing; and Professional, Scientific and Technical Services. Brisbane's employment increases due, in part, to increased employment growth in Professionals, which comprises more than 12 per cent of the region's employment by 2022.

Although employment in Ipswich would receive a boost from a rise in Manufacturing, the region's overall employment growth is constrained by weaker growth in Health Care and Social Assistance (the largest employer in the region), Retail Trade, and Public Administration and Safety.

The effects of a productivity improvement on Mining would negatively affect employment growth in the Fitzroy, Mackay and Queensland – Outback regions. Townsville and Wide Bay experience employment falls relative to the 2022 baseline, due to the proportion of employment in Health Care and Social Assistance and Retail Trade in these regions, (almost 30 per cent of total employment in each region).

Figure 6: Regional employment under Scenario One and change (%) from 2022 baseline



Occupations

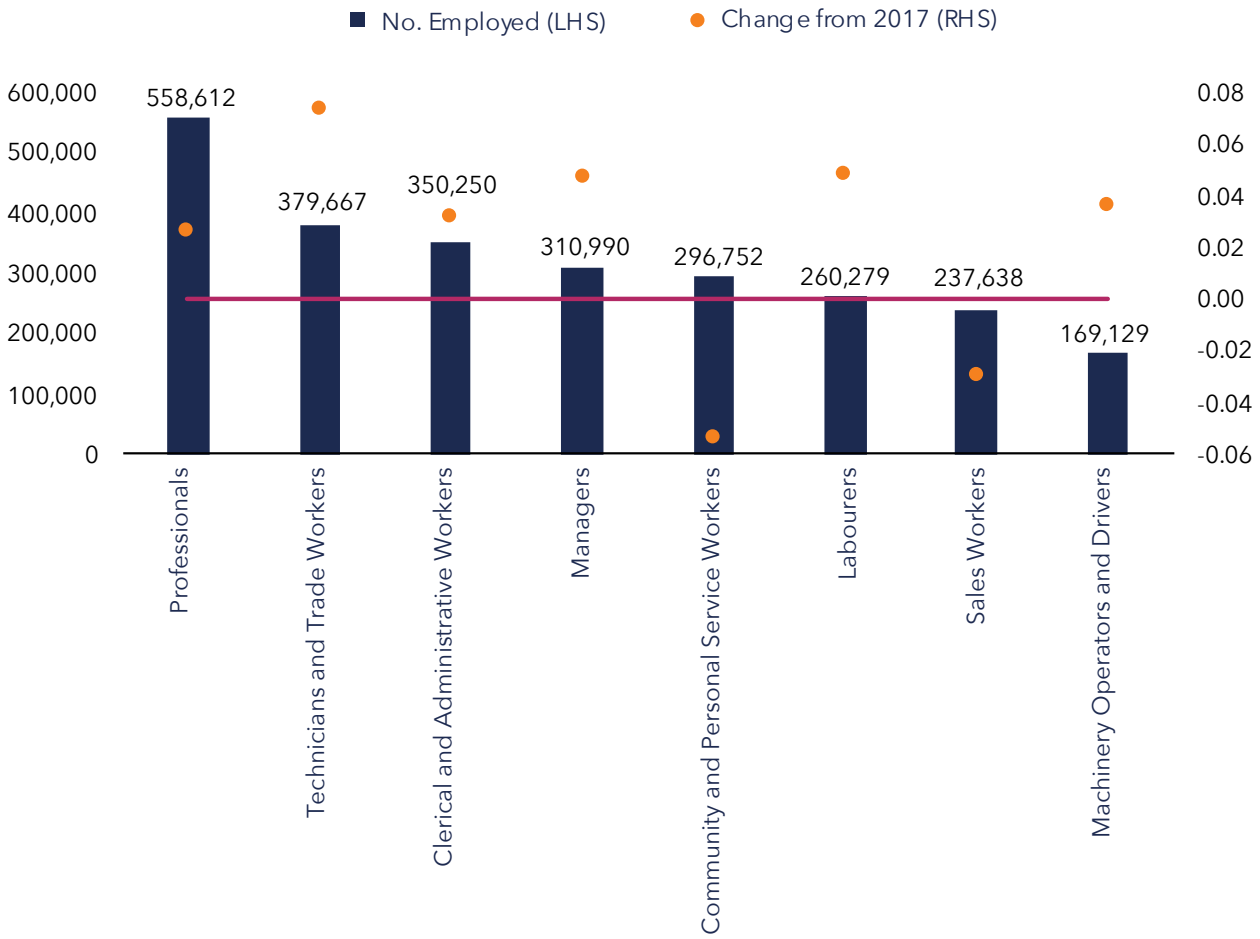
While growth for all occupations increased by only 0.03 per cent when compared with the 2022 baseline, employment in several occupational groupings exceeded this. There were 280 more Technicians and Trade Workers in this scenario than employed in the baseline, with Construction Trades Workers making up almost one-third of this increase. The number of Engineering, ICT and Science Technicians increased by 0.08 per cent in this scenario, in part because of the growth in Professional, Scientific and Technical Services.

The number of Labourers was 0.05 per cent greater in this scenario, with most of this growth due to an increase in Construction and Mining, Labourers, and Cleaners and Laundry Workers. More than half of all Cleaners and Laundry Workers are employed in Administrative and Support Services and Accommodation and Food Services, both of which grew above the average in Scenario One.

There were an additional 147 Managers employed in Scenario One. Growth in Agriculture, Forestry and Fishing results in the number of Farmers and Farm Managers increasing by 0.09 per cent while employment growth in Manufacturing and Construction generated additional employment of Construction Distribution and Production Managers.

The slower growth in Health Care and Social Assistance results in fewer Community and Personal Service Workers in this scenario, with 137 fewer Carers and Aides. Likewise, the slower employment growth of Retail Trade, compared with the 2022 baseline, results in a smaller number of Sales Workers.

Figure 7: Occupational employment under Scenario One and change (%) from 2022 baseline



In summary, the effect of this scenario on overall employment is minimal but individual industries, regions and occupational groupings are affected differently. With the exception of Mining, trade-exposed industries experience above average growth under this scenario, as do those regions with high levels of employment in those industries. The above average growth of industries such as Construction and Agriculture, Forestry and Fishing leads to above average growth in the employment of Technicians and Trade Workers, and Labourers.

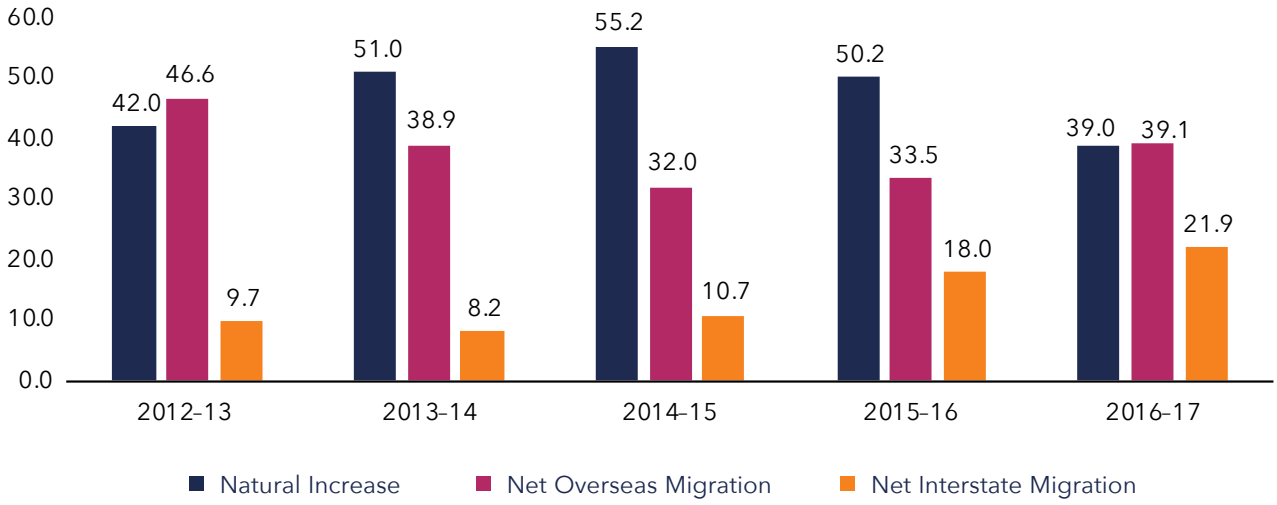
SCENARIO TWO
CHANGING WORKFORCE THROUGH MIGRATION

2

An increase in net interstate migration to Queensland of 30,000 beginning in 2018; while international migration remains at 23,000 per annum over the forecast period. The additional interstate migration is assumed to have the same age profile as existing net interstate migration into Queensland.

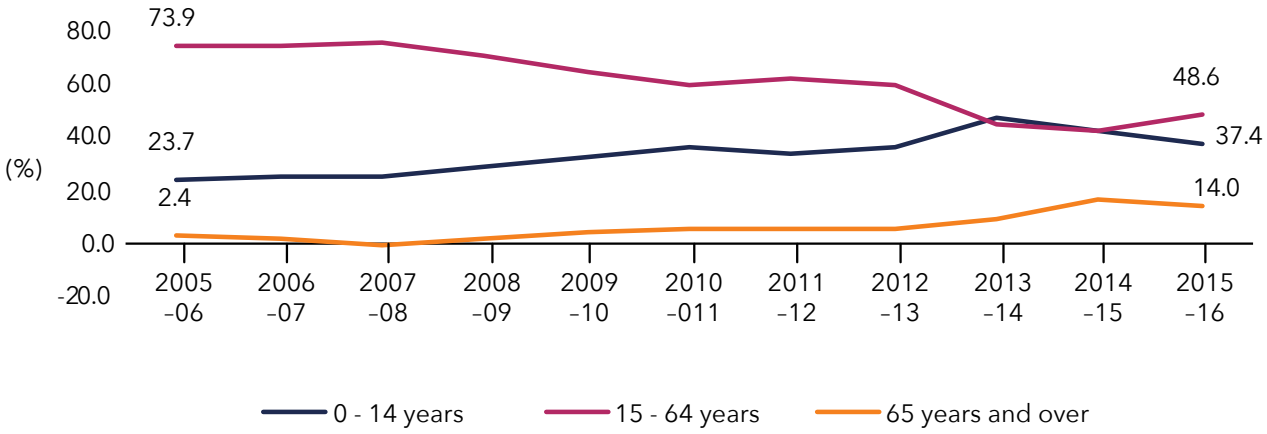
Migration is important to Queensland industries in both driving demand for goods and services and in supplementing the local workforce. In 2005–06, more than 26,000 people moved to Queensland from interstate, but this number fell as the mining boom ended. By 2013–14, fewer than 6000 people moved to Queensland from the other states. However, interstate migration began to increase the following year and in 2016–17, almost 17,500 people migrated to Queensland from other states. As interstate migration grew, its contribution to Queensland's population growth also increased while the proportion of population growth attributed to natural increase declined.

Figure 8: Composition of population growth (%), Queensland, five years to 2016–17



Another important factor impacting the workforce is the changing age composition of interstate migration. In 2005–06, almost three-quarters of all interstate migrants were of working age; by 2015–16 this proportion had fallen to below 40 per cent. In comparison, the proportion of interstate migrants aged 65 and over grew from 2.4 per cent in 2005–06 to a peak of 16 per cent in 2014–15. The 0 – 14 age group also increased from about 24 per cent in 2005–06 to more than 37 per cent in 2015–16.

Figure 9: Composition of interstate migration (%), Queensland



This change in the age distribution of the interstate migration profile not only reduces the size of the working population moving to Queensland, but also increases demand for various services, such as aged and child care.

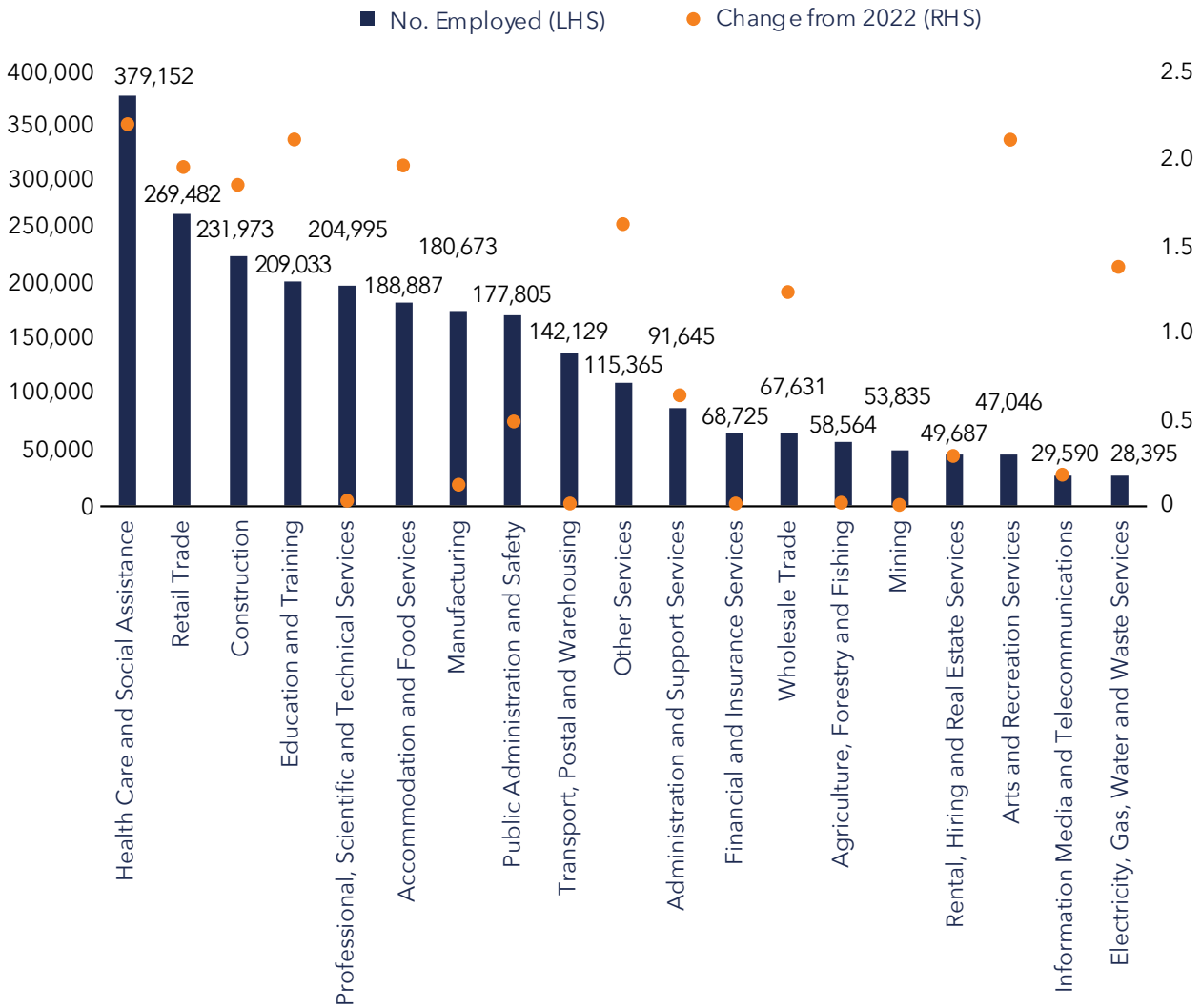
This scenario is designed to analyse the impact of these changes on workforce migration to Queensland. Interstate migration is increased to 30,000 in 2017–18 and is assumed to have the same age profile as existing interstate migration into Queensland. In essence, this means that the number of children (0 – 14 years) migrating to Queensland increases by 2.4 per cent each year; the working population grows by an average of 8.5 per cent each year; and the population of older interstate migrants grows at 13 per cent annually between 2018 and 2022. For the purposes of this scenario, international migration is held to 23,000 annually over the five years to 2022.

Results

- Employment is projected to increase by 1.2 per cent under this scenario compared with the 2022 baseline.
- Health Care and Social Assistance employs one-quarter of all new workers as an expanded population increases demand for local services.
- The Gold and Sunshine Coasts, Townsville and Cairns are projected to experience strong growth under this scenario, due to the size of their service industries.
- Employment for Community and Personal Service Workers, Sales Workers and Professionals is projected to increase by more than the state average due to the strong growth in the Health Care and Social Assistance, Retail Trade, and Education and Training industries.

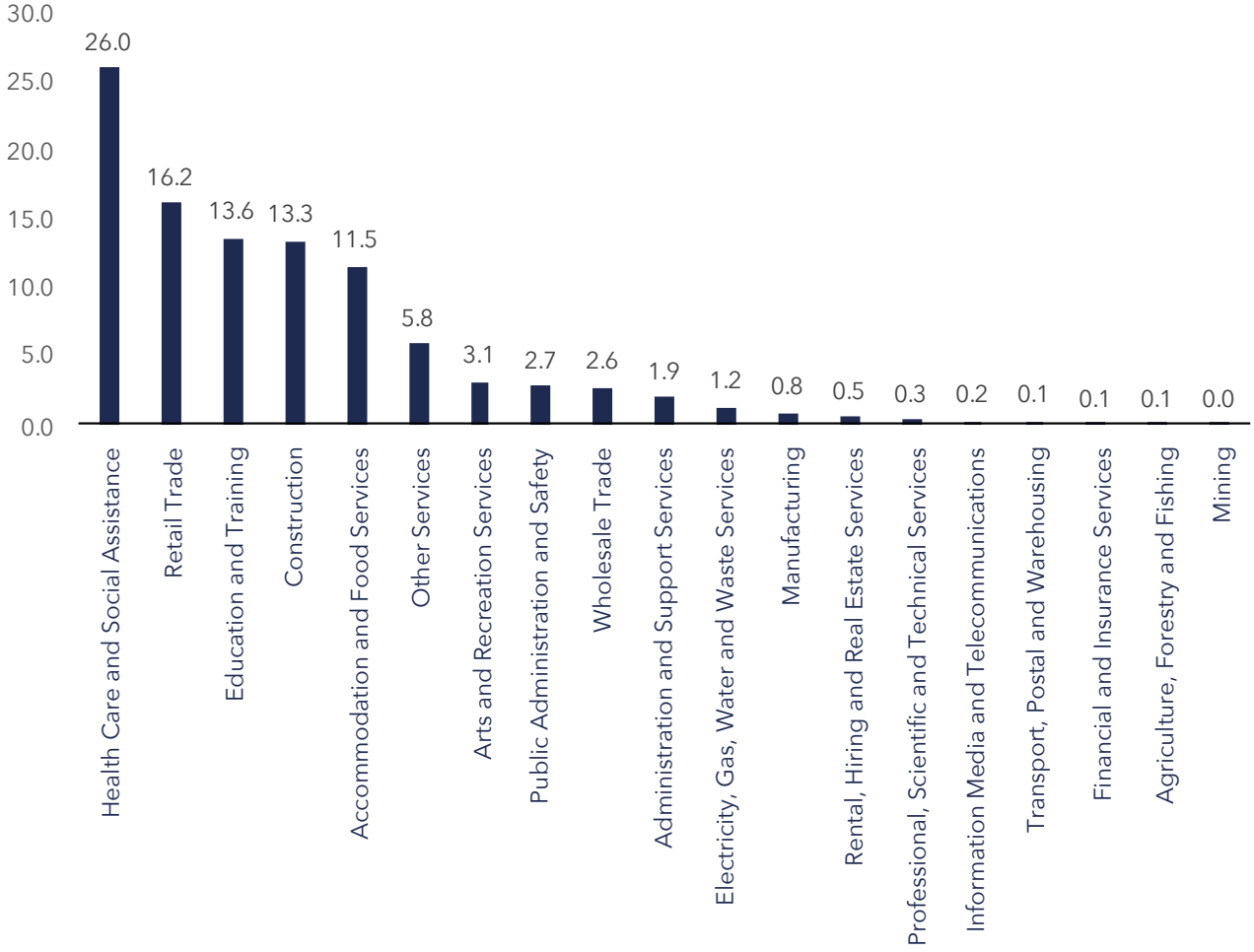
Under this scenario, the population of Queensland in 2021–22 is 77,000 people (or 1.45 per cent) larger compared with the 2022 baseline population figure. The additional population, spread across the state, creates demand for local services and sees employment increase by almost 32,000 people compared with the baseline employment figure.

Figure 10: Industry employment under Scenario Two and change (%) from 2022 baseline



More than 80 per cent of this new employment is in five industries: Health Care and Social Assistance; Retail Trade; Education and Training; Construction; and Accommodation and Food Services. Given the concentration of employment growth in these industries, growth in other industries is relatively subdued.

Figure 11: Contribution to additional employment (%) in Queensland by industry



Further analysis of the modelling shows how the Health Care and Social Assistance industry dominates growth under this scenario. Of the 10 industry groups employing the greatest proportion of additional workers, half are from that particular industry.

Table 3: Ten highest-growth industry groups under Scenario Two

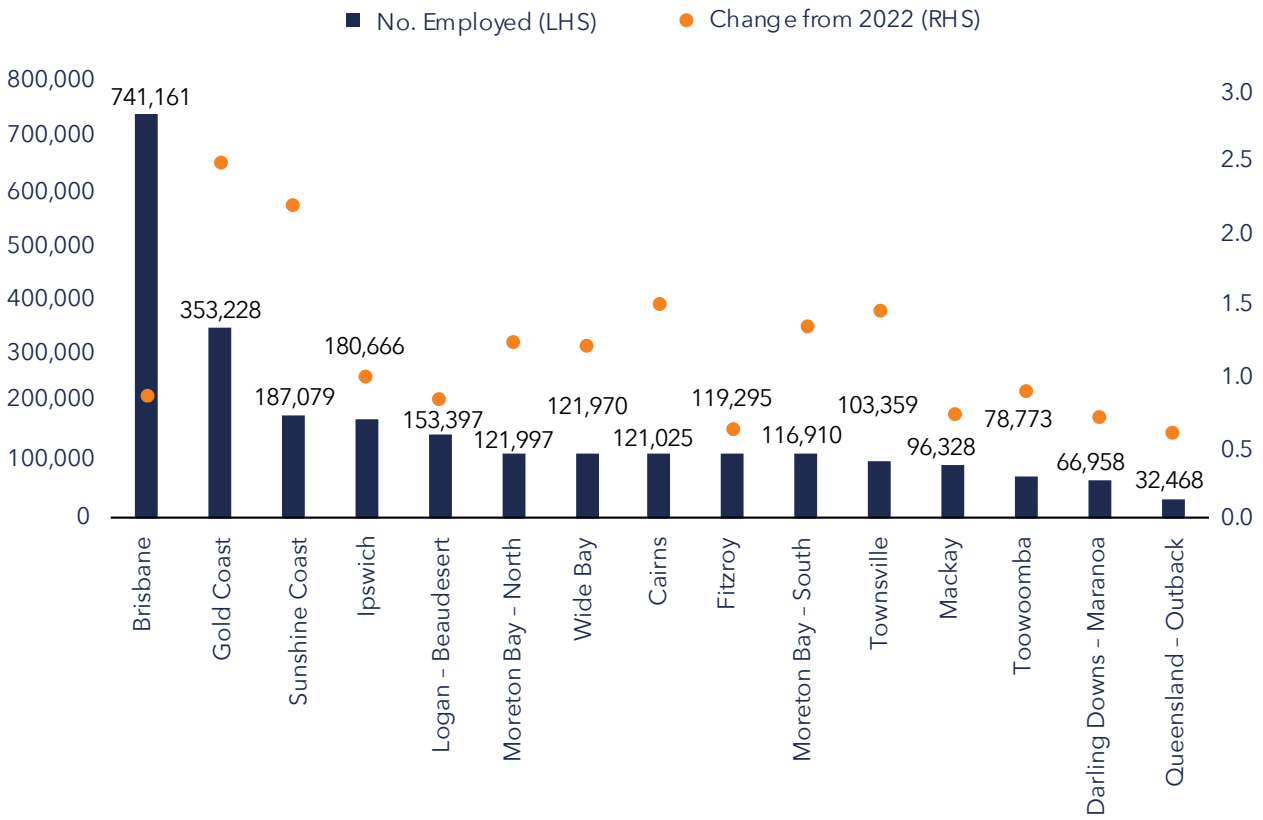
Industry group	Industry division	Contribution to additional workforce (%)
School Education	Education and Training	9.7
Cafes, Restaurants and Takeaway Food Services	Accommodation and Food Services	7.5
Hospitals	Heath Care and Social Assistance	6.3
Allied Health Services	Heath Care and Social Assistance	4.1
Residential Building Construction	Construction	3.9
Supermarket and Grocery Stores	Retail Trade	3.9
Medical Services	Heath Care and Social Assistance	3.8
Child Care Services	Heath Care and Social Assistance	3.7
Residential Care Services	Heath Care and Social Assistance	3.4
Building Installation Services	Construction	3.2

Regions

Under Scenario Two, the distribution of additional migrants is assumed to follow existing regional settlement patterns of interstate migrants. All regions gain an increase in employment under the scenario, but almost 30 per cent of the extra workforce is located in Brisbane. Nevertheless, the increase in employment (0.8 per cent) in Brisbane under this scenario compared with the 2022 baseline figure is modest compared with growth in the Gold Coast and the Sunshine Coast (2.5 and 2.1 per cent respectively). The Townsville and Cairns regions also experience relatively strong growth due to the size of service industries such as Health Care and Social Assistance, Retail Trade, and Education and Training. The Arts and Recreation Services industry also expands by almost 2.5 per cent in these regions, but this only represents an extra 80 people across the two regions.

Mackay, Darling Downs – Maranoa, Fitzroy, and Queensland – Outback are the regions which experience the lowest growth under this scenario. These regions tend to have lower proportions of employment in Health Care and Social Assistance and higher dependence on industries such as Mining; and Agriculture, Forestry and Fishing. For example, more than 40 per cent of people living in Queensland - Outback work in Public Administration and Safety; Mining; and Agriculture, Forestry and Fishing. Given the low growth rates for these industries under Scenario Two, it is not surprising that this region experiences the smallest increase of all the regions, with around 190 additional workers.

Figure 12: Regional employment under Scenario Two and change (%) from 2022



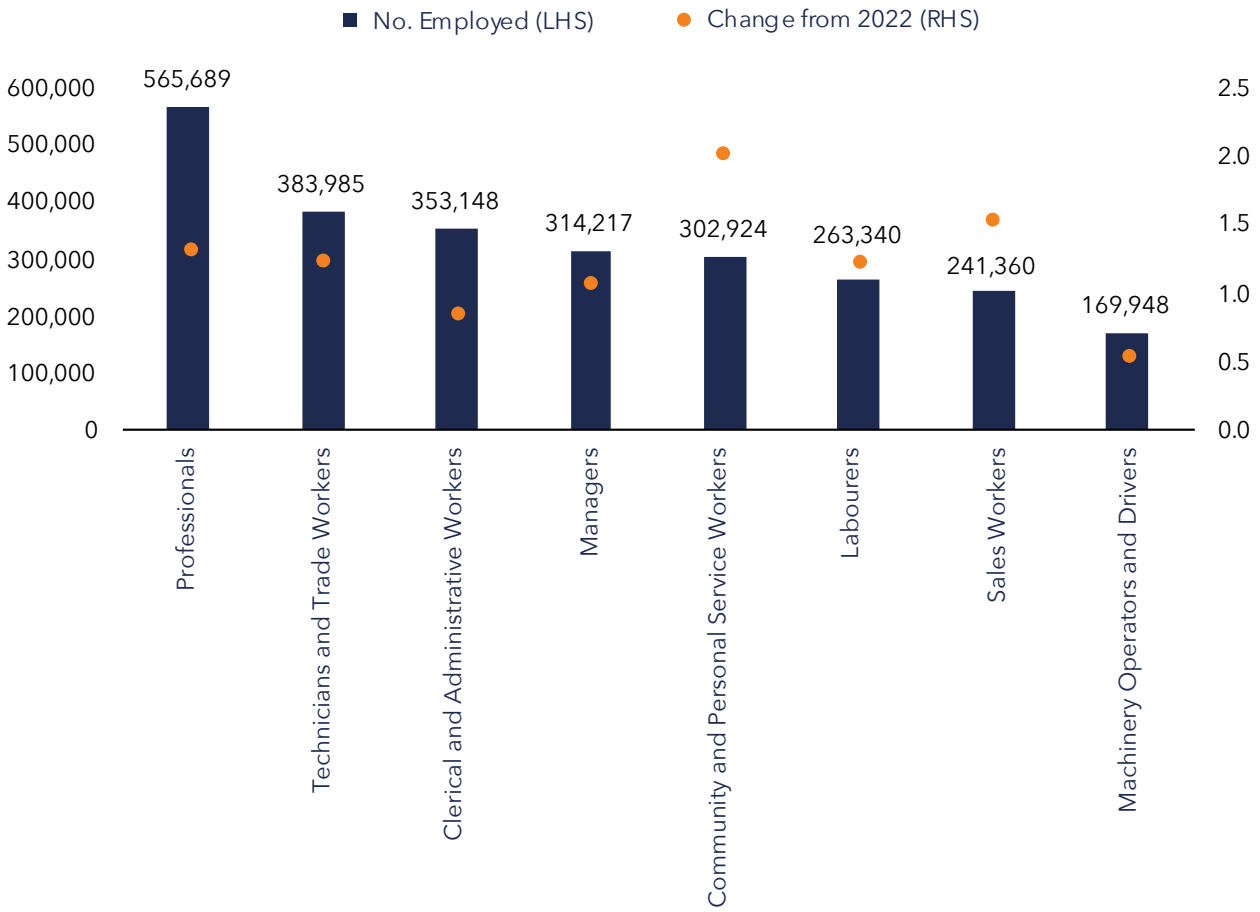
Occupations

While all occupations increase under this scenario, only three occupational groupings grow at a faster rate than the state average of 1.2 per cent – Community and Personal Service Workers, Sales Workers, and Professionals. Those employed predominantly in service industries experience the greatest growth. The expansion of the Health Care and Social Assistance industry sees Community and Personal Service Workers increase by two per cent when compared with the 2022 baseline. In this occupational group, the number of Child Care Workers is projected to grow by 2.8 per cent, while employment of Education Aides increases by 2.4 per cent.

Increased demand in the Retail Trade industry sees the number of Sales Workers grow by 3650 from the 2022 figure, with the bulk of the expansion in the largest occupation of Sales Assistants (General).

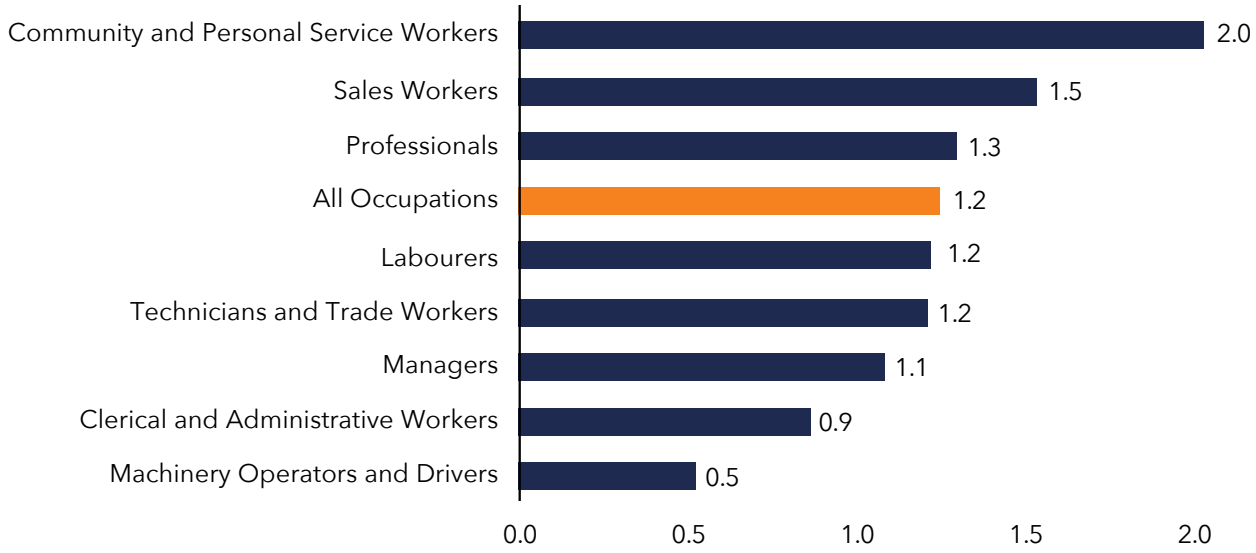
The relatively strong population growth at both ends of the age spectrum in this scenario leads to growth in the employment of Professionals, with School Teachers increasing by almost three per cent and Health Therapy Professionals, Medical Practitioners, and Midwifery and Nursing Professionals all increasing by more than two per cent compared with the 2022 baseline.

Figure 13: Occupational employment under Scenario Two and change (%) from 2022 baseline



Although the number of Managers increases under this scenario, the growth is slower than the occupational growth as a whole. While the number of School Principals and Child Care Centre Managers expands by three per cent under this scenario, limited impact on industries such as Agriculture, Forestry and Fishing; Financial and Insurance Services; and Manufacturing means that the growth of Farm, Production and Engineering Managers and Business Administration Managers is limited. Employment growth for Clerical and Administrative Workers and Machinery Operators and Drivers is also below the average for all occupations but numbers are still greater than those in the baseline.

Figure 14: Variation in occupational employment under Scenario Two compared with 2022 baseline (%)



An increased population with a lower proportion of those of working age leads to an increase of overall employment and an increase in demand for services for both the young and those 64 years and older. Employment in industries that service a domestic population, such as Health Care and Social Assistance, Retail Trade, and Education and Training, show very strong growth in this scenario, effectively displacing employment growth in industries such as Agriculture, Forestry and Fishing and Mining. The strong growth in these service industries results in above average growth in occupations such as Community and Personal Service Workers and Sales Workers.

As with the other scenarios, the industry composition and projected population growth of a region affects the impact that this scenario has on local employment. Hence regions such as the Gold and Sunshine Coasts experience above average employment growth as they have large service sectors, strong projected population growth and traditionally attract significant proportions of interstate migrants.

SCENARIO THREE
EXTERNAL IMPACT

3

Reduce the price of iron ore, coking coal and thermal coal by 50 per cent from their projected baseline values from 2017–18 to 2021–22.

After devising scenarios based on technological change and changing demographics, Jobs Queensland explored a number of external factors that might impact the continued growth of the Queensland economy.

External factors can arise through events such as Severe Tropical Cyclone (STC) Debbie, which affected industries across the state in 2017, or they may be the result of overseas events, such as changes in international benchmark fuel prices that affect local energy prices.

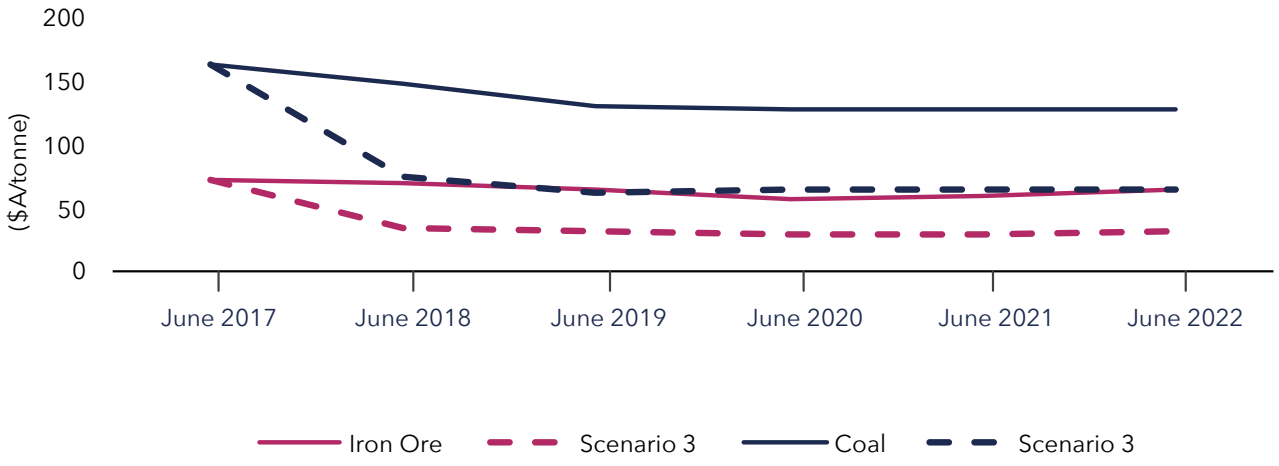
A number of potential themes and scenarios were discussed during workshops in late 2017 and a scenario involving commodity prices was identified as one having a significant impact on both the Queensland economy as a whole and individual industries, occupations and regions. As changes in the price of metallurgical coal are connected with changes in the price of iron ore, the price of iron ore is included in this scenario, which involves decreasing international prices for these commodities.

Coal contributes significantly to the Queensland economy, accounting for more than 90 per cent of exports from the resources industry and almost 45 per cent of the $66.5 billion in Queensland exports reported in 2016–17. [20]

The coal price projections applied in this scenario were calculated using the price and exchange rate projections from the Queensland Government's 2017–18 Budget Papers. Over the forecast horizon, coal prices are projected to be between $130 and $150 per tonne. Iron ore prices fell between 2011–12 and 2015–16 and over the forecast period are projected to be between $60 and $75 a tonne.

20. Queensland Government Statistician's Office. (2018). *Trade data – overseas exports by industry (4-digit ANZSIC 2006 edition) and country of destination, Queensland and other states and territories, 2007–08 to 2017–18 (preliminary).* Retrieved from http://www.qgso.qld.gov.au/products/tables/trade-data-overseas-exports-industry-anzsic/index.php.

Figure 15: Coal[21] and iron ore prices, baseline vs Scenario Three



Results

- Under this scenario, employment is 0.4 per cent lower than projected under the 2022 baseline, but still higher compared with 2017.
- The fall in the Australian dollar sees employment grow in Agriculture, Forestry and Fishing; and Manufacturing.
- Regions which depend on mining are projected to experience lower employment under this scenario.
- The impact of this scenario on Retail Trade, Mining, and Construction sees below average employment growth for Sales Workers, Technicians and Trade Workers, and Machinery Operators and Drivers.

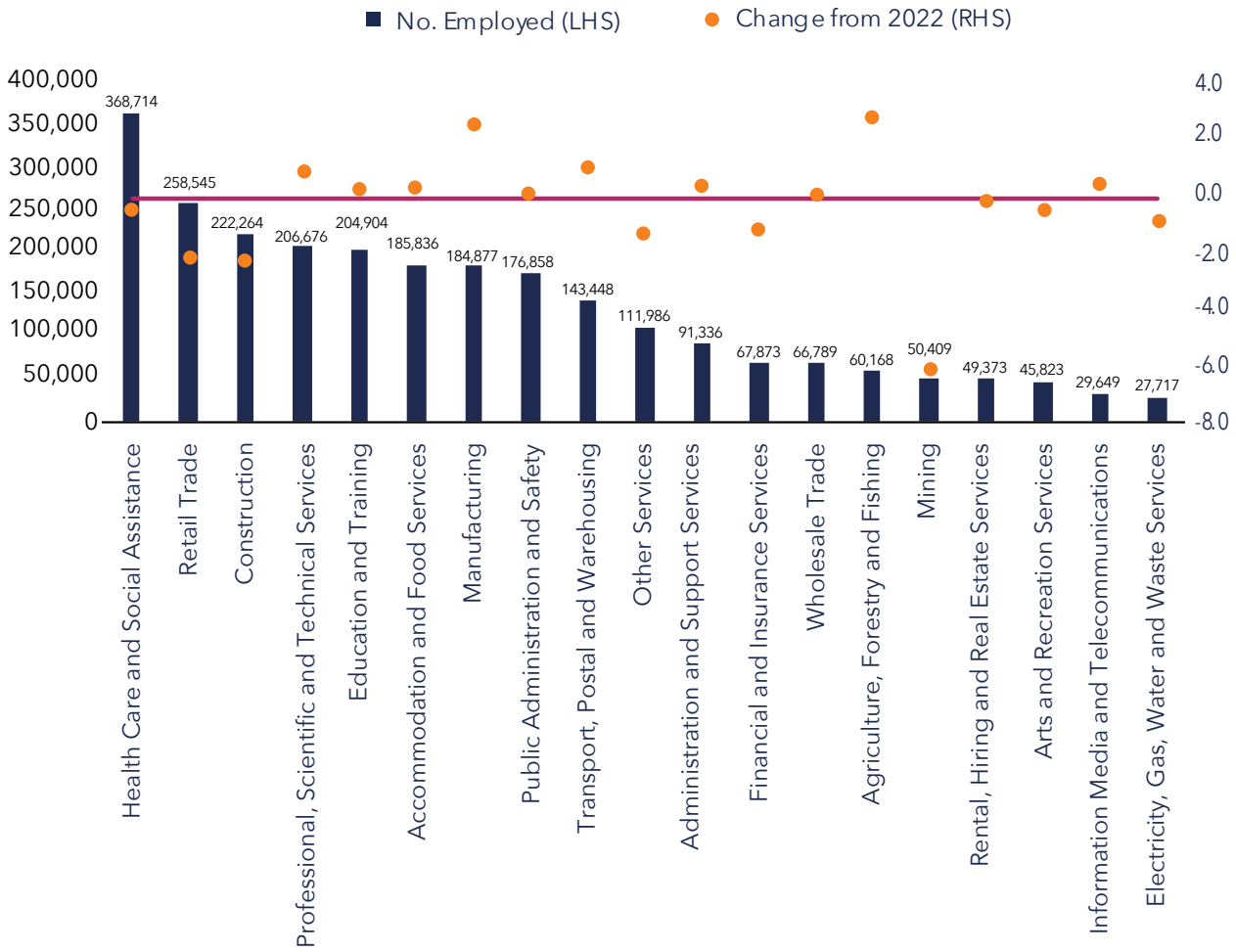
While the initial impact of a scenario like this is a decline in the value of Queensland's exports, it is the associated effects which have ramifications for the economy as a whole. The fall in commodity prices leads to a fall in the terms of trade (the ratio of Australia's average export price to its average import price), which leads to a loss of purchasing power for Australians purchasing imports. Company profits decline, with business investment and employment falling as a result. As the labour market weakens, real wages also decline, leading to a likely fall in household consumption. Government revenue declines and the exchange rate is expected to fall. Such a decline would have a secondary impact on the economy, with some sectors, such as tourism and agriculture, benefiting from the lower exchange rate through increased competitiveness.

Industries

Compared with the 2022 baseline scenario, overall employment under this scenario is lower by almost 9500 people. Unsurprisingly, employment in the Mining industry is most affected, with employment down by 3400 people (6.4 per cent) compared with 2022 baseline figures. The three largest employing industries in this scenario, Health Care and Social Assistance, Retail Trade, and Construction also grow more slowly, affected by lower household consumption. While industries serving the domestic market are generally negatively impacted under this scenario, export-oriented industries, such as manufacturing and agriculture, actually expand as they reap the benefits of the lower Australian dollar.

21. The model used for this project aggregates coking coal and thermal coal into one commodity, therefore weighted average prices for coal are provided, where the weights are shares of export value (approximately 60 per cent metallurgical coal, 40 per cent thermal coal).

Figure 16: Employment under Scenario Three and change (%) from 2022 baseline



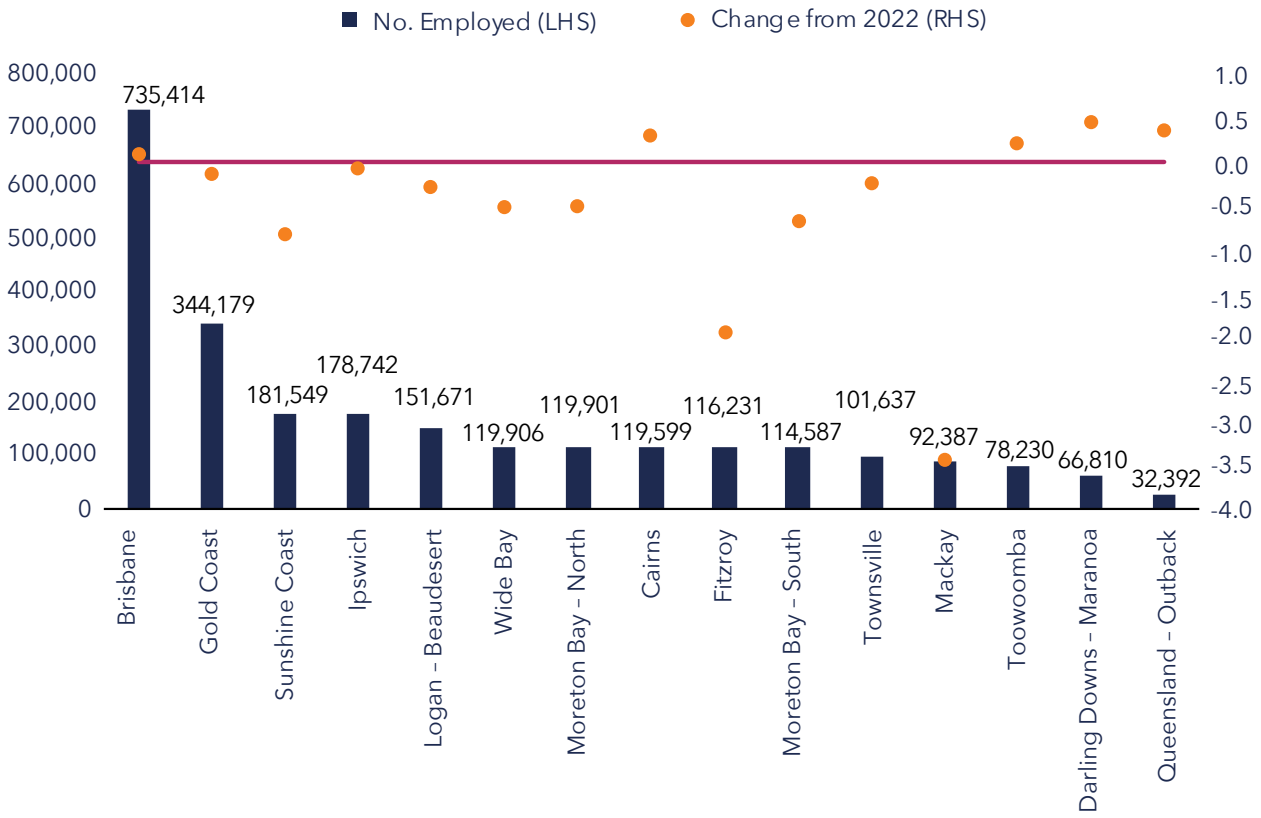
Regions

Regions that have relatively high proportions of the industries that are most vulnerable to this scenario are the ones which suffer the lowest projected employment. Employment in Mackay is actually projected to fall from the 2017 figure of more than 93,600 to about 92,400. This is not just due to its dependence on Mining, which makes up around 13 per cent of all employment, but also to the size of its Retail Trade and Health Care and Social Assistance workforce, which comprises more than 20 per cent of the Mackay workforce in 2022.

Nevertheless, employment opportunities are available in Manufacturing and Agriculture, Forestry and Fishing which together are projected to employ around 14 per cent of the Mackay workforce by 2022.

The composition of the workforce in Fitzroy, where more than 14 per cent are employed in Health Care and Social Assistance and almost seven per cent in Mining, sees employment around two per cent lower than projected under the baseline scenario, but still higher than the 2017 baseline.

Figure 17: Regional employment under Scenario Three and change (%) from 2022 baseline



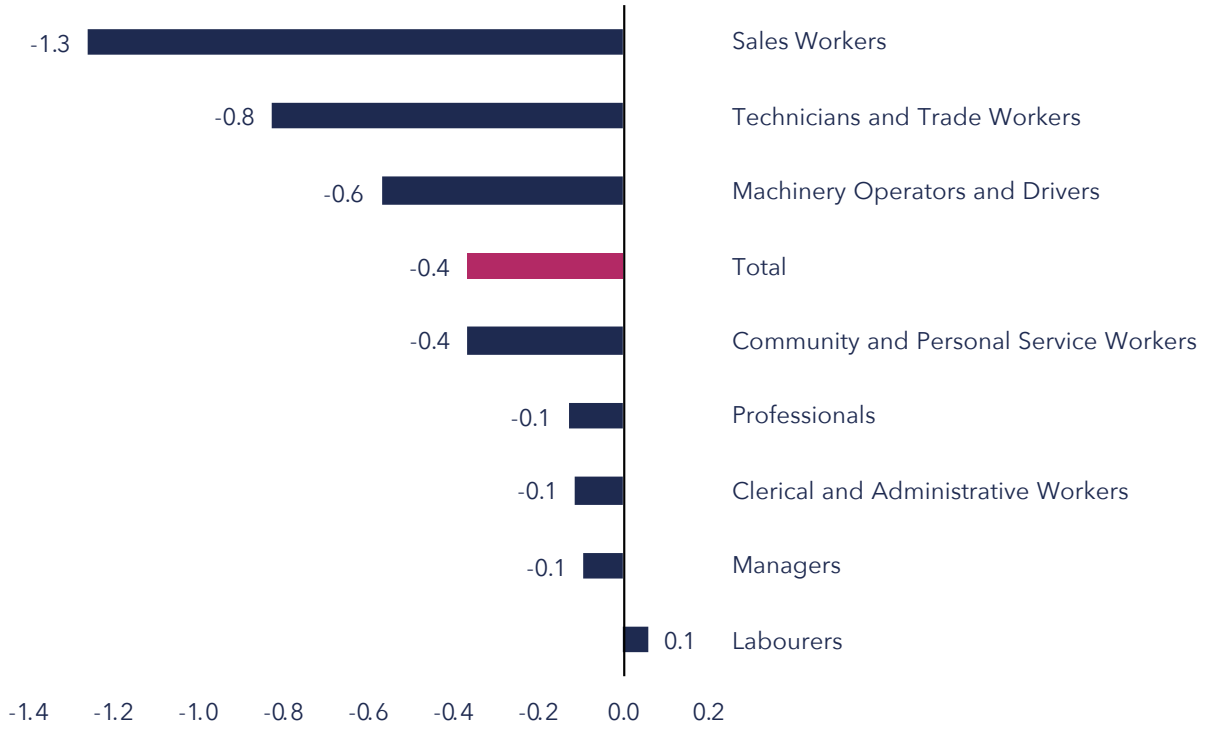
Mining is the second largest employer in Queensland – Outback (13.6 per cent) but Public Administration and Safety, which remains static, employs about 1300 more people. Agriculture, Forestry and Fishing; and Accommodation and Food Services, which both fare positively under this scenario, employ more than 7500 people in Queensland – Outback, while the Retail Trade and Health Care and Social Assistance workforces employ more than 4100 people combined. Toowoomba and Darling Downs – Maranoa also experience slight employment growth under Scenario Three. In Toowoomba's case, this is driven by a sizeable Education and Training industry and small mining sector. Almost 10 per cent of Darling Downs – Maranoa is employed in Manufacturing and both regions also employ relatively large numbers of people in Agriculture, Forestry and Fishing.

Occupations

While employment growth in most occupations is lower under this scenario compared with the 2022 baseline, only three occupational groupings grow more slowly than the state average of -0.4 per cent: Sales Workers, Technicians and Trade Workers, and Machinery Operators and Drivers. The effect of a fall in commodity prices on Retail Trade sees almost 3000 fewer Sales Workers employed under this scenario, while the contraction of Construction also sees a fall in the number of Technicians and Trades Workers. Employment of Construction Trades Workers, which make up around one-third of this group, is 2.1 per cent lower than the 2022 baseline under this scenario. The decline in Machinery Operators and Drivers is a direct result of the fall in Mining employment.

Labourers is the only occupation which is larger when compared with the 2022 baseline, but the difference is only about 150 people and can be attributed to an increase in the employment of Cleaners and Laundry Workers; Factory Process Workers; and Farm, Forestry and Garden Workers – all of whom are predominantly employed in those industries which fare relatively well in this scenario.

Figure 18: Variation in occupational employment under Scenario Three compared with 2022 baseline (%)



The fall in commodity prices in Scenario Three has a generally negative effect on employment in Queensland. Although employment is projected to be higher than it was in 2017, it does not grow as strongly when compared with the 2022 baseline.

Understandably, employment in the Mining industry is projected to decline under this scenario, but the overall economic affect also sees employment growth slow across those industries servicing the domestic economy, while the fall in the Australian dollar benefits trade-exposed industries. Only those regions with low levels of employment in Mining and relatively significant high levels of employment in trade-exposed industries experience employment growth.
The generally negative economic impact of Scenario Three also sees employment in most occupational groups lower when compared with the 2022 baseline.

QUALIFICATIONS AND SCENARIOS

The qualifications data used in the baseline scenario are derived from the Australian Bureau of Statistics Survey of Education and Work (see Appendix D), with changes attributed to a cohort effect and an acquisition effect.[22] The cohort effect assumes that everyone in the workforce carries along their existing qualification level and field of education as they age. For instance, each year a proportion of the 15 – 19 year cohort moves up into the 20 – 24 year cohort, contributing to the qualifications recorded for that group. The cohort effect is calculated by assuming that a proportion of each demographic will retain their qualification level from one year to the next. The qualification figures in this report refer only to the highest qualification level obtained by a worker and is not cumulative.

In Queensland, 7.9 per cent of those in the 20 – 24 year workforce have a Bachelor Degree, yet in the 25 – 29 cohort, this proportion rises to 13.7 per cent.[23] This difference between the cohort effect and the actual number of qualifications is accounted for by the acquisition effect, which assumes that a proportion of each demographic will acquire new qualifications.

Age and sex estimates for both qualification acquisitions and population projections are combined to inform the skill projections in this report, in conjunction with the occupational modelling. Due to the way the modelling has been conducted, actual qualification numbers differ across scenarios but there is minimal difference between the scenarios and the 2022 baseline in terms of proportions.

Results

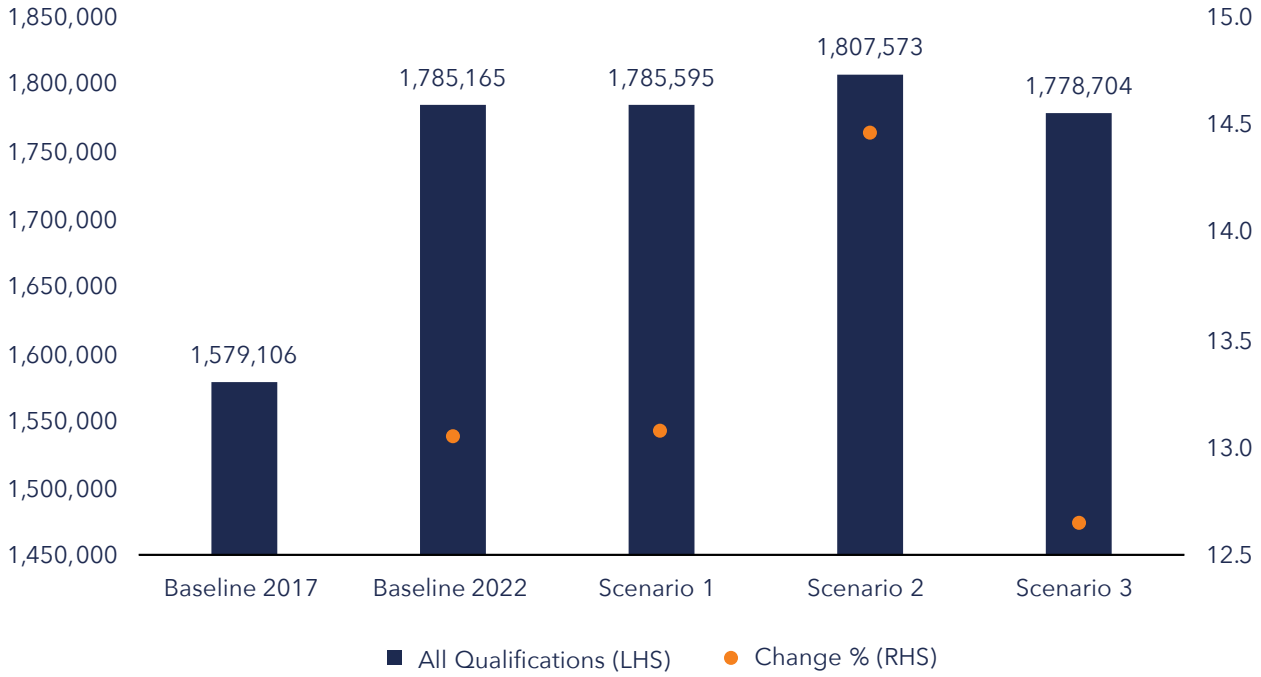
- Under every scenario, the workforce becomes more educated, with the proportion of workers without post-school qualifications projected to fall by between one and 2.6 per cent from 2017.
- The number of workers with a Certificate increases by between 7.4 and 9.8 per cent and remains the largest qualification group in the labour force.
- Under each scenario, the smallest group is projected to be workers with Graduate Diploma or Graduate Certificate qualifications.
- Bachelor-qualified workers are projected to make up over one-third of all new qualifications.
- The number of workers with Postgraduate qualifications is projected to increase by the greatest proportion across all scenarios.
- Management and Commerce is projected to remain the largest field of education in 2022.
- The proportion of the workforce with Society and Culture qualifications is projected to grow by the largest rate, followed by those with Creative Arts qualifications.
- Management and Commerce is projected to be the largest field of education possessed by those with Postgraduate, Bachelor and Advanced Diploma and Associate Degrees.
- Education is projected to be the largest field of education possessed by those with Graduate Diploma and Graduate Certificate qualifications.
- Under all scenarios, more than one-third of Certificate-qualified workers are projected to have an Engineering and Related Technologies qualification by 2022.

22. Dixon. Janine. (2017). *Victoria University Employment Forecasts 2017 edition.* CoPS Working Paper No.G-277. Retrieved from https://www.copsmodels.com/ftp/workpapr/g-277.pdf.
23. ABS. (2016). *Census of Population and Housing - Counting Persons, Place of Usual Residence, Age in Single Years and State.* Findings based on use of ABS TableBuilder data.

Qualification levels

Under the baseline scenario, it is anticipated that by 2022 there will be an additional 206,000 qualified workers in Queensland, with more than one-third of these new qualifications at Bachelor Degree Level. The greatest increase in total qualifications occurs under Scenario Two, which projects an increase of almost 22,500 extra qualifications from the 2022 baseline figure. Growth is not as robust under Scenario Three with total qualifications around 6500 below the 2022 baseline.

Figure 19: Total qualifications and change (%) compared with 2017, Queensland, all scenarios



Under all scenarios, the largest increase in qualifications is at Postgraduate Level, which is projected to expand by between 25.8 per cent (Scenario Three) and 27.6 per cent (Scenario Two) between 2017 and 2022. As older people retire, the number of workers without any post-school qualifications will fall. The workforce will be more educated and employed in professional and managerial occupations, primarily in service industries. Nevertheless, around 30 per cent of the workforce is projected to be without qualifications under each scenario.

Figure 20: Number of workers with qualifications and change (%), 2017 and 2022, Queensland

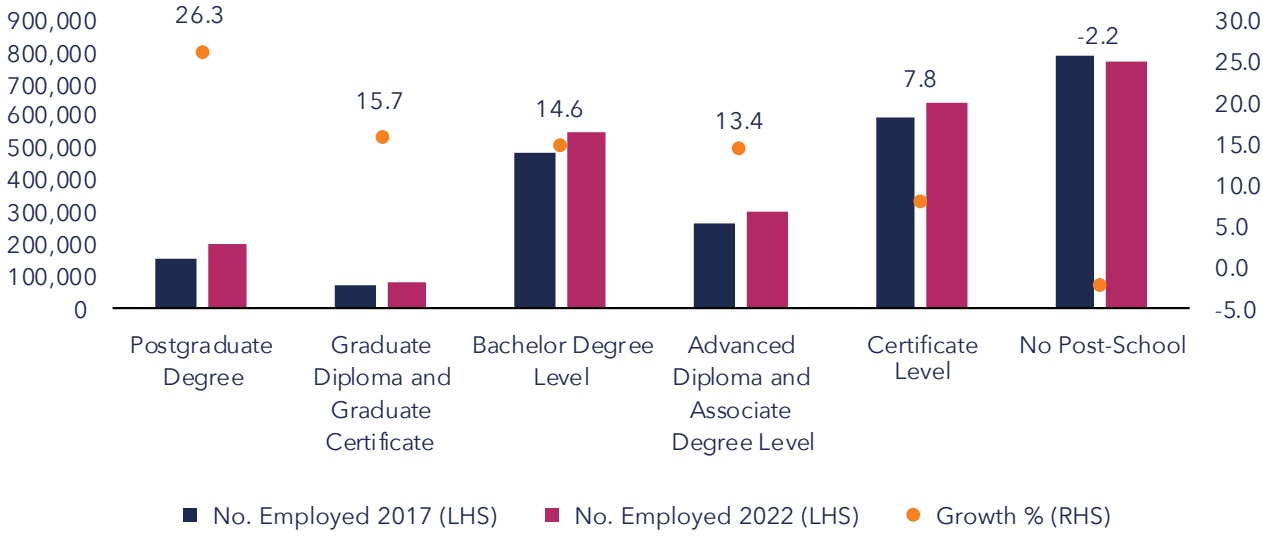
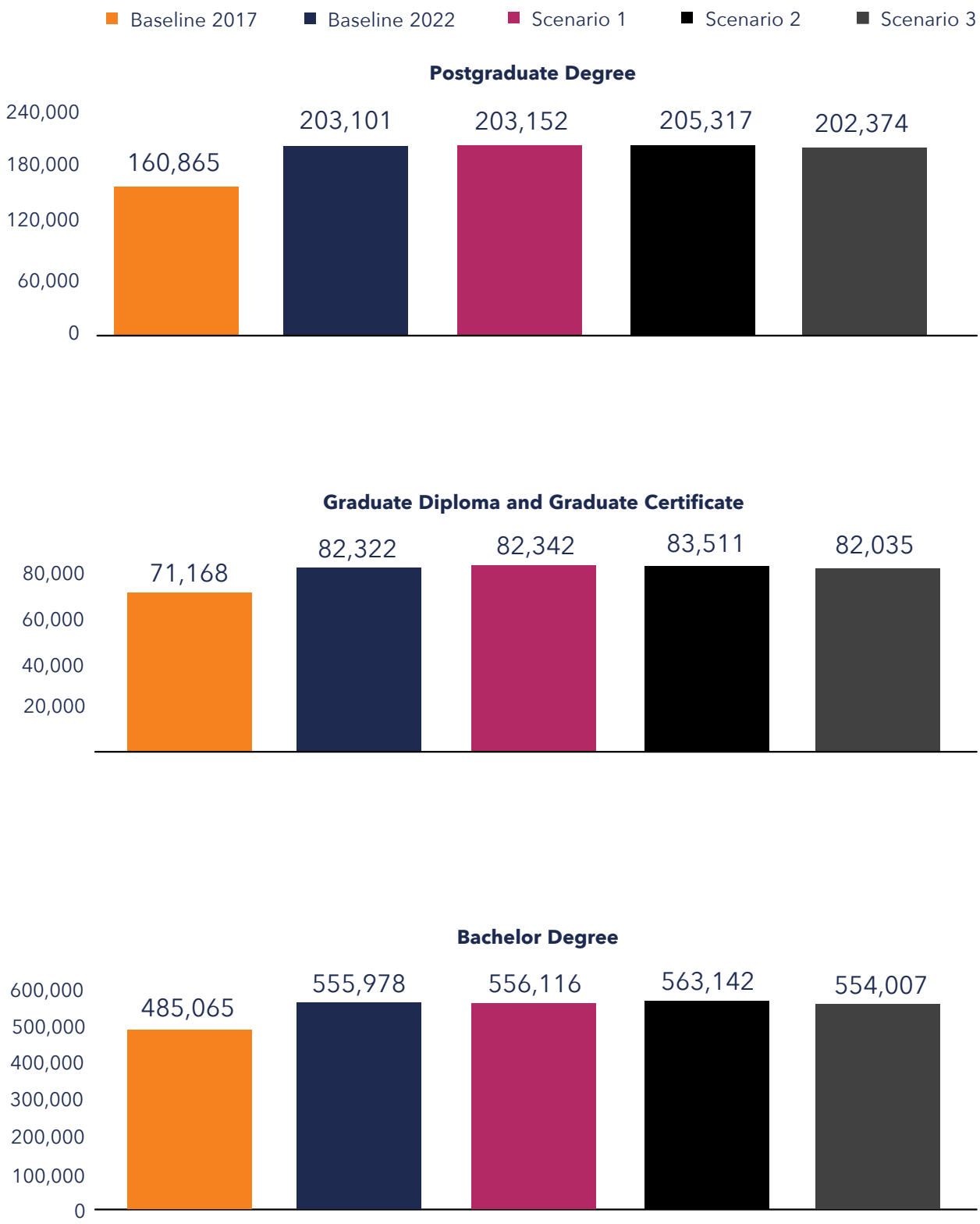
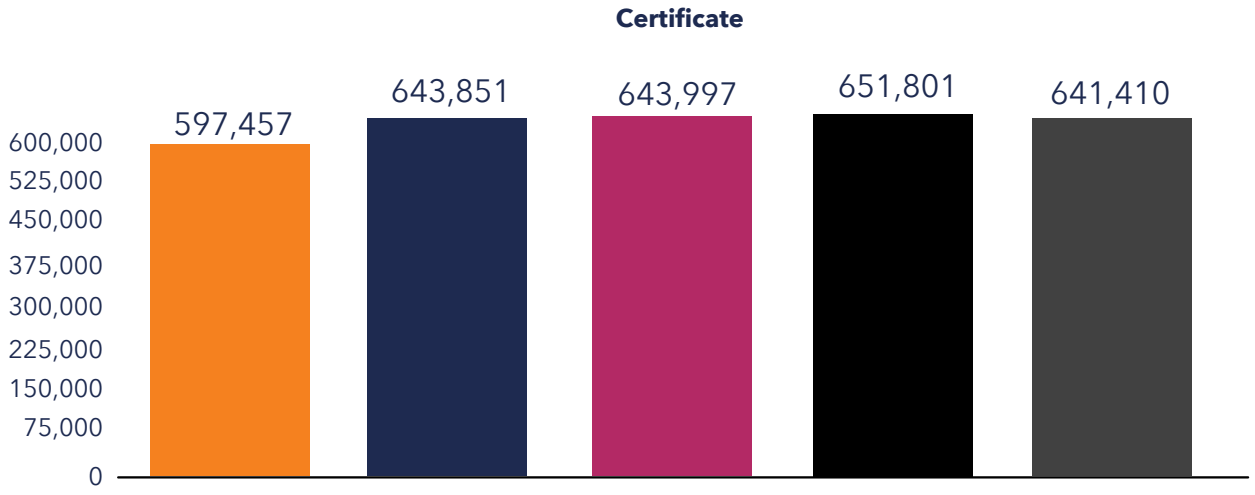
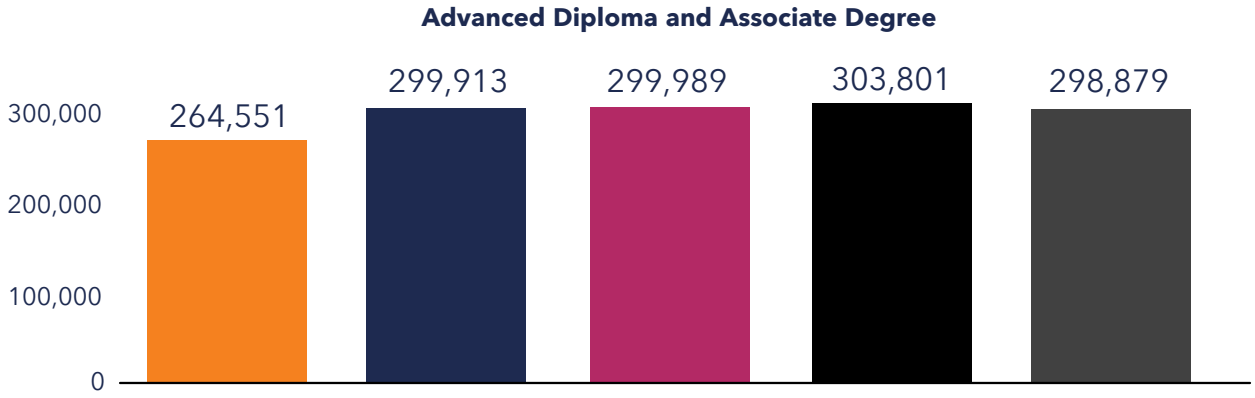
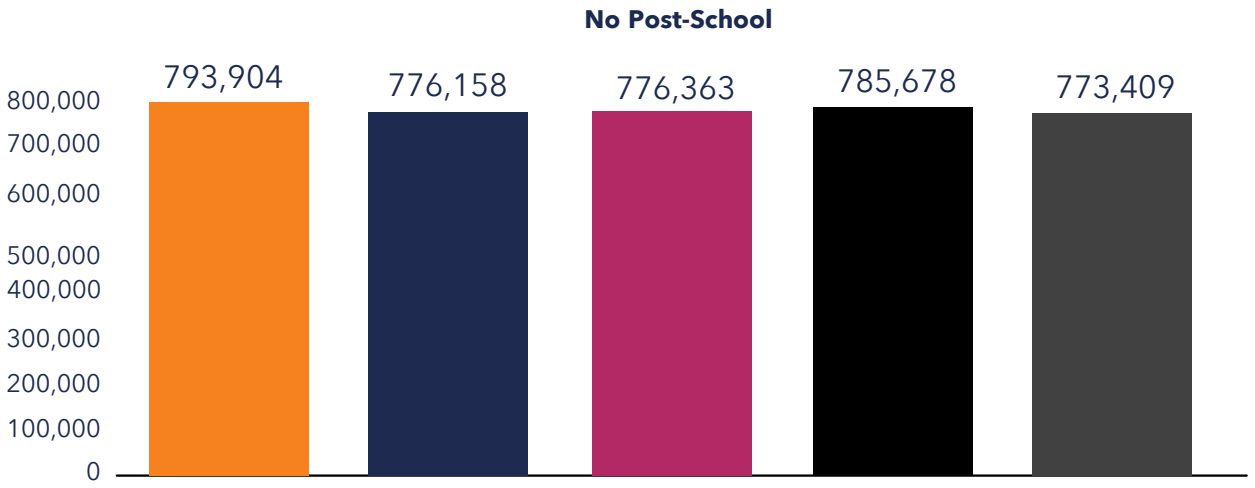


Figure 21: Workforce with various qualifications, all scenarios









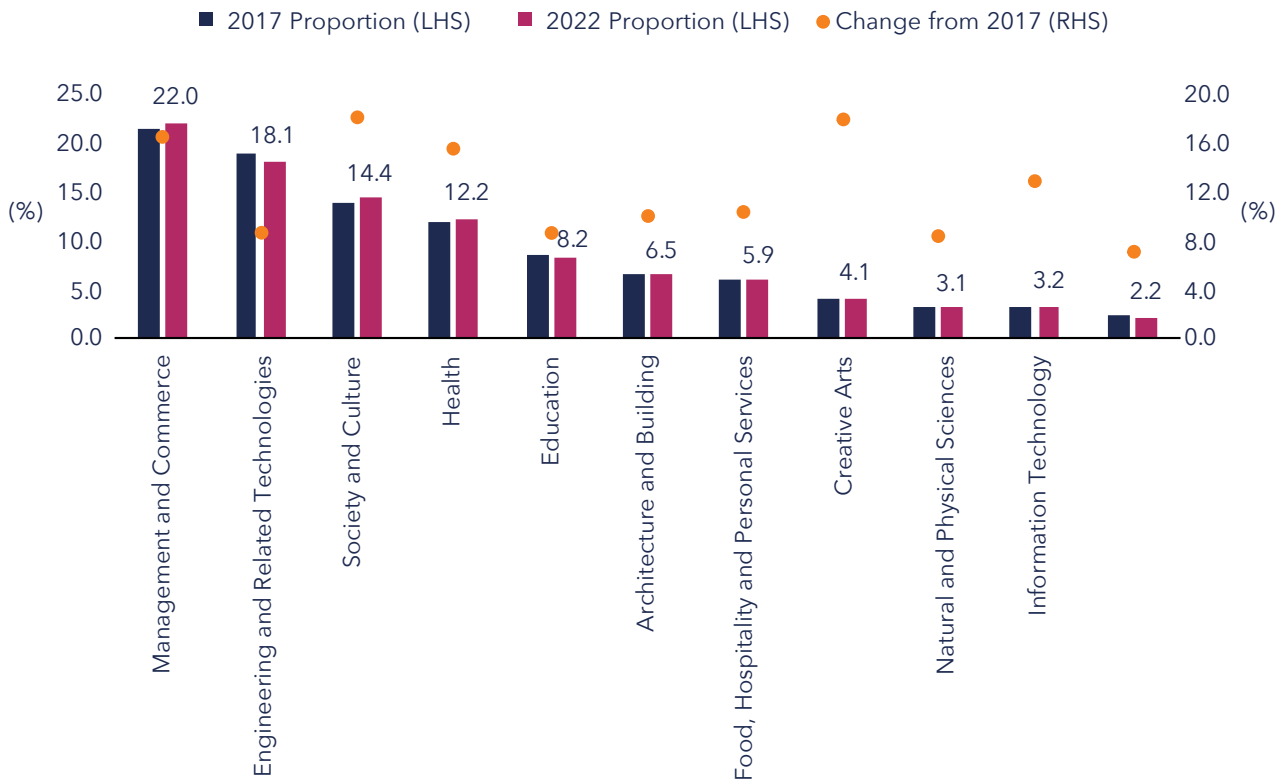
Modelling shows that around one-quarter (or around 650,000 people) of the workforce are projected to have Certificate qualifications and, this remains relatively unchanged across all scenarios. Around one-fifth of the workforce are projected to have a Bachelor Degree, 12 per cent to have an Advanced Diploma or Associate Degree, eight per cent to have Postgraduate qualifications and just over three per cent are projected to have a Graduate Diploma or Graduate Certificate.

Field of education

Of the workforce with qualifications in 2017, around 21 per cent possessed Management and Commerce qualifications and this is projected to increase slightly by 2022 under all scenarios. Almost half of these qualifications are in Business and Management and around one-fifth in Accounting. At 18.1 per cent, Engineering and Related Technologies is the next largest field in 2022, however this proportion actually falls slightly from 2017; it is dominated by Electrical and Electronic, Mechanical and Industrial, and Automotive Engineering.

Almost 15 per cent of all qualifications in 2022 are in Society and Culture with about one-third of these qualifications in Human Welfare Studies and Services which includes fields such as Social Work, Aged and Disability Care, and Youth Work. Health qualifications make up more than 12 per cent of all qualifications in 2022, and almost half of these are in Nursing. Education rounds out the top five with about eight per cent of all qualifications. It should be noted that the proportion of Health and Education qualifications increases slightly under Scenario Two due to the increased demand for these services from an expanded population.

Figure 22: Field of education, proportion of workforce with qualifications and growth (%), 2017 and 2022, Baseline Scenario

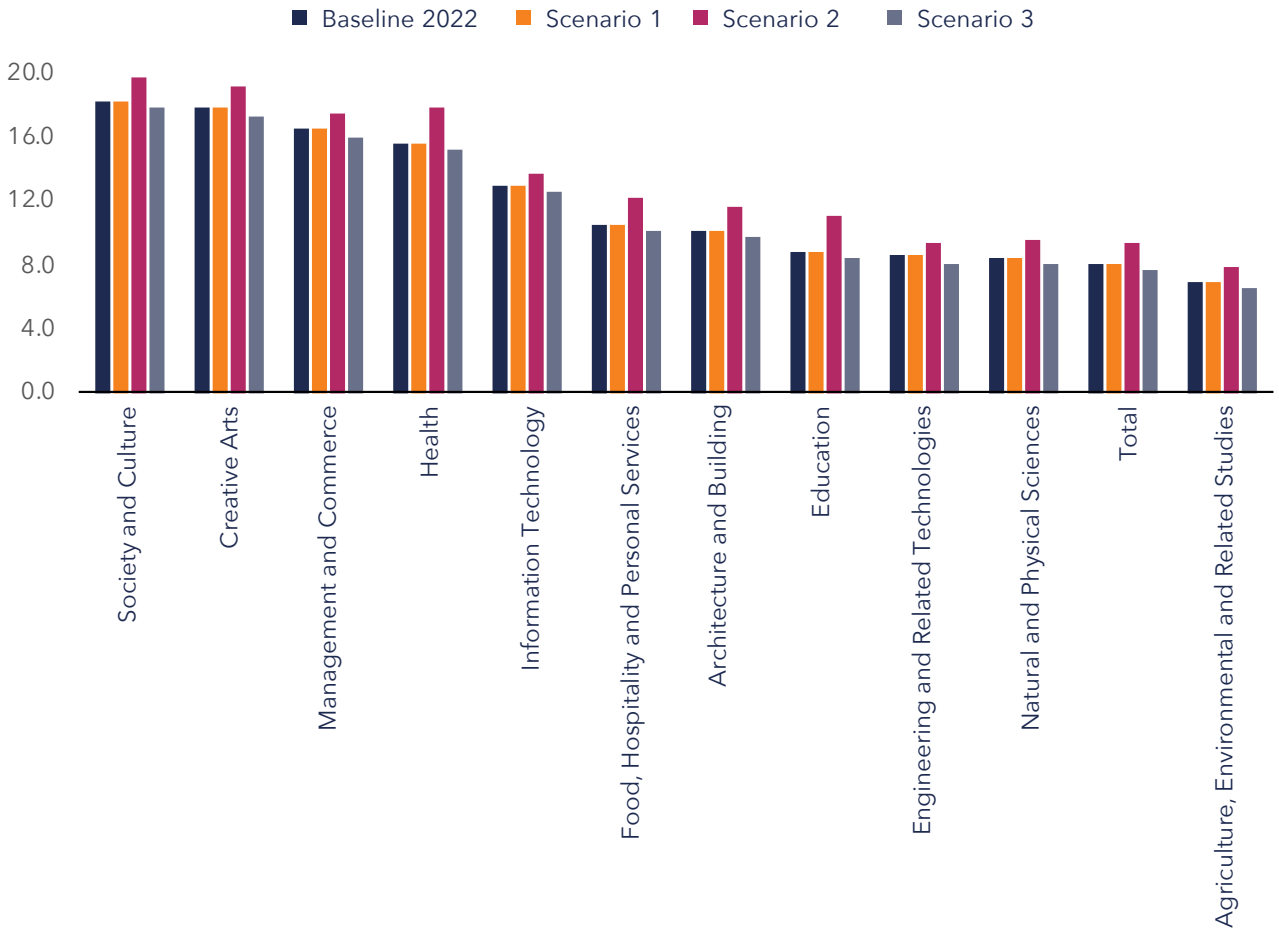


In terms of actual growth, Scenario Two tends to accelerate the growth of all fields of education with qualifications growing on average by 9.3 per cent compared with the 2017 baseline. On the other hand, Scenario Three slows the growth of qualifications compared with the 2017 baseline, with qualifications projected to increase by around 6.5 per cent on average. Scenario One has very little impact on the qualifications of the workforce.

The proportion of the workforce with Society and Culture qualifications is projected to increase by between 18.1 per cent (Baseline, Scenario One) and 19.7 per cent (Scenario Two) compared with 2017, followed by Creative Arts, which is projected to increase by between 17.2 per cent and 19 per cent. Qualifications in Agriculture, Environmental and Related Studies are the only ones projected to grow at a below average rate.

At the detailed level, Medical Studies is projected to grow by between 23.5 and 26.6 per cent from 2017. Behavioural Science increases by between 22.4 and 24.7 per cent and Studies in Human Society (which includes fields such as History and Archaeology) follows closely, with projected growth of between 21.4 and 23.2 per cent. The fields of Horticulture and Viticulture and Other Agriculture, Environmental and Related Studies grow at the slowest rate over the five years to 2022 across all scenarios (see Appendix E).

Figure 23: Change in fields of education by scenario compared with 2017 (%)



Level of education combined with field of education

The modelling shows little proportional change between the scenarios and the 2022 baseline, although actual numbers of each field of education are projected to grow under each scenario. By 2022, 29 per cent of all Postgraduate qualifications are projected to be in Management and Commerce, an increase of almost one per cent from 2017. By contrast, postgraduate studies in Natural and Physical Sciences decline by 0.7 per cent as a proportion of total Postgraduate studies over this time, to less than nine per cent.

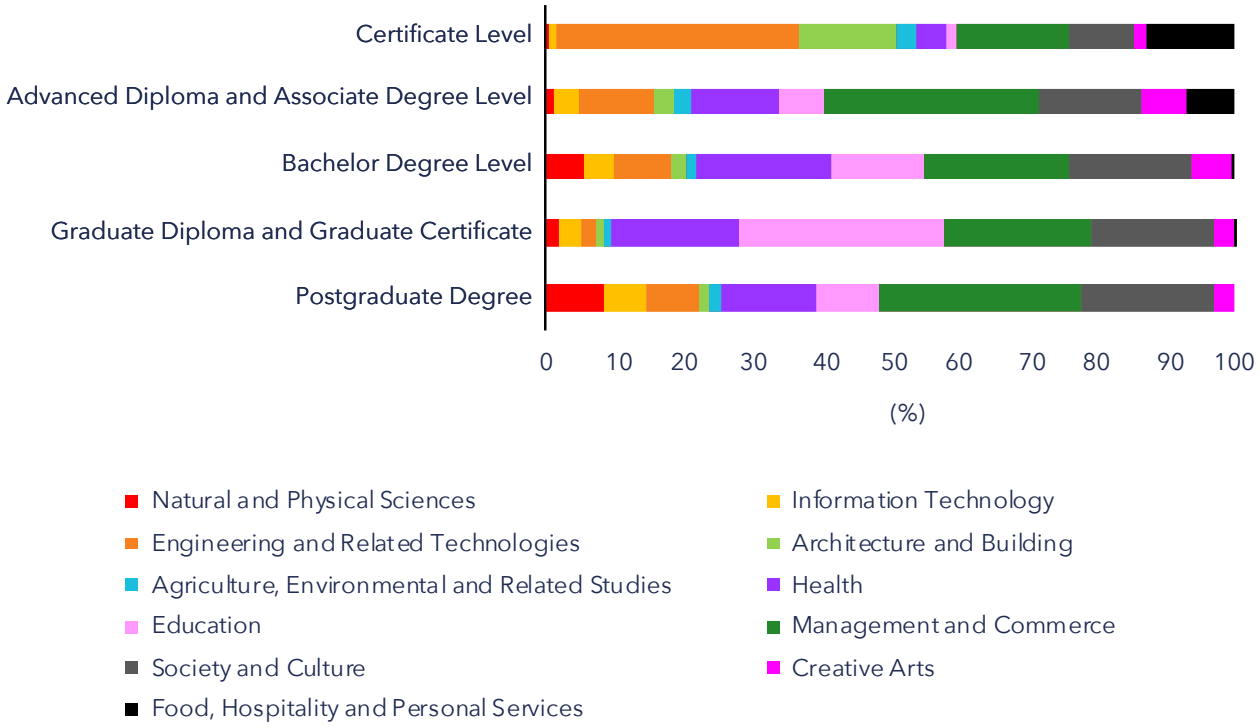
Almost 30 per cent of all Graduate Diploma and Graduate Certificate qualifications are projected to be in Education but this represents a decline from 2017, while the proportion of workers studying Society and Culture, Management and Commerce, Health, and Creative Arts qualifications are projected to increase over this time.

Projections show the proportion of Bachelor Degrees in Education falls over the five years to 2022, while Bachelor Degrees in Society and Culture increase as a proportion of the total. Nevertheless, the greatest proportion of Bachelor Degrees are in Management and Commerce, followed by Health.

Management and Commerce are projected to make up more than 31 per cent of all Advanced Diploma and Associate Degree Level qualifications, trailed by Society and Culture qualifications at around 15 per cent. Studies in Education at this level fall from 7.2 per cent of the total in 2017 to 6.7 per cent in 2022.

By 2022, more than 35 per cent of Certificate Level qualifications are projected to be in Engineering and Related Technologies; 16 per cent are in Management and Commerce; and 14 per cent in Architecture and Building.

Figure 24: Proportion of qualification levels by field of education, 2022 (%)



Postgraduate qualifications in Creative Arts increase by the greatest percentage under the baseline scenario, growing by more than 30 per cent to around 6290. Graduate Diploma qualifications in Society and Culture, and Creative Arts are projected to increase by almost 21 per cent by 2022, to 14,600 and 2500 respectively.

It is projected that there will be almost 89,000 Bachelor Degree qualifications in Society and Culture, an increase of 19.1 per cent, which is just slightly higher than the growth of Bachelor Degrees in Creative Arts (up by 18.9 per cent). Creative Arts qualifications also increase by more than 16 per cent at the Advanced Diploma Level to around 19,500. Almost 60,000 Certificate qualifications are in Society and Culture, which experienced the greatest growth (11 per cent), while the number of Certificate qualifications in Natural and Physical Sciences fell by almost three per cent to 2000.

Table 4: Growth of qualification levels by field of education to 2022 (%)

Field of education	Post-graduate Degree	Graduate Diploma and Graduate Certificate	Bachelor Degree Level	Advanced Diploma and Associate Degree Level	Certificate Level
Natural and Physical Sciences	17.2	7.6	5.6	2.8	-2.8
Information Technology	24.3	13.9	12.0	9.7	4.8
Engineering and Related Technologies	25.6	15.4	13.7	11.2	6.1
Architecture and Building	27.9	17.4	16.2	13.9	8.2
Agriculture, Environmental and Related Studies	21.8	11.3	10.1	7.8	2.6
Health	27.2	17.5	15.6	13.3	7.7
Education	18.9	9.9	7.8	6.0	0.9
Management and Commerce	29.4	19.3	17.4	15.0	9.9
Society and Culture	29.6	20.5	19.1	16.2	10.9
Creative Arts	30.2	20.5	18.9	16.4	10.2
Food, Hospitality and Personal Services	n/a	19.2	17.4	14.3	9.3
Total	26.3	15.7	14.6	13.4	7.8

Occupations and qualifications

More than 60 per cent of the Queensland workforce with Postgraduate qualifications are projected to be employed in just six occupational groupings by 2022 (Table5). Scenario One employment in these occupations increases for all except Health Professionals, which has a very slight fall in the numbers of General Practitioners and Registered Nurses compared with 2022 baseline figures. Employment of Legal, Social and Welfare Professionals remains unchanged in this scenario.

Scenario Two employment grows for Postgraduate workers in these occupations, with 500 more Postgraduate-qualified Health Professionals, compared with 2022 baseline figures. Scenario Three employment of Postgraduate-qualified workers, in the occupations listed, falls compared with the baseline, except for an increase in the number of Education Professionals, namely University Lecturers and Tutors.

Table 5: Largest employing occupations of workers with Postgraduate qualifications

Occupation (ANZSCO Sub-Major Group)	2022	Scenario 1	Scenario 2	Scenario 3
Specialist Managers	24,421	24,433	24,643	24,348
Health Professionals	24,127	24,106	24,631	23,961
Education Professionals	23,196	23,208	23,579	23,274
Business, Human Resource and Marketing Professionals	22,918	22,936	23,012	22,874
Design, Engineering, Science and Transport Professionals	19,622	19,639	19,714	19,625
Legal, Social and Welfare Professionals	12,587	12,587	12,744	12,540

More than 60 per cent of the Queensland workforce with Graduate Diploma and Graduate Certificate qualifications are projected to be employed in just five occupational groupings by 2022 (Table 6). Scenario One sees very little change in the numbers of workers employed with these qualifications, however Scenario Two sees greater growth in all these occupations compared with the 2022 baseline, with 330 more Primary and Secondary School Teachers. Scenario Three projects a fall in employment of Graduate-qualified workers in the occupations listed compared with the baseline.

Table 6: Largest employing occupations of workers with Graduate Diploma and Graduate Certificate qualifications

Occupation (ANZSCO Sub-Major Group)	2022	Scenario 1	Scenario 2	Scenario 3
Education Professionals	15,536	15,532	15,945	15,469
Health Professionals	13,042	13,035	13,305	12,978
Business, Human Resource and Marketing Professionals	8,656	8,663	8,696	8,647
Specialist Managers	8,309	8,314	8,391	8,290
Legal, Social and Welfare Professionals	4,451	4,452	4,497	4,446

Almost 70 per cent of the workforce with Bachelor Level Degrees are employed in 10 occupational groupings (Table 7). This is the second largest qualification grouping with over 555,000 Bachelor-qualified workers projected by 2022.

Scenario One impacts occupations differently. There are slightly lower numbers of Education and Health Professionals but the number of Business, Human Resource and Marketing Professionals, and Design, Engineering, Science and Transport Professionals, is slightly higher than the 2022 baseline.

Scenario Two is projected to increase the growth of parts of this workforce, with the number of Bachelor-qualified Health Professionals, Carers and Aides, and Sales Assistants up by two per cent each compared with the 2022 baseline. The number of Education Professionals with Bachelor qualifications is three per cent higher than the baseline.

Scenario Three is less positive with almost 2000 fewer Bachelor-qualified workers compared with the 2022 baseline.

Table 7: Largest employing occupations of workers with Bachelor qualifications

Occupation (ANZSCO Sub-Major Group)	2022	Scenario 1	Scenario 2	Scenario 3
Health Professionals	83,727	83,683	85,465	83,319
Education Professionals	56,915	56,899	58,447	56,686
Business, Human Resource and Marketing Professionals	55,368	55,417	55,604	55,340
Specialist Managers	44,503	44,531	44,934	44,341
Design, Engineering, Science and Transport Professionals	39,278	39,323	39,419	39,396
Hospitality, Retail and Service Managers	22,741	22,746	23,069	22,572
Legal, Social and Welfare Professionals	22,158	22,168	22,345	22,160
ICT Professionals	18,845	18,863	18,904	18,855
Sales Assistants and Salespersons	17,328	17,320	17,633	17,007
Carers and Aides	16,836	16,821	17,210	16,730

By 2022, almost 300,000 workers are projected to possess an Advanced Diploma or Associate Degree (Table 8). The 15 largest occupational groupings, making up almost 70 per cent of the total, are listed in. While affecting occupations differently, overall Scenario One sees 0.3 per cent fewer workers with this level of qualification compared with the 2022 baseline.

The population change of Scenario Two leads to an increase in employment for all those occupations listed, with an additional 620 Carers and Aides and almost 320 more Health Professionals. In contrast, Scenario Three has a generally negative effect, reducing the numbers of workers employed with these qualifications.

Table 8: Largest employing occupations of workers with Advanced Diploma and Associate Degree qualifications

Occupation (ANZSCO Sub-Major Group)	2022	Scenario 1	Scenario 2	Scenario 3
Carers and Aides	25,745	25,724	26,365	25,604
Specialist Managers	19,761	19,774	19,971	19,708
Hospitality, Retail and Service Managers	17,748	17,752	18,009	17,655
Health Professionals	16,097	16,081	16,415	16,011
Business, Human Resource and Marketing Professionals	14,616	14,631	14,677	14,608
Sales Assistants and Salespersons	13,914	13,907	14,161	13,684
Engineering, ICT and Science Technicians	12,255	12,266	12,342	12,187
Numerical Clerks	12,045	12,054	12,136	12,005
General Clerical Workers	10,508	10,511	10,606	10,484
Design, Engineering, Science and Transport Professionals	10,366	10,379	10,399	10,447
Education Professionals	10,270	10,266	10,525	10,234
Office Managers and Program Administrators	10,086	10,089	10,186	10,068
Health and Welfare Support Workers	9,639	9,633	9,827	9,603
Sports and Personal Service Workers	9,542	9,549	9,707	9,476
Protective Service Workers	8,364	8,356	8,514	8,366
Inquiry Clerks and Receptionists	8,038	8,037	8,140	8,025

Around 644,000 people with Certificate qualifications are forecast to be employed in Queensland by 2022, with almost 70 per cent of them employed in the occupations in Table 9. Scenario One effects occupations differently – for instance there are slightly fewer Carers and Aides but slightly more Electrotechnology and Telecommunications Trades Workers – but overall it is projected that there will be an additional 150 Certificate-qualified workers compared with the 2022 baseline.

Scenario Two sees overall higher growth, with more than two per cent more Carers and Aides employed than in the baseline. The number of Construction Trades Workers is almost 940 higher under Scenario Two as well. As with other qualification levels, Scenario Three has a negative effect, slowing employment growth overall. The fall in Mining and Construction employment sees 2.5 per cent fewer Certificate-qualified Machine and Stationary Plant Operators compared with the baseline, while there are 640 fewer Construction Trades Workers.

Table 9: Largest employing occupations of workers with Certificate qualifications

Occupation (ANZSCO Sub-Major Group)	2022	Scenario 1	Scenario 2	Scenario 3
Automotive and Engineering Trades Workers	69,711	69,740	70,170	69,403
Carers and Aides	53,643	53,606	54,811	53,454
Construction Trades Workers	50,598	50,629	51,535	49,956
Electrotechnology and Telecommunications Trades Workers	40,650	40,675	41,148	40,115
Sales Assistants and Salespersons	30,381	30,362	30,919	29,954
Hospitality, Retail and Service Managers	27,167	27,165	27,568	27,100
Other Technicians and Trades Workers	25,435	25,462	25,766	25,340
Specialist Managers	24,477	24,495	24,754	24,424
Road and Rail Drivers	21,426	21,425	21,509	21,454
Food Trades Workers	18,576	18,577	18,918	18,548
Engineering, ICT and Science Technicians	17,777	17,788	17,909	17,709
General Clerical Workers	16,769	16,774	16,926	16,761
Machine and Stationary Plant Operators	14,628	14,621	14,684	14,263
Inquiry Clerks and Receptionists	14,585	14,584	14,773	14,587
Numerical Clerks	14,436	14,446	14,543	14,416

More than 776,000 workers are forecast to have no post-school qualifications by 2022. More than 65 per cent of them work in the occupational groupings in Table 10 (page 48). While there is an additional 205 workers employed in Queensland with no qualifications under Scenario One, some of the larger occupations, such as Sales Assistants and Carers and Aides, actually see a reduction in employment compared with 2022.

It is projected that an additional 1700 Sales Assistants without qualifications will be employed under Scenario Two, and the numbers of Carers and Aides and Hospitality Workers also expand significantly, with increased demand due to the higher population.

Scenario Three leads to around 2700 fewer people without qualifications employed in Queensland, with half of this decrease projected to be Sales Assistants and Salespersons. The number of unqualified Construction Trades Workers, Machine and Stationary Plant Operators and Construction and Mining Labourers also falls under this scenario compared with the baseline. Conversely, there are more than 480 extra Factory Process Workers due to the expansion of Manufacturing.

Table 10: Largest employing occupations of workers with no post-school qualifications

Occupation (ANZSCO Sub-Major Group)	2022	Scenario 1	Scenario 2	Scenario 3
Sales Assistants and Salespersons	93,909	93,850	95,597	92,495
Road and Rail Drivers	43,461	43,485	43,641	43,408
Hospitality, Retail and Service Managers	40,353	40,354	40,978	40,148
Cleaners and Laundry Workers	38,667	38,690	39,238	38,839
Carers and Aides	33,281	33,223	34,022	33,149
Hospitality Workers	31,586	31,593	32,218	31,510
General Clerical Workers	30,155	30,159	30,436	30,147
Factory Process Workers	27,296	27,316	27,410	27,781
Food Preparation Assistants	26,596	26,594	27,106	26,443
Other Labourers	25,668	25,670	26,008	25,473
Numerical Clerks	25,380	25,396	25,563	25,343
Inquiry Clerks and Receptionists	24,678	24,671	25,007	24,684
Construction and Mining Labourers	20,899	20,930	21,196	20,469
Sales Support Workers	20,540	20,529	20,894	20,293
Construction Trades Workers	20,363	20,408	20,737	19,792
Machine and Stationary Plant Operators	20,248	20,254	20,328	19,788

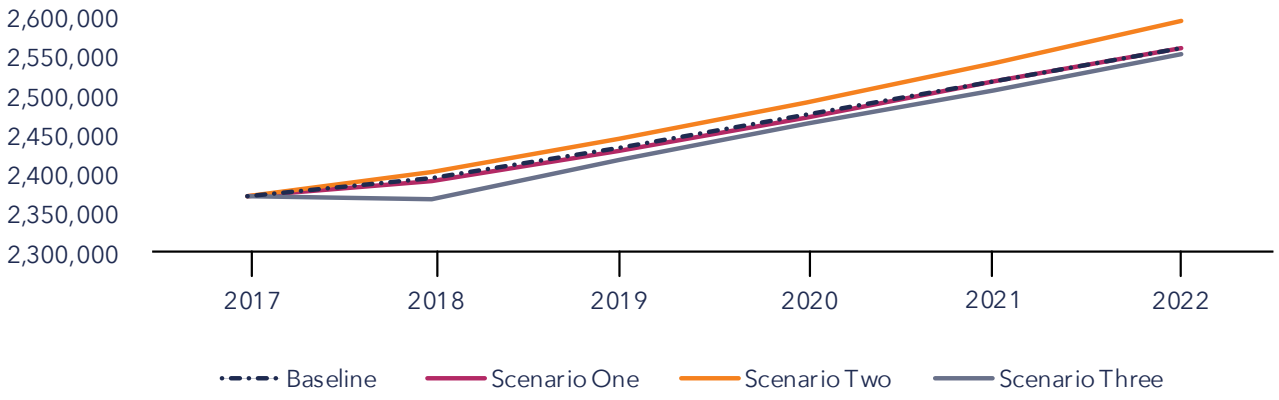
QUESTIONS FOR POLICY AND PRACTICE

In addition to the major findings of this project, the modelling of these future scenarios has also revealed other issues for consideration that include the following:

Employment to grow

Regardless of the scenario, employment in Queensland is projected to increase by 2022, with between 180,000 and 220,000 additional workers. The largest employing industries are projected to be Health Care and Social Assistance; Retail Trade; Construction; Education and Training; and Professional, Scientific and Technical Services, which will make up almost half of all employment (more than one per cent higher than in 2017).

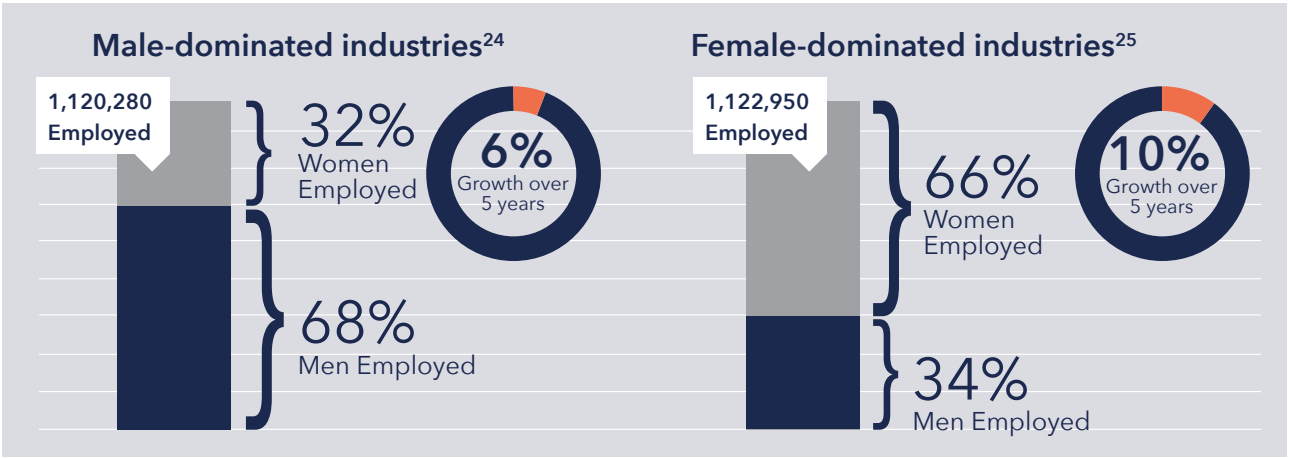
Figure 25: Change in employment between 2017 and 2022, all scenarios



Gender

Industries predominantly staffed by men are not projected to grow as quickly as those in which women's employment is more prevalent. While the numbers employed in male- and female-dominated industries are similar, the male-dominated industries are projected to grow at 60 per cent of the rate of those industries employing a majority of women.

This implies a continuation of the recent trend of increased participation rates and employment of females when compared to males. One issue that may need to be considered is the gender segmentation of particular occupations and industries.



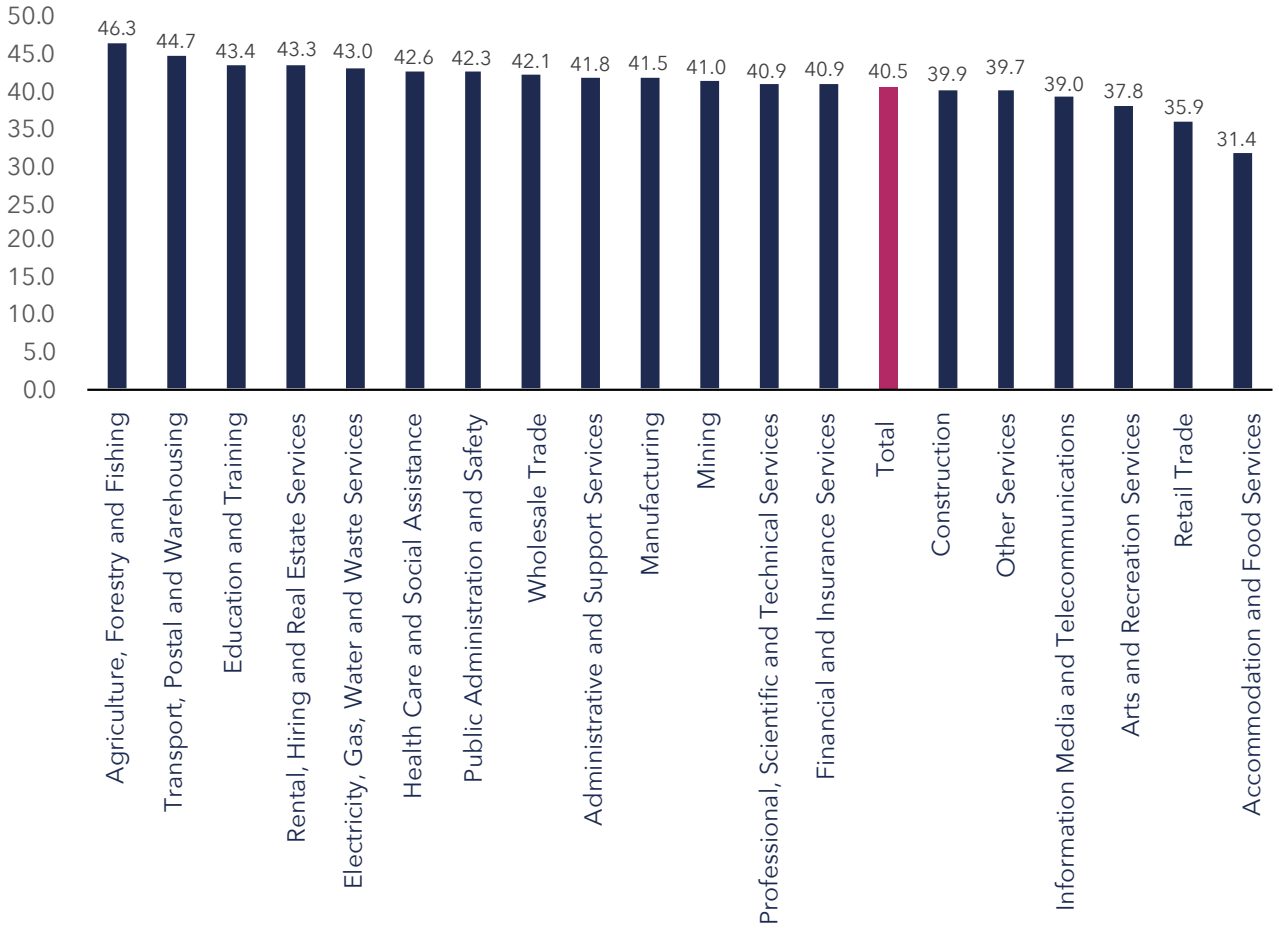
24. Includes Construction; Mining; Electricity, Gas and Wastewater Services; Transport, Postal and Warehousing; Wholesale Trade; Agriculture, Forestry and Fishing; Information Media and Telecommunications; Public Administration and Safety; Other Services; Professional, Scientific and Technical Services; and Arts and Recreation Services.
25. Includes Rental, Hiring and Real Estate Services; Administrative and Support Services; Financial and Insurance Services; Accommodation and Food Services; Retail Trade; Education and Training; and Health Care and Social Assistance.

Ageing workforce

By 2022, it is projected that about 64 per cent of all workers will be employed in industries where the average age is above the current state average of 40.5 years. Agriculture, Forestry and Fishing is the oldest industry (46.3 years) while the average age of workers in Health Care and Social Assistance, the largest and fastest growing industry, is 42.6 years.[26]

As technological advancement alters job roles and functions, experienced employees (more likely to be older) may be required to retrain or upskill. An ageing workforce may also have additional caring duties or health issues, which potentially poses challenges for industry around working conditions and job design. In addition, opportunities present for those entering the workforce for the first time (especially younger workers) as older workers retire.[27]

Figure 26: Average age by industry, 2016



26. ABS. (2016). *Census of Population and Housing* - Counting Employed Persons, Place of Work (POW), State and Age by Industry. Findings based on use of ABS TableBuilder data.
27. Gahan P. & Healy, J. (2017). *The challenge and opportunity of an ageing workforce*. Retrieved from https://pursuit.unimelb.edu.au/articles/the-challenge-and-opportunity-of-an-ageing-workforce.

Youth employment

Industries with lower-than-average-age workers are those that provide the bulk of entry level jobs for younger people seeking to establish themselves in the labour market. Problematically, employment growth in these industries is projected to be below the state average over the five years to 2022, which may impact on employment opportunities for younger workers.

Industries employing a majority of part-time workers[28]

	Arts and Recreation Services	Retail Trade	Accommodation and Food Services
Workforce (000s)	41.4	252.6	176.4
Employed Part-time	58.6 %	53.4 %	51.5 %
Average Age	37.8	35.9	31.4
Difference From Average Growth (%)	-1.2%	-3.2%	-4.0%

28. Figures derived from ABS (2016) Census of Population and Housing data and Anticipating Future Skills baseline figures.

An educated workforce

The workforce will become more educated, with the number of workers without post-school qualifications declining across all scenarios. The greatest growth is projected to be in tertiary qualifications with one-fifth of workers having a Bachelor qualification. Given its role as a pathway to university education, this does not mean the importance of vocational educational declines, and over one-quarter of the workforce is projected to possess Certificate qualifications by 2022. This does not include those workers who have a Certificate qualification in addition to other higher level qualifications.

Table 11: Growth in qualification levels by scenario from 2017 baseline (%)

	Baseline 2022	Scenario One	Scenario Two	Scenario Three
Postgraduate Degree	26.3	26.3	27.6	25.8
Graduate Diploma and Graduate Certificate	15.7	15.7	17.3	15.3
Bachelor Degree	14.6	14.6	16.1	14.2
Advanced Diploma and Associate Degree	13.4	13.4	14.8	13.0
Certificate	7.8	7.8	9.1	7.4
All qualifications	13.0	13.1	14.5	12.6
No post-school qualifications	-2.2	-2.2	-1.0	-2.6

Table 12: Qualification levels by scenario

	Baseline 2017	Baseline 2022	Scenario One	Scenario Two	Scenario Three
Postgraduate Degree	160,865	203,101	203,152	205,317	202,374
Graduate Diploma and Graduate Certificate	71,168	82,322	82,342	83,511	82,035
Bachelor Degree	485,065	555,978	556,116	563,142	554,007
Advanced Diploma and Associate Degree	264,551	299,913	299,989	303,801	298,879
Certificate	597,457	643,851	643,997	651,801	641,410
All qualifications	1,579,106	1,785,165	1,785,596	1,807,572	1,778,705
No post-school qualifications	793,904	776,158	785,678	785,678	773,409

STEM qualifications

The Australian Government has stated that it views science, technology, engineering and mathematics (STEM) education as critically important for the future.[29] This modelling shows that the number of workers with qualifications in these fields is projected to grow at a much slower rate than fields such as Society and Culture, and Creative Arts. Industry and governments may need to consider ways to increase the growth rate of these fields to meet future demand.

Regional growth varies

Employment projections show that employment growth is predominantly in the faster growing population centres of the south east corner of the state, which has implications for future training infrastructure and regional labour supply. However, each scenario impacts individual regions differently, depending on their industry composition. This demonstrates the importance of region-specific responses and activities alongside global policies.

FURTHER WORK

While the quantitative projections are indicative, they do reveal a number of trends which may be useful in Jobs Queensland's role of providing education and training advice to the Queensland Government. In addition, the findings may be useful in informing deliberations by prospective students, employers and other stakeholders.

The application of replacement data to the modelling and further analysis of supply-side issues would enhance the value of the data. Jobs Queensland will undertake further analysis of the modelling and consider it when proposing government action in a range of policy areas.

The data presented in this report represents only a portion of the modelling undertaken for this project. More detailed projections via a number of data tools are available on the Jobs Queensland website: jobsqueensland.qld.gov.au.

29. Australian Government. Department of Education and Training. *Support for Science, Technology, Engineering and Mathematics (STEM).* Retrieved from https://www.education.gov.au/support-science-technology-engineering-and-mathematics.

INDUSTRY OVERVIEW[30]

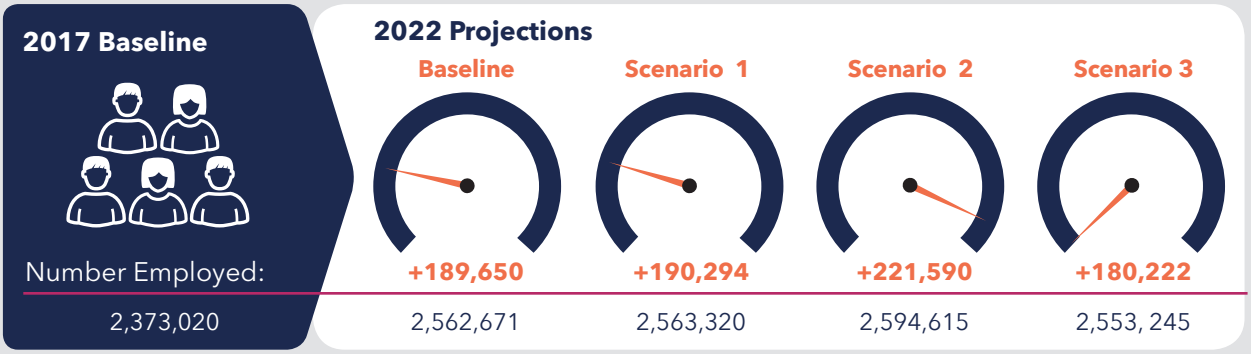
The industry overviews compare the 2022 employment results for each scenario with the number of people employed in that industry in 2017. Each overview contains an industry description including some industry sub-sectors. There is also an employment outlook for the industry under each scenario.

The dials show the magnitude of employment change and the additional number of workers employed under each scenario compared with employment in 2017. The figures in black show total employment for the industry under each scenario. Shortened titles of an industry (e.g. retail, health) may be used in the employment outlook – these should be read as referring to the actual industry division (e.g. Retail Trade, Health Care and Social Assistance).

All industries

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



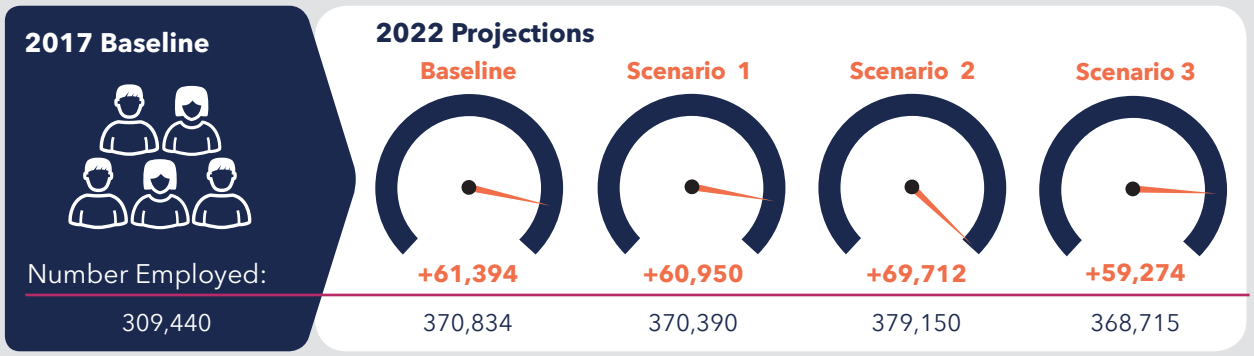
Outlook: Under the baseline scenario, employment in Queensland is projected to increase by almost eight per cent over the five years to 2022. Under Scenario One, employment will increase slightly (by almost 650 additional workers). The population changes in Scenario Two are projected to lead to employment growth of more than 9.3 per cent between 2017 and 2022 while Scenario Three sees employment growth slow to 7.6 per cent, or 180,222 additional workers.

30. All profiles compiled using information from ABS, 1292.0 - Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 (Revision 2.0), http://www.abs.gov.au/ausstats/abs@.nsf/mf/1292.0.

Health Care and Social Assistance

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



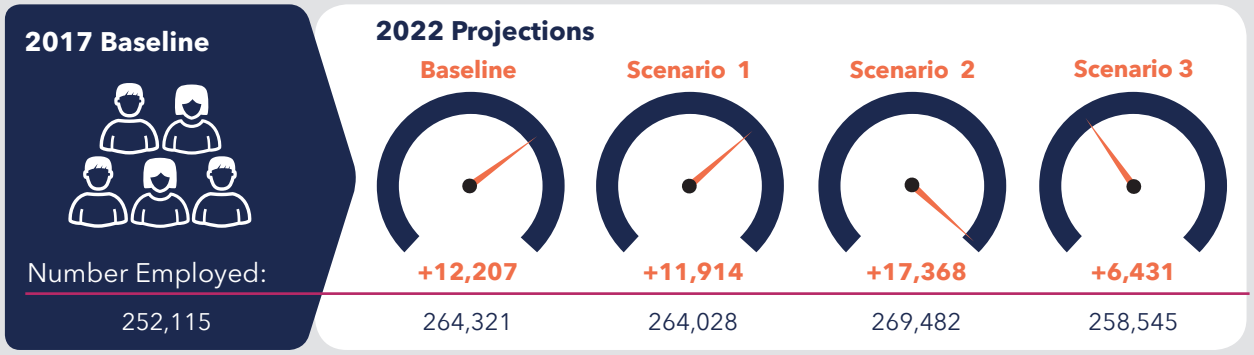
Profile: The Health Care and Social Assistance industry is mainly engaged in providing human health care and social assistance. It includes hospitals, medical and other care services (including allied health, ambulances and pathology), residential care services and social assistance services, such as child care, disabilities assistance, and welfare counselling services.

Outlook: This is the largest employing industry in Queensland and under the baseline scenario it is expected to grow by almost 20 per cent by 2022. The fall in household consumption which occurs under Scenario One has a negative effect on this industry and there are almost 450 fewer workers compared with the baseline. The economic effect of Scenario Three also affects the Health Care and Social Assistance industry negatively, with around 2100 fewer workers employed in this scenario compared with the baseline. The demographic changes in Scenario Two increases employment in this industry at twice the state average, with an additional 8318 workers projected to be needed by 2022.

Retail Trade

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



Profile: The Retail Trade engages in the purchase and/or on-selling, without significant transformation, to the general public. It also includes the commission-based buying and the commission-based selling of goods. Goods may be sold using non-traditional means including the internet. It is a large and diverse industry that includes sectors such as motor vehicle and motor vehicle parts retailing, fuel and food retailing, and other store-based retailing, such as hardware, electrical goods and pharmaceutical products.

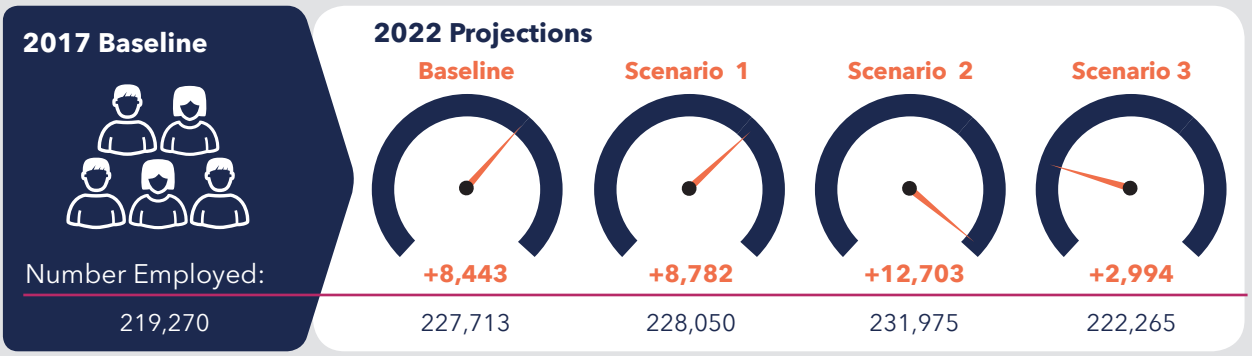
Outlook: Under the baseline scenario, employment in Retail Trade grows at around 60 per cent of the rate of all industries as a whole, with an additional 12,207 workers employed by 2022. The dampening of household consumption, combined with the adaption of new technologies, leads to lower employment in Scenario One compared with the baseline. Conversely, employment in the retail industry increases by more than 5160 people under Scenario Two due to increased demand for goods from a larger population. Due to the economic impact of Scenario Three, employment in Retail Trade is projected to increase by 2.6 per cent over the five years to 2022, compared with growth of almost five per cent under the baseline.

INDUSTRY OVERVIEW

Construction

SNAPSHOT

Projected change in industry employment, all scenarios, 2017-2022



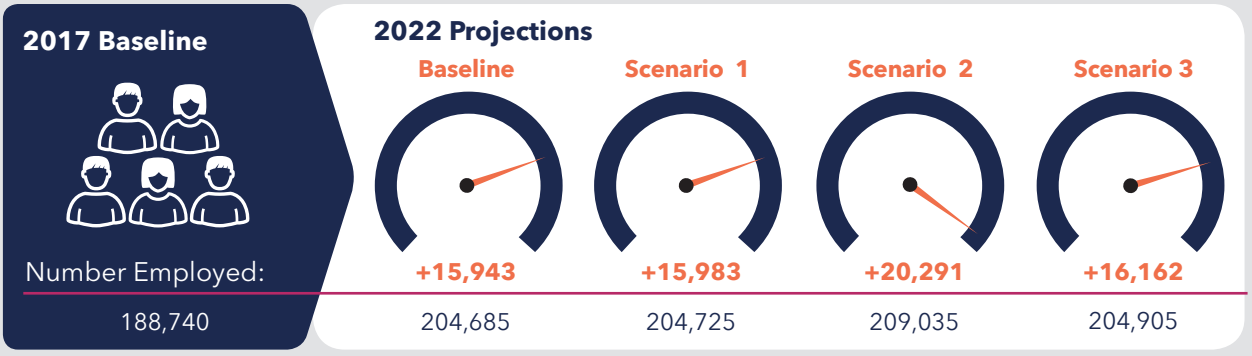
Profile: The Construction industry engages in the construction of buildings and other structures, additions, alterations, reconstruction, installation and maintenance and repairs of buildings and other structures. It also includes businesses engaged in demolition or wrecking of buildings and other structures, clearing of building sites and blasting, test drilling, landfill, levelling, earthmoving, excavating, land drainage and other land preparation.

Outlook: The baseline scenario sees Construction grow by approximately 8440 people by 2022. An extra 339 people are employed under Scenario One, as industries increase capital investment which boosts demand for construction and building. This demand also escalates under Scenario Two and the industry expands at a greater rate than the average, leading to an extra 4260 workers in Construction by 2022. The contraction of mining and the effects on the economy in Scenario Three sees employment in Construction increase by only 1.4 per cent over the five years to 2022.

Education and Training

SNAPSHOT

Projected change in industry employment, all scenarios, 2017-2022



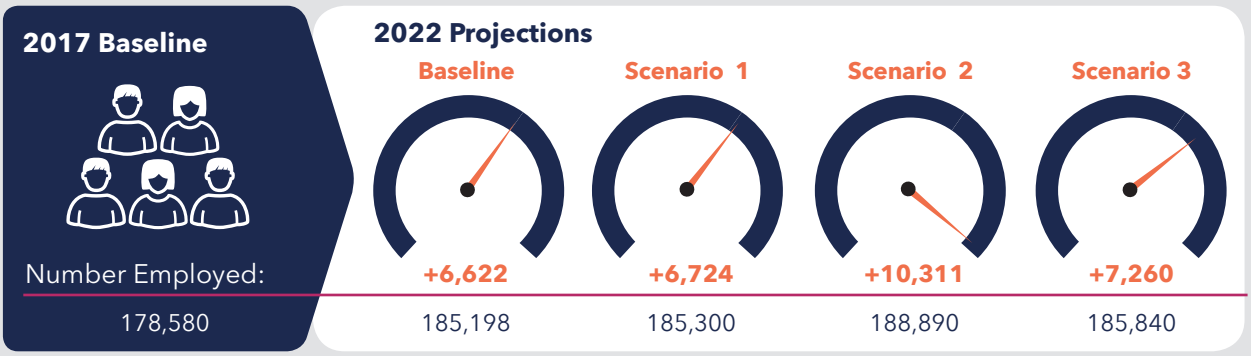
Profile: The Education and Training industry engages in the provision and support of education and training, and includes preschool and school education, tertiary education and adult, community and other education (e.g. driving schools) and educational support services, such as curriculum development.

Outlook: Education and Training is forecast to grow at a rate higher than the state average, with almost 16,000 more people employed by 2022 under the baseline scenario. While Scenario One and Three see employment slightly higher than the baseline projections, it is Scenario Two which creates the greatest increase in employment. Under Scenario Two, an additional 4348 workers are employed in the industry, an increase of almost 11 per cent since 2017.

Accommodation and Food Services

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



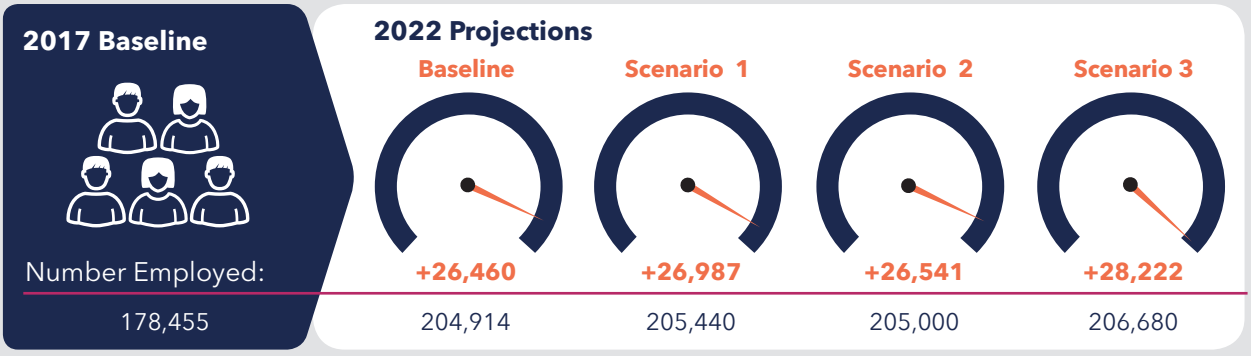
Profile: The Accommodation and Food Services industry engages in providing short-term accommodation for visitors and/or meals, snacks, and beverages for consumption by customers both on and off-site. It includes sectors such as hotels, motels, cafes, pubs and restaurants.

Outlook: Employment in this industry increases across all scenarios, with the industry expanding by around 3.7 per cent under the baseline. This is a labour-intensive industry and under Scenario One, slightly more people (102) are employed as the productivity gain supports expansion of the industry. Scenario Two sees employment increase by an extra 3689 compared with the baseline scenario, as an increased population drives demand for the services and goods offered. The boost to tourism from the fall in the Australian dollar which occurs in Scenario Three also sees additional growth, with the Accommodation and Food Services industry increasing by four per cent in 2022 compared with 2017.

Professional, Scientific and Technical Services

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



Profile: The Professional, Scientific and Technical Services industry engages in providing professional, scientific and technical services and often requires a high level of expertise, training and formal qualifications. These services include scientific research, architecture, engineering, computer systems design, law, accountancy, advertising, market research, management and other consultancy, veterinary science and professional photography.

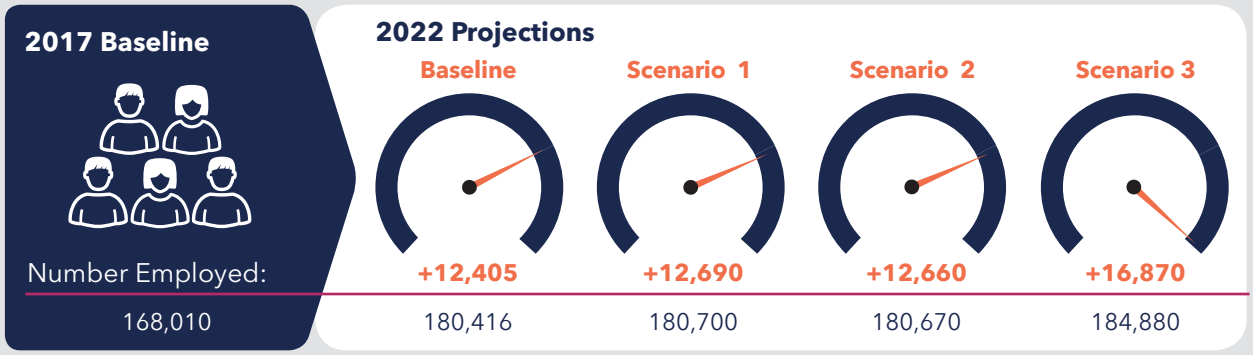
Outlook: Employment in this industry increases under all scenarios and is forecast to grow strongly under the baseline scenario, up by 14.8 per cent over the five years to 2022. Given that this industry provides services to almost every part of the economy, it benefits from the general expansion in GDP that occurs in Scenario One and employment increases by more than 15 per cent over the five years to 2022. Under Scenario Two, employment in this industry increases by about 80 workers, but Scenario Three is projected to lead to the employment of an additional 1762 people compared with the 2022 baseline.

INDUSTRY OVERVIEW

Manufacturing

SNAPSHOT

Projected change in industry employment, all scenarios, 2017-2022



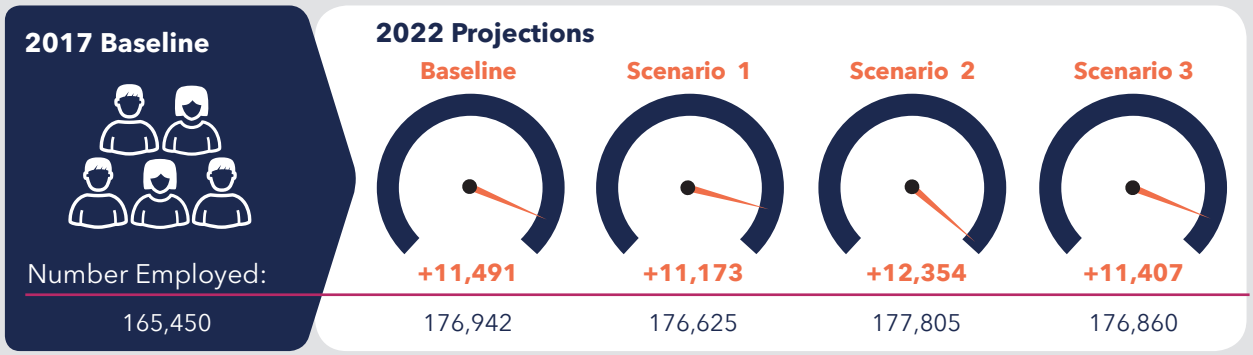
Profile: The Manufacturing industry mainly engages in the physical or chemical transformation of materials, substances or components into new products. It is a large and diverse industry that includes sectors such as food products, pulp and paper products, fabricated metal products, furniture and printing.

Outlook: Employment in Manufacturing has increased since the 2017 baseline was devised and this expansion is projected to continue under all scenarios, with gains of more than 250 extra workers in both Scenarios One and Two by 2022. These gains are driven by increased exports in the first scenario and increased population in the second. The fall of the Australian dollar, envisaged under Scenario Three, sees the Manufacturing workforce increase by almost 16,870 people between 2017 and 2022, around 2.5 percentage points higher than under the baseline scenario.

Public Administration and Safety

SNAPSHOT

Projected change in industry employment, all scenarios, 2017-2022



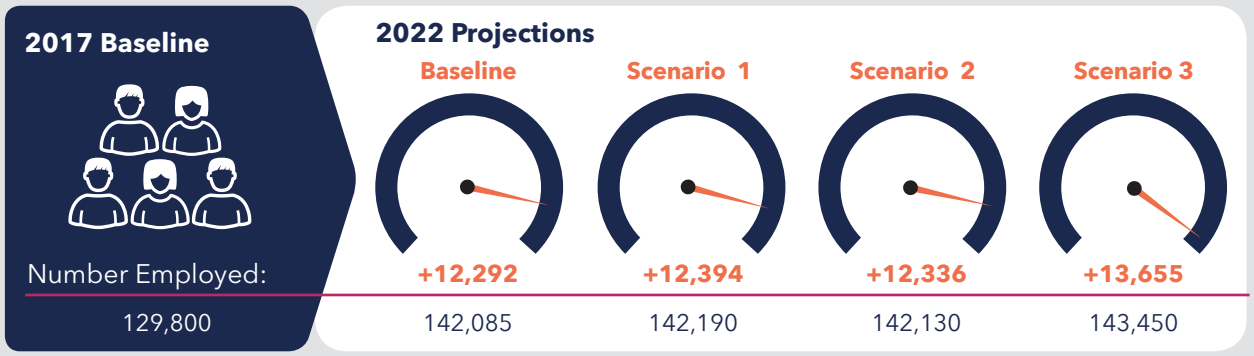
Profile: The Public Administration and Safety industry includes central, state and local governments, courts, consulates and embassies, defence and public order, safety and regulatory services. These include police, fire and correctional services, locksmiths, security guards and customs.

Outlook: Employment in this industry increases by around seven per cent (11,491) over the five years to 2022 under the baseline. Under Scenario One, employment growth slows slightly. Scenario Three also sees a slight slowing of growth in this industry, with about 85 fewer workers compared with the 2022 baseline. The increased population and demand for government services generated under Scenario Two leads to around 865 more people employed in Public Administration and Safety compared with the 2022 baseline.

Transport, Postal and Warehousing

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



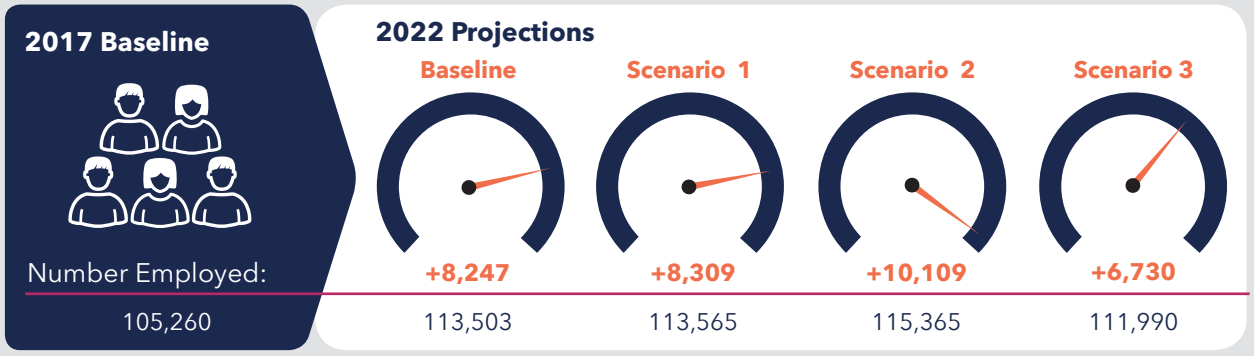
Profile: The Transport, Postal and Warehousing industry engages in the transportation of passengers and freight by road, rail, water or air, as well as postal services, pipeline transport, and scenic and sightseeing transport. It also includes warehousing and storage services.

Outlook: The Transport, Postal and Warehousing industry is projected to increase at a greater rate than the state average, with more than 142,000 people employed by 2022 according to the baseline scenario. The industry expands slightly under Scenario One, with 102 more workers employed. Employment growth is projected to be very small but positive under Scenario Two (increasing by only 44 workers). The expansion of industries such as agriculture, manufacturing and tourism under Scenario Three leads to increased demand for warehousing, road and air transport, and the industry is projected to employ almost 1370 additional workers compared with the 2022 baseline.

Other Services

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



Profile: The Other Services industry includes a broad range of personal services; religious, civic, professional and other interest group services; selected repair and maintenance activities; and private households employing staff. The sector includes hair, beauty, funeral, dry-cleaning, diet and weight management services; religious operations; unions; professional associations; and equipment and machinery maintenance and repair.

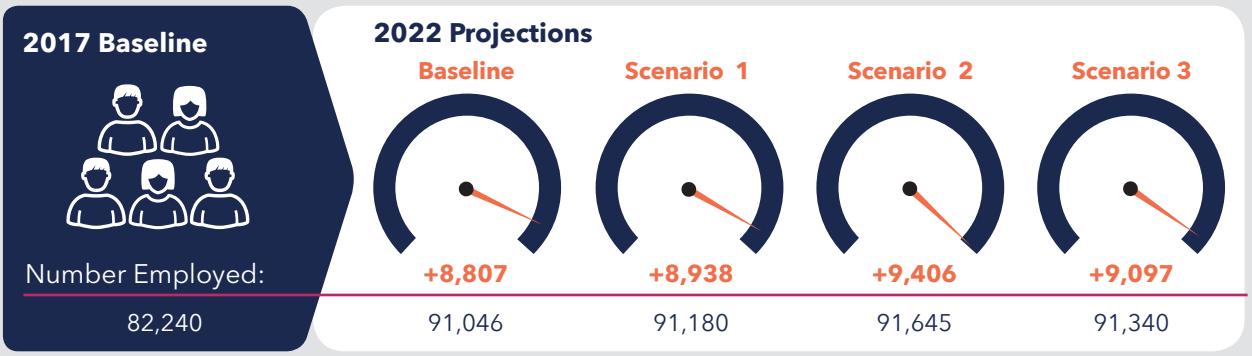
Outlook: According to the baseline, employment is projected to be just slightly below the state average, with an estimated 113,500 people employed in this industry by 2022. Employment in Scenario One increases marginally for this industry, up by 7.9 per cent between 2017 and 2022 compared with 7.8 per cent for the baseline. Increased demand for personal services such as hairdressing leads to above average growth in Scenario Two and 1862 additional workers compared with the baseline. Scenario Three results in more than 1500 fewer workers, with decreased demand for repair and maintenance services as well as lower demand for personal services.

INDUSTRY OVERVIEW

Administrative and Support Services

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



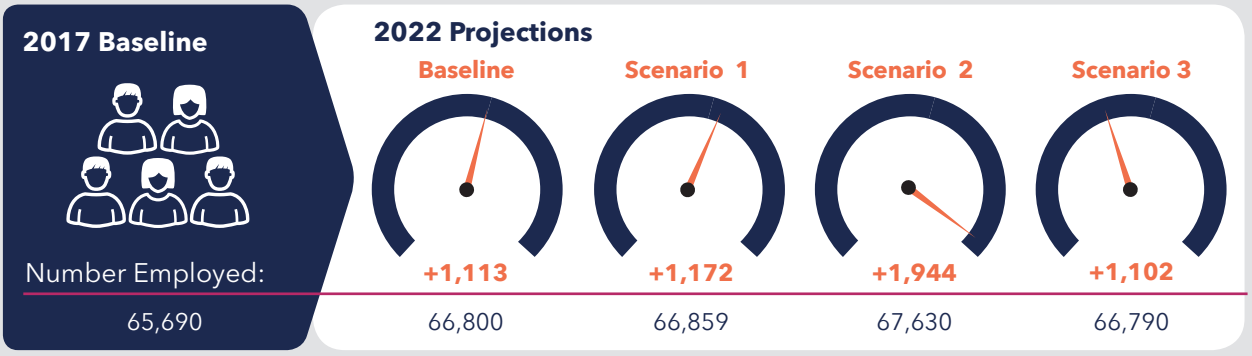
Profile: The Administrative and Support Services industry engages in performing routine support activities for the day-to-day operations of other businesses. These activities include office administration, employment and travel services, call centres, building cleaning, pest control, gardening and packaging services.

Outlook: According to the baseline scenario, this industry is forecast to grow at a rate higher than the state average, increasing by 10.7 per cent over the five years to 2022. Employment in this industry increases relative to the baseline under each scenario, with Scenario Two producing the greatest increase (more than 9400 workers) over the five years. An additional 131 workers are projected to be employed in Scenario One and around 290 more workers are employed under Scenario Three, due to increased demand for Employment and Travel Services as well as Other Administrative Services, such as Debt Collection.

Wholesale Trade

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



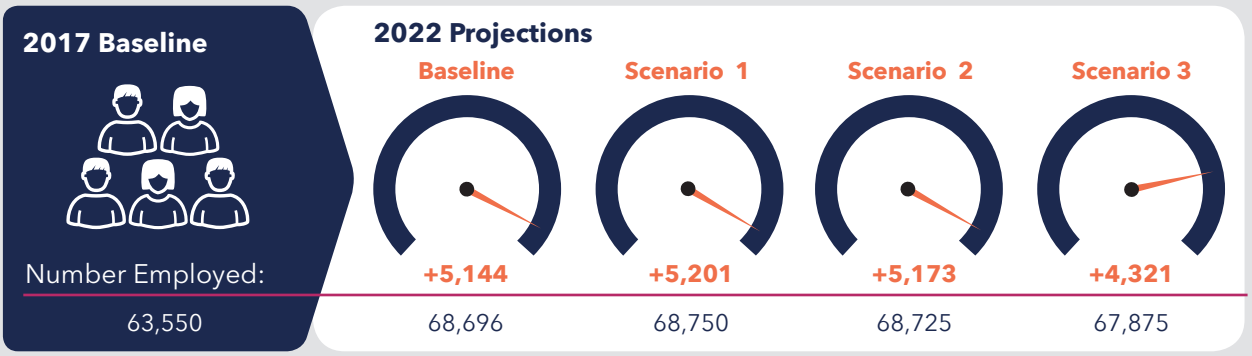
Profile: The Wholesale Trade industry engages in the purchase and on-selling of goods, without significant transformation, to businesses. It also includes the commission-based buying and/or the commission-based selling of goods on behalf of others for a commission or fee without taking title to the goods.

Outlook: Employment in the Wholesale Trade industry grows at the slowest rate of all industries under the baseline scenario, expanding by 1.7 per cent over the five years to 2022. Employment does grow at a slightly faster rate under Scenario One (approximately 1.8 per cent) while the population increase that drives demand in many industries serviced by Wholesale Trade generates increased employment by about 830 people under Scenario Two. The economic impact of Scenario Three has minimal impact on Wholesale Trade compared with the baseline.

Financial and Insurance Services

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



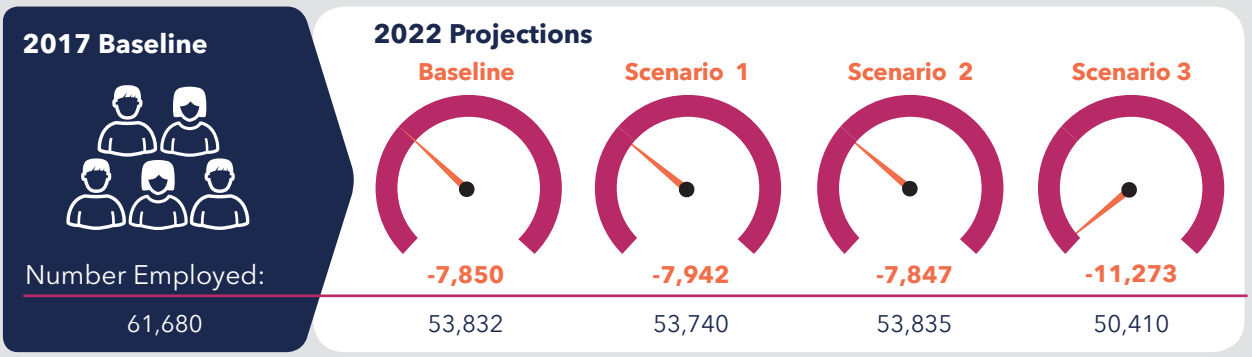
Profile: The Financial and Insurance Services industry engages in financial transactions involving the creation, liquidation, or change in ownership of financial assets, and/or in facilitating financial transactions. It includes sectors such as banks, building societies, insurance, superannuation funds and broking and investment services.

Outlook: The baseline scenario forecasts employment in this industry increasing at a greater rate than the state average, with more than 5140 people employed by 2022. Employment under Scenarios One and Two increases slightly (up by approximately 60 and 30 people respectively) but the biggest impact occurs under Scenario Three. The negative economic impact under this scenario flows through to the Financial and Insurance Services industry, with employment growth below average compared with the baseline.

Mining

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



Profile: The Mining industry mainly extracts naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas. It includes activities such as underground or open cut mining, quarrying and mining support, including exploration and directional drilling.

Outlook: Since the baseline figures were prepared, employment in Mining has actually grown due to increased production arising from increased demand and prices. Whether production remains at these levels will impact the accuracy of the projections and demonstrates both the cyclical nature of the mining industry and the importance of considering possible plausible futures when contemplating future job demand.

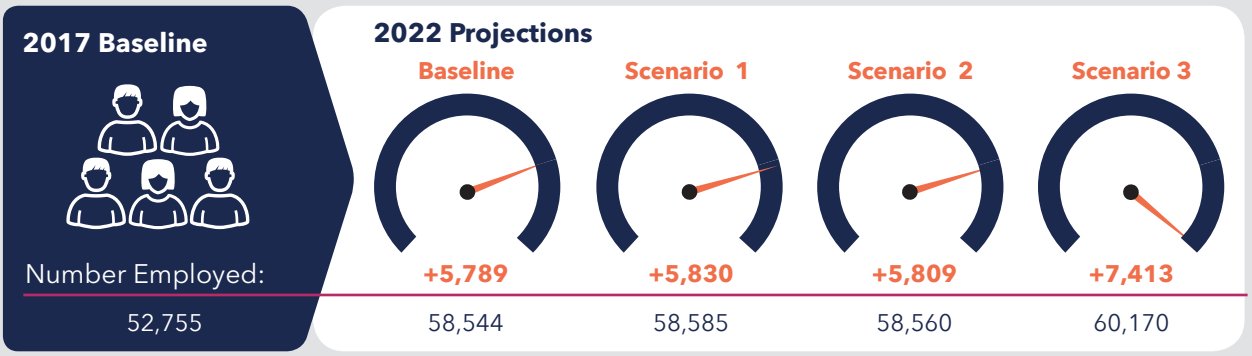
The modelling shows that employment in Mining is projected to fall over the five years to 2022, falling by 12.7 per cent over the five years to 2022. Under Scenario One, employment falls by an extra 92 persons as technological developments reduce the need for some workers. There is minimal impact on the industry under Scenario Two but Scenario Three sees employment in Mining fall by 18 per cent (or 3423 people) over the five years to 2022.

INDUSTRY OVERVIEW

Agriculture, Forestry and Fishing

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



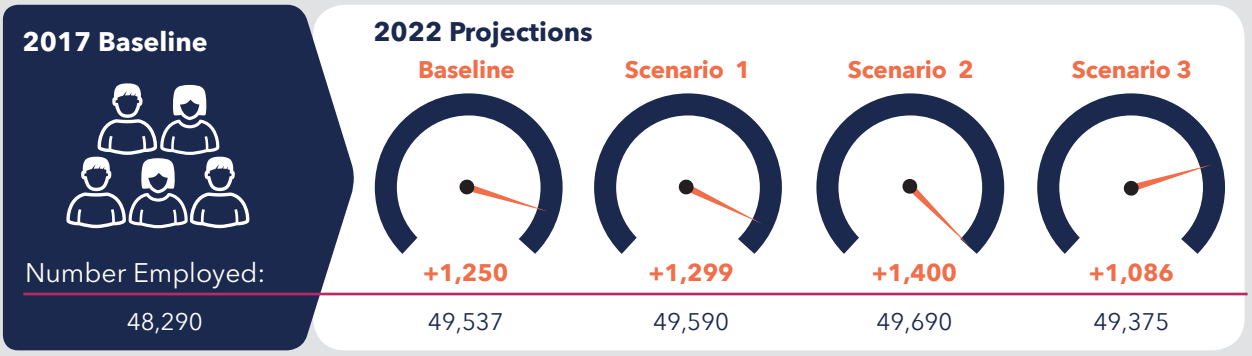
Profile: The Agriculture, Forestry and Fishing industry is mainly engaged in growing crops, raising animals, growing and harvesting timber, and harvesting fish and other animals from farms or their natural habitats. It also includes Agriculture, Forestry and Fishing Support Services such as reafforestation, shearing and aerial crop spraying.

Outlook: Under the baseline scenario, this industry experiences much of its above-average growth due to its recovery in 2018 and 2019 from the damage caused by STC Debbie. Scenarios One and Two both see employment increase by about 11 per cent over the five years to 2022. Due to the positive effects of a falling Australian dollar, employment increases by more than 7400 people under Scenario Three compared with about 5790 for the baseline.

Rental, Hiring and Real Estate Services

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



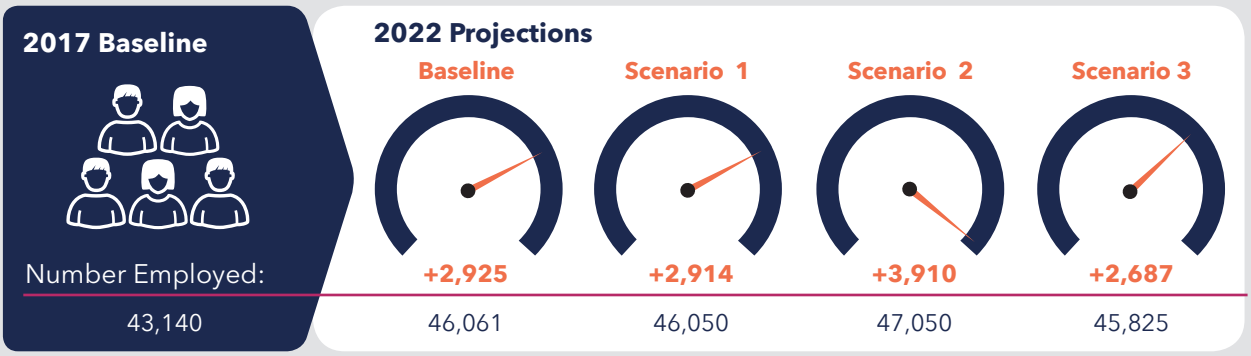
Profile: The Rental, Hiring and Real Estate Services industry engages in renting, hiring, or otherwise allowing the use of tangible or intangible assets and related services such as real estate management.

Outlook: Under the baseline scenario, employment in this industry is projected to increase by around 2.6 per cent over the five years to 2022. An increase in capital investment under Scenario One boosts employment in this industry by around 0.1 percentage points while Scenario Two sees employment increase by 150 people (2.9 per cent) compared with the baseline, due to increased demand for real estate and property operation. Employment growth in these subsectors is weaker under Scenario Three, resulting in the industry employing about 165 people fewer than employment projected under the 2022 baseline.

Arts and Recreation Services

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



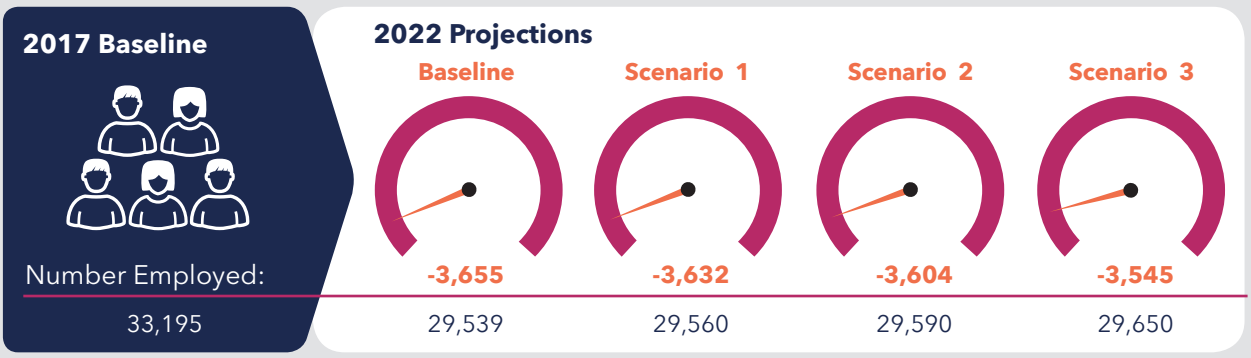
Profile: The Arts and Recreation Services industry engages in the preservation and exhibition of objects and sites of historical, cultural or educational interest; the production of original artistic works and/or participation in live performances, events, or exhibits intended for public viewing; and the operation of facilities or the provision of services that enable patrons to participate in sporting or recreational activities, or to pursue amusement interests. It includes museums, racing, gambling activities, performing arts, zoos and fitness centres.

Outlook: The baseline scenario forecasts below-average growth for this industry, with an increase in employment of 6.8 per cent over the five years to 2022. Scenario One sees minimal change in employment, but Scenario Two results in an extra 985 people working in this industry compared with the baseline. The contraction of the economy in Scenario Three, which affects disposable income, reduces spending on arts and recreation and the workforce is projected to be almost 240 positions smaller by 2022 compared with the baseline.

Information Media and Telecommunications

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



Profile: The Information Media and Telecommunications industry engages in creating, enhancing and storing information products in media that allow their dissemination; transmitting information products using analogue and digital; and providing transmission services and/or operating infrastructure to enable transmission and storage of information and information products. It includes sectors such as libraries, publishing, broadcasting (including via the internet) and telecommunications services.

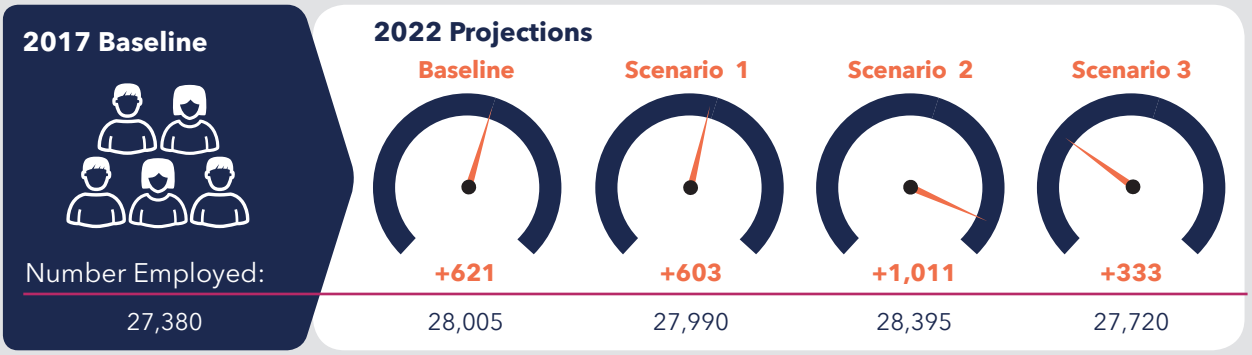
Outlook: Employment in this industry is projected to fall across all scenarios, however the largest fall is forecast for the baseline scenario. Under this scenario, the publishing sector loses 1275 workers and telecommunications services sheds almost 1660 jobs, with employment overall falling by 11 per cent. The rate of decline slows somewhat under Scenarios One and Two, with employment falling by approximately 10.9 per cent in each case. In Scenario Three, employment in Motion Picture and Video Activities grows slightly (117 people) while other sectors fall at a smaller rate than that projected in the baseline scenario, resulting in employment falling by 10.7 per cent overall to 29,650.

INDUSTRY OVERVIEW

Electricity, Gas, Water and Waste Services

SNAPSHOT

Projected change in industry employment, all scenarios, 2017–2022



Profile: The Electricity, Gas, Water and Waste Services industry engages in the provision of electricity; gas through mains systems; water; drainage; and sewage services. It also includes the collection, treatment and disposal of waste materials; remediation of contaminated materials (including land); and materials-recovery activities.

Outlook: Under the baseline scenario, employment in this industry increases by about 2.3 per cent over the five years to 2022. Given the technological changes impacting this industry, a modest fall in employment is projected under Scenario One, while population growth under Scenario Two leads to an extra 390 workers compared with the baseline scenario. Employment growth slows under Scenario Three, with employment in the industry increasing by only 1.2 per cent over the five years to 2022.

REGIONAL OVERVIEW[31]

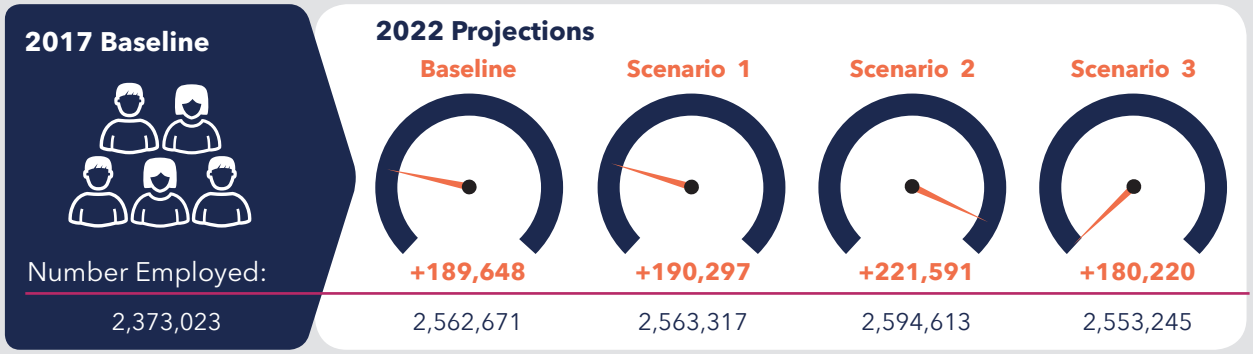
The regional overviews compare the 2022 employment results for each scenario with the number of people employed in that industry in 2017. Each overview contains a geographical description of the region and its major industries. There is also an employment outlook for the region under each scenario.

The dials show the magnitude of employment change and the additional number of workers employed under each scenario compared with employment in 2017. The figures in black show total employment for the region under each scenario.

Queensland

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



Outlook: Under the baseline scenario, employment in Queensland is projected to increase by almost eight per cent over the five years to 2022. Under Scenario One, employment will increase slightly (by 649 additional workers). The population changes in Scenario Two are projected to lead to employment growth of more than 9.3 per cent between 2017 and 2022, while Scenario Three sees employment growth slow to 7.6 per cent, or 180,220 additional workers.

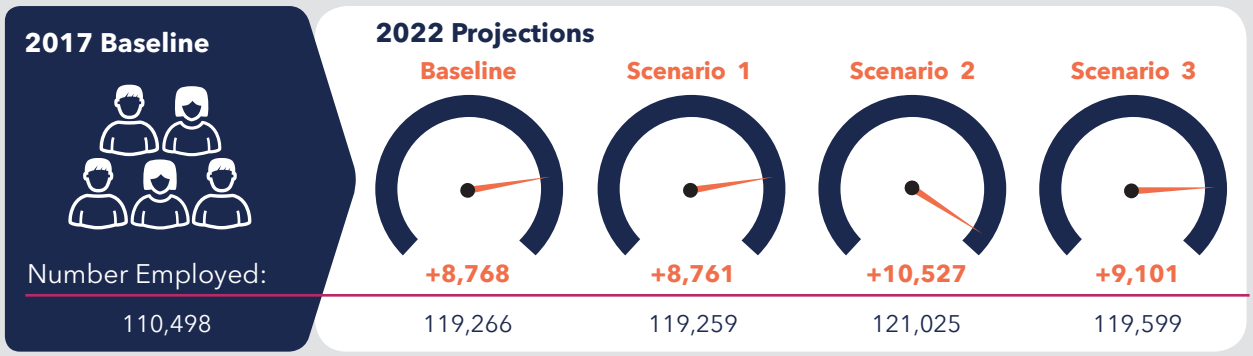
31. Regional profile compiled using the ABS Australian Statistical Geography Standard, http://www.abs.gov.au/ausstats/abs@.nsf/mf/1270.0.55.001.

REGIONAL OVERVIEW

Cairns

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



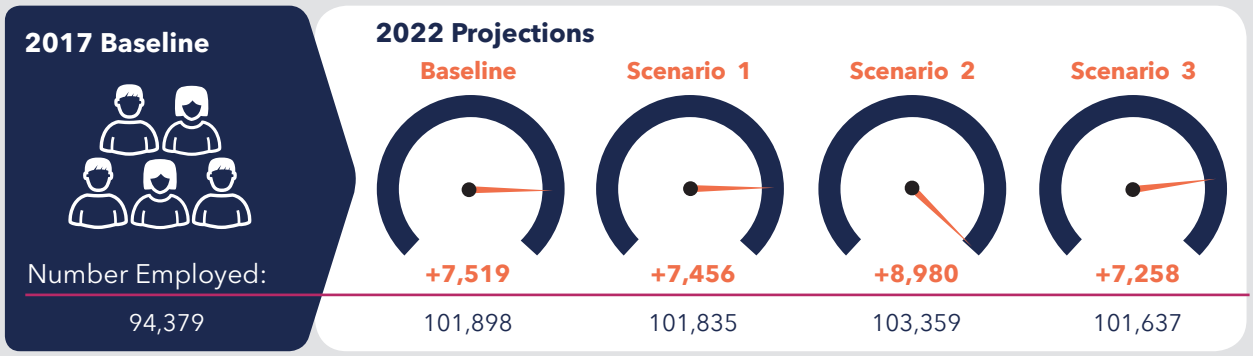
Profile: The Cairns region extends along the Queensland coast from Hinchinbrook Island to Cape Tribulation and covers the area west to Mount Garnet. It includes the regional centres of Cairns, Cardwell, Atherton and Port Douglas. One of Queensland's tourism hubs, employment in the Cairns region is focused within the industries of Retail Trade, Education and Training and Accommodation and Food Services. The industries of Health Care and Social Assistance, Public Administration and Safety, and Construction also contribute strongly to the employment profile of the region.

Outlook: Under the baseline scenario, employment in the Cairns region grows by approximately 8700 people and Scenario One has virtually no additional impact, with employment growth remaining around 7.9 per cent. Employment growth under Scenario Two increases to 9.5 per cent, with more than 10,500 additional people employed in Cairns by 2022. Scenario Three sees a modest increase in employment compared with the baseline as Manufacturing, Accommodation and Food Services and Transport, Postal and Warehousing industries benefit from a falling Australian dollar. This leads to employment projected to grow by 8.2 per cent over the five years to 2022.

Townsville

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



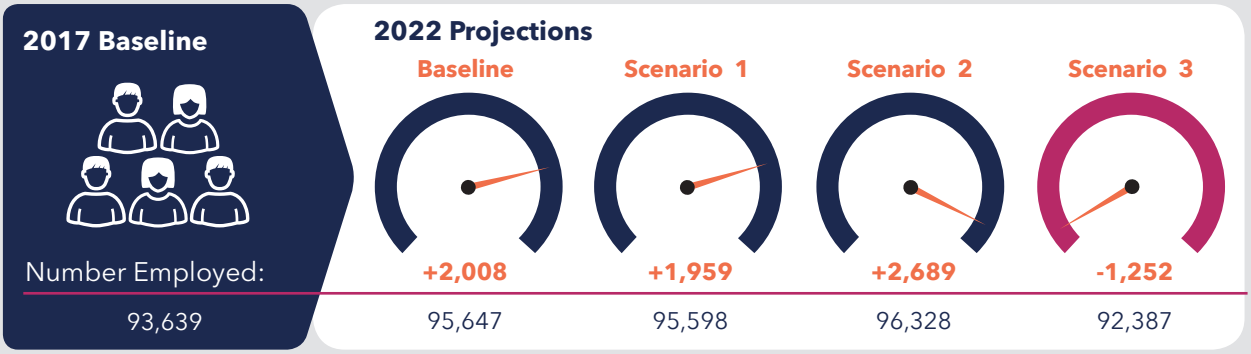
Profile: The Townsville region in North Queensland spans from Home Hill to Ingham along the coast, then extends west to Pentland. It includes centres such as Townsville, Charters Towers and Greenvale. The employment profile of the Townsville region is diverse, with the industries of Health Care and Social Assistance, Retail Trade, Education and Training, Public Administration and Safety, and Accommodation and Food Services comprising the largest employers.

Outlook: Under the baseline scenario, employment in the Townsville region grows by approximately 7500 people (or eight per cent). Scenario One shows a modest slowing of employment growth compared to the baseline, with no change in the composition of industry employment. Scenario Two sees an additional 1461 people employed, primarily in the health, retail and education industries. Scenario Three shows regional employment increasing by 7.7 per cent over the five years to 2022, with lower employment growth in construction and retail, while manufacturing employment increases on the back of a falling Australian dollar.

Mackay[32]

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



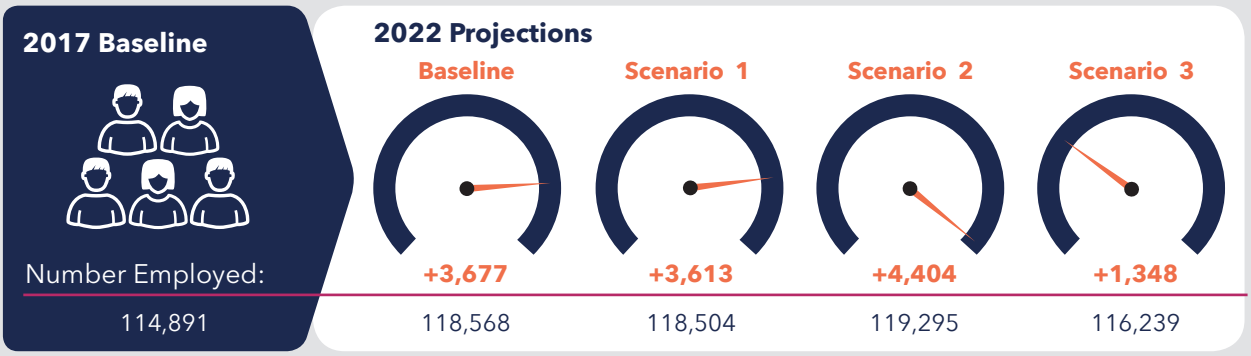
Profile: The Mackay region on the Central Queensland Coast extends to south of Bowen to just north of Marlborough and west to Belyando. It includes Hamilton Island and the centres of Airlie Beach, Collinsville, Mackay, Moranbah and Clermont. Much like its neighbour Fitzroy, Mackay is home to a large number of resource-related projects, with Mining the largest employer in the region. Employment is also significant in the Retail Trade, Health Care and Social Assistance, Construction, and Accommodation and Food Services industries.

Outlook: Under the baseline scenario, employment in the Mackay region grows by more than 2000 people and Scenario One has minimal effect. Scenario Two sees employment growth of 2.9 per cent (or an additional 681 workers), primarily in the health, retail and education sectors. Unsurprisingly, employment under Scenario Three is projected to be almost 3300 lower than the 2022 figure, with 40 per cent of this decrease attributable to a fall in employment in Mining.

Fitzroy[33]

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



Profile: The Fitzroy region extends along the section of Queensland coast encompassing Seventeen Seventy to Shoalwater Bay and covers the area west to Emerald and south to Taroom. It includes the regional centres of Rockhampton and Gladstone. While the Health Care and Social Assistance and Retail Trade industries are the region's largest employers, the region also has significant employment in the industries of Mining, Manufacturing and Construction.

Outlook: Under the baseline scenario, employment in the Fitzroy region grows by approximately 3700 between 2017 and 2022. Scenario One shows a slight fall in employment growth compared to the baseline, while Scenario Two sees an additional 727 people employed, primarily in the health, retail and education sectors. Due to the importance of coal mining to the region, Scenario Three is projected to result in 2329 fewer people employed, with employment in Mining and Construction hit the hardest. Under Scenario Three, Manufacturing and Agriculture, Forestry and Fishing experience additional employment growth due to a falling Australian dollar.

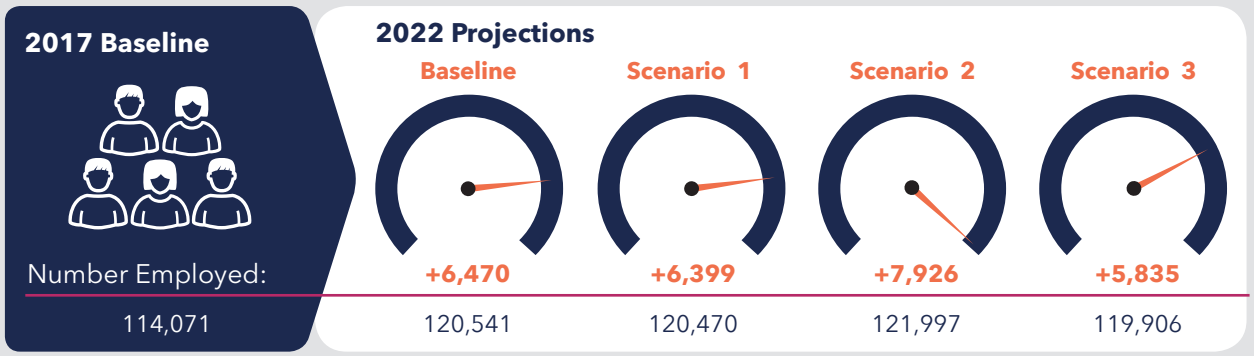
32. This region has been renamed Mackay - Isaac - Whitsunday but the previous name has been retained for consistency.
33. This region has been renamed Central Queensland but the previous name has been retained for consistency.

REGIONAL OVERVIEW

Wide Bay

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



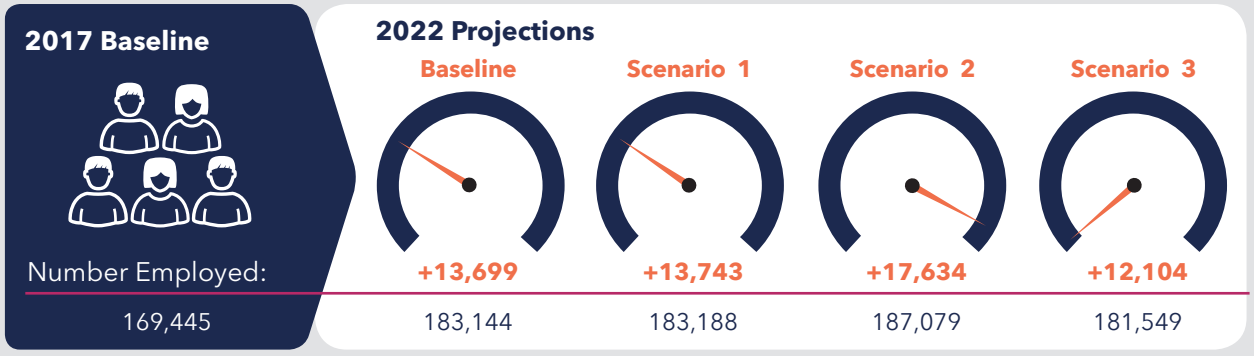
Profile: The Wide Bay region lies north of the Sunshine Coast and spans the coast from Rainbow Beach to Bundaberg, inclusive of Fraser Island. It extends west past Monto and includes centres such as Mundubbera, Kingaroy, Nanango, and Gympie. Agriculture, Forestry and Fishing and Manufacturing have historically employed significant numbers of people but service industries, such as health and retail, have grown to become major employers in the area.

Outlook: Under the baseline scenario, employment in the Wide Bay region grows by approximately 6500 people, but Scenario One sees a reduction in this figure of about 70 workers. The region attracts fairly large numbers of interstate migrants, and Scenario Two is projected to increase employment by more than 7900 people over the five years to 2022. While employment in Agriculture, Forestry and Fishing and Manufacturing increases due to a falling Australian dollar under Scenario Three, the impact of a decrease in commodity prices results in lower overall employment in the Wide Bay region compared with the 2022 baseline.

Sunshine Coast

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



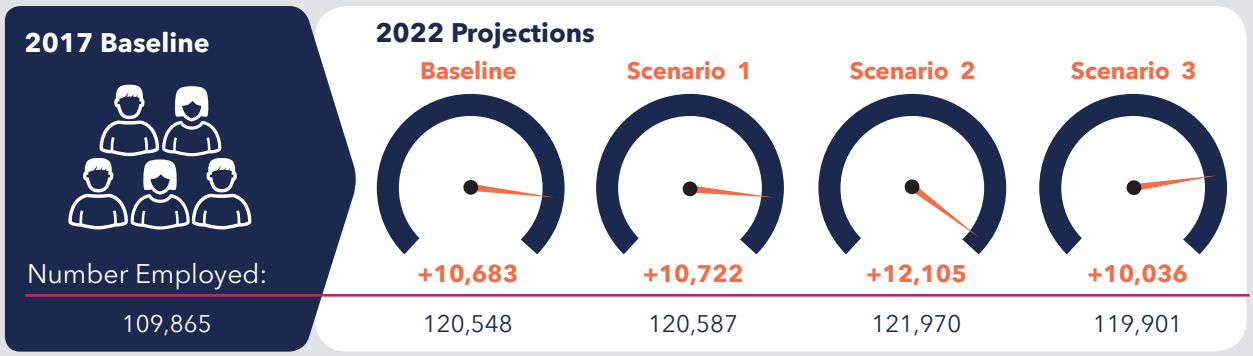
Profile: The Sunshine Coast region lies along the Queensland Coast from Beerburrum to Boreen Point and west to Pomona and beyond Maleny. It includes centres such as Caloundra, Nambour, Cooroy and Kin Kin. It is a fast-growing region and this is reflected by strong employment in Health Care and Social Assistance, Retail Trade, Construction, Education and Training, and Accommodation and Food Services.

Outlook: Under the baseline scenario, employment in the Sunshine Coast region grows by approximately 13,700 and Scenario One has very little impact on employment. Employment under Scenario Two is projected to increase by an additional 3935 people due to the region's popularity as a destination for interstate migrants, meaning the population-driven industries of health, construction, retail, education and accommodation all experience additional employment. Under Scenario Three, these same industries are projected to grow more slowly, with the exception being the Accommodation and Food Services sector, resulting in employment growth around one percentage point smaller, relative to the baseline.

Moreton Bay - North

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



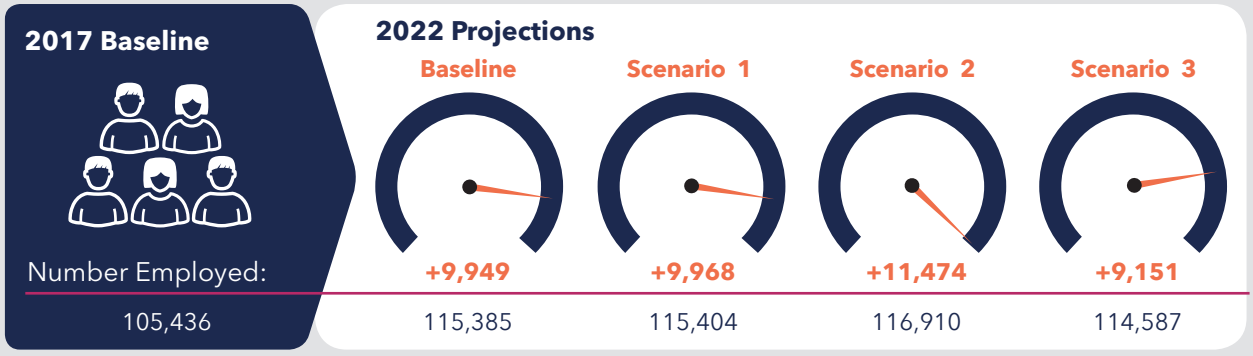
Profile: Moreton Bay – North region lies north of the Ipswich region and runs west to the coast where it takes in Bribie and Moreton islands. It includes the Redcliffe Peninsula and centres such as Kilcoy and Caboolture. Major employers in the Moreton Bay – North region include the Health Care and Social Assistance, Construction, and Retail Trade industries, reflective of the population growth over recent years. Employment in Manufacturing, as well as the associated Transport, Postal and Warehousing sector, is also important for the region.

Outlook: Under the baseline scenario, employment in the Moreton Bay – North region grows by almost 10,700 people, with a slight increase (almost 40 extra workers) employed under Scenario One. Scenario Two sees employment expand, primarily in the health, construction and retail industries, with an additional 12,105 employed by 2022. Due to a falling Australian dollar, the projection for Scenario Three is for growth to slow to 9.1 per cent, with significant falls in Construction and Retail Trade employment, partially offset by growth in Manufacturing.

Moreton Bay - South

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



Profile: The Moreton Bay - South region lies north of Brisbane, running from Samford Valley north to the southern fringe of the D'Aguilar National Park and west to Mount Glorious. It includes North Lakes, Brendale, Cashmere and Dayboro. The Moreton Bay – South region shares similar characteristics to its northern counterpart, with major employers including Health Care and Social Assistance, Construction and Retail Trade. Unlike the northern region, the Public Administration and Safety sector is a more significant employer for the region while Manufacturing is less so.

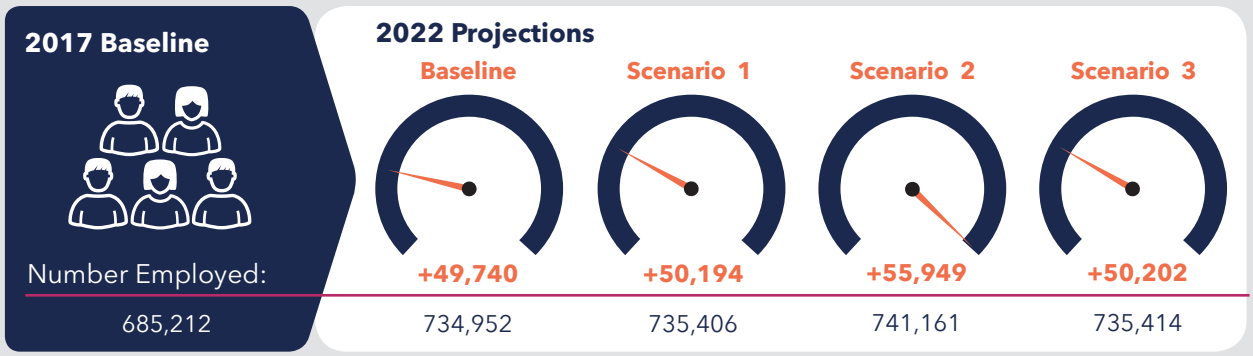
Outlook: Employment in this region is projected to increase by 9.4 per cent over the five years to 2022. Scenario One sees employment increase by 9.5 per cent, or an extra 9968 workers over the same period. The importance of service industries to this region means that almost 11,500 additional people are projected to be employed under Scenario Two, while employment growth slows to 8.7 per cent under Scenario Three.

REGIONAL OVERVIEW

Brisbane

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



Profile: The Brisbane region is comprised of five SA4 regions: Brisbane – East, Brisbane – North, Brisbane – South, Brisbane – West and Brisbane Inner City. It covers an area from Brighton in the north and Redland Bay to the east, the Brisbane CBD, Sunnybank Hills to the south, and an area west to Upper Brookfield and Anstead.

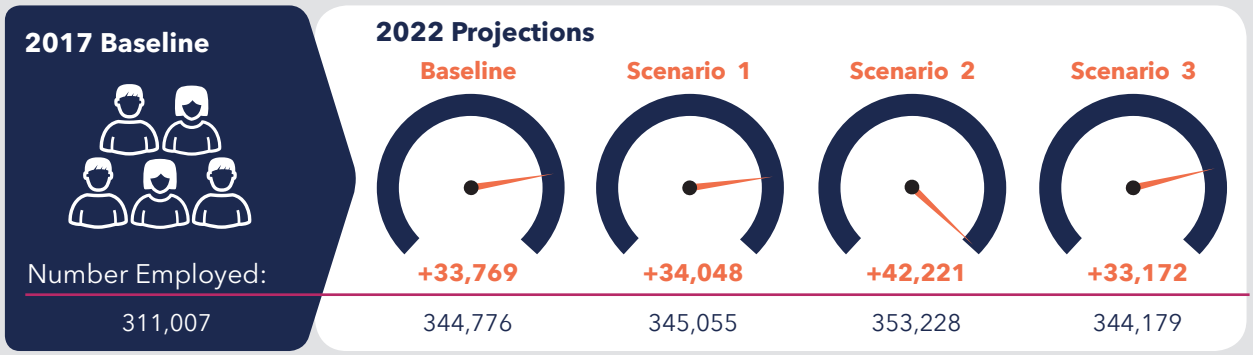
It represents the primary employment hub for many industries in Queensland, including Health Care and Social Assistance, due to a number of prominent hospitals, and Education and Training, comprised of the many schools, universities and TAFE campuses in the region. It is also the location of many prominent business and state government department operations, resulting in strong employment within the Professional, Scientific and Technical Services and Public Administration and Safety sectors.

Outlook: Employment in the Brisbane region is forecast to grow by 7.3 per cent (approximately 49,700 people) by 2022 and it increases under all other scenarios. Under Scenario One, it is projected that employment increases by an extra 454 people (with around half of this increase attributable to the Professional sector). Scenario Three sees employment increase by a similar amount but in this case, Manufacturing also contributes to this additional employment. With the region being one of the main landing spots for additional interstate migration, employment grows by 8.2 per cent (or almost 56,000 additional workers) under Scenario Two.

Gold Coast

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



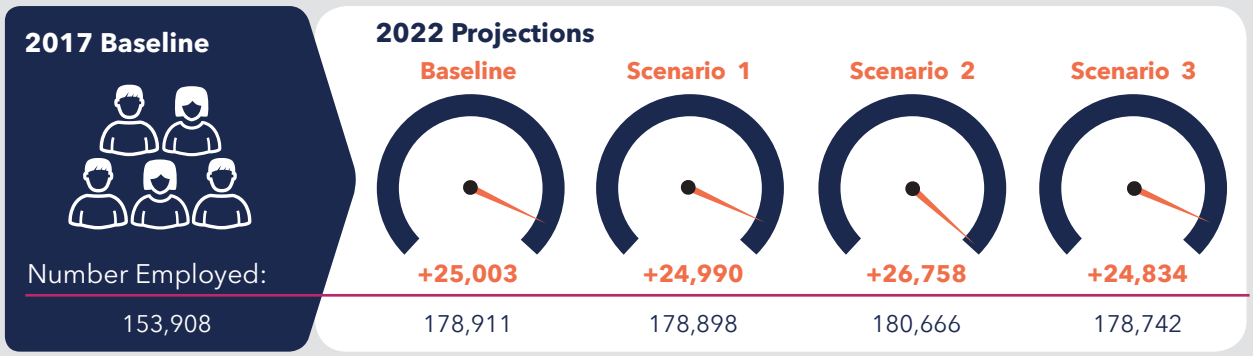
Profile: The Gold Coast region extends along the coast from the Queensland border to north of Jacobs Well, inclusive of South Stradbroke Island. It covers the area west to Tamborine and Canungra and south to Springbrook and Lamington National Park. Recognised as a major tourism hub, employment in the region is focused on the Retail Trade, Accommodation and Food Services, and Education and Training industries. However, employment in Health Care and Social Assistance, Construction, and Professional, Technical and Scientific Services is also significant.

Outlook: Under the baseline scenario, employment in the Gold Coast region grows by more than 33,700 people (10.9 per cent) between 2017 and 2022 and this increases to more than 34,000 under Scenario One. The large intake of additional interstate migrants means that employment under Scenario Two is projected to increase by 42,221, with the Health Care and Social Assistance sector accounting for about one-quarter of these additional workers. Scenario Three shows employment growth slowing to 10.7 per cent due to the benefits of a lower Australian dollar not completely offsetting the negative impact of falling commodity prices in the medium term, particularly in the case of Construction and Retail Trade.

Ipswich

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



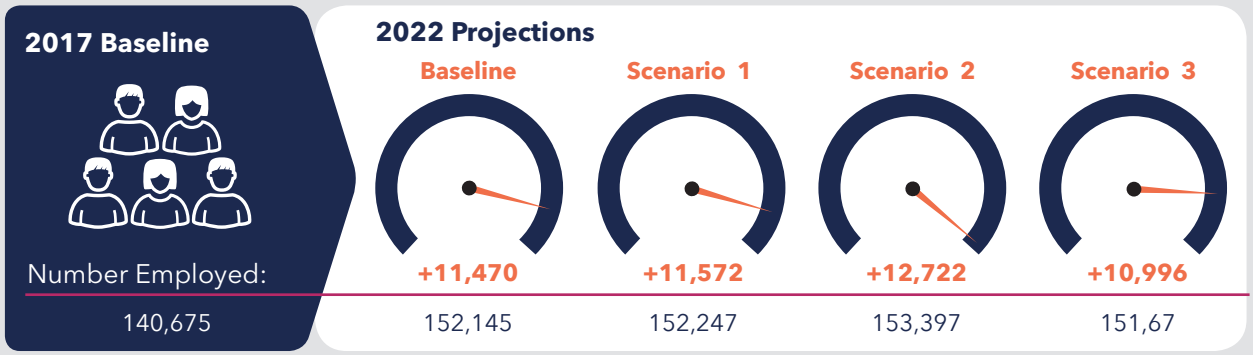
Profile: The Ipswich region is situated south-west of Brisbane and runs from Toogoolawah to south of Boonah and west to Plainland. It includes the centres of Ipswich and Esk. The region is well known for its Manufacturing industry, the second largest employer in the region behind Health Care and Social Assistance. It is also one of the fastest growing regions in Queensland, with the population-driven industries of Retail Trade, Construction and Education and Training being major industries in the region.

Outlook: Under the baseline scenario, employment in the Ipswich region grows by approximately 25,000 people or 16.2 per cent between 2017 and 2022. Scenario One has relatively little employment impact. Under Scenario Two, the industries of Health Care and Social Assistance, Education and Training, and Retail Trade grow strongly and employment increases by 17.4 per cent, with almost 26,760 more people employed compared with 2017. Under Scenario Three, employment growth slows to 16.1 per cent, due primarily to losses in the Retail Trade and Construction industries, notwithstanding an additional 500 people employed in Manufacturing.

Logan - Beaudesert

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



Profile: The Logan-Beaudesert region lies south of Brisbane, extending from Springwood to the Queensland border. It includes the centres of Logan, Jimboomba, Beaudesert and Rathdowney. The Logan-Beaudesert region shares similarities to Ipswich in terms of its employment profile. The Manufacturing sector is the largest employer in the region, which promotes employment in the associated Transport, Postal and Warehousing industry. The region's population is also growing strongly, with solid employment in the Retail Trade, Construction and Health Care and Social Assistance industries.

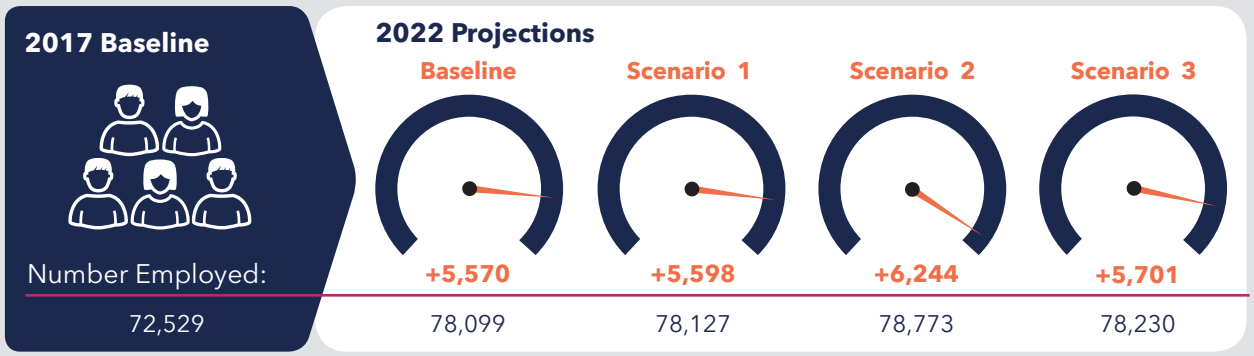
Outlook: Under the baseline scenario, employment in the Logan-Beaudesert region grows by approximately 11,500 people and Scenario One has a minimal impact on the region. Scenario Two is projected to lead to employment growth of nine per cent, with the Health Care and Social Assistance, Construction, and Retail Trade industries accounting for more than half of the additional 12,700 workers. Lower employment in the Retail Trade and Construction industries means employment-growth falls to below eight per cent over the five years to 2022. Like Ipswich, however, Manufacturing employment increases by more than 430 people compared with the baseline.

REGIONAL OVERVIEW

Toowoomba

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



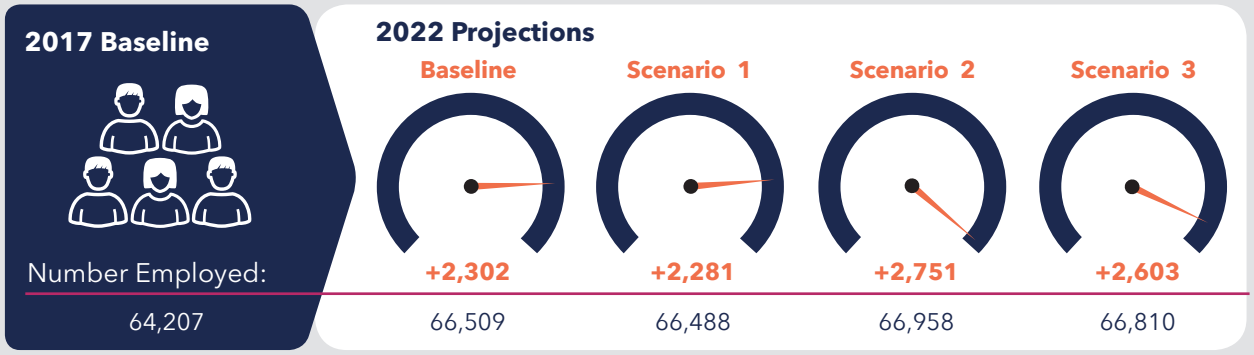
Profile: The Toowoomba region lies west of Ipswich, from Geham in the north to Cambooya in the west, and further south to Glen Rock State Forest. It includes the centres of Toowoomba, Gatton and Highfields. Toowoomba has a diverse economy and employment in the region is strongest in the population-driven industries of Health Care and Social Assistance; Education and Training; Retail Trade; Construction; Professional, Technical and Scientific Services; and Agriculture, Forestry and Fishing are also notable employers in the region.

Outlook: Under the baseline scenario, employment in the Toowoomba region grows by approximately 5600 people (7.7 per cent) and Scenario One has relatively little effect on overall employment growth for the region. As the Toowoomba region experiences a comparatively smaller intake of interstate migrants compared to other Queensland regions, Scenario Two has a smaller impact than on some other regions, with employment projected to increase by around 6220 over the five years. Toowoomba is one of the few Queensland regions where employment growth is projected to increase under Scenario Three compared with the 2022 baseline. While employment falls in Retail Trade and Construction, it increases in Agriculture, Forestry and Fishing and Manufacturing due to a falling Australian dollar.

Darling Downs - Maranoa

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



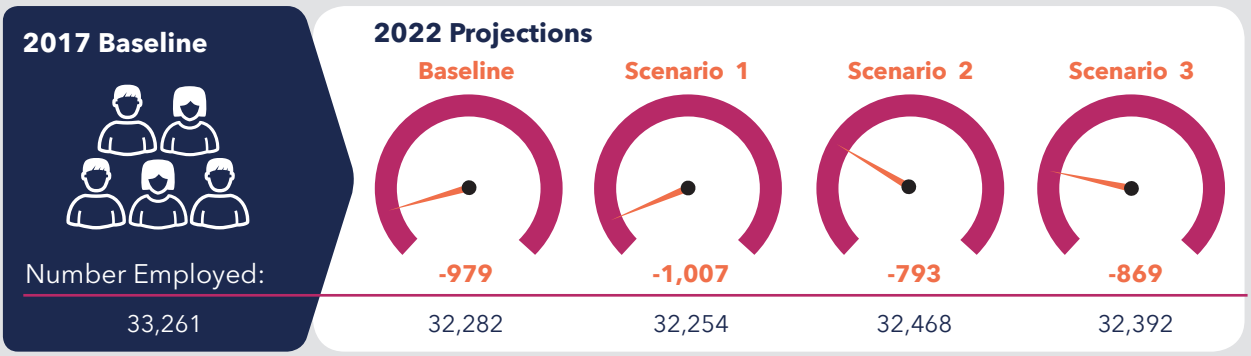
Profile: West of Toowoomba, this region covers a large area of south-west Queensland, from the border north to Wandoan and west to Bollon. It includes centres such as Warwick, Stanthorpe, Dalby, Roma, St George and Dirranbandi. While the Agriculture, Forestry and Fishing industry was a major employer for many years (and still employs almost 8 per cent of all workers), Health Care and Social Assistance, Manufacturing and Retail Trade now employ more of the workforce. The Public Administration and Safety; and Transport, Postal and Warehousing industries are also important for employment in the region.

Outlook: Under the baseline scenario, employment in the Darling Downs region grows by more than 2300 people or 3.6 per cent. Under Scenario One, the proportion of people employed in agriculture increases slightly to the detriment of the health sector, but overall employment is barely affected. This region attracts fewer interstate migrants compared with other Queensland regions and employment growth under Scenario Two is relatively muted, with 2751 additional workers over the five years to 2022. Employment growth in Agriculture, Forestry and Fishing; Manufacturing; and Accommodation and Food Services results in projected growth of 2603 more workers employed in the region under Scenario Three by 2022.

Queensland – Outback

SNAPSHOT

Projected change in regional employment, all scenarios, 2017–2022



Profile: The Queensland – Outback region covers the western half of the state, from the Queensland border south of Thargomindah and Birdsville up to the Gulf of Carpentaria and Cape York. It includes the islands of the Torres Strait and centres such as Cooktown, Normanton, Mount Isa, Hughenden, Barcaldine and Cunnamulla. Despite being the largest region in terms of land mass, the Queensland – Outback has the smallest workforce of all the regions. Employment in the region is greatest in the industries of Public Administration and Safety; Mining; Accommodation and Food Services; and Agriculture, Forestry and Fishing.

Outlook: Under the baseline scenario, employment in the Queensland – Outback region declines by 979 people (2.9 per cent), with falls in the Mining, Retail Trade, Construction, and Other Services workforces exceeding projected growth in the public administration, agriculture and professional sectors. Under Scenario One, employment is projected to fall by three per cent, or more than 1000 workers. Employment under Scenario Two falls by fewer than 800 workers (2.4 per cent). Increased employment growth in the Agriculture, Forestry and Fishing; and Accommodation and Food Services sectors as a result of a falling Australian dollar is not sufficient to offset a fall in Mining employment under Scenario Three, with about 870 fewer people employed over the five years to 2022.

APPENDICES

Appendix A: Key macroeconomic variables

Model Parameters[1]						
	Actual	Forecasts		Projections[2]		
Component	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Employment[3]	0	1	1½	1¾	1¾	1¾
Population[4]	1.48	1.54	1.6	1.64	1.68	1.71
Participation rate (%)[5]	70.7 (M)	70.8 (M)	70.9 (M)	70.9 (M)	71.0 (M)	71.1 (M)
	58.6 (F)	58.8 (F)	59.0 (F)	59.1 (F)	59.2 (F)	59.3 (F)
Labour productivity index	See Appendix B for details.					
Model Derivations						
Unemployment rate	Derived within the model as a function of employment and population.					
Gross state product	Derived within the model as a function of employment and labour productivity index.					
Wage price index	Derived within the model as a function of employment and labour productivity index.					

(M) = Male and (F) = Female

1. Unless otherwise stated, all growth rates shown are year average growth.
2. Figures for 2021-22 are modelling projections and rounded to the nearest quarter percentage where applicable.
3. Queensland Treasury. (2017). Queensland 2017-18 *Budget Strategy and Outlook, Budget Paper No. 2*. p. 5.Retrieved from https://s3.treasury.qld.gov.au/files/bp2-2017-18.pdf.
4. Queensland Government Statistician's Office. (2016). *Queensland Government population projections: Greater Brisbane GCCSA and Statistical areas level 4 snapshot.* Retrieved from http://www.qgso.qld.gov.au/subjects/demography/population-projections/reports/qld-govt-pop-proj-sa4-snapshot/index.php.
5. Australia. The Treasury. (2015), *Appendix D 2015 Intergenerational Report.* Retrieved from https://treasury.gov.au/publication/2015-intergenerational-report/chart-data/appendix-d/.

Appendix B: Labour Productivity Index

Industry productivity was calculated using industry Gross Value Added (GVA) per unit of labour and then indexed to the 2014-15 values. The productivity of all industry was forecast for 2017–18 to 2021–22. Labour productivity has been derived from the assumptions produced and used for the baseline. Individual industry productivity indices were forecast using three main models: the trend model (if the process is trend stationary), ARIMA23 and exponential smoothing. The individual forecasts were then adjusted so that their weighted average was consistent with the implied productivity growth of all industries.

Year	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Agriculture, Forestry and Fishing	100	90	112	116	118	121	123	125
Mining	100	125	133	140	147	152	158	164
Manufacturing	100	96	95	96	97	98	98	99
Electricity, Gas, Water and Waste Services	100	113	141	142	144	146	147	149
Construction	100	93	83	84	85	86	87	88
Wholesale Trade	100	105	115	118	121	123	126	128
Retail Trade	100	103	108	110	112	113	114	115
Accommodation and Food Services	100	117	102	103	105	106	107	109
Transport, Postal and Warehousing	100	97	105	106	107	108	109	110
Information Media and Telecommunications	100	104	103	107	111	115	118	122
Financial and Insurance Services	100	97	106	107	107	108	109	109
Rental, Hiring and Real Estate Services	100	108	111	113	116	118	120	122
Professional, Scientific and Technical Services	100	106	119	120	121	122	123	124
Administrative and Support Services	100	100	108	109	109	110	110	111
Public Administration and Safety	100	106	97	98	98	99	99	100
Education and Training	100	97	103	105	106	107	108	110
Health Care and Social Assistance	100	100	113	114	116	117	118	119
Arts and Recreation Services	100	98	103	104	104	104	105	105
Other Services	100	102	106	107	109	110	112	113

Appendix C: List of SA4 Regions

ABS Regions	Regions in Project
Brisbane - East	Brisbane
Brisbane - North	
Brisbane - South	
Brisbane - West	
Brisbane Inner City	
Cairns	Cairns
Darling Downs - Maranoa	Darling Downs - Maranoa
Central Queensland	Fitzroy
Gold Coast	Gold Coast
Ipswich	Ipswich
Logan - Beaudesert	Logan - Beaudesert
Mackay - Isaac – Whitsunday	Mackay
Moreton Bay - North	Moreton Bay - North
Moreton Bay - South	Moreton Bay - South
Queensland - Outback	Queensland - Outback
Sunshine Coast	Sunshine Coast
Toowoomba	Toowoomba
Townsville	Townsville
Wide Bay	Wide Bay

Appendix D: 1272.0 Australian Standard Classification of Education (ASCED), 2001

Broad Level of Education

Postgraduate Degree	Advanced Diploma and Associate Degree Level
Graduate Diploma and Graduate Certificate	Certificate Level
Bachelor Degree Level	No Post-School

Field of Education (Narrow and Detailed)

NATURAL AND PHYSICAL SCIENCES
Mathematical Sciences
Physics and Astronomy
Chemical Sciences
Earth Sciences
Biological Sciences
Other Natural and Physical Sciences
INFORMATION TECHNOLOGY
Computer Science
Information Systems
Other Information Technology
ENGINEERING AND RELATED TECHNOLOGIES
Manufacturing Engineering and Technology
Process and Resources Engineering
Automotive Engineering and Technology
Mechanical and Industrial Engineering and Technology
Civil Engineering
Geomatic Engineering
Electrical and Electronic Engineering and Technology
Aerospace Engineering and Technology
Maritime Engineering and Technology
Other Engineering and Related Technologies

ARCHITECTURE AND BUILDING
Architecture and Urban Environment
Building
AGRICULTURE, ENVIRONMENTAL AND RELATED STUDIES
Agriculture
Horticulture and Viticulture
Forestry Studies
Fisheries Studies
Environmental Studies
Other Agriculture, Environmental and Related Studies
HEALTH
Medical Studies
Nursing
Pharmacy
Dental Studies
Optical Science
Veterinary Studies
Radiography
Rehabilitation Therapies
Complementary Therapies
Other Health
EDUCATION
Teacher Education
Curriculum and Education Studies
Other Education

Appendix D: 1272.0 Australian Standard Classification of Education (ASCED), 2001

MANAGEMENT AND COMMERCE
Accounting
Business and Management
Sales and Marketing
Tourism
Office Studies
Banking, Finance and Related Fields
Other Management and Commerce
SOCIETY AND CULTURE
Political Science and Policy Studies
Studies in Human Society
Human Welfare Studies and Services
Behavioural Science
Law
Justice and Law Enforcement
Librarianship, Information Management and Curatorial Studies
Language and Literature
Philosophy and Religious Studies
Economics and Econometrics
Sport and Recreation
Other Society and Culture
CREATIVE ARTS
Performing Arts
Visual Arts and Crafts
Graphic and Design Studies
Communication and Media Studies
Other Creative Arts
FOOD, HOSPITALITY AND PERSONAL SERVICES
Food and Hospitality
Personal Services

Appendix E: Detailed Field of Education, Size and Growth in 2022

Natural and Physical Sciences		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Mathematical Sciences	7,951	7.9
Physics and Astronomy	3,647	10.2
Chemical Sciences	8,282	7.8
Earth Sciences	6,245	7.2
Biological Sciences	16,005	10.2
Other Natural and Physical Sciences	13,601	7.2

Information Technology		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Computer Science	46,368	12.7
Information Systems	9,261	15.6
Other Information Technology	1,840	5.3

Engineering and Related Technologies		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Manufacturing Engineering and Technology	26,886	7.3
Process and Resources Engineering	16,522	12.5
Automotive Engineering and Technology	56,271	8.4
Mechanical and Industrial Engineering and Technology	84,597	5.7
Civil Engineering	19,855	13.0
Geomatic Engineering	5,609	11.5
Electrical and Electronic Engineering and Technology	90,254	9.3
Aerospace Engineering and Technology	11,374	10.4
Maritime Engineering and Technology	6,177	8.9
Other Engineering and Related Technologies	5,134	13.4

Appendix E: Detailed Field of Education, Size and Growth in 2022

Architecture and Building		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Architecture and Urban Environment	17,886	17.2
Building	97,513	8.8

Agriculture, Environmental and Related Studies		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Agriculture	14,765	8.0
Horticulture and Viticulture	14,468	3.8
Forestry Studies	705	7.0
Fisheries Studies	744	19.6
Environmental Studies	8,577	10.0
Other Agriculture, Environmental and Related Studies	492	2.7

Health		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Medical Studies	28,903	24.0
Nursing	106,691	16.8
Pharmacy	8,265	11.1
Dental Studies	10,966	13.4
Optical Science	2,240	6.4
Veterinary Studies	5,701	7.6
Public Health	13,756	11.3
Radiography	4,309	11.4
Rehabilitation Therapies	22,894	12.3
Complementary Therapies	3,289	10.1
Other Health	11,511	11.2

Education		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Teacher Education	138,998	9.0
Curriculum and Education Studies	250	14.2
Other Education	8,010	3.8

Management and Commerce		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Accounting	86,159	16.6
Business and Management	185,134	17.6
Sales and Marketing	50,148	15.2
Tourism	12,142	14.3
Office Studies	20,844	11.3
Banking, Finance and Related Fields	29,086	15.3
Other Management and Commerce	8,873	15.3

Society and Culture		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Political Science and Policy Studies	8,890	20.8
Studies in Human Society	19,401	21.8
Human Welfare Studies and Services	84,651	17.7
Behavioural Science	24,860	23.0
Law	31,449	18.8
Justice and Law Enforcement	12,324	13.1
Librarianship, Information Management and Curatorial Studies	8,474	15.7
Language and Literature	17,056	20.4
Philosophy and Religious Studies	8,413	20.1
Economics and Econometrics	19,390	19.6
Sport and Recreation	14,745	8.4
Other Society and Culture	6,861	12.0

Appendix E: Detailed Field of Education, Size and Growth in 2022

Creative Arts		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Performing Arts	12,067	17.1
Visual Arts and Crafts	14,091	17.7
Graphic and Design Studies	20,045	16.7
Communication and Media Studies	27,565	18.6
Other Creative Arts	0	0.0

Food, Hospitality and Personal Services		
Field of Education	**No. of Workers with Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
Food and Hospitality	65,503	10.9
Personal Services	40,177	9.7

No Post-School Qualifications		
Field of Education	**No. of Workers without Qualifications in 2022**	**Increase between 2017 and 2022 (%)**
	776,158	-2.2
Total	**2,561,323**	**7.9**

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