Australian Government
Jobs and Skills Australia

Jobs and Skills Atlas

Methodology

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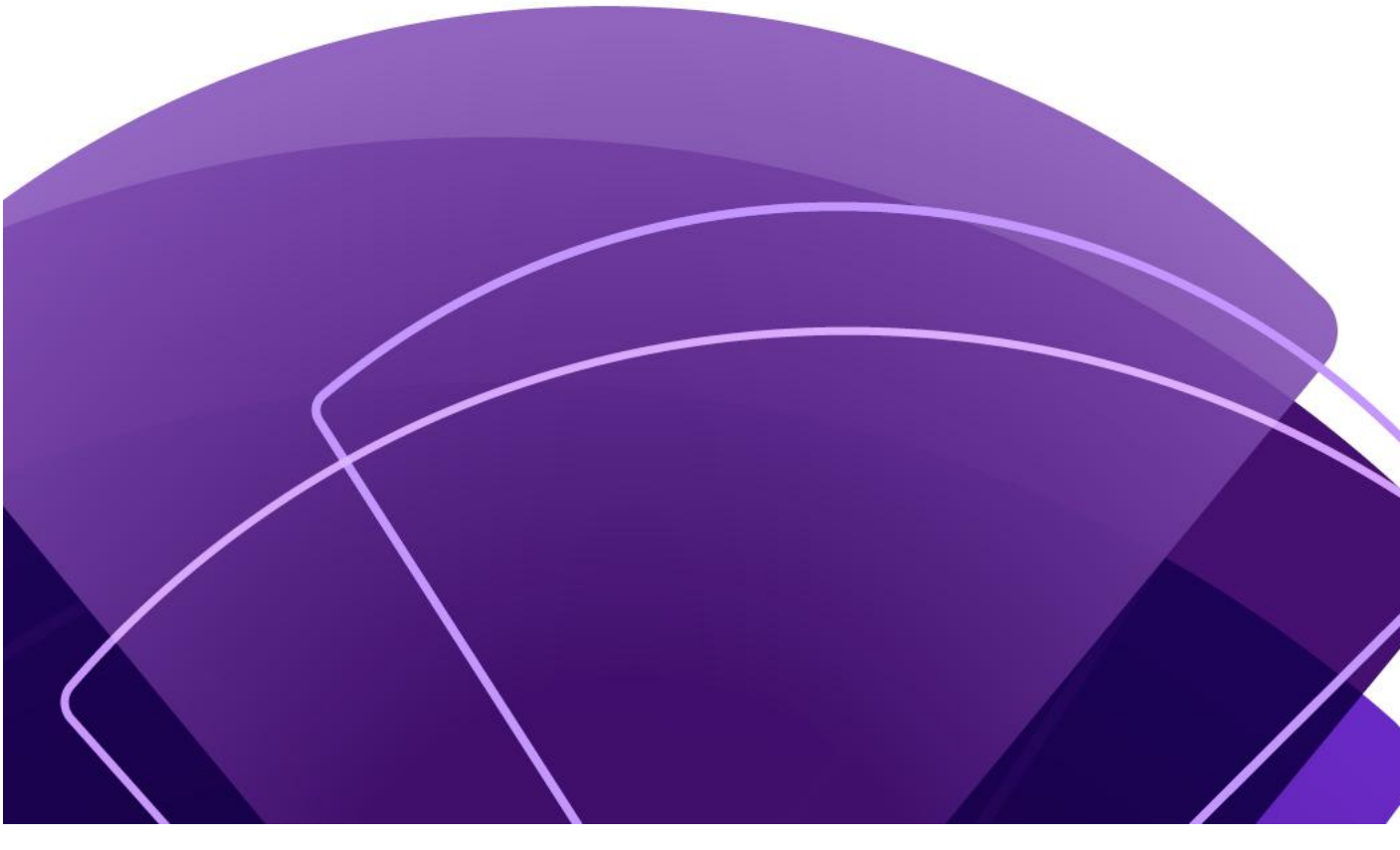

Overview

The Jobs and Skills Atlas is an integrated data platform with a range of labour market and skills data from various sources. Its primary focus is to provide industry, occupations, skills and demographic data at regional (Statistical Area 4 (SA4)), state and national levels. It is designed to be used by a range of stakeholders including economists, policy analysts, managers, employers, employment providers, industry associations, governments at all levels and the public.

Data sets are from a variety of reputable sources including the Australian Bureau of Statistics (ABS), Jobs and Skills Australia (JSA), The Department of Education and the National Centre for Vocational Education Research (NCVER). Each dataset is updated with its own frequency depending on each dataset's update schedule. For example, the Labour Force Survey (LFS), Internet Vacancy Index (IVI) and Nowcast of Employment by Region and Occupation (NERO) data are updated monthly unless otherwise stated, while the Census is updated every 5 years.

This document outlines the data sources and processing methods used to compile the statistics and charts presented in the Jobs and Skills Atlas.

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Methodology Scope and Limitations

The Jobs and Skills Atlas (Atlas) provides an overview of the labour market from an industry, occupation, training and geographical perspective. Levels of geographical detail are national, state and regional (Statistical area level 4 (SA4)), showing information about occupation and industry. By combining various data sets and information sources in one tool, Atlas enables access to the information in a consistent and user-friendly format with the ability to reference and cross-reference these data points.

This document describes the source data, and the processing applied to produce the statistics and charts presented in the product. It does not describe the methodology behind the sources, but rather, how those sources have been treated. Methodologies for source data can be found in that data set's documentation. References can be found in the List of references in this paper.

By making underlying data visible and showing the treatment of the data, the aim is to enable analysts, economists, researchers and other curious users to understand the tool in more detail.

This document provides information on:

- where the data is obtained from
- what transformations and filtering have been applied
- what display rules, such as rounding precision and data suppression are used
- other assumptions, caveats and limitations that apply to the data.

Caveats and definitions

Within Atlas, caveats and definitions are provided to outline the limitations of the data and guide interpretation and appropriate use.

As an aggregate of other data sources, Atlas is susceptible to the limitations of those datasets. For example, Atlas uses employment estimates from NERO, which is an experimental dataset and thus, the figures have an inherit degree of estimation error.

Data Privacy

Maintaining privacy and anonymity of described populations is an important principle in presenting data on Atlas. The risk of personally identifiable disclosure increases where described populations are small. Measures taken to preserve privacy include:

- Data suppression to prevent reporting counts for small populations - such as those in a region who work in a given occupation when this describes fewer than 10 persons or is estimated to be less than 10 persons. Where this approach is taken for a dataset, it is identified.
- Perturbation is an approach where random adjustments are made to values in the data to avoid the disclosure of information leading to persons being identified while

preserving the utility of and patterns in the overall data that can be released and with a minimum impact on the underlying pattern of the statistics.[1]

[1] Australian Bureau of Statistics (ABS), 'Perturbation and interpreting tables with small cells, sparsity and relative standard errors', *ABS, TableBuilder Confidentiality and relative standard error*, 19 November 2021.

Data Methodology

This section describes the data sources in Atlas, including any processing, filters, and treatments applied, and caveats and notes relevant to that dataset. The data sources are listed in *Table 1*. Further details are included in the subsections for each dataset.

For information about specific tables and rounding, please see the Appendix A and B.

Table 1 Data sources and classification standards in Atlas

Name	Appears on	Update Frequency	Granularity
ABS			
Labour Force, Australia	- Map - Region view: Labour Market	Monthly	State/Territory, National
Labour Force, Australia, Detailed	- Map - Region view: Labour Market and Industries - Industry view: Employment (top 10 regions)	Monthly and quarterly (dependent on source table)	SA4 Regions, State/Territory, National
Job Vacancies Survey, Australia	- Industry view: Vacancies	Quarterly	National
Characteristics of Employment Survey, Australia	- Industry view: Median weekly earnings	Yearly	State/Territory, National
Census of Population and Housing (2021)	- Region view: Labour Market (Population education and indigenous breakdowns) and Industries (Employment by sex) - Occupation view: Educational background	Every five years	SA4 Regions, State/Territory, National
Australian Statistical Geography Standard (ASGS) shapefile boundaries	- Map	Updated on an as-needed basis which results in irregular and infrequent updates. This dataset may not change for several years	SA4 Regions, State/Territory, National
Region Internal Migration Estimates	- Region view: Labour Market (Population breakdown)	Yearly	SA4 Regions
ATO			

Australian Business Register	- Industry view	Monthly	National
NCVER			
Total VET students and courses	- Region view: Vocational Ed & Training - Training view	Yearly	SA4 Regions, State/Territory, National
Apprentices and Trainees	- Occupation view	Quarterly	National, SA4 (ANZSCO 4-digit unit group)
training.gov.au			
Nationally recognised training	- Region view: Vocational Ed & Training	As needed	National
Department of Education			
Higher education statistics	- Region view: Higher education tab	Yearly	SA4 Regions, State/Territory, National
JSA			
Occupations and Industries Analysis, Labour Market Insights	- Map: Top 5 industries by employment - Region view: Industries - Industry view - Occupation view	Quarterly	State/Territory, National
Internet Vacancy Index (IVI)	- Region view: Occupations - Occupation view	Monthly	SA4 Regions, State/Territory, National (4-digit ANZSCO unit group)
Nowcast of Employment by Region and Occupation (NERO)	- Region view: Occupations - Occupation view	Monthly	SA4 Regions (4-digit ANZSCO unit group)
Occupation Shortage List (OSL)	- Region view: Occupations - Occupation view	Yearly	State/territory and National (ANZSCO 4-digit unit group and 6-digit occupation)
Clean energy critical occupation	- Region view: Occupations - Occupation view	N/A	National data reiterated at state and regional levels
Employment Projections	- Industry view - Occupation view	Yearly	National
VET National Data Asset (VNDA)	- Region view: Vocational Ed & Training - Training view	N/A	National
Occupational Mobility	- Occupation view	TBC	National (ANZSCO 4-digit unit group and 6-digit occupation)

Regional Labour Market Indicator	- Map: SA4s - Region view: Labour Market	Quarterly	SA4
Recruitment Experiences and Outlook Survey (REOS)	- Region view: Employer recruitment insights - Industry view	Quarterly	National and States/Territories
Survey of Employers who have Recently Advertised (SERA)	- Occupation view	Yearly	National (ANZSCO 4-digit unit group)

Data is updated in an automated process which retrieves the latest available publication of each data source every month.

Labour Force, Australia and Labour Force, Australia, Detailed

The ABS Labour Force Survey (LFS) is a key source for Atlas. Atlas draws from two core ABS releases: Labour Force, Australia and Labour Force, Australia, Detailed.

The Labour Force, Australia dataset includes headline estimates of employment, unemployment, underemployment, participation and hours worked at the state, territory and national level.

The Labour Force, Australia, Detailed release provides detailed monthly and quarterly Labour Force Survey data, including labour force status by region (SA4), and employment by industry and occupation.

LFS statistics are based on a sample of approximately 24,000 private dwellings, resulting in a total sample of about 50,000 people.

While the LFS includes regional data in its output, it is designed primarily to produce statistics at the state/territory level and above. Due to the relatively small sample sizes for regional LFS estimates, the ABS has used administrative data with statistical modelling techniques to produce modelled estimates by age and sex at the SA4 level. The modelled estimates the ABS' best source of timely information on regional employment and unemployment.

While the modelling process significantly improves the quality of LFS SA4 data, they can still be subject to some sampling and other statistical variability, which can vary by region. This can be higher for SA4 estimates disaggregated by age or sex. While the modelling process means the figures are significantly higher quality than the direct survey estimates, caution should still be exercised when interpreting LFS SA4 estimates.

The regional data presented in the Jobs and Skills Atlas is ABS modelled estimates. The only exception to this are the figures for the ACT, where 15+ employment, unemployment rate and participation rates are monthly, seasonally adjusted data, while the employment to population ratio is a 3-month average of original data and the youth unemployment rate is a 12-month average of original data.

As ABS SA4 data is not adjusted for seasonal variations (other than the exceptions noted above), it is preferable to make year-on-year comparisons within the same time series, as movements between different months of the year may be influenced by seasonal factors.

Labour Force Survey tables used in the Atlas

From Labour Force, Australia:

- GM1. Labour force status and Gross changes (flows) by Age, Sex, State and Territory, Original (Monthly).
- Table 12. Labour force status by Sex, State and Territory - Trend, Seasonally adjusted and Original (Monthly).
- Table 12a. Labour force status by Sex, Territory - Seasonally adjusted (Monthly).
- Table 13. Labour force status for 15–24 year olds by Sex - Trend, Seasonally adjusted and Original (Monthly).
- Table 16. Labour force status for 15–24 year olds by State, Territory and Educational attendance (full-time) - Original (Monthly).
- Table 18. Labour force status for 15–64 year olds by Sex - Trend, Seasonally adjusted and Original (Monthly).
- Table 22. Underutilised persons by Age and Sex - Trend, Seasonally adjusted and Original (Monthly).

From Labour Force, Australia, Detailed:

- LM1. Labour force status by age, greater capital city and rest of state (ASGS), marital status and sex, February 1978 onwards (pivot table) (Monthly).
- MRM1. Modelled estimates of labour force status, by SA4 (ASGS) (Monthly).
- MRM2. Modelled estimates of labour force status, by SA4 (ASGS), Age and Sex (Monthly)
- RQ1. Employed persons by Industry division of main job (ANZSIC), Labour market region (ASGS) and Sex, Annual averages of the preceding four quarters, Year to August 1999 onwards which provides industry employment, by ANZSIC, in SA4 regions (Provided directly to JSA by the ABS).
- EQ06. Employed persons by Industry group of main job (ANZSIC), Sex, State and Territory, November 1984 onwards (Quarterly).

Most of the Labour Force survey data is updated monthly, although some datasets, specifically RQ1 and EQ06 from the Labour Force, Australia, Detailed release, are updated quarterly.

The LFS statistics are based on the place of usual residence of the people being surveyed, and this may not be the same location as someone's place of work.

Some data in the Atlas are derived from customised LFS reports provided to JSA and are not publicly available.

Calculated labour force metrics

The following metrics are derived from the Labour Force Survey tables:

- Civilian Population
- Employment
- Unemployment rate
- Participation rate
- Employment to population ratio
- Youth unemployment rate.

Population refers to the civilian population (as defined in the LFS), aged 15 and over unless otherwise stated. The *working age population* refers to the civilian population aged 15 to 64.

$$Working\ Age\ Population\ =\ Population_{aged\ 15-64}$$

Employment is calculated by combining the count of full-time employed persons and part-time employed persons.

$$Employment\ =\ Employed_{full-time}\ +\ Employed_{part-time}$$

The *unemployment rate* is the percentage of the labour force (employed persons + unemployed persons) that is unemployed.

$$Unemployment\ Rate\ =\ \frac{Unemployed\ Total}{Unemployed\ Total\ +\ Employment}$$

The *participation rate* is the *labour force* (which is the sum of *employment* and *unemployment*) expressed as a percentage of the *population* (which is the sum of *labour force* and *not in the labour force*).

$$Participation\ Rate\ =\ \frac{Employment\ +\ Unemployed\ Total}{Population}$$

The *employment to population ratio in the Atlas* is the number of *employed* persons aged 15-64 years expressed as a percentage of the *population* aged 15-64. The Australian Bureau of Statistics publishes the employment to population ratio for both 15+ and 15 to 64-year-olds. While both are of value, using a working age (15-64 years) employment to population ratio can be particularly helpful when comparing labour market strength between regions. This is because the proportion of people aged 65 and over (the vast majority of whom are retired) can vary substantially between SA4s, which can have an impact on the 15+ employment to population ratio. By using a working age (15-64 years) employment to population ratio, the comparison focuses on the age range where people are most likely to be working and is, therefore, a better indicator of relative overall labour market performance.

$$Employment\ To\ Population\ Ratio\ =\ \frac{Employment_{aged\ 15-64}}{Population_{aged\ 15-64}}$$

The *youth unemployment rate* is calculated by dividing the count of unemployed persons aged 15-24 by the labour force aged 15-24.

$$Youth\ Unemployment\ Rate\ =\ \frac{Unemployed\ Total_{aged\ 15-24}}{Unemployed\ Total_{aged\ 15-24}\ +\ Employment_{aged\ 15-24}}$$

Atlas also uses different tables from the LFS to obtain metrics for different population cohorts including age and sex for a subset of the above metrics. The listing of sources and data sets for all labour force variables are provided in Appendix A.

Smoothing treatment

Smoothing is a statistical approach to eliminate outliers from a dataset to emphasise patterns. Surveys such as the Labour Force Survey, collect data from a sample and then use this to produce an estimate for the total population of an area. Sampling error and other sources of error or bias may occur as part of this process.

Different metrics, geographical levels, and cohorts (age, sex, educational attainment, etc.) might be reported using different smoothing methods, such as moving averages of different periods (for example: 3, 6 or 12-month, or 4-quarter averages), or seasonal adjustments and trend decompositions.

Caution should be exercised when making comparisons of values from different geographical levels, as given measurements or estimates may be subject to different treatments at the national, state/territory, or SA4 level.

At the regional level (SA4), the Australian Capital Territory is the only region for which monthly seasonally adjusted data is available. For all other regions:

- Data is not adjusted for seasonal variations, it is preferable to make year-on-year comparisons within the same time series, as movements between different months of the year may be influenced by seasonal factors.
- The regional data presented in the Jobs and Skills Atlas is ABS modelled estimates. The modelled estimates are the ABS's best source of timely information on regional employment and unemployment.
- Youth unemployment rates are generally based on small sample sizes and are therefore subject to high levels of volatility in the data. This metric (and its movements) may not reflect actual youth labour market conditions in the SA4 and should be interpreted with a high degree of caution.

Rounding treatment

The metrics are calculated using unrounded values and are rounded for display with the precisions as listed below:

- Population (15+) – nearest 100*
- Employment – nearest 100*
- Unemployment Rate – one decimal place
- Employment to population ratio (15-64) – one decimal place
- Participation rate – one decimal place
- Youth unemployment rate – one decimal place
- Age, sex, education and Aboriginal and Torres Strait Islander status breakdown percentages - one decimal place
- Age and sex breakdown counts - nearest 100*
- Aboriginal and Torres Strait Islander breakdown counts – not rounded*
- Industries – nearest 100
- 1-year changes - one decimal place.

* When the value is greater than 1 million, the value is rounded to the nearest ten thousand.

Data suppression

Employment count by industry and SA4 can in some cases result in small sample sizes. This can make interpretation difficult and require extra data security measures where information about survey respondents may be discernible.

To address these issues, in cases where the estimated employment is fewer than 1000 in an industry for a selected area, the value is omitted showing ≤1000 instead, and the accompanying percentage share is not calculated.

Definition of sex within the Labour Force Survey

The datasets obtained from the ABS include a variable for the sex of people. This variable describes the sex at birth of survey participants and not gender or other variations of sex characteristics. Sex recorded at birth is defined in an operational definition on the ABS

website[2]. The legislated requirements for collecting data about sex are specified in the Census and Statistics Regulation 2016[3].

Australian Capital Territory as a SA4 and territory

The Australian Capital Territory (ACT) is both a SA4 and a territory. When viewing the ACT from within the SA4 region tab of the Atlas (as well as the State tab), treatments, methods, and sources common to states and territories are used for the ACT over the same treatments, methods, and sources for SA4s, where available. This typically only applies to LFS data. Hence, Atlas treats the ACT as a territory, rather than as an SA4, where possible. This means that much of the data for the ACT are presented in seasonally adjusted terms, which is a different treatment when compared with the corresponding data items for other SA4s. Therefore, caution is advised when making comparisons between the ACT and other SA4s.

Western Australian (WA) Outback North and South

The Labour Force Survey (LFS) uses the list of SA4s from the version of the Australian Statistical Geography Standard (ASGS) published in 2011[4], whereas the Nowcast of Employment by Region and Employment (NERO), uses the version from 2016[5].

Those versions differ in the way Western Australia Outback is reported. The 2016 ASGS version used by NERO divides the region into Western Australia - Outback North and Western Australia – Outback South, while the ABS reports using Western Australia – Outback (North and South) as a whole. Accordingly, LFS figures are not available for Western Australia - Outback North and Western Australia – Outback South in Atlas.

The LFS figures for both regions in Atlas relate to the combined region of Western Australia – Outback (North and South), so overstates the labour force estimates in each SA4 individually.

Job Vacancies Survey

The ABS releases the quarterly Job Vacancies Survey (JVS)[6] describing the number of vacancies in February, May, August, and November. The survey covers all employing organisations in Australia with at least 5 employees, except for businesses primarily involved in the 'agriculture, forestry and fishing' industry, private households employing staff, foreign embassies and permanent defence forces.

The job vacancies figures relate to the number of vacancies available for immediate filling on the actual survey reference date, rather than the monthly or quarterly period.

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[2] ABS, 'Standard for Sex, Gender, Variations of Sex Characteristics and Sexual Orientation Variables', *ABS Standards*, latest release.

[3] Australian Government, 'Census and Statistics Regulation 2016', *Federal Register of Legislation*, 11 February 2020.

[4] ABS, 'Australian Statistical Geography Standard (ASGS): Volume 1 - Main Structure and Greater Capital City Statistical Areas, July 2011', *ABS*, 23 December 2010.

[5] ABS, 'Australian Statistical Geography Standard (ASGS): Volume 1 - Main Structure and Greater Capital City Statistical Areas, July 2016', *ABS*, 12 July 2016.

[6] ABS, Job Vacancies Australia, *ABS website*, latest release.

The JVS informs the Industry tab vacancy numbers for each industry division. The data corresponds to the original series (not seasonally adjusted or trended), with data not available for the 'Agriculture, Forestry and Fishing' industry as this industry is not covered by the survey.

Job Vacancies Survey tables used in the Atlas

- Table 4. Job vacancies, industry, Australia ('000) - original.

Characteristics of Employment Survey

The Characteristics of Employment Survey (COE)[7] is conducted once a year by the ABS as a supplement to the monthly Labour Force Survey (LFS). It is conducted in the month of August with its results released in December of the same year.

As it is a supplement of the LFS, the COE has the same scope and coverage: population aged 15 years and over, excluding defence force members and overseas residents. Additionally, data refers only to persons employed in the labour force (not unemployed persons or persons not in the labour force).

The topics of the survey are employee earnings, working arrangements, membership to trade unions and labour hire workers, with some topics, such as trade union membership collected every second year. The data is used in Atlas to inform median weekly earnings by industry over time and latest median earnings figures by sex. It is important to note these figures are a guide only and should not be used to determine a wage rate as they do not consider years of experience or other factors that may influence a person's wage. They are based on weekly earnings and do not take account of variations in hours worked or paid for. Further, these estimates are subject to some degree of non-sampling error as respondents (or a responsible adult in the household) is asked to report earnings and they may not refer to actual pay records. Their purpose is for reference and cross-industry comparisons.

The data is presented in Atlas's Industry tab.

Census of Population and Housing

Every five years, the ABS counts every person and household in Australia[8]. The Atlas presents data from the 2021 Census to provide a breakdown of the population by their educational attainment and by their First Nations status.

These breakdowns are shown in the Labour Force tab and are available at the national, state/territory and SA4 level.

It should be noted that the 2021 Census was conducted during the COVID period, so some data will be reflective of this time[9]. Therefore 2021 Census data should be interpreted with this context in mind.

Frequency

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[7] ABS, Characteristics of Employment Australia, *ABS website*, latest release.

[8] ABS, Census of Population and Housing, accessed September 2023.

[9] ABS, COVID-19 and the Census, accessed July 2024.

It should be noted that while much of the data presented in Atlas is monthly, data from the Census is a snapshot from 2021. Caution is therefore advised in making comparisons between Census data and more recent data sources.

Perturbation

Perturbation is an approach in which random adjustments are made to values in the data to avoid releasing confidential data. It has been used with the Census 2021 datasets via the Census Table Builder Pro service provided by the ABS. Perturbation enables the release of a greater range of more detailed data. However, this may result in minor differences between totals calculated directly when compared with the sum of the sub-populations included in that total.

Educational attainment

This breakdown is derived from the 2021 census variable Level of highest educational attainment (HEAP)[10].

In the Region – Labour Market section, under Population, the Atlas reports 5 groups:

- Below Year 12 (incl. Cert I/II)
- Year 12
- Certificate III & IV
- Diploma and Advanced Diploma
- Bachelor's Degree or above.

The count excludes Census respondents younger than 15 or older than 64, as well as people currently enrolled in primary or secondary school, and responses that are inadequately described or not stated.

Educational background information is also available in the Atlas' Occupation view. In this case, the category "Below Year 12 (incl. Cert I/II)" has been expanded, thus, showing 7 groups, instead of 5. for each unit group (4-Digit ANZSCO) and its corresponding occupation major group (1-Digit ANZSCO). These are:

- Year 10 and below
- Year 11
- Year 12
- Certificate III/IV
- Diploma / Advanced Diploma
- Bachelor degree
- Post Graduate / Graduate Diploma or Graduate Certificate

The educational attainment distribution is based on place of usual residence.

The Occupation lens also expands on the main fields of education by occupation (4-Digit ANZSCO) according to Census. They do not necessarily reflect a requirement to perform a job, but they describe the most common fields of education of the people in a particular

[10] ABS, 'Level of highest educational attainment (HEAP)', *ABS, Guide to Census data*, 15 October 2021, accessed July 2023.

occupation and the distribution of the education level (from Certificate level to Postgraduate level) in each field.

Aboriginal and Torres Strait Islander Australians

Atlas presents Indigenous status percentage within the population metric under the Labour Market section, in the cohort breakdowns section when Population is selected. It shows the count of persons aged 15-64 who self-identify as First Nations peoples.

This variable is from Census where it is labelled "Indigenous status (INGP)"[1][11]. It can take 6 distinct values. The response 'Overseas visitor' has been excluded while the responses 'Aboriginal', 'Torres Strait Islander' and 'Both Aboriginal and Torres Strait Islander' have been combined into 'Aboriginal and/or Torres Strait Islander'. The responses 'Not stated' and 'Non-Indigenous' have been left unchanged.

This information is collected through self-identification and any changes in how a person chooses to respond will affect the count. The count is also affected if respondents did not answer this question. The national non-response rate for Indigenous status (INGP) was 4.9% in the 2021 Census.

Australian Business Register

The Australia Business Register (ABR) data is a directory of registered businesses in Australia which is managed by the Australian Taxation Office.

ABR data is available to Australian government agencies. JSA has obtained access to this dataset as part of the Department of Employment and Workplace Relations, an approved government agency.

An automated procedure processes this dataset to obtain the number of business entries (newly registered ABNs), exits (closed or cancelled ABNs), and the total unique number of active ABNs for each industry (1 and 2-digit ANZSIC) at a national level.

The results are presented in the Industry view for the latest 5 years and includes public and private businesses as well as sole traders or individuals who have registered an Australian Business Number (ABN).

Occupations and Industries Analysis

Data for the Industry view and the Occupation view come from the JSA Occupation and Industry Profiles.

JSA trends data from the detailed Labour Force Survey to create an estimation of employment over time across all industries (down to ANZSIC 3-Digit level) and occupations (down to 4-Digit ANZSCO level) nationally and by state.

JSA does not produce trended data at the regional (SA4) level. As a result, within the Region view, the industry employment data for SA4s comes from the Labour Force Survey (4-quarter average of original data), while the sex breakdowns by industry are from Census

[11] ABS, 'Indigenous status (INGP)', *ABS, Guide to Census data*, 15 October 2021, accessed July 2023

2021, and the regional data by occupations come from the Nowcast Employment by Region and Occupation (NERO) which is outlined within the NERO section of this document.

Given that the SA4 data and State data come from different series, SA4 figures, if aggregated, will not be equal to the state trended data.

JSA Occupation and Industry Analysis also uses a customised report produced by the ABS at the end of each calendar year, with employment data by industry and occupation. From this customised report, Atlas showcases the top employing industries for each occupation, and the main occupations within each industry. These are available from the Industry and Occupation views respectively.

Industry

Atlas presents JSA employment trended data, at a national and state level, by industry. This also includes the respective sex breakdown by industry.

Industry data can be found when browsing by region within the Region view's Industries tab, and/or when browsing by industry (1-Digit and 2-Digit ANZSIC) within the Industry view, in which other data sources are included to provide a more comprehensive view of each industry at a national level.

The JSA industry employment trended series differs from the 1-Digit ANZSIC trended series released by the ABS in Table 04 of the detailed Labour Force Survey. The trending method used by JSA applies significant smoothing, meaning it serves as a better reflection of longer-term trends within an occupation or industry. For certain industries, employment values over the COVID period (May 2020 to November 2021) are not included and care should be taken when referring to any figure from this period. Revisions may occur if data becomes available.

Occupation

Altas presents JSA employment trended data at a national level by 4-Digit ANZSCO or occupations groups. The employment trend of the corresponding 1-Digit ANZSCO is also presented for comparison/reference purpose.

JSA also receives annual customised reports from the ABS, including a

- customised report based on Labour Force, from which Atlas presents part-time share, female share, median age, and main industry subdivisions (2-Digit ANZSIC) for each ANZSCO 4 at a national level, and a
- customised report based on the Survey of Employees Earnings and Hours, from which Atlas presents median weekly earnings by ANZSCO 4 at a national level.

The same team within JSA also produces other occupation insights based on Census data, including age groups breakdown, highest education level breakdown, and main fields of education by ANZSCO 4. This is all available within Atlas' Occupation view.

Internet Vacancy Index (IVI)

The Internet Vacancy Index[12] (IVI) is an administrative dataset that provides data on online job advertisements from advertising activity each month.

The count of online job ads (IVI job value) is collected from a range of online advertising boards including SEEK, CareerOne and Workforce Australia. It provides an estimate of the count of advertisements by 4-digit ANZSCO unit groups and different geographical levels: national, state/territory, Statistical Area (Level 4) and a custom set of regions unique to IVI called 'IVI region'.

The IVI does not:

- reflect the total number of job advertisements in the Australian labour market
- account for jobs advertised through other online job boards, employer websites, social media, newspapers, or other informal methods such as word-of-mouth
- take account of multiple positions being advertised in a single job advertisement.

Job vacancies and job advertisements are different. Some employment opportunities are not advertised by employers, who may instead fill their vacancies via internal promotion or alternative recruitment methods.

Online job advertisements can be slightly biased towards higher skilled positions. Employers with lower skilled vacancies tend to use informal recruitment methods like social media or word-of-mouth more regularly. On-line advertising of job vacancies is far less common in regional and remote areas of Australia.

This data is based on the location of the estimated advertisement, or place of work, unlike the rest of the data in Atlas, which is based on place of usual residence. This should be considered when interpreting or combining data in Atlas, particularly in SA4s in capital cities.

Further information on IVI data, the rationale for the custom geographic structure, other limitations and details involved in the preparation of the data and counting procedures can be found at the 'Sources and Citation' section.

Rounding treatment

The estimated job advertisements value is rounded to the nearest whole number.

Smoothing treatment

The smoothing approach used depends on the geographical level.

For estimated job advertisements aggregated by SA4 and 4-digit ANZSCO unit group, the sample size can be quite small. So, to mitigate volatility, a 6-month moving average is applied. At the state/territory and national level, vacancies are seasonally adjusted.

Data suppression

[12] Jobs and Skills Australia (JSA), 'Internet Vacancy Index', *JSA website*, latest release; JSA, 'Internet Vacancy Index Methodology', *JSA website*, latest release.

If the estimated job advertisements are fewer than 5, then values are suppressed for the sake of data privacy.

For the estimated job advertisements time series, if any data point in the series is less than 5, then the entire time series chart is suppressed.

Nowcast of Employment by Region and Occupation (NERO)

NERO[13] is an experimental dataset providing information on employment in 355 occupations across 88 SA4 regions in Australia.

Previously, this type of data was only readily available every five years as part of the ABS Census of Population and Housing. With NERO, these insights can be produced monthly.

Given its experimental nature, NERO is subject to error resulting from its model of the labour market including errors in the data it uses, its estimates, as well as the model structure. Also, it is worth noting that NERO estimates are based on the place of usual residence which may not be the same location as someone's place of work.

For additional information about the nowcasting methodology used, see the NERO methodology paper.

Smoothing treatment

NERO data has already been adjusted according to a complex, multi-step smoothing process and thus, no further treatment is applied.

Data suppression

If the employment (nowcast) is less than 100, then values are suppressed for the sake of data privacy.

For the employment (nowcast) time series, if any data point in the series is less than 100, then the entire time series chart is suppressed.

Vacancy rate calculation

Online job advertising count data from the Internet vacancy index is combined with the employment counts from NERO to calculate the vacancy rate.

The vacancy rate for an occupation in a region is found with the formula:

$$Vacancy\ rate_{ANZSCO4} = \frac{vacancies_{ANZSCO4}}{employment_{ANZSCO4}} \text{ x } 100,$$

It should be noted that while IVI data is based on place of work, NERO is based on place of usual residence. Therefore, misalignments can occur, causing data at the SA4 level to not accurately reflect vacancies by residency. This effect is particularly relevant in the case of capital cities.

[13] Jobs and Skills Australia (JSA), 'Nowcast of Employment by Region and Occupation (NERO)', *JSA website*, latest release; JSA, 'Nowcast of Employment by Region and Occupation Methodology', *JSA website*, latest release.

This vacancy rate is only calculated at SA4 level, as estimates of employment by occupation at a state level is not available within the dashboard.

Rounding treatment

The vacancy rate is rounded to 1 decimal place.

Smoothing treatment

While no smoothing is applied after the vacancy rate calculation, it must be noted that the estimated vacancies (of which only the SA4 level data is used) uses a 6-month average, while NERO uses a significantly more complicated, multi-step smoothing process.

Data suppression

The vacancy rate is suppressed if and only if either of the instances of data used to derive it are suppressed. This means that the vacancy rate is suppressed if the:

- employment (nowcast) is less than 100
- estimated vacancies are fewer than 5.

The time series chart is suppressed if any data point in the:

- NERO series is less than 100
- estimated vacancies series is less than 5.

Occupation Shortage List (OSL)

The Occupation Shortage List (OSL)[14] formerly known as the Skill Priority List (SPL), provides a current rating of occupations in shortage in Australia and in each state and territory. In the Atlas, when an SA4 is selected, the OSL rating for the corresponding state or territory is presented.

The ratings provide information about shortage based on evidence from data modelling, statistical analysis of the labour market, stakeholder consultation, employer surveys, and additional engagements with various stakeholder groups.

The OSL has four ratings to classify the shortage status on a specific occupation:

- **Shortage (S):** An occupation is in national shortage or overall shortage. This occurs when employers are unable to fill or have considerable difficulty filling vacancies for an occupation or cannot meet significant specialised skill needs within that occupation, at current levels of remuneration and conditions of employment and in reasonably accessible locations. In some cases, shortages may be apparent for specialisations within the occupation, but not for all instances of that occupation. In these cases, provided there is sufficient evidence, that occupation will still be considered in shortage.
- **Regional shortage (R):** Shortages are restricted to regional areas.
- **Metro shortage (M):** Shortages are restricted to metropolitan areas.

[14] Jobs and Skills Australia (JSA), 'Occupation Shortage List', *JSA website*, latest release; JSA, 'Occupation Shortage List Methodology', *JSA website*, latest release.

- **No shortage (NS):** Research has not identified any significant difficulty of filling vacancies.

For some occupations, a lack of evidence will, by default, result in an occupation being rated as 'No Shortage'.

OSL data is available from the Region view Occupations section, and from the Occupation tab. In both locations, users can view shortage ratings at a state and national level. These ratings are available at ANZSCO 4-Digit Unit group level and ANZSCO 6-Digit Occupation level.

JSA also released the Skills Shortage drivers, which are designed to help identifying potential reasons why an occupation is in shortage. This analysis was based on unit groups (4-digit ANZSCO) for which 4 primary drivers have been identified, based on the most likely cause of the shortage:

- **Long training gap:** few qualified applicants per vacancy and a long training pathway – corresponding to a certificate III or above.
- **Short training gap:** there are few applicants per vacancy and a qualification less than a Certificate III is required.
- **Suitability gap:** enough qualified applicants, but they are not regarded as suitable. Reasons cited include a lack of employability skills and work experience. Another factor which may be in play is unconscious bias of employers, including employers may have unrealistic expectations of graduates and workers.
- **Retention gap:** below average rates of retention, potentially reinforced by low numbers of new applicants per vacancy. There may be enough people with the requisite skills, qualifications and experience to fill vacancies in each unit group, but workers for these unit groups may not remain in the role long due to current working conditions.
- **Uncertain:** There may be cases where the shortage driver of a unit group is uncertain. This may occur when unit groups do not satisfy any of the above definitions or requirements. Uncertainty can also arise when there is not enough data of sufficient quality to identify the primary driver of a shortage.

Frequency

The OSL was first released in 2021 under the name 'Skills Priority List' (SPL). The current release was published in 2024. It is updated annually.

Clean Energy Critical Occupation

The Clean Energy Capacity Study undertaken by JSA defines the jobs and industries that are critical to Australia's clean energy workforce, extending beyond sectors like wind, solar and hydroelectricity into parts of construction, research and development, and others.

The Atlas facilitates a look into these jobs through the Occupations tab by flagging the occupations identified as critical for a clean energy economy and allowing users to filter the occupations table to only show these 38 occupations (Appendix C).

More information on the definition of clean energy, the methodology to identify Australia's clean energy workforce, and the identification of critical occupations, can be found at the Clean Energy Capacity Study site.

Employment Projections

JSA has commissioned Victoria University to produce national employment projections to May 2035, using the Victoria University Employment Forecasting (VUEF) Model[15,16]. Projections are available by industry, occupation, and state/territory.

The employment projections have been calibrated to the macroeconomic and labour market outlook provided by the Australian Treasury and are presented over 5 and 10-year periods to highlight the shorter-term trends as well as to show the impact of longer-term or structural changes.

The projections are based off a starting point of employment estimated at May 2025 using the JSA trended series of the ABS' Detailed Labour Force Survey data, which may not align with estimates of employment from other data sources.

JSA's annual employment projections are useful for understanding the impact of the current economic and labour market outlook on Australia's future workforce needs and can be used by industry and governments to inform policy decisions and workforce planning activities. However, like any model these projections are based on assumptions and contain a degree of inherent uncertainty. Therefore, they should be used as indicative of the future trends based on our current knowledge, rather than a precise prediction of the future.

Total VET students and courses (TVA), Apprentices and Trainees

The National Centre for Vocational Education Research (NCVER) collects data about the Australian vocational education and training (VET) sector through a number of statistical collections and surveys.

The data from NCVER are collected from registered training organisations and state/territory training authorities around Australia. All collections meet the Australian Vocational Education and Training Management Information Statistical Standard (AVETMISS) and use the AVETMISS Validation Software to ensure consistent quality of data. NCVER is not responsible for the correct extraction, analysis or interpretation of the data.

Training organisations are mandated to report nationally recognised training activity only. Additionally, some training organisations may exclude international students from reporting. The extent of under-reporting of locally developed training activity (local courses, local skill sets, local units of competency, etc.) as well as the under-reporting of the delivery to international students are unknown and therefore, for statistical consistency, that delivery is excluded from the data.

Atlas uses the Total VET students and courses (TVA) dataset from NCVER to provide information on training package program completions, as well as count of completions, and in-training Apprentices and Trainees. The specific tables used in the Atlas are the TVA

[15] Dixon, J. (2017). Victoria University Employment Forecasts. CoPS Working Paper G-277.

[16] Jobs and Skills Australia (JSA), 'Employment Projections', *JSA website*, latest release.

program enrolments, TVA program completions, and Apprentices and trainees, which can be accessed from the NCVER website through their VOCSTATS tool[17,18].

To protect students' confidentiality, in VOCSTATS, the Total VET students and courses databases have perturbation applied. Perturbation adjusts values in the data to avoid the disclosure of information leading to persons being identified while preserving the utility-of and patterns in the overall data. Currently in the Training view, Atlas presents program completions for the latest year of data available (2024). The location completions is based on the student's place of residence, not delivery location.

Further cohort disaggregation for completions numbers, by gender, disability status and indigenous status, are available for training package qualifications with at least 5 completions. To prevent the identification of individuals in training packages with low numbers, all figures have been rounded to the nearest 5. Then, cohort percentages are calculated after rounding, and when numbers are below 5, the data is suppressed.

To protect the anonymity of apprentice and trainee cohort groups smaller than 5, the proportional size of very small cohorts is artificially inflated.

A new data release with 2025 VET activity data is expected in September 2026. When the data is available, the Atlas will be updated.

In the Occupation view of the Atlas, the dropdown box is populated by 4-digit ANZSCO unit groups using version 1.3 (2013) of the ANZSCO classification. The source of the data for Apprentices and Trainees for that occupation uses the 2022 version of ANZSCO. This can lead to mismatches for unit groups that have undergone reclassification between ANZSCO versions. One example is 3622 - “Gardeners” which was reclassified to 3626 – “Gardeners (General)” in the 2021 version of ANZSCO and thus shows no data when “Gardeners” is selected. This is expected to be resolved in a future Atlas release which will use OSCA.

VET National Data Asset (VNDA)

VNDA is a collaborative project between Jobs and Skills Australia (JSA), the Australian Bureau of Statistics (ABS), and the National Centre for Vocational Education Research (NCVER).

The VNDA[19] is an integrated data asset that links records from total VET activity data collected by NCVER and other government administrative data from the Australian Tax Office, Department of Social Services and Department of Education. This approach allows VNDA unique access and visibility into the VET student population and provides detailed insights that other collection methods, such as surveys, cannot provide.

VNDA has enabled JSA to produce the VET Student Outcomes - Top 500 Courses report, which provides valuable insights about employment, economic, social and further study outcomes for VET students’ who completed a qualification in the 2019-20 financial year, with

[17] VOCSTATS, '*Total VET students and courses',* Program enrolments, 2024, accessed October 2025.

[18] VOCSTATS, '*Apprentices and trainees',* Apprentices and Trainees collection, quarterly updates.

[19] Jobs and Skills Australia (JSA), ‘VET National Data Asset (VNDA)’, *JSA website*, latest release.

student outcomes reported for 2019-20 financial year. The full report is available on the VNDA webpage.

The Training tab inside the Region view in Atlas, uses VNDA to show employment rate, median graduate income, higher education progression and further VET progression for those training package qualifications included in VNDA's report.

It should be noted that the primary source of data withing the Training tab is NCVER's latest data collection of total VET students and courses, corresponding to the 2023 calendar year, in contrast to VNDA's data from 2019-20. This has several implications:

- The current VNDA report only includes the top 500 courses, whereas Atlas presents approximately 3000 training packages qualifications. Consequently, many of the training packages in Atlas do not have direct 'National student outcomes' data for the specific course.
- The VNDA top 500 report has only used data at the national level, which means, regardless of the state of region (SA4) selected, the national outcome is displayed as a reference.
- VNDA presents top 500 courses, whereas Atlas presents nationally recognised training package qualifications. Thus, included in the top 500 courses there are some courses that are not full training package qualification, e.g. Units of competency such as First Aid Management of Anaphylaxis. Courses not classified as training package qualifications have not been included in Atlas.
- Since the latest NCVER data (2023) is from a different year than the VNDA (2019-20), there may be qualifications for which there is data about the student outcome, but that qualifications have been superseded by a newer qualification with a different course code identifier. Atlas uses the National Register of VET from training.gov.au (TGA) to generate a map of the relationships between all TGA courses which supersede each other (replacing a course with an updated and almost equivalent course). When student outcomes are available for a strongly related qualification that directly precedes or supersedes the selected qualification, the Atlas informs the user and provides a quick hyperlink to view the outcomes for that course. When student outcomes are available for a weakly-related qualification, e.g. the selected qualification and another course with student outcomes is superseded by the same course, the Atlas will present information informing the user that student outcomes can be viewed for a related course.

  This means, alternative courses with 'National student outcomes' data will be offered to be displayed where the current course has been superseded, or other courses of interest have been identified. This identification is based on the relationship between courses as provided by TGA.

Nationally recognised training

Training.gov.au, also known as TGA is the national register of vocational education and training in Australia[20]. It is managed by the Department of Employment and Workplace Relations (DEWR) on behalf of State and Territory Governments.

TGA is the authoritative source of Nationally Recognised Training (NRT) and Register Training Organisations (RTOs).

Nationally recognised training includes training packages, qualifications, units of competency, accredited courses and skill sets. Registered training organisations have the approved scope to deliver national recognised training as required by national and state/territory legislation.

This dataset is used together with NCVER's TVA and the VNDA dataset to suggest for a selected training package qualification not in VNDA, other training package qualifications that appear in VNDA that are related to the one selected, based on the supersession relationship ('Supersedes' or 'Superseded by') reported by TGA. Accordingly, a training package qualification could be related to a course in VNDA in several ways:

1) The VNDA dataset contains the selected training package qualification
2) The course in VNDA is superseded by the selected training package qualification
3) The course in VNDA supersedes the given training package qualification
4) Both, the given training package qualification and the course in VNDA, have a superseding relationship to a third course, but no direct supersession relationship between them.

A given training package qualification can have one, multiple or none of the above relationships to those in the VNDA dataset.

Higher Education student data collection

The Department of Education collects statistics relating to the provision of higher education at all Australian institutions[21]. The data is managed through three key collections: (i) Student data, (ii) Staff data, and (iii) Undergraduate Applications, Offers and Acceptances.

The Jobs and Skills Atlas presents data from the student data collection, which encompasses enrolments and completions by field of education (FOE) and course level.

The field of education classification describes the principal subject matter of study. The hierarchy has three levels: broad, narrow and detailed fields.

- Broad field - is the broadest level of the classification, and it is based on the theoretical content and broad study purpose.
- Narrow field – is a subdivision of the broad field based on objects of interest
- Detailed field – is a subdivision of narrow field, based on methods, techniques, tools and equipment.

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[20] Training.gov.au (TGA), 'Nationally recognised training', *TGA website*, accessed December 2025.

[21] Higher Education statistical collection, student data 2023. Department of Education, accessed November 2024.

Atlas currently showcases data for narrow (denoted by 4-digit codes) and detailed (denoted by 6-digit codes) fields only.

The course level, or level of education, is an indication of the complexity, length and depth of learning involved. Similarly to the field of education classification, the course level hierarchy is broken down into broad, narrow and detailed levels. Atlas presents data at the broad level only, which takes one of the following levels:

- Postgraduate level - includes courses that lead to one or more of the next awards: graduate certificates not accredited as VET awards, graduate diploma not accredited as VET award, masters degree, or doctoral degree.
- Undergraduate courses - denote those that lead to diplomas not accredited as VET awards, advanced diplomas not accredited as VET awards, associate degrees, bachelor degrees or honours programs.
- Enabling courses - are foundation or bridging programs with the purpose of preparing students to undertake a course leading to a higher education award. Usually, these courses prepare students for undergraduate study.
- Non-award study - refers to enrolments in a course, subject or unit, without being enrolled in or eligible for the completion of a full degree.

The higher education section in Atlas presents total students enrolled and the total completions, by field of education and course level, for the latest collection year, as well as student's percentages for key demographics (gender, indigenous status and disability status). To prevent the identification of individuals, data has been suppressed when completions are lower than 5. The data analysis and validation are conducted and provided by the Department of Education's Higher Education Analysis team.

Data is available at the national, state and regional (SA4) levels with location based on the student's permanent home address while studying. This may be different to their residence during the semester and location after graduation. Also important to note, disability and indigenous status are self-identified and may underestimate true numbers.

Occupational Mobility

JSA performs analysis on data received from the Australian Taxation Office in order to describe the movement between different occupations annually. This analysis uses a person's occupation from their tax filings to determine the flow at the level of population from occupations into each other. For example, a subset of Cooks, Kitchenhands, and Waiters in a given year may be employed as Chefs the following year. Similarly, a subset of Chefs may be working as Cooks, Cafe or Restaurant Managers, or in unrelated industries the following year.

The Atlas shows information relating to the flow of persons into and out of a unit group, as well as changes in specialisation between occupations, within the same unit group for the latest year available (FY 2021). Flow counts between 6-digit occupations with less than 10 persons are omitted, and are rounded to the nearest 5 from 10 and above. 4-digit unit groups flow counts are then aggregated from these 6-digit occupation flow counts after processing. Due to very small flows being omitted, the "moving into" a unit group and "moving out of" a unit group flows are slightly understated.

The full report can be found on the Data on Occupation Mobility webpage.

Regional Labour Market Indicator (RLMI)

The Regional Labour Market Indicator (RLMI), released quarterly, combines key indicators of spare labour market capacity. Regions are grouped into distinct categories of overall labour market performance; Strong, Above average, Average, Below average, and Poor. This provides a view of labour market performance of an SA4 relative to other SA4s in the analysis. An SA4 with a rating of 'Strong' should be interpreted as having a labour market with a high rate of employment as well as the ability for further utilisation. Given the RLMI methodology in which an SA4 is defined relative to other SA4s, there is approximately the same number of SA4s in each rating and an SA4's rating may be change due to changes in the labour markets of other SA4s. The RLMI only exists at the SA4 level.

Recruitment Experiences and Outlook Survey (REOS)

Jobs and Skills Australia conducts the REOS, an ongoing survey of employers to monitor recruitment activity in the labour market. Data is collected on a range of topics including current and recent recruitment activity, recruitment difficulty and future staffing expectations.

The REOS is targeted towards employers with five or more employees and excludes many government organisations. The survey typically covers around 800 employers across Australia each month, and the data is weighted by business size (number of employees) and region (individual Capital Cities, Rest of State areas).

The REOS results are not seasonally adjusted and may therefore be affected by seasonal factors, particularly around the December-January holiday period. Due to reduced data collection in January, results for the first quarter of the year may exhibit a higher level of volatility.

Survey results are published regularly on the Jobs and Skills Australia website through the Recruitment Insights Report. Atlas showcases a subset of the metrics covered by the report; these are:

- Recruitment rate: the proportion of all employers who were either recruiting at the time of the survey or had recruited in the month prior to being surveyed.
- Recruitment difficulty rate: the proportion of recruiting employers who reported that the vacancy was difficult to fill. Ther survey includes questions about the scale of difficulty and their reasons for the difficulty.
- Recruiters expecting to increase staffing levels: the question to all employers about what they think their staffing numbers will look like over the next 3 months.

These variables are available in Atlas at the national level and for each state and territory. For South Australia, Tasmania, Northen Territory and Australian Capital Territory, data is based on a low number of records and should be interpreted with caution.

Disaggregated data by region type (capital cities vs rest of state areas), business size (5 to 19 employees and 20 employees or more), as well as the recruitment reason are also available when selecting any of these three variables.

Additionally, national data by industry is also showcased in the Industry view in Atlas, but in this section, no further disaggregation is available.

For more details on the survey methodology and metrics, please visit the Recruitment Experiences and Outlook Survey page in Jobs and Skills Australia.

Survey of Employers who have Recently Advertised (SERA)

The Survey of Employers who have Recently Advertised (SERA) is a survey of employers and recruiters conducted by the Social Research Centre on behalf of JSA. It collects information about recruitment experiences from participants who have recently advertised vacancies online.

The Atlas shows some of the results of this survey such as, for each occupation; the proportion of vacancies filled, the average number of qualified and suitable applicants per vacancy, and the average experience required per vacancy.

There is a minimum threshold of survey respondents required per occupation; hence not all occupations will show SERA data.

The number of applicants that suitable or qualified are deemed by the employer responding to the survey. For unit groups without strict qualification requirements, this can result in more suitable applicants per vacancy than qualified applicants per vacancy- typically and in most cases, suitable applicants would all be qualified though.

Total New Vacancies (TNV)

The Total New Vacancies dataset[22] is a modelled dataset providing an estimate of the total number of new vacancies by region or by 2-digit ANZSCO. In Atlas, the Total New Vacancies are shown at the National and State level. This dataset uses JSA's IVI dataset and REOS datasets together to produce its data. More can be read about the methodology used here.

Note that users should exercise caution when interpreting TNV data and are encouraged to make comparisons on an annual basis rather than quarter-to-quarter, as shorter timeframes can be subject to volatility.

Australian Statistical Geography Standard (ASGS) shapefile boundaries

The Atlas displays various data and information at a number of geographic levels: SA4, state/territory and national. It uses shapefiles to display the boundaries of each region on the map.

The region selection feature allows users to search for a region by postcode and makes use of a correspondence between the postcode and SA4 boundaries to allow searching by postcode or region name.

SA4 Region shapefile

The Australian Statistical Geographic Standard (ASGS) is a hierarchical geographical classification, defined by the Australian Bureau of Statistics (ABS), which is used in the collection and dissemination of official statistics.

Statistical area level 4 (SA4) regions are one of the spatial units defined under the ASGS.

SA4s are the largest sub-State regions in the Main Structure of the Australian Statistical Geography Standard (ASGS) and have been designed for the output of a variety of regional data. They are specifically designed for the output of ABS Labour Force Survey data and

[22] Jobs and Skills Australia (JSA), Total New Vacancies, *JSA website*, latest release.

therefore have population limits imposed by the Labour Force Survey sample. These areas represent labour markets or groups of labour markets within each State and Territory. There is a total of 88 SA4 regions shown in the Atlas but as noted above, the ABS LFS combines the two regions of Western Australia – Outback North and Western Australia – Outback South, into Western Australia – Outback (North and South), and thus LFS data is only available for 87 regions.

A state-based shapefile from the same source is used for the state and national level map.

The version of the ASGS used currently in the product was released in 2016[5] and the post code search feature uses postal areas defined in the 2021 release under Non-ABS Structures[23].

Processing

The original ABS shapefile was simplified using the Visvalingam weighted area procedure[24] to reduce the size of the map for a faster load time and better user experience.

Local Government Areas (LGA) and Employment Region (ER) shapefiles

Users can choose to view the map borders of LGAs and ERs within the map function. However, no data has been linked and thus these shapefile regions are not interactive.

For more information on these areas, visit: Employment Region Dashboards and Profiles | Jobs and Skills Australia and Small Area Labour Markets | Jobs and Skills Australia

[23] ABS, 'Postal Areas', *ABS, Australian Statistical Geography Standard (ASGS) Edition 3*, 6 October 2021, accessed June 2023.

[24] M. Visvalingam & J. D. Whyatt, 'Line generalisation by repeated elimination of points', *The cartographic journal* 30.1 (1993): 46-51.

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Appendix A

This appendix lists the source tables used in constructing the Atlas data model. The ABS provides LFS data in original, seasonally adjusted and/or trend series. In some instances, the Atlas team implemented additional smoothing by taking a moving average and where this has been done the number of months over which the figure has been averaged is indicated (for example 3MA refers to data that are a 3-month average).

Table 2 National LFS metrics

Variable	Disaggregation	Series Type	Source
Population (15+)	-	Original	Table12
Employment	-	Seasonally adjusted	Table12
Unemployment rate	-	Seasonally adjusted	Table12
Employment to population ratio (15-64)	-	Seasonally adjusted	Table18
Participation rate (15+)	-	Seasonally adjusted	Table12
Youth unemployment rate	-	Seasonally adjusted	Table13
Employment	Age	Seasonally adjusted	Table22
Employment to population ratio (15-64) (segments '15-24 years' and '25-54 years' only)	Age	Seasonally adjusted	LM1 and Table22
Employment to population ratio (15-64) (segments '55-64 years' only)	Age	3MA	LM1
Participation rate (15+)	Age	Seasonally adjusted	LM1 and Table22
Population (15+)	Age	3MA	LM1
Employment	Sex	Seasonally adjusted	Table12 or Table22
Employment to population ratio (15-64)	Sex	Seasonally adjusted	Table18
Participation rate (15+)	Sex	Seasonally adjusted	Table12
Population (15+)	Sex	3MA	LM1

Table 3 State/Territory LFS metrics

Variable	Disaggregation	Series Type	Source
Population (15+)	-	Original	Table12 and Table12a
Employment	-	Seasonally adjusted	Table12 and Table12a
Unemployment rate	-	Seasonally adjusted	Table12 and Table12a
Employment to population ratio (15-64)	-	3MA	GM1
Participation rate (15+)	-	Seasonally adjusted	Table12 and Table12a
Youth unemployment rate	-	12MA	Table16
Employment	Age	12MA	LM1
Employment to population ratio (15-64)	Age	12MA	LM1
Participation rate (15+)	Age	12MA	LM1
Population (15+)	Age	12MA	LM1
Employment	Sex	Seasonally adjusted	Table12 and Table12a
Employment to population ratio (15-64)	Sex	3MA	LM1
Participation rate (15+)	Sex	Seasonally adjusted	Table12 and Table12a
Population (15+)	Sex	3MA	GM1 or LM1

Table 4 Statistical Area 4 region LFS metrics

Variable	Disaggregation	Series Type	Source
Population (15+)	-	Original	MRM2
Employment	-	Modelled	MRM1
Unemployment rate	-	Modelled	MRM1
Employment to population ratio (15-64)	-	Modelled	MRM2
Participation rate (15+)	-	Modelled	MRM1
Youth unemployment rate	-	Modelled	MRM2
Employment	Age	Modelled	MRM2
Employment to population ratio (15-64)	Age	Modelled	MRM2
Participation rate (15+)	Age	Modelled	MRM2
Population (15+)	Age	Modelled	MRM2
Employment	Sex	Modelled	MRM2
Employment to population ratio (15-64)	Sex	Modelled	MRM2
Participation rate (15+)	Sex	Modelled	MRM2
Population (15+)	Sex	Modelled	MRM2

Table 5 National, State/Territory and Statistical Area 4 region LFS industries data

Region type	Variable	Disaggregation	Series Type	Source
National and States/Territories	Labour force head counts by ANZSIC major group	-	Trend	Table EQ06 trended by Jobs and Skills, Australia
National and States/Territories	Labour force head counts by ANZSIC major group	sex	Perturbed survey	Table EQ06 trended by Jobs and Skills, Australia
SA4	Labour force head counts by ANZSIC major group	-	4 quarter average	RQ1
SA4	Labour force head counts by ANZSIC major group	sex	Perturbed survey	ABS Census of Population and Housing, 2021

Appendix B

This appendix lists the product business rules.

Table 6 Business rules

Business rule	Rule type
LFS	
For the industry employment counts at the SA4 level a 4-quarter average is applied.	Smoothing
For reporting the labour force metrics for all regions (map overview and labour force tabs), the following precision rules apply: For counts – nearest 100 (nearest 10,000 if over 1 million) For rates and ratios – 1 decimal place.	Rounding
Employment to population ratio age bands is based on the population aged 15 years or older and less than 65 years old. The age breakdown of employment to population ratio is based on the age-bands; 15-24, 25-54 and 55-64.	Definition
In the industry tab we suppress data that is based on an excessively small sample. This is deemed to be the case if a region and industry major group combination contains fewer than 1000 individuals. In this case the number of employed and the percentage share for that industry will not be shown and instead will appear ≤1000 and no percentage share are calculated.	Data suppression
The unemployment rate and youth unemployment rate metrics are not displayed for age or gender cohorts due to the risk of high volatility arising from a small sample.	Data suppression
NERO	
Nowcast (NERO) employment counts rounded to nearest 100.	Rounding
The Atlas allows users to report results for several regions together giving an average value weighted by population. If NERO employment estimates to aggregated include values of 10 then the vacancy rate and the employment count is not displayed.	Aggregation
IVI	
A 6-month moving average is used to smooth vacancies by occupations (4-digit ANZSCO).	Smoothing
IVI, NERO	
Estimated vacancies are rounded to the nearest whole number in the occupations tab. For the summary on the overview tab, if the value is greater than 1000, it is rounded to the nearest 100. Otherwise, it is rounded to the nearest 10.	Rounding
Vacancy rate is rounded to one decimal place.	Rounding

If the employment (nowcast) is less than 100, then values are shown as <100. For the employment (nowcast) time series, if any data point in the series is less than 100, then the entire time series chart is suppressed.	Data suppression
If the estimated vacancies are fewer than 5, then values are suppressed for the sake of data privacy. For the estimated vacancies time series, if any data point in the series is less than 5, then the entire time series chart is suppressed.	Data suppression
The vacancy rate is suppressed if either of the instances of data used to derive it are suppressed. Concretely, this means that the vacancy rate is suppressed if the: • employment (nowcast) is less than 100 • estimated vacancies are fewer than 5. The time series chart is suppressed if any data point in the: • NERO series is less than 100 • estimated vacancies series is less than 5.	Data suppression
VET - TVA	
When student numbers are less than 5, cohorts data is not shown.	Data suppression
VET – Apprentices and Trainees	
When student numbers are less than 5, cohorts groups are artificially inflated	Data obscuring
Higher Education	
When student numbers are less than 10, cohorts data is not shown. Additionally, when student numbers are less than 5, the number of students is also masked by showing “<5”.	Data suppression
CENSUS	
Perturbation is applied to preserve anonymity in the data obtained from the Census.	Data suppression
ALL DATASETS	
Any value in the millions is abbreviated to with an M (for example 3,500,000 becomes 3.5M), but thousands remain unchanged (EG: 770,000 remains as 770,000).	Display

Appendix C

This appendix lists the 38 Clean Energy Critical Occupations within the Clean Energy Capacity Study.

Architectural, Building and Surveying Technicians

Agricultural and Forestry Scientists

Airconditioning and Refrigeration Mechanics

Aircraft Maintenance Engineers

Architects and Landscape Architects

Automotive Electricians

Chemists, and Food and Wine Scientists

Chemical and Materials Engineers

Chemical, Gas, Petroleum and Power Generation Plant Operators

Civil Engineering Draftspersons and Technicians

Civil Engineering Professionals

Construction Managers

Electrical Distribution Trades Workers

Electrical Engineers

Electricians

Electronic Engineering Draftspersons and Technicians

Electronics Trades Workers

Engineering Managers

Environmental Scientists

Geologists, Geophysicists and Hydrogeologists

Industrial, Mechanical and Production Engineers

Marine Transport Professionals

Metal Fitters and Machinists

Mining Engineers

Motor Mechanics

Occupational and Environmental Health Professionals

Other Building and Engineering Technicians

Other Engineering Professionals

Plumbers

Policy and Planning Managers

Production Managers

Research and Development Managers

Structural Steel and Welding Trades Workers

Structural Steel Construction Workers

Telecommunications Trades Workers

University Lecturers and Tutors

Urban and Regional Planners

Vocational Education Teachers

Appendix D

Definitions of terms used in the Jobs and Skills Atlas

Units

%pts – percentage points. This is the arithmetic difference between two percentages. For example, if the unemployment rate goes from 4% to 5% that is a 1 percentage point increase (1 %pt). Not to be confused with the percentage change or the difference as a ratio of the original percentage, which in this case, it would be a 25% increase in the unemployment rate itself.

% share – proportion of people in a given group.

Statistical Area Level 4 (SA4) – a geographical area representing the largest sub-state regions in the main structure of the Australian Statistical Geography Standard (ASGS). SA4 regions were initially designed specifically for dissemination of ABS Labour Force Survey data, with each area representing a labour market or group of labour markets within a state or territory.

Labour market data

Population (15+) – or Civilian Population. All usual residents of Australia aged 15 years and over except:

- members of the permanent defence forces
- certain diplomatic personnel of overseas governments customarily excluded from census and estimated population counts
- overseas residents in Australia
- members of non-Australian defence forces (and their dependents) stationed in Australia.

Working age population – usual residents of Australia aged 15 to 64 years old, excluding the categories already noted under Population (15+).

Employment – the number of people aged 15 years and over classified as employed by the ABS. This includes those who:

- worked for one hour or more for pay, profit or payment of any kind
- worked for one hour or more without pay in a family business or on a farm
- were owner-managers who were away from their work
- had a job but were away from work for less than four weeks, or for more than four weeks but had received pay for some or all of the last four weeks; or
- had a job but were away from work as part of a standard work or shift arrangement, because of being on strike/locked out, or on worker's compensation and expected to return to their job.

Unemployment – The number of people aged 15 and over classified as unemployed by the ABS, by meeting the following criteria:

- not already be classified as employed
- available for work; and
- has actively looked for work in the last four weeks or is waiting to start a job within the next four weeks and could have started in the reference week if that job was available then.

Labour force – the sum of employment and unemployment.

Not in the labour force – people who were not in categories employed or unemployed. This includes people who undertook unpaid household duties or other voluntary work only, were retired, voluntarily inactive and those permanently unable to work.

Unemployment rate – the proportion of the labour force (sum of employment and unemployment) who were unemployed. To be classified as unemployed by the ABS, a person:

- must be aged 15 years and over
- is not already be classified as employed
- is available for work
- has actively looked for work in the last four weeks
- is waiting to start a job within the next four weeks
- could have started in the reference week if a job was available.

Youth unemployment rate – the unemployment rate for persons aged 15 to 24 years old.

Participation rate – proportion of the civilian population aged 15 and over in the labour force (sum of employment and unemployment). The demographic structure of a region can have a significant influence on its participation rate.

Employment to population ratio – Proportion of the civilian population that is employed in the age range 15-64 years old.

The Australian Bureau of Statistics publishes the employment to population ratio for both 15+ and 15-64 year olds. While both are of value, using a working age (15-64 years) employment rate can be particularly helpful when comparing labour market strength between regions. This is because the proportion of people aged 65 and over (the vast majority of whom are retired) can vary substantially between SA4s, which can have an impact on the 15+ employment to population ratio. By using a working age (15-64 years) employment to population ratio, the comparison focuses on the age range where people are most likely to be working and is, therefore, a better indicator of relative overall labour market performance.

Labour market rating – The Regional Labour Market Indicator (RLMI) is a single summary measure of labour market performance by combining key indicators, such as the employment rate (15-64 yo), unemployment rate, underemployment rate, JobSeeker income support rate (15-64 yo), and the job vacancy fill rate. It reflects both employee and employer perspectives to give a view of labour market performance, relative to the national average.

Industry data

ANZSIC – Australian and New Zealand Standard Industrial Classification, 2006 (Revision 2.0)

NFD – Codes ending in zero are described as 'not further defined' and are used to code responses which cannot be coded to the unit level of the classification but can be coded to a higher level of the classification structure.

Median weekly earnings – this is the median weekly pay for full–time employees in their main job before tax, salary sacrifice or any other deductions. These figures are a guide only and should not be used to determine a wage rate as they do not take into account years of experience or other factors that may influence a person's wage.

Employment projections – medium term forecast of employment (5 years and 10 years from reference point) in Australia, by industry.

Active businesses – count of Australian Business Numbers (ABN) of which the entity is either an 'Australian Public Company', 'Australian Private Company', or 'Individual/Sole Trader' and has been registered by the given date or prior and has not been cancelled as of the given date.

Vacancies – quarterly survey that estimates job vacancies classified by industry.

Occupation data

ANZSCO – Australian and New Zealand Standard Classification of Occupations, 2013 version 1.3

Employment – at a regional level refers to the monthly estimates of employment by occupation (Nowcast of Employment by Region and Occupation), whereas at a national level, this is trended data by JSA based on the Detailed Labour Force Survey, quarterly releases. Employment numbers are suppressed when the value is less than 100.

Vacancies – monthly count of online job advertisements (Internet Vacancy Index). This number is suppressed when the value is less than 5.

Vacancy rate – the ratio of online job ads (Internet Vacancy Index) to employment. This rate is available monthly for regional data and quarterly for national data, and if both, employment and vacancies numbers are available.

Median weekly earnings – this is the median weekly pay for full–time employees in their main job before tax, salary sacrifice or any other deductions, based on ABS Survey of Employee Earnings and Hours. These figures are a guide only and should not be used to determine a wage rate as they do not take into account years of experience or other factors that may influence a person's wage.

Median hourly earnings – central value of hourly earnings within an occupation at a national level, based on ABS Survey of Employee Earnings and Hours. These figures are a guide only and should not be used to determine a wage rate as they do not take into account years of experience or other factors that may influence a person's wage.

Clean energy critical occupation – The Clean Energy Generation Capacity study identifies 38 occupations as critical to the clean energy workforce required for transitioning to a sustainable energy economy in achieving net zero emissions by 2050. For more detail read The Clean Energy Generation report.

Occupation Shortage List (OSL) – The Occupation Shortage List (OSL)[1], formerly known as the Skill Priority List (SPL), provides a current rating of occupations in shortage in Australia and in each state and territory. The OSL has four ratings to classify the shortage status on a specific occupation:

- **Shortage (S)**: An occupation is in national shortage or overall shortage. This occurs when employers are unable to fill or have considerable difficulty filling vacancies for

an occupation or cannot meet significant specialised skill needs within that occupation, at current levels of remuneration and conditions of employment and in reasonably accessible locations. In some cases, shortages may be apparent for specialisations within the occupation, but not for all instances of that occupation. In these cases, provided there is sufficient evidence, that occupation will still be considered in shortage.

- **Regional shortage (R):** Shortages are restricted to regional areas.
- **Metro shortage (M)**: Shortages are restricted to metropolitan areas.
- **No shortage (NS):** Research has not identified any significant difficulty of filling vacancies.

For some occupations, a lack of evidence will, by default, result in an occupation being rated as 'No Shortage'.

Occupation shortage drivers – Potential reason why an occupation is in shortage. This analysis was based on unit groups (ANZSCO level 4) for which 4 primary drivers have been identified, based on the most likely cause of the shortage:

- **Long training gap:** few qualified applicants per vacancy and a long training pathway – corresponding to a certificate III or above.
- **Short training gap:** there are few applicants per vacancy and a qualification less than a Certificate III is required.
- **Suitability gap:** enough qualified applicants, but they are not regarded as suitable. Reasons cited include a lack of employability skills and work experience. Another factor which may be in play is unconscious bias of employers, including employers may have unrealistic expectations of graduates and workers.
- **Retention gap:** below average rates of retention, potentially reinforced by low numbers of new applicants per vacancy. There may be enough people with the requisite skills, qualifications and experience to fill vacancies in each unit group, but workers for these unit groups may not remain in the role long due to current working conditions.
- **Uncertain:** There may be cases where the shortage driver of a unit group is uncertain. This may occur when unit groups do not satisfy any of the above definitions or requirements. Uncertainty can also arise when there is not enough data of sufficient quality to identify the primary driver of a shortage.

Projected employment – medium term forecast of employment (5 years and 10 years from reference point) in Australia, by occupation.

Occupational mobility – analysis of annual flows between occupations, as well as headcounts and stocks, inflows and outflows of workers by occupation.

Educational background – highest educational achievement across each 4-digit ANZSCO at census time. A level of educational attainment for a given 4-digit ANZSCO might not reflect a requirement to perform that role.

Apprentices and Trainees – quarterly enrolment, completion and in-training activity of Apprentices and Trainees. The apprentice's or trainee's enrolled-course is mapped to a 4-digit ANZSCO unit group which is considered most suitable for that course. An apprentice or trainee in a course which is mapped to a given 4-digit ANZSCO may not reflect a new member of that 4-digit ANZSCO's workforce.

Higher education data

Course level – or level of education, is an indication of the complexity, length and depth of learning involved. At the broad level, higher education courses are classified in postgraduate, undergraduate, enabling and non-award courses.

- The **postgraduate** level includes courses that lead to one or more of the next awards: graduate certificates not accredited as VET awards, graduate diplomas not accredited as VET awards, masters degree, or doctoral degree.
- **Undergraduate** courses include diplomas not accredited as VET awards, advanced diploma not accredited as VET awards, associate degree, bachelor degree and honours program.
- **Enabling** courses are foundation or bridging programs with the purpose of preparing students to undertake a course leading to a higher education award. Usually, these courses prepare students for undergraduate study.
- **Non-award** study refers to enrolments in a course, subject or unit, without being enrolled in or eligible for the completion of a full degree.

Field of education – or FOE, refers to the principal subject matter of study.

- **Narrow field:** 4-Digit code. Refers to specific areas of study within a broad field.
- **Detailed field:** 6-Digit code. Refers to specialised areas of study within the narrow field, distinguished by methods, techniques, and tools.

VET data

VET – Vocational Education and Training

TVA – Total VET Activity. Annual mandatory reporting on student enrolments, completions and course data submitted by Registered Training Organisations.

Cohort data

Age (labour market) – distribution of people by age group (15-24, 25-54, 55+) from the monthly Labour Force Survey.

Age (occupation) – distribution of people in an occupation by age groups of 5 years, starting from 15-19 until 65 and over, from the Census of Population and Housing based on please of usual residence.

Disability (VET and Higher Ed) – indicates whether students consider themselves to have a disability, impairment or long-term medical condition.

Education (labour market) – level of highest educational attainment of people aged 15 to 64 years who were not attending primary or secondary school at Census time.

Education level (occupation) – distribution of highest educational attainment by occupation at Census time and based on place of usual residence (this includes year 10 and below and up to post graduate degree).

Gender (VET and Higher Ed) – self-assessment response by the student. Refers to current gender, which may be different to sex recorded at birth. When gender information is collected, individuals should be given the option to select ‘Female’, ‘Male’, or ‘Indeterminate/Intersex/Unspecified’.

Indigenous (labour market) – variable from the 2021 Census recording the response of persons aged 15-64 who identified themselves as being of Australian Aboriginal and/or Torres Strait Islander origin.

Indigenous (VET and Higher Ed) – status identifier indicating students who self-identify as being of Australian Aboriginal or Torres Strait Islander descent and is accepted as such by the community in which they live.

Median age (industry) – median age of all workers in an industry based on labour force survey data (4-quarter average).

Median age (occupation) – median age of all workers in an occupation based on labour force survey data (4-quarter average).

Sex (labour market) – refers to the biological characteristics of an individual, categorised as male or female.