Making Our Way

Adaptive capacity and climate transition in Australia's regional economies

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CPD CENTRE FOR POLICY DEVELOPMENT

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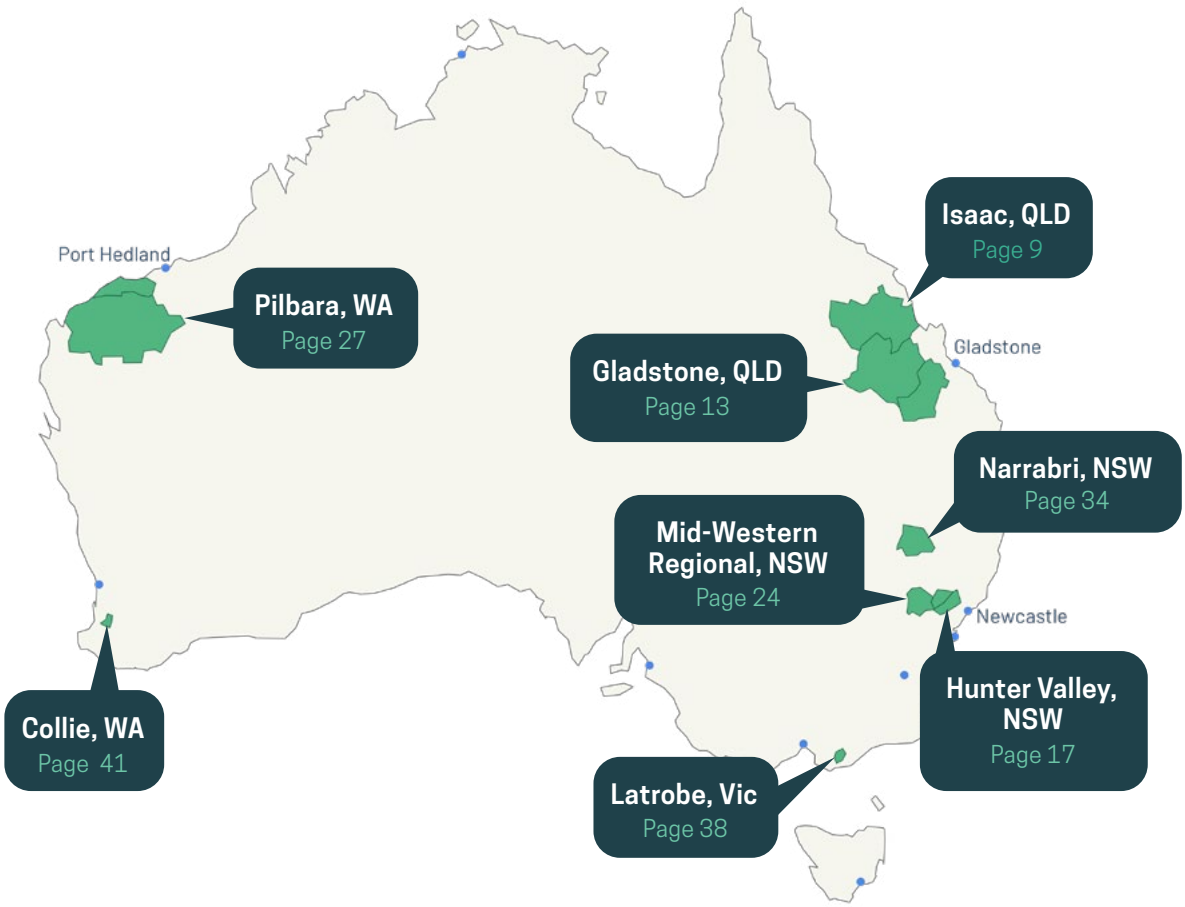
CASE STUDIES

This report proposes a framework to identify priority areas for investment and policy action, based on the levels of adaptive capacity in fossil-fuel-exposed regions. Adaptive capacity in this context is understood as the ability of communities to prosper following the exit of local fossil fuel industries.

The analysis is based on 7 dimensions of adaptive capacity, from economic diversity to social capital. The key proposition is that these dimensions should be used for detailed analysis at the local level to identify local priorities. The case studies throughout this document provide brief summaries of how the adaptive capacity framework can lead to different conclusions in different regions.

In almost all cases, we have tested and validated these conclusions with local stakeholders and policymakers in each LGA, but any errors remaining in our analysis are certainly ours and not theirs.

The numbers in the case study figures throughout this report are z-scores: the number of standard deviations that the LGA is from the average for all non-capital-city LGAs. In a normal distribution, around 68% of LGAs will be within 1 standard deviation of the average. Only 5% of LGAs will be more than 2 standard deviations of the mean, and only 0.03% are more than 3 standard deviations away.



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EXECUTIVE SUMMARY

As countries around the world decarbonise their economies and increase investment in renewable energy resources, Australia faces declining demand for key exports including coal and gas.[1]

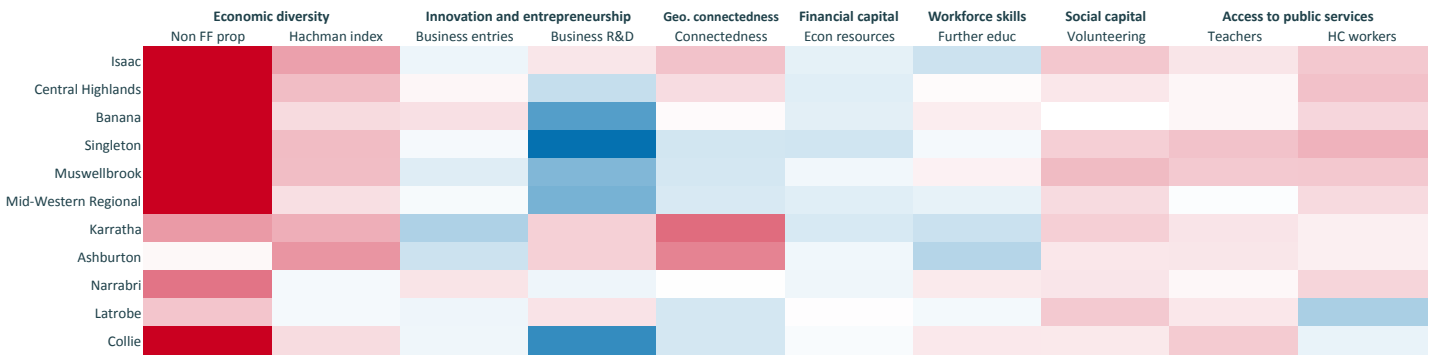
The economic transition away from fossil fuels will affect entire communities, rather than only workers in one general industry, and transition planning needs to build the overall adaptive capacity of these communities.

Current discussions about regional transition planning often revolve around identifying a new anchor industry (for example, a hydrogen hub) to be the engine of a regional economy. This approach is certainly useful, however it is not a robust strategy by itself: if the new anchor industry does not take off or succeed, communities are back at square one. For this reason, it is critical to build a community's economic resilience and adaptive capacity more generally.

Analysis of adaptive capacity – and the intention of this report – is to help identify the sorts of investments that give communities the necessary building blocks for the coming transition. Improving the adaptive capacity of Australia's fossil-fuel-exposed regions will require building future industries, directing investment towards enabling conditions, and ensuring these communities remain good places to live.

In this report, the Centre for Policy Development seeks to understand the levels of adaptive capacity of eleven LGAs (local government areas) exposed to declining demand for fossil fuels in Queensland, New South Wales, Victoria, and Western Australia. The work examines seven dimensions of adaptive capacity such as economic dynamism, geographic connectedness, and social capital, and measures them by comparing related indicators from each LGA to a regional Australia benchmark. This framework can provide a roadmap for the work of institutions like the new national Net Zero Authority, and for local communities looking to articulate a vision for their future.

Figure ES.1 *Comparison of adaptive capacity indicators for Australian regions most exposed to declining fossil fuel demand*



Notes: Colours indicate the number of standard deviations away from the Australian average for non-capital-city LGAs.
indicates positive standard deviations; indicates negative standard deviations.
Maximum colour intensity is reached at +/- 4 standard deviations. See the case studies for more information.

At a high level, it is clear that all of the LGAs have low levels of economic diversity, and potentially concerning signals for overall livability and social capital (as measured by volunteering rates and access to services). These should be clear priorities for all LGAs. However, the picture becomes more nuanced when looking at other dimensions of adaptive capacity.

LGAs in NSW and Collie in WA have relatively dynamic and innovative local economies, with good proximity to domestic markets. This is a good base to build upon and diversify – these regions should focus on supercharging existing strengths.

In contrast, LGAs in the Pilbara and Central Queensland have less dynamic local economies and are less well-connected to local domestic markets – it may take more effort, planning and support for new industries to thrive and for these communities to adapt.

In summary, the report recommends that:

- **Local transition plans – and the work of institutions like the Net Zero Authority – should aim to strengthen overall economic resilience and adaptability, rather than focusing solely on new anchor industries.**
- **Community needs should be identified from the ground up – ideally through a process that brings together stakeholders across the community. Strengths and needs will differ by region and policy responses will need to be tailored to each place.**
- **Local, state and federal governments should collaborate to identify and support realistic yet ambitious economic transition plans for Australia's fossil-fuel-exposed LGAs.**
  - **Local governments should play key roles in identifying strengths and weaknesses based on current levels of adaptive capacity.**
  - **Transition plans should include a specific focus on increasing economic diversity – a weakness for almost all LGAs – while other aspects of the plans should draw upon existing capital and levels of adaptive capacity in each LGA.**
- **State and federal governments should provide coordinating institutions, policy frameworks, and funding to support local transition plans.**
  - **Overarching policy frameworks and common nomenclature – like the adaptive capacity framework in this report – reduce friction between levels of government and aid coordination.**
  - **State and federal treasuries hold the purse strings, and locally-developed transition plans need to be backed by real funding.**
  - **State and federal governments also control many policy areas that are highly consequential for adaptive capacity of regional communities, and coordinating institutions such as the Net Zero Authority could play a key role in joining these up.**
- **The federal government should improve the availability of key data sources and analytical tools to enable local communities to assess their own adaptive capacity.**

This research has strong links to other work by the Centre for Policy Development, including work on wellbeing and people- and place-centred approaches to service design and delivery. The findings speak to a range of ongoing government processes such as the national Net Zero Authority in fossil-fuel-exposed communities, the federal Treasurer's initiatives to define new measures of progress, the work of the national Economic Inclusion Advisory Committee to help increase economic participation, and many state and local commissions and authorities.

INTRODUCTION

For decades, many Australian regional communities have relied on fossil fuel industries as a key source of income with few alternative employers locally available. As countries around the world respond to the existential threat of climate change and accelerate their move to clean energy, these communities are facing inevitable economic disruption. Governments and NGOs, internationally and domestically, are focused on ensuring that this transition is fair and sustainable for communities that depend on fossil fuel industries. In Australia, a national Net Zero Authority was recently established, however the remit and operational activities of this authority are yet to be finalised.

In January 2022, the Centre for Policy Development released *'Who's Buying: the impact of global decarbonisation on Australia's regions'* which identified the Australian regions that are particularly dependent on exports of fossil fuels based on their exposure to export market decarbonisation.[2] And in April 2023 we published *'Understanding adaptive capacity: A tool for economic transition planning',* which presents a framework to analyse the factors that shape a community's resilience to change.[3]

In this report, we build on '*Who's Buying'* and *'Understanding adaptive capacity'* by applying the adaptive capacity framework in detail to the eleven LGAs (local government areas) in Table 1, selected because they have large shares of their economies that are directly exposed to declining global and domestic demand for fossil fuels. Isaac, Central Highlands, Banana, Singleton, Muswellbrook, Mid-Western Regional, Karratha and Ashburton are all focus regions from CPD's report *Who's Buying*. Narrabri also has a high percentage of jobs in the fossil fuel industry. Latrobe and Collie have coal industries that serve domestic markets (and have both been the subject of state-level transition planning). There are certainly other LGAs that will have a keen interest in transition planning – such as Gladstone or Lithgow – but for the purposes of this report we focus on the LGAs most directly exposed to fossil fuel industries.

This report has two aims:

- **To explore the current levels of adaptive capacity in communities that will be most affected by the global transition away from fossil fuels.**
- **To help identify the sorts of investments to give communities the necessary building blocks for the coming transition.**

To achieve these aims, we identify a range of dimensions to analyse the adaptive capacity of the regions in Table 1 and compare the values of related indicators with the average values for regional Australia.[4] This analysis highlights the importance of a bottom-up approach that focuses on the whole community – community strengths and weaknesses differ significantly by region, and so any solution must be tailored to each place.

Adaptive capacity may change over time as regions experience transition. For example, if there is population decline as workers emigrate from a region, this will impact the skills and income levels of the remaining population. Therefore, the need for different types of investments should be calibrated as time passes and as Australia undergoes its net zero transition.

Table 1: *Focus regions of this report*

LGA	**State**	**Population** (ABS 2021 Census)
Isaac	QLD	22,046
Central Highlands	QLD	27,836
Banana	QLD	14,513
Singleton	NSW	24,577
Muswellbrook	NSW	16,357
Mid-Western Regional	NSW	25,713
Karratha	WA	22,199
Ashburton	WA	7,391
Narrabri	NSW	12,703
Latrobe	VIC	77,318
Collie	WA	8,812

Definitions for "adaptive capacity" are contested but important

The ability of a region to prosper through a long-term decline in its legacy industrial base depends on its level of adaptive capacity. However, "adaptive capacity", and the related term "economic resilience", are widely contested and complex terms that vary between applications and academic fields.[5]

Broadly speaking, "adaptive capacity" refers to the factors that shape whether a community is resilient, and the extent to which affected communities possess these factors.

In this report, we adopt the definition used by Martin and Sunley (2015, p. 13), which is the ability of a region to adapt and prosper through change.

Stated in full, regional economic resilience is the: *"...capacity of a regional or local economy to withstand or recover from market, competitive and environmental shocks to its developmental growth path, if necessary by undergoing adaptive changes to its economic structures and its social and institutional arrangements, so as to maintain or restore its previous developmental path, or transit to a new sustainable path characterised by a fuller and more productive use of its physical, human and environmental resources".*[6]

CASE STUDY

ISAAC, QLD

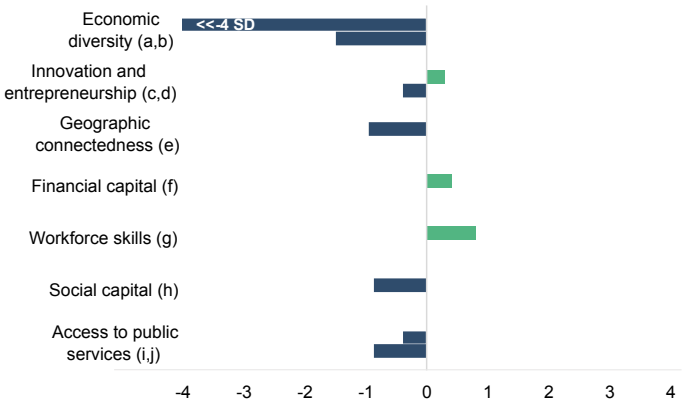
Isaac, located 1,000 km from Brisbane and around 900 km from Cairns, has a very high employment concentration in the coal mining industry, which exceeds even that of other fossil-fuel-exposed LGAs. As a result, the Hachman Index for Isaac is one of the lowest in this analysis. Much of the region's economic output is attributable to the resource sector, with a smaller portion due to agriculture.

Given the high concentration of adults with skills in heavy industry, the region's future economic development could focus on developing industries related to renewable energy. AEMO – the Australian Energy Market Operator – locates Isaac in Queensland's Northern Renewable Energy Zone, identifying its potential for good quality renewable sources and other characteristics suitable for developing renewable energy.

Isaac is located on the coastline with good quality export infrastructure, and both household-level financial resources as well as further education are slightly higher-than-average, creating conditions for Isaac to develop new export-oriented industries in regional value chains. Another possibility for future industry development is in tourism, with Isaac's coastline being conducive to commercial fishing and aquaculture operations.

Isaac has lower access to public services than the benchmark LGA, and this could indicate underinvestment in the region. Coupled with lower-than-average volunteering rates, it suggests that strengthening community services and community activities could be an important priority for the region.

Figure CS.1. *Adaptive capacity dimensions for Isaac*



Notes: (a) is the proportion of the workforce not in fossil fuel industries; (b) is the Hachman Index; (c) is the rate of business entries; (d) is business expenditure on R&D per 10,000 population by SA3; (e) is the straight-line distance between an LGA and the nearest capital city; (f) is the Index of Economic Resources published by the ABS; (g) is the proportion of the population with post-school education; (h) is the proportion of volunteers; bar (i) is the number of teachers per 1,000 children; (j) is the number of healthcare workers per 1,000 people in a SA3.

SEVEN DIMENSIONS OF REGIONAL ADAPTIVE CAPACITY

The adaptive capacity of an Australian region in the context of long-term decline in fossil-fuel demand can be understood to depend on its ability to produce an alternative vision for itself and develop new pathways for innovation, industrial development, and employment opportunities aligned with this vision[7].

In the following, this report focuses on seven key dimensions – with ten quantitative indicators – that demonstrate different factors of the underlying adaptive capacity of regions exposed to declining fossil fuel demand.

The seven dimensions are outlined in Table 2, and were first introduced in our April 2023 technical paper '*Understanding adaptive capacity*'[8]. The value of the indicator for each LGA is compared to a regional benchmark of non-capital-city LGAs, and in the case studies we examine each LGA individually. The dimensions can be thought of as contributing to three overarching goals: building future industries, investing in enabling conditions (or customising approaches based on enabling conditions), and ensuring these communities remain good places to live.

By adopting an approach based on dimensions and indicators rather than developing an index (see, for example, the Productivity Commission report on transitioning regional economies[9]), we provide insights into aspects of adaptive capacity that need to be invested in for different fossil-fuel-exposed local government areas. Combining several dimensions into an index could provide an aggregate snapshot of adaptive capacity. However, it would obscure the finer details that make each region unique, complicating the identification of the necessary investments.

(Notwithstanding the analytical problem that constructing an index requires several arbitrary decisions such as how to weigh each underlying indicator and dimension.)

A multi-dimensional approach helps policymakers better understand the individual policy issues, as well as come up with solutions.

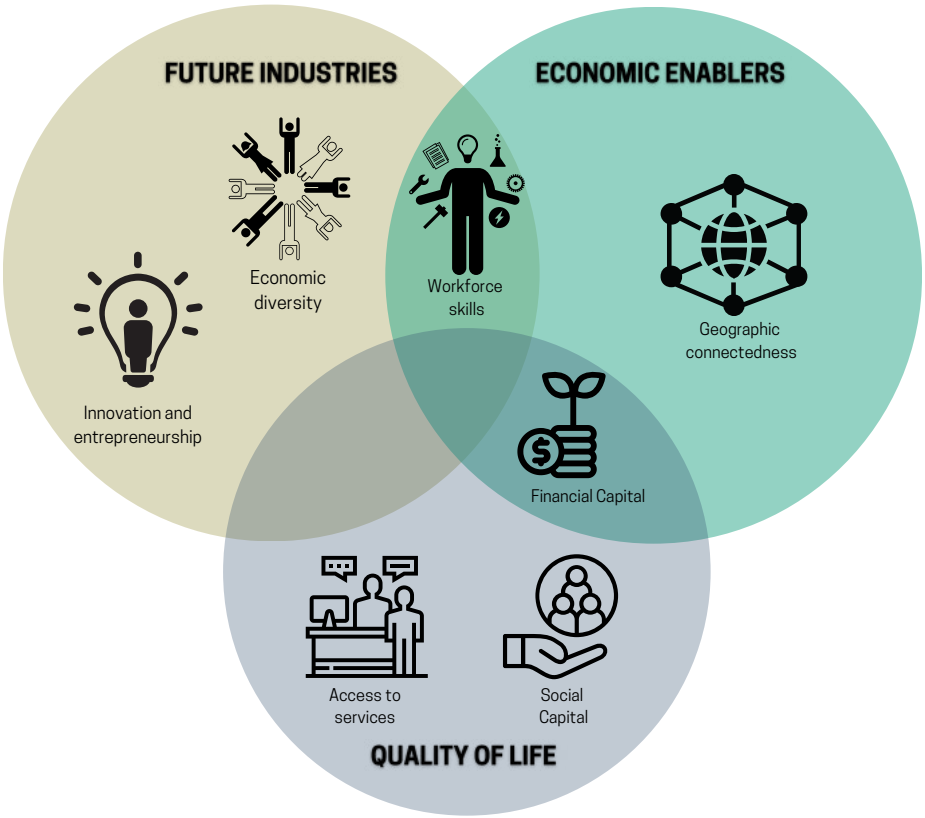


Figure 1. *Communities with high levels of adaptive capacity will be more able to thrive through economic transition*

Table 2: *Dimensions for assessing adaptive capacity of fossil-fuel-exposed regions*

Dimension	Indicator	Brief description	Year published
Economic diversity[10]	Non-fossil-fuel workers	Percentage of workers working outside of fossil-fuel industries	2021
	Hachman Index	Index measuring economic diversification through employment statistics	2021
Innovation and entrepreneurship	Business entries[11]	Number of new businesses for year ended 30 June as proportion of total businesses at year ended 30 June	2021
	Business expenditure on research & development (BERD)[12]	Average per annum business expenditure on research and development (per 10,000 resident population)	2009-2015
Geographic connectedness	Geographic connectedness[13]	Negative straight-line distance from nearest capital city	2021
Financial capital	Economic resources[14]	Index measuring economic resources in Australian regions (considers both wealth and income)	2021
Workforce skills	Further education[15]	Proportion of population with further education (post high school)	2021
Social capital	Volunteering participation[16]	Percentage of volunteers in LGA	2021
Access to public services	Teachers ratio[17]	Ratio of teachers to children in LGA	2021
	Healthcare ratio[18]	Ratio of healthcare workers to resident population in SA3	2021

Notes: The report uses the most recently published data for each indicator.

Each of these indicators has been constructed so that higher numbers indicate greater levels of adaptive capacity. For instance, this is why we focus on the number of workers not in fossil fuel industries as a measure of economic diversity, and the *negative* of the distance to the nearest capital city.

These dimensions and indicators are not the only ones that could be used to identify the adaptive capacity of fossil-fuel-exposed regions. They are limited by our capacity to undertake extensive analysis, as well as by a lack of available and suitable data. For example, studies have identified that institutional capacity is an important factor for whether regions are resilient to the decline of fossil fuel industries.[19] However, no standard measure of LGA-level institutional capacity exists in Australia. Analysis of adaptive capacity would also benefit from initiatives by governments to collect and publish LGA-level data on dimensions including communications infrastructure, electricity network access, environmental health and natural capital, and more.

We discuss some of these limitations further in *'Understanding adaptive capacity: A tool for economic transition planning'*.[20]

Importantly, data needs to be both up-to-date (updated at least annually) as well as highly geographically disaggregated (down to at least LGA or SA3/SA2 level) in order to inform local transition planning. Australian governments should carefully consider how to increase access to open data to inform and strengthen transition planning.

ECONOMIC DIVERSITY

The level of economic diversity in a region is typically understood to have important positive implications for adaptive capacity and economic performance.[21] As industries have different demand elasticities, export orientations, capital intensities, and exposures to competition, greater economic diversification reduces vulnerability to shocks and also enables a faster recovery. With a more diversified economic structure, a region is able to be more flexible when re-orientating its industrial base to adapt to changing economic conditions.[22] Industries that are less affected by the change can absorb the labour and other resources from affected industries, thus reducing negative impacts on overall employment and economic activity. On the contrary, regions that are less economically diversified may be more susceptible to sector-specific shocks, have fewer opportunities to re-orientate their industrial base, and have fewer opportunities to recover from shocks. Focusing on increasing regional economic diversity does not guarantee that a region will experience better future economic growth prospects; however, it is an important factor in reducing variance in economic outcomes.[23]

The report uses two measures of economic diversity, the number of people not employed in the fossil fuel industry in each LGA as a proportion of total employees, and the Hachman index. The results are not the same across the two indicators for all LGAs – demonstrating the value in having multiple ways to assess any single dimension of adaptive capacity.

Both indicators use data for employment by industry based on the Australian and New Zealand Standards Industrial Classification (ANZSIC) 2006 at the 2-digit level. The following industries are assumed to be fully contained within the fossil fuel industry: coal mining, oil and gas extraction, and gas supply. We include metallurgical coal in our analysis,[24] and we also assumed that 71% of the employees in the electricity supply industry are related to fossil fuels, as this was the approximate percentage of fossil fuels in the total electricity generation mix in 2021.[25]

The Hachman index compares each LGA's employment distribution to that in a reference region, in this case all non-capital-city Australian LGAs. The maximum theoretical value of the Index is 1.0 meaning that the region has the same level of economic diversity as the reference region, while the lowest theoretical value is 0. Higher values imply greater economic diversity.

Natural gas has a considerably lower employment share than coal in Australia

Most of the fossil-fuel-exposed regions have larger coal mining industries than gas and oil exploration industries, reflecting that coal mining has a longer and more established presence in Australia and requires more employees for its operations than gas exploration. In total, 49,616 people were employed in coal mining, while 18,693 were employed in gas and oil exploration as of 2021. The exception is the Western Australian LGA of Karratha, in which very few workers were employed in coal mining, compared to around 600 in oil and gas exploration (with a total workforce of 11,133 employees). The Australian LGAs with the highest percentage of employees in gas and oil exploration are Karratha (5.4% of the LGA's workforce) and Isaac (4.8%); all other LGAs have workforce shares of 3% or less.

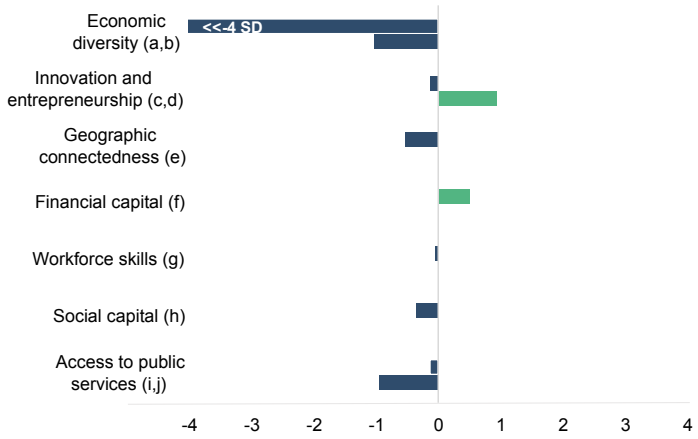
CASE STUDY

GLADSTONE REGION, QLD

The values of the indicators for Central Highlands and Banana are quite similar, with both LGAs sharing a common border and lying near Gladstone, which serves as a major export hub for coal. The LGA of Gladstone is critical to the success of the region with a relatively diverse local economy itself (hence the LGA of Gladstone has not been a focus of this report, but rather we look at the surrounding LGAs). Both Central Highlands and Banana have high percentages of the workforce employed in fossil fuel industries, contributing to low levels of the Hachman index.

They also both produce large quantities of beef, with Central Highlands having one of the largest inventories of cattle in Australia. These industries are supported by strong transport infrastructure, which is not fully reflected in our "geographic connectedness" measure above. While the distance between Central Highlands and the nearest capital city, in this case Brisbane, is slightly longer than average compared to other non-capital-city LGAs, major freight routes intersect the region integrating these regional markets. This includes the north-south link between Charters Towers and northern NSW, which is identified as the inland transport alternative between Cairns and Melbourne. The proposed Queensland Beef Corridors would benefit Central Highlands. For Banana, there are rail and road links to Gladstone and Rockhampton as well as direct flights to Brisbane.

Figure CS.2. *Adaptive capacity dimensions for Central Highlands*



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CASE STUDY CONTINUED

GLADSTONE REGION, QLD

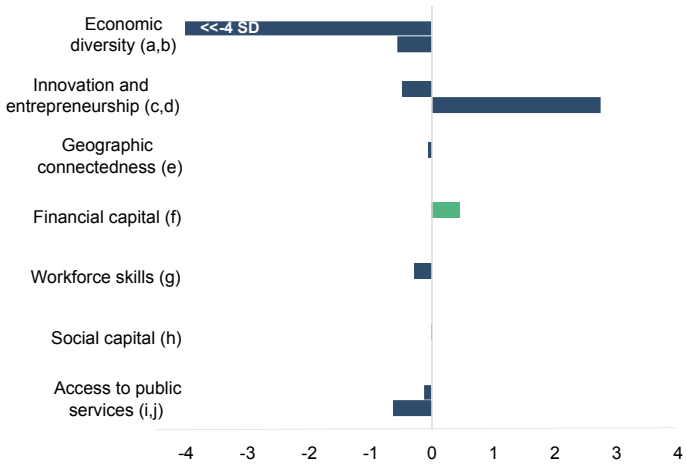
This existing infrastructure and natural resources puts both LGAs in a strong position to develop alternative industries – eg. agriculture, horticulture, and minerals extraction and processing – that connect to domestic and international markets.

For instance, Central Highlands has one of the largest sapphire-producing fields in the Southern Hemisphere, which has contributed to an emerging tourism economy, as visitors come to see the Sapphire Gemfields. This could be built upon with targeted investments in the downstream value chain, value-adding locally to produce intermediate and final products.

The higher-than-average levels of (historical) business R&D in both LGAs provide some evidence of currently existing innovation capacity. However entrepreneurship (as measured by business entries) is lower than in other LGAs, suggesting targeted investment is needed to kick-start a new wave of local entrepreneurship.

Innovation could be further promoted through the development of collaborative frameworks between local industries and research institutions. For example, Central Highlands hosts a Central Queensland University Campus as well as Emerald Agricultural College.

Figure CS.3. *Adaptive capacity dimensions for Banana*



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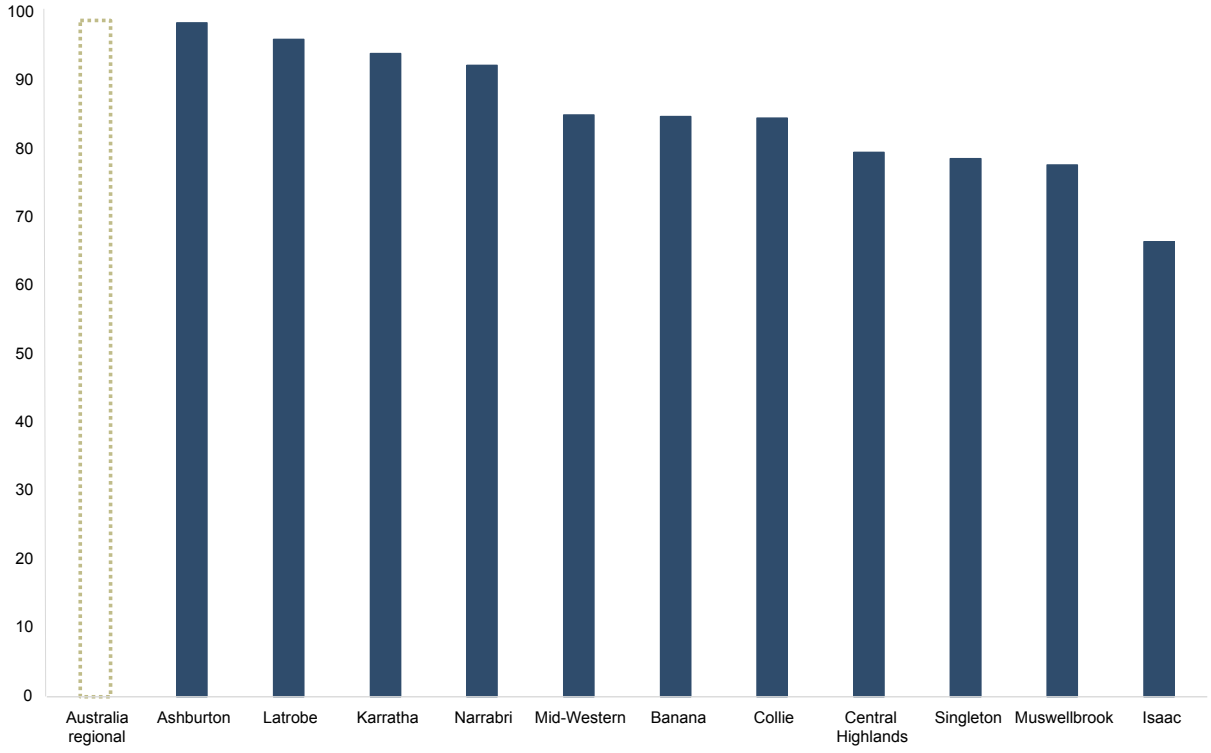
As expected, there are lower proportions of employees not in fossil fuel industries in the fossil-fuel-exposed LGAs than in comparable Australian LGAs. The proportion is particularly low in Isaac, at 67%. The LGAs of Muswellbrook (78%), Singleton (79%), and Central Highlands (80%) follow. For each of these LGAs, the largest contributor to employment is the coal mining industry.
For example, in Isaac, the coal mining industry is around six times larger in terms of employment than the next largest fossil fuel industry, which is oil and gas extraction.

It should not come as a surprise that fossil-fuel-exposed LGAs have a greater concentration in fossil fuel industries than the rest of regional Australia. Of interest, however, is the varying values for this indicator across the exposed LGAs. This demonstrates which LGAs are more or less dependent on fossil fuel industries for employment, with LGAs like Ashburton and Latrobe having relatively small proportions of the workforce working directly in fossil fuel industries.

Figure 2. *Fossil fuel industries are over-represented in transition-exposed LGAs.*
Per cent of workforce not in fossil fuel industries.



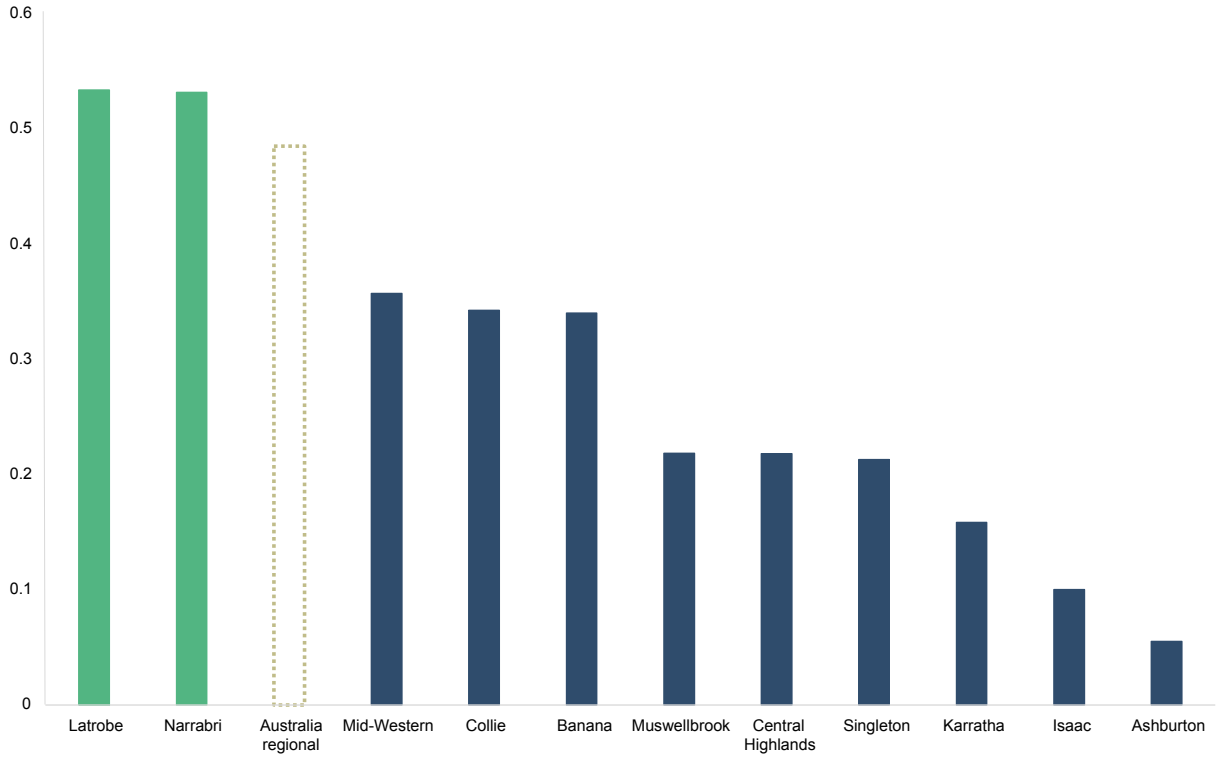
Source: ABS 2021 Census; CPD analysis

The values of the Hachman Index provide a similar story for most of the fossil-fuel-exposed LGAs. Latrobe and Narrabri have relatively low concentrations of fossil fuel industries and Hachman index scores of greater than 0.5 and greater than the average non-capital-city LGA. In addition to fossil fuel industries, Narrabri also has a considerable industrial focus on agriculture, while Latrobe has a range of industries, including construction, retail, public administration, and healthcare. In comparison, Isaac has a Hachman index score of 0.1, reflecting the very high focus on fossil fuels in this LGA.

Karratha and Ashburton have a relatively high proportion of workers outside of fossil fuel industries, and yet still have a counterintuitively low Hachman index score. The main reason behind this is their relatively high concentration of employment in metal ore mining and non-metallic mineral mining and quarrying. The local economies are highly concentrated, just not (only) in fossil fuels, and this generally implies a lower level of economic adaptive capacity.

Figure 3. *Latrobe and Narrabri are the only fossil-fuel-exposed LGAs with higher than average Hachman Index scores*

Hachman Index



Source: ABS 2021 Census; CPD analysis

CASE STUDY

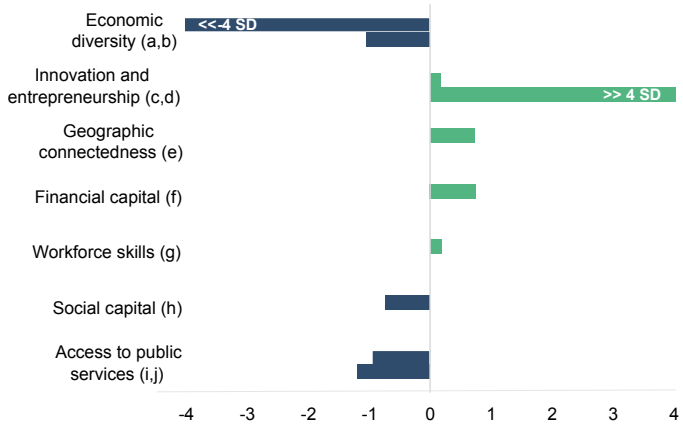
HUNTER VALLEY, NSW

Compared to other regional LGAs, the Upper Hunter Valley LGAs both have higher-than-average levels of geographic connectedness, with major state roads nearby that facilitate connection to Newcastle and Sydney. The region receives regular rail services and intercity buses stop there during their journeys. These features mean there is strong capacity for Singleton and Muswellbrook to increase their currently lower-than-average levels of economic diversity; the economies of both LGAs are currently concentrated in coal mining and tourism.

The region has good geographic connections, and through deeper integration into supply chains in both Newcastle and Sydney there is good potential to diversify into new industries. Recent developments in Newcastle have improved export opportunities further, with the Port of Newcastle diversifying into more revenue streams besides coal and the airport runway being upgraded to allow for export of fresh produce and incoming tourism from Asia.

Currently higher-than-average levels of innovation – including a particularly high level of business expenditure on R&D – suggest there may be a good base of dynamic firms that could take advantage of new opportunities. One option for ensuring the translation of existing levels of innovative capacity to increasing economic diversity would be to work with local universities to spin out and commercialise new ventures.

Figure CS.4. *Adaptive capacity dimensions for Singleton*



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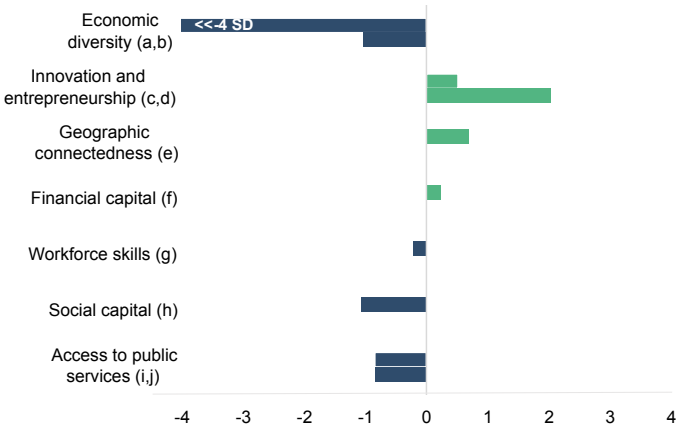
CASE STUDY CONTINUED

HUNTER VALLEY, NSW

The University of Newcastle, for example, is developing a type of solar PV that can be painted onto rooftops. Manufacturing of this technology in the Hunter could form a crucial step towards a knowledge-based economy in the region. Further, the accelerator Melt is setting up a branch in Muswellbrook to assist manufacturing start-ups to turn their ideas into marketable products. Another option for these LGAs would be to tap into the med-tech sector that is emerging in the Hunter Valley.

However there are clear opportunities to improve social capital and livability in the region – where the indicators above indicate lower-than-average access to services and rates of volunteering.

Figure CS.5. *Adaptive capacity dimensions for Muswellbrook*



Notes: (a) is the proportion of the workforce not in fossil fuel industries; (b) is the Hachman Index; (c) is the rate of business entries; (d) is business expenditure on R&D per 10,000 population by SA3; (e) is the straight-line distance between an LGA and the nearest capital city; (f) is the Index of Economic Resources published by the ABS; (g) is the proportion of the population with post-school education; (h) is the proportion of volunteers; bar (i) is the number of teachers per 1,000 children; (j) is the number of healthcare workers per 1,000 people in a SA3.

INNOVATION AND ENTREPRENEURSHIP

A region's capacity for innovation and entrepreneurship influences its ability to transform its industrial base and recover from economic shocks through the development of new ideas.[26] This is linked to, but separate from, the previous dimension of economic diversity.

Innovation is the implementation of a new or much improved product, process, or marketing or organisational method.[27] Innovative capacity also increases the abilities of regions to overcome various types of lock-in, including functional, cognitive and political, that hinder regional renewal.[28] Improving regional innovation capacity is thus a key policy priority for the transformation of regional economies.[29] Entrepreneurship is closely linked to innovation, and is required for new ideas and processes to be commercialised. Following the decline of existing industries, entrepreneurialism helps regions turn over and renew their economic base.

This report uses two measures to identify levels of innovation and entrepreneurship in LGAs: the number of new businesses in an LGA as a proportion of total businesses, and business expenditure on R&D per 10,000 resident population by SA3 over the period 2009-2015.[30] These metrics relate to the level of entrepreneurship in a region and the capacity of local businesses to innovate; if the values of these measures are low for an LGA, it indicates that there could be a role for governments to introduce policies to support innovation and entrepreneurship. This can include for example mechanisms to increase collaboration amongst industry, government, and the research sector.

There are two main limitations with the use of these indicators. First, it is unknown how many of the new businesses are supported by the fossil fuel sector and how much of the R&D is spent in this sector. For instance, just because an LGA has high levels of new business formation, it may not actually be a signal of a resilient and dynamic local economy if all the new entrants exist entirely within fossil fuel supply chains. Second, the data for R&D expenditure are by now somewhat outdated.

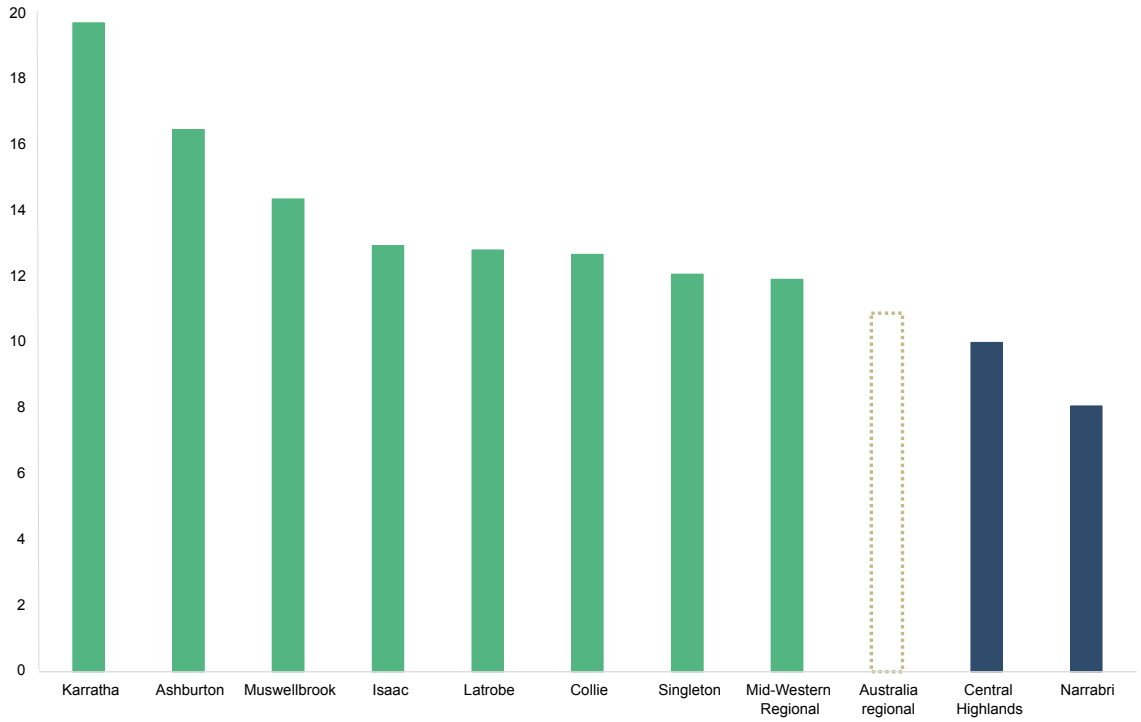
Based on both indicators, Singleton, Muswellbrook, Mid-Western Regional, and Collie all have a strong base of innovation and entrepreneurship that can be built upon. Singleton, Muswellbrook, and Mid-Western Regional are located next to each other in New South Wales and are an interconnected regional economy. The results are mixed for the other LGAs, with above-average performance based only on one of the two indicators. Karratha has a particularly high percentage of new businesses. One explanation could be the relatively small numbers of businesses in Karratha, leading to relatively large percentage changes as new businesses enter.

+

Overall, based on this simple analysis, fossil-fuel-exposed LGAs in general seem to have higher levels of innovation and entrepreneurship than other regional LGAs. This should give confidence that these communities have the ingredients to adapt to changing economic conditions.

Figure 4. *Fossil-fuel-exposed LGAs typically have higher-than-average business entry rates*

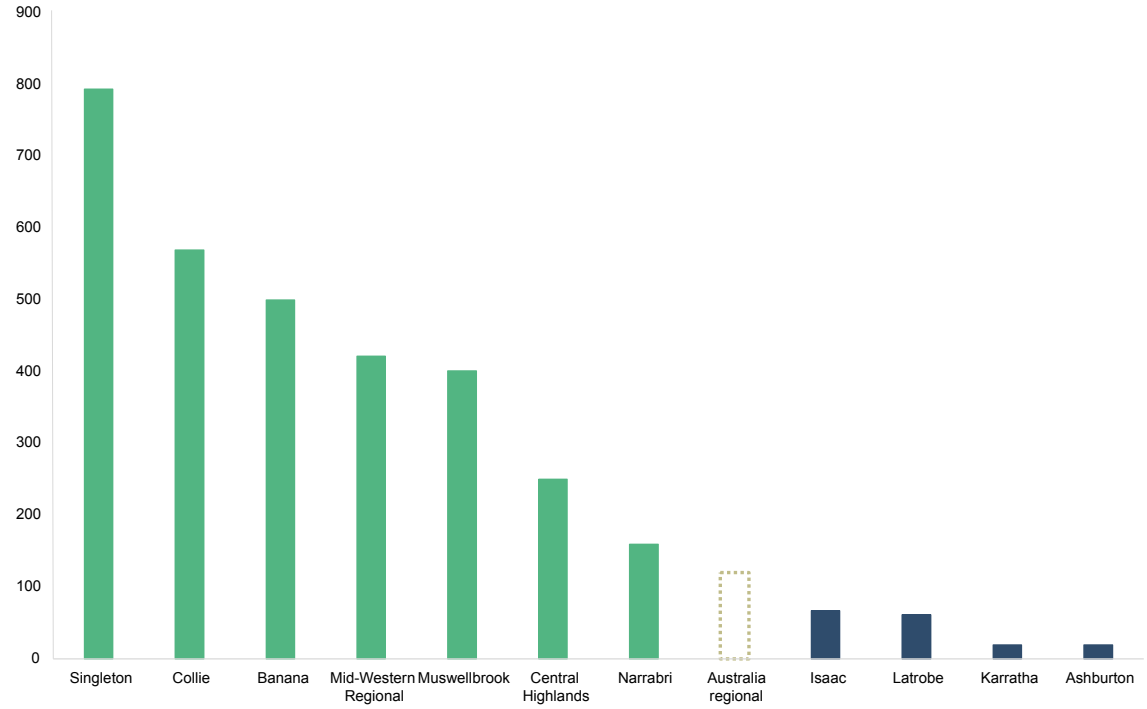
Number of new businesses as proportion of total businesses



Source: ABS Business Register 2021; CPD analysis

Figure 5. *R&D expenditure in most LGAs has been well above the regional average*

Average annual business expenditure on R&D per 10,000 resident population



Notes: Data on R&D expenditure is based on SA3 areas – LGAs have been linked to the SA3 area that contains the majority of the LGA by land area.

Source: DISR Innovation Data, 2009-2015; CPD analysis.

GEOGRAPHIC CONNECTEDNESS

Communities require connections to thrive. New industries and businesses need to connect to markets and sources of demand, and residents desire access to services and opportunities that increase their quality of life. Geographic connectedness and spatial proximity further enhance regional resilience by facilitating knowledge flows amongst individuals and increasing efficiency within regional labour markets.[31]

Connectedness does not only have to be to domestic communities, but that is our focus here. It is certainly possible for communities to thrive from a connection to international export markets – for instance, Newcastle's connection to global coal markets. But these connections can also be brittle if export demand for that commodity declines. This is why for adaptive capacity we are interested in connectedness to domestic regions and markets (in the example of Newcastle, it is well integrated into the broader regional economy around Sydney).

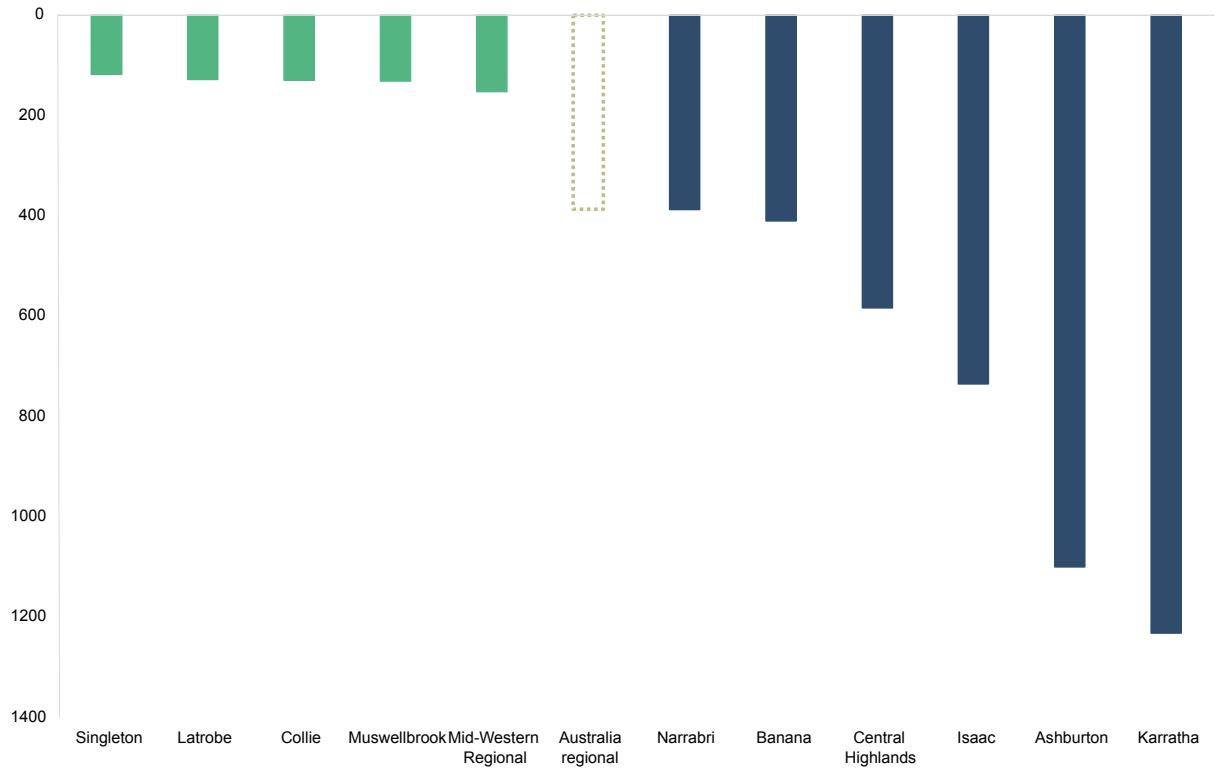
In our analysis we measure the connectedness of the LGAs using the straight-line distance from a fossil-fuel-exposed LGA to the nearest capital city, such as Greater Sydney.[32] We use distance to the nearest capital city as these are likely to offer the greatest variety of supply chains and demand for new production, and because the data are most readily available.

The indicator we have chosen is a simplistic and imperfect measure. Proximity to the nearest capital city does not reveal whether communities are integrated into other markets such as renewable energy industrial precincts (for instance, the Queensland LGAs are closer to designated renewable energy zones than to Brisbane). It also does not consider the strength of connections – two nearby markets may be poorly connected without suitable infrastructure or supply chain partnerships.

The LGAs vary considerably in their distance to the closest capital city. Singleton, Latrobe, Collie, Muswellbrook and Mid-Western Regional are each under 200 kilometres from the nearest capital city – suggesting that integration into local domestic markets should be a key priority for these communities. Karratha and Ashburton in remote north-west Australia are clear outliers, and the gas industry in these regions has been typified by the use of fly-in-fly-out (FIFO) workers. For these communities the strongest opportunities may be in export industries – of existing commodities (eg. iron), new commodities (eg. hydrogen) or services (eg. tourism) – as the cost of integrating into Australian markets may be too high.

Figure 6. *Fossil-fuel-exposed LGAs are often geographically far away from capital cities*

Straight-line distance between LGA and nearest capital city in kilometres



Source: Australian Statistical Geography Standard (ASGS) Edition 3; CPD analysis

FINANCIAL CAPITAL

Higher levels of household financial capital including income and wealth provide a financial buffer to households and a source of capital for local investment, such as starting up new businesses and supporting entrepreneurship. At a household-level, households with more financial resources are better able to absorb decreases in spending power, for example due to unemployment as industries close, and are also better able to support other areas of the community through a transition.

The economic resources indicator used in this report – the Index of Economic Resources (IER) – is part of the suite of Socio-Economic Indexes for Areas (SEIFA) published by the ABS.[33]

SEIFA contains four indices, each of which rank Australian geographical areas based on their relative socioeconomic advantage and disadvantage. The IER summarises census variables related to financial advantage, such as household income, housing costs, and assets.

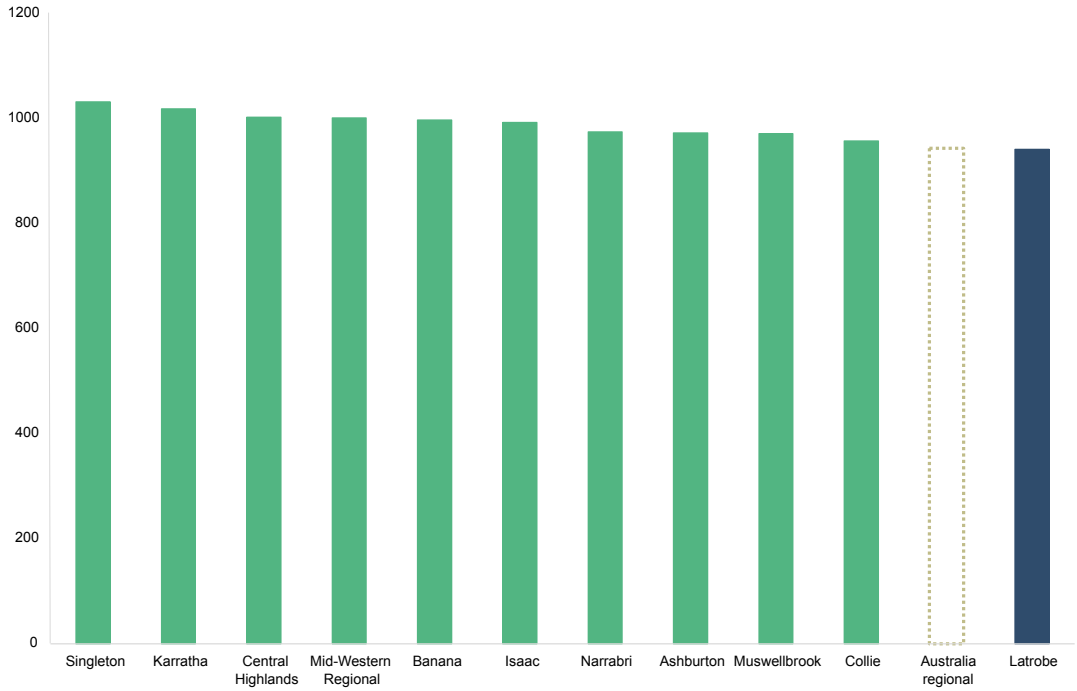
Ten of the eleven LGAs have a score for the Index of Economic Resources marginally above the average value for Australian non-capital-city LGAs, with Singleton having the highest score. The lowest score for all Australian non-capital-city LGAs is 475.

These findings suggest that levels of income and wealth are decent for many people living in the fossil-fuel-exposed LGAs.

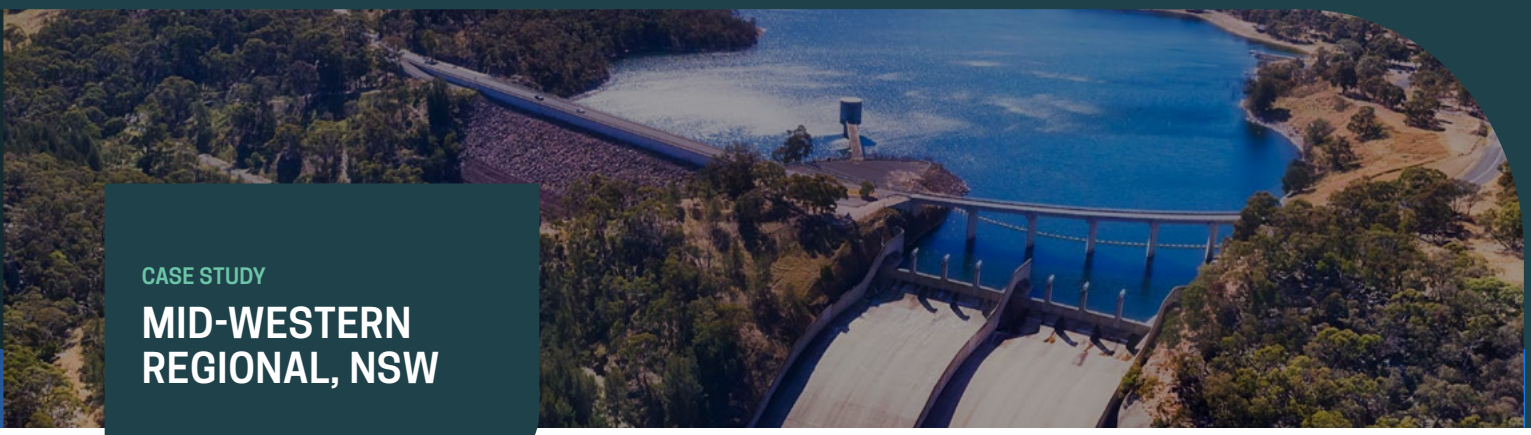
There are however important caveats to this statement. First, the value of homes may decrease if fossil-fuel-exposed regions are unable to offer alternative forms of employment and people emigrate from these regions – which would directly reduce levels of household financial capital in the region.[34] Second, there is concern by workers in fossil fuel industries that conditions including wages in the clean economy sector are unlikely to match their current benefits.[35] Over time, this may reduce the economic resources of people in former fossil-fuel-exposed communities, even if the regions successfully create new job opportunities in the clean economy.

Figure 7. *Levels of economic resources in most fossil-fuel-exposed LGAs are high.*

ABS Index of Economic Resources, Socio-Economic Indexes for Areas



Source: ABS 2021 Census; CPD analysis.



CASE STUDY

MID-WESTERN REGIONAL, NSW

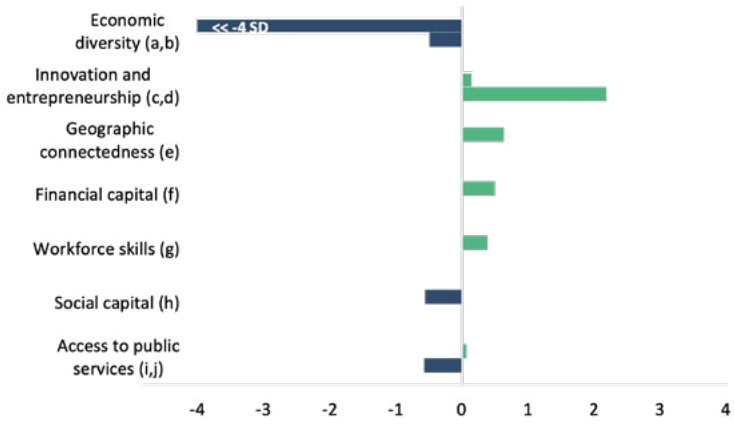
Mid-Western Regional LGA is located in the Central Tablelands in NSW, around three hours north-west of Sydney, and is relatively balanced along our dimensions of adaptive capacity.

Figure CS.6. shows that the LGA has a high proportion of fossil-fuel workers, as expected. These workers are mainly employed in coal mining, particularly around the Ulan Seam. It also has marginally lower-than-average levels of volunteering as well as economic diversity based on the Hachman index. Other dimensions – such as innovation, financial capital and education – are marginally higher-than-average. The LGA has significantly higher-than-average business investment in R&D.

Going forward, the LGA has opportunities to broaden its industrial base in particular by growing its existing agricultural sector as the area is known as the food bowl of NSW. For example, co-location with low-cost renewable energy resources could be used to diversify in value-added food processing and to develop an "agrivoltaics" industry (putting agriculture and solar panels on the same land). The LGA's relatively close location to Sydney is useful both for the export of local goods and because of the potential to further develop a strong identity as an attractive tourist hub, particularly focusing on the region's industrial heritage in the locomotive industry and its historic towns.

Mid-Western Regional's relatively high levels of post-school education, coupled with a strong presence of engineering skills linked to the fossil fuel industry, would be useful in developing a thriving manufacturing industry – well connected to broader markets through Sydney. Relatively high household-level economic capital is a positive for supporting future industries and businesses, as well as new community infrastructure.

Figure CS.6. *Adaptive capacity dimensions for Mid-Western Regional*



Notes: (a) is the proportion of the workforce not in fossil fuel industries; (b) is the Hachman Index; (c) is the rate of business entries; (d) is business expenditure on R&D per 10,000 population by SA3; (e) is the straight-line distance between an LGA and the nearest capital city; (f) is the Index of Economic Resources published by the ABS; (g) is the proportion of the population with post-school education; (h) is the proportion of volunteers; bar (i) is the number of teachers per 1,000 children; (j) is the number of healthcare workers per 1,000 people in a SA3.

WORKFORCE SKILLS

Human capital includes the skills, knowledge, experience and educational attainment of the people living in a region and is essential for the economic resilience of regions to structural changes.[36] A more highly educated workforce is linked to higher creativity levels, the generation of new knowledge and the absorption of knowledge generated elsewhere, thus enabling communities to adapt quickly to both short- and longer-term economic changes.[37]

High-skilled and well-qualified workers may be more productive with more transferable skills, thus helping to increase regional economic resilience.[38]

In Australia, the main types of tertiary study are higher education offered by universities and vocational education and training offered by TAFE.

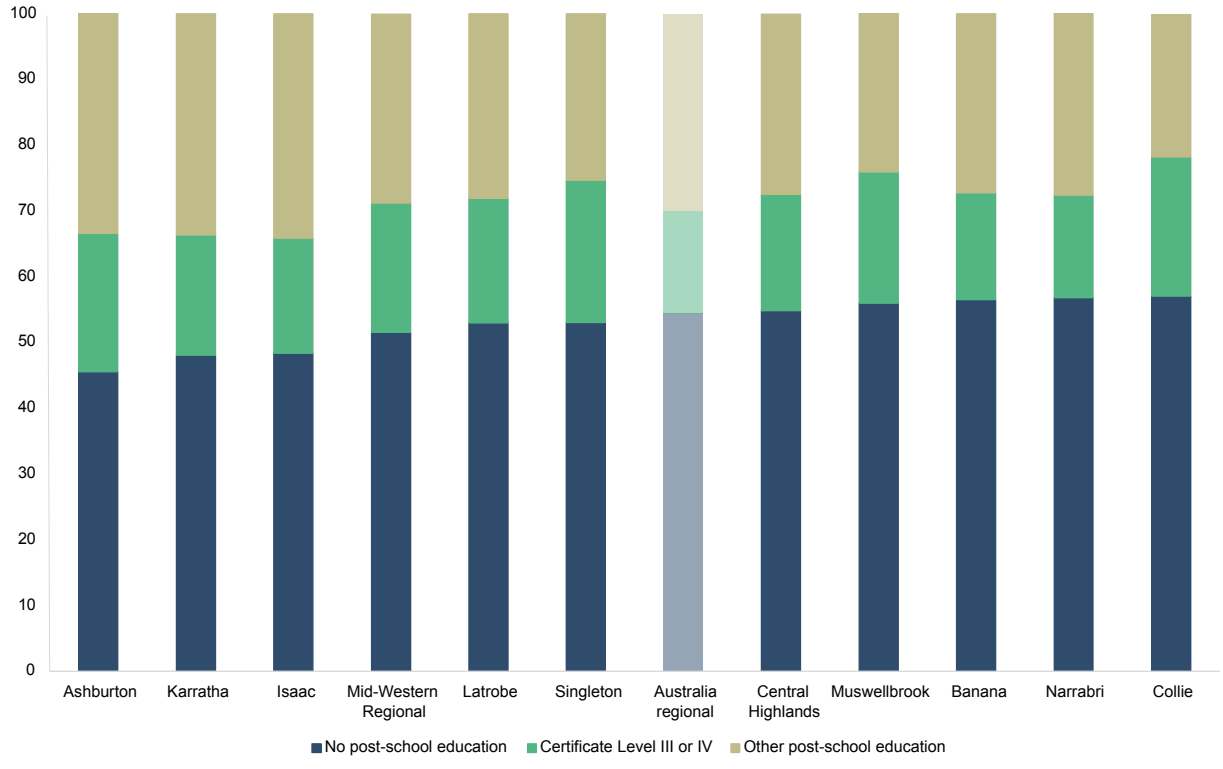
These post-school offerings differ based on a range of factors including duration of courses, costs, and, most importantly for this report, skills learned and connections to the workplace.

TAFE courses are typically catered towards training people for a specific job role and industry such as mining, potentially with direct links to employment upon completion.

University courses are typically more theoretical, helping students develop soft skills such as critical thinking, problem solving, and the ability to analyse ideas. Universities also serve as an important hub for research and development that supports new industries.

Figure 8. *Fossil-fuel-exposed LGAs have a relatively high proportion of certificate level III or IV holders*

Proportion of total population with post-school education



Source: ABS 2021 Census; CPD analysis.

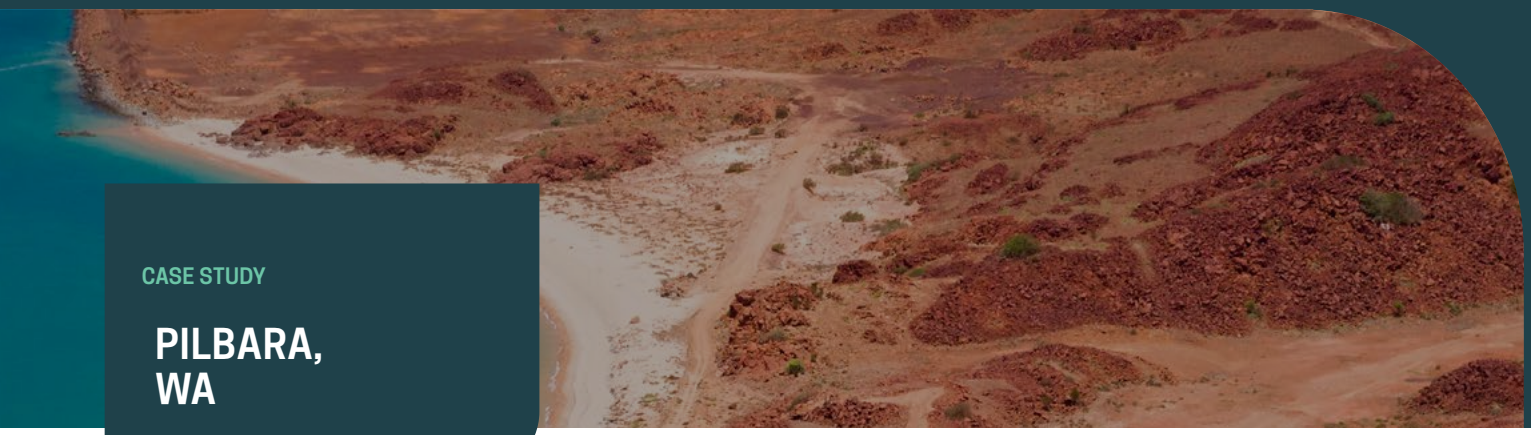
Around 46% of the population (67% of adults) in Australia's non-capital-city areas have a post-school qualification. Of those that have studied at a post-school institution, the largest category of post-school education in these LGAs is Certificate III or IV from a TAFE institution. Fewer have attended university.

Of the LGAs, Ashburton has the highest proportion of people with post-school education, while Collie has the lowest. Karratha also has the highest proportion of people who have studied at the bachelor degree level or higher (11%), while less than 5% of people in Collie have this level of education.

The fossil-fuel-exposed LGAs all have a higher than average proportion of workers in Science, Technology, Engineering, and Mathematics (STEM) occupations.[39,40] Compared to a non-capital-city LGA average of 13%, the LGAs have STEM occupation proportions of between 15% and 25%. The high proportions in the LGAs of focus are likely to reflect a high market concentration of the fossil fuel industry.

STEM employees have valuable skill sets, with the ability to understand and apply data and develop solutions to complex problems. Provided they do not decide to emigrate following the exit of the fossil fuel industry from the local economy, their skills offer a valuable base for building new industries.

This dimension of adaptive capacity could be improved by more detailed analysis of the distribution of specific skills. In this framework we are simply looking at the proportion of people with post-secondary education. But it may be possible to determine the trade skills and university courses that will be particularly in demand and useful for the formation of new businesses and industries.



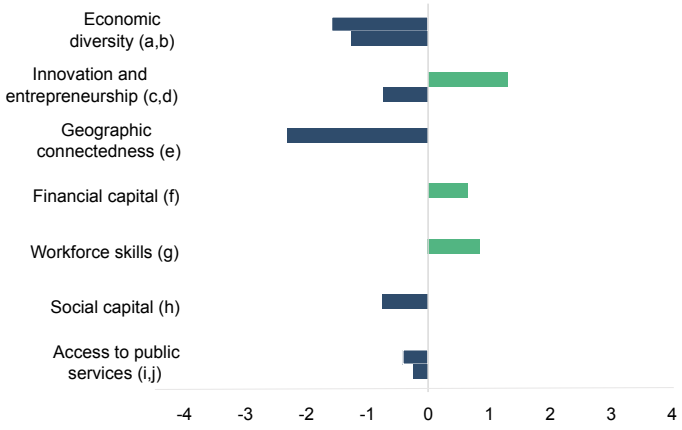
CASE STUDY

PILBARA, WA

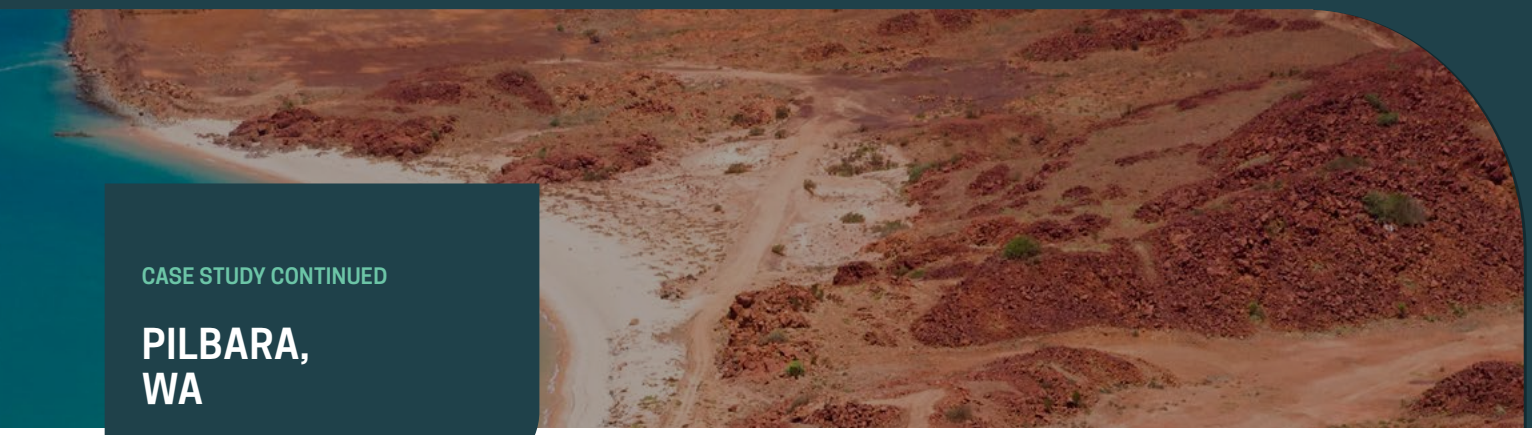
Karratha and Ashburton are located in the Pilbara and are around 16 hours by car from Perth. This limits the opportunities for integration into the Perth market (through exports of goods and services, or labour mobility) and makes it difficult to attract tourists to the LGAs. Currently, the fossil fuel industries in Ashburton and Karratha – mainly natural gas – are highly dependent on the use of fly-in fly-out (FIFO) workers.

Karratha and Ashburton are however well-placed to support large mining industries or develop related industries such as hydrogen. Several types of mineral resources essential to the net zero transition – such as manganese, copper, lithium, zinc, nickel and cobalt – can be found in the area. There is also work underway to develop a renewable hydrogen hub in Karratha. More generally, the region continues to be well-placed for maritime trade with several ports across the Pilbara, but there may still be specific investments required to adapt existing infrastructure towards new export-oriented industries.

Figure A.7. *Adaptive capacity dimensions for Karratha*



Notes: (a) is the proportion of the workforce not in fossil fuel industries; (b) is the Hachman Index; (c) is the rate of business entries; (d) is business expenditure on R&D per 10,000 population by SA3; (e) is the straight-line distance between an LGA and the nearest capital city; (f) is the Index of Economic Resources published by the ABS; (g) is the proportion of the population with post-school education; (h) is the proportion of volunteers; bar (i) is the number of teachers per 1,000 children; (j) is the number of healthcare workers per 1,000 people in a SA3.



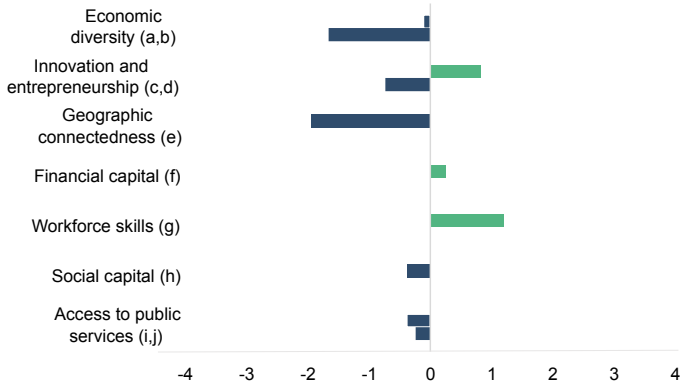
CASE STUDY CONTINUED

PILBARA, WA

Currently, both LGAs have relatively low Hachman indices, suggesting higher-than-average economic concentration. In Karratha, industry is concentrated in iron ore mining, oil and gas extraction and other non-metallic mineral mining and quarrying. Ashburton – which has the lowest Hachman Index of all the fossil-fuel-exposed LGAs studied in this report – has a very high industry concentration in iron ore mining.

As a result, both LGAs have a high percentage of adults with experience as technicians and trade workers, which would benefit the growth of related industries, particularly green steel processing. Many adults hold a Certificate level III or IV and the level of post-schooling education in both LGAs is higher-than-average. The rather high level of business entries in both LGAs may indicate a relatively high level of entrepreneurship that could be fostered further. In contrast, ensuring that the Pilbara continues to prosper will likely require a focus on strengthening social capital and access to services, ensuring a livable and attractive environment for future industries.

Figure A.8. *Adaptive capacity dimensions for Ashburton*



Notes: (a) is the proportion of the workforce not in fossil fuel industries; (b) is the Hachman Index; (c) is the rate of business entries; (d) is business expenditure on R&D per 10,000 population by SA3; (e) is the straight-line distance between an LGA and the nearest capital city; (f) is the Index of Economic Resources published by the ABS; (g) is the proportion of the population with post-school education; (h) is the proportion of volunteers; bar (i) is the number of teachers per 1,000 children; (j) is the number of healthcare workers per 1,000 people in a SA3.

SOCIAL CAPITAL

Social capital can enhance a region's ability to respond to economic shocks by strengthening the ability of its members to work collaboratively on common, self-identified goals, increasing sense of community and belonging, and building networks between organisations and individuals.[41] A strong social fabric is an advantage as communities go through significant economic transition, as it provides alternative non-work-based avenues of support, connection, identity, and meaning to people's lives.

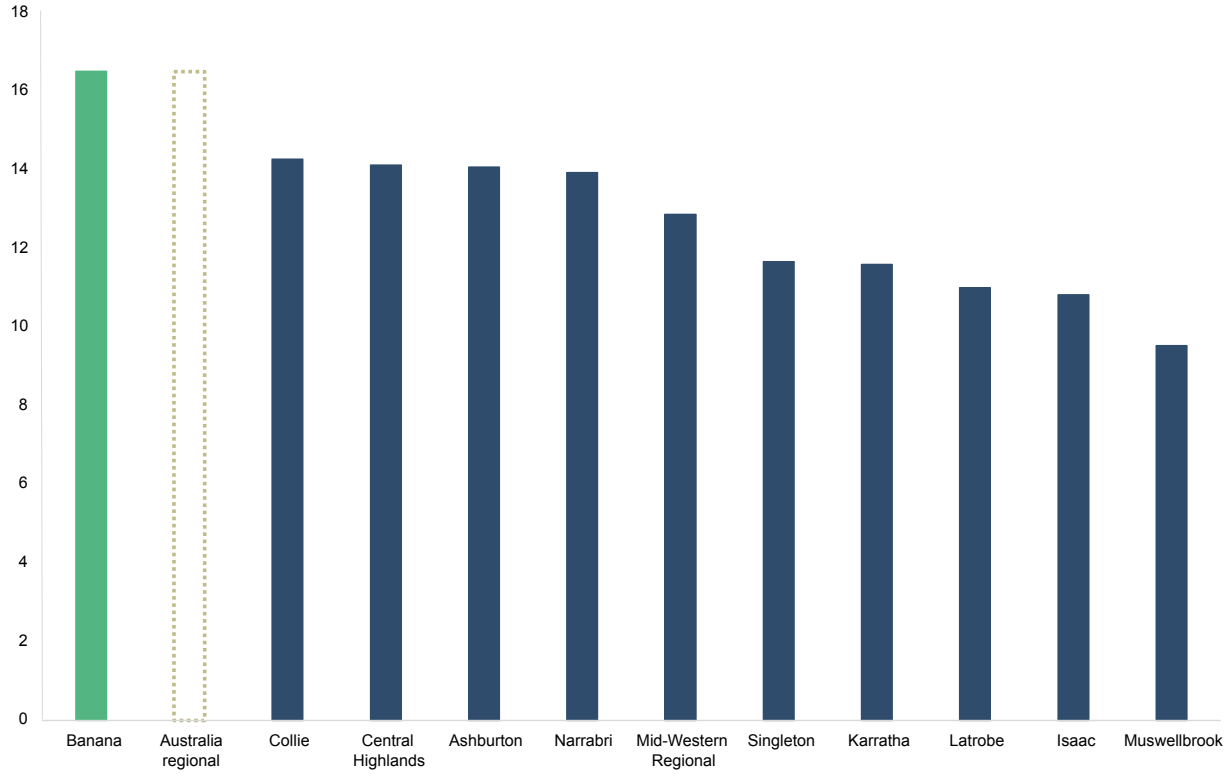
Social capital can include civic networks, norms of reciprocity, and trust in institutions, acquaintances, and strangers. One way of measuring social capital is through volunteering rates, a proxy for the presence and strength of non-work-based community groups.

Other relevant existing data that can demonstrate levels of social capital – such as survey responses on whether people believe they are able to get support in times of crisis and whether they trust their neighbours – would complement the analysis but are too under-powered in regional LGAs.[42]

Volunteering rates in the fossil-fuel-exposed LGAs range from around 10% (in Muswellbrook) to 17% (in Banana). With the exception of Banana, volunteering rates for the fossil-fuel-exposed LGAs are lower than the average for non-capital-city Australian LGAs. In some of these regions, this could be explained by a reduced sense of local community due to the prevalence of fly-in-fly-out (or drive-in-drive-out) workers, but not all the LGAs have high proportions of such workers.

Figure 9. *Volunteer rates in fossil-fuel-exposed LGAs are typically lower-than-average*

Proportion of population that does unpaid voluntary work for an organisation or group



Source: ABS 2021 Census; CPD analysis.

ACCESS TO PUBLIC SERVICES

Access to public services such as healthcare, education, childcare facilities, aged care, and housing are critical factors for quality of life. The likelihood of residents to remain in a region (rather than emigrate) is an important component of that region's adaptive capacity. The accessibility of public services reflects government ability to accurately understand the diversity and nature of the different needs that exist in a population, create and tailor suitable delivery channels, and ensure equity in distribution of services.[43]

In this report we use two simple measures of access to public services. The first is the ratio of teachers to children aged between 3 and 18 years. The measure includes teachers of children from the early childhood years to secondary school. Both communities and individuals benefit from access to quality education: individuals benefit by being more likely to find employment, remain employed, learn new skills while working, and earn more over their working life.[44]

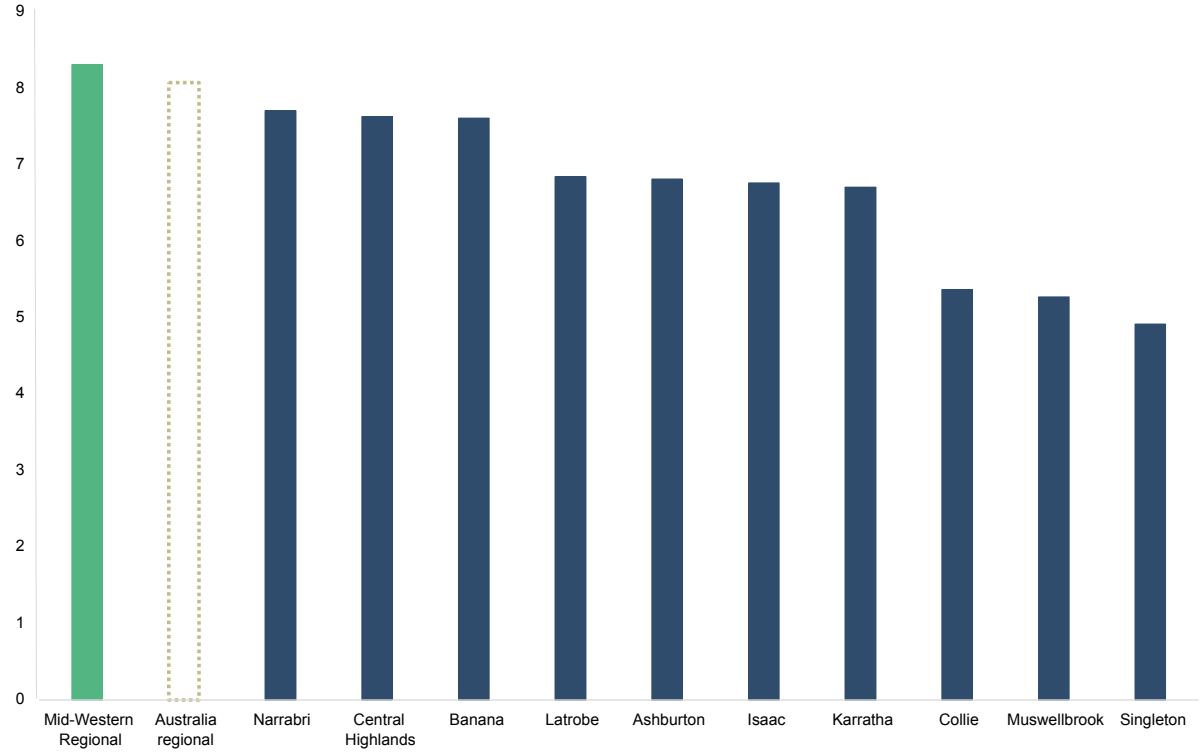
The second measure is the number of healthcare workers per 1,000 resident population in a SA3. The Commonwealth Department of Health and Aged Care provides detailed information on healthcare workers[45], which can be coupled with data on resident population from the ABS Census. Access to healthcare has been identified as one of the most important features impacting the liveability of a region.[46] Being able to access quality healthcare plays a crucial role in determining whether regions can maintain economic stability by preventing, treating and managing diseases. The measure uses the geographical unit of SA3, as healthcare workers typically provide care to people from several different communities concurrently.

While these indicators are undoubtedly important, there are several ways to think about the characteristics of regions in which people want to live. Further work on adaptive capacity should aim to more broadly assess a region's livability, including factors like access to nature and affordable housing. Our indicators also do not consider the quality of the education and healthcare services available in a region. There do exist composite indices of liveability and services in Australia, however these only focus on cities.[47]

Only a small number of fossil-fuel-exposed LGAs have a teacher or healthcare worker ratio higher than the benchmark LGAs. In terms of teacher-to-student ratios, Mid-Western Regional is the only LGA to perform better than the benchmark, while this is the case only for Latrobe and Collie for ratios of healthcare worker to resident population. There does not appear to be any systematic relationship between the measures of access to education and healthcare.

Figure 10. *Student-to-teacher ratios are considerably lower-than-average in almost all fossil-fuel-exposed LGAs*

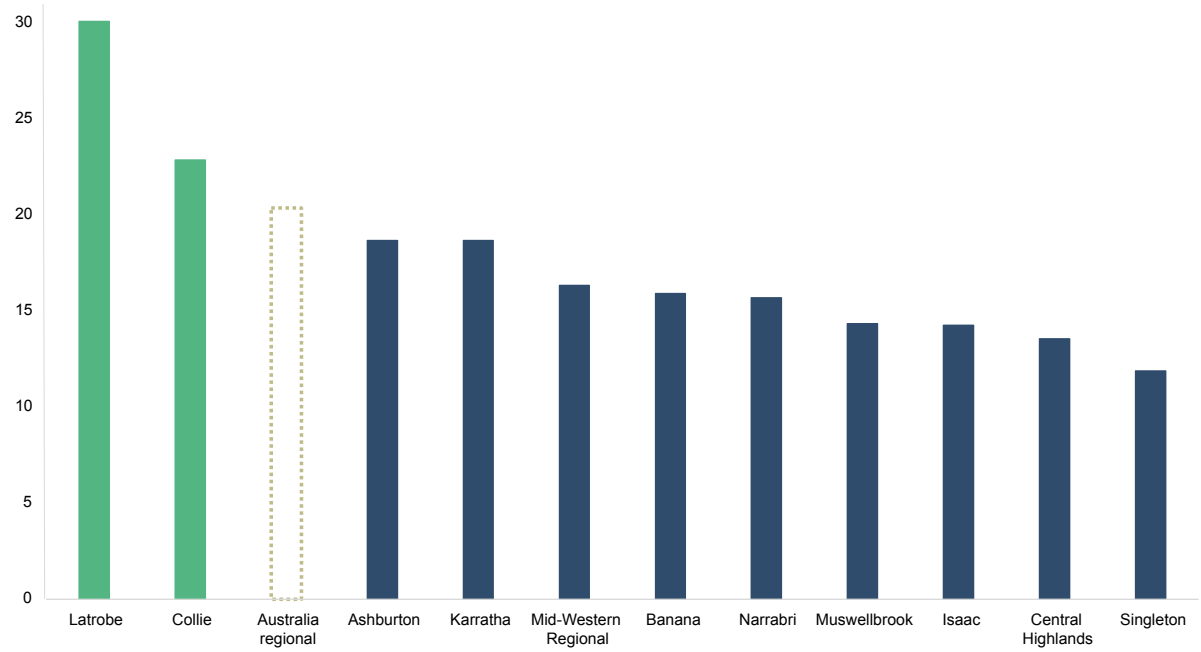
Number of teachers per 1,000 children (3-18 years of age)



Source: ABS 2021 Census; CPD analysis.

Figure 11. *Most fossil-fuel-exposed LGAs have lower-than-average access to healthcare workers; the clear exception is Latrobe*

Number of healthcare workers per 1,000 resident population by SA3



Source: National Health Workforce Dataset 2021; CPD analysis.

Notes: Data on healthcare workers is based on SA3 areas – LGAs have been linked to the SA3 area that contains the majority of the LGA by land area

DIFFERENT FOSSIL-FUEL-EXPOSED REGIONS WILL REQUIRE DIFFERENT POLICY RESPONSES

The section above examines each dimension of our adaptive capacity in turn, and Figure 12 provides a summary of the dimensions across the fossil-fuel-exposed LGAs. Some key findings arise from this analysis.

First, all LGAs have specific strengths and weaknesses in the framework of adaptive capacity. For example, Latrobe is the only fossil-fuel-exposed LGA to have a lower Index of Economic Resources score than the average regional LGA but it scores quite well on some other indicators including the Hachman Index of economic diversity. And while the Hunter Region LGAs and Collie seem to have thriving entrepreneurial and business investment, this is a weakness for most other LGAs.

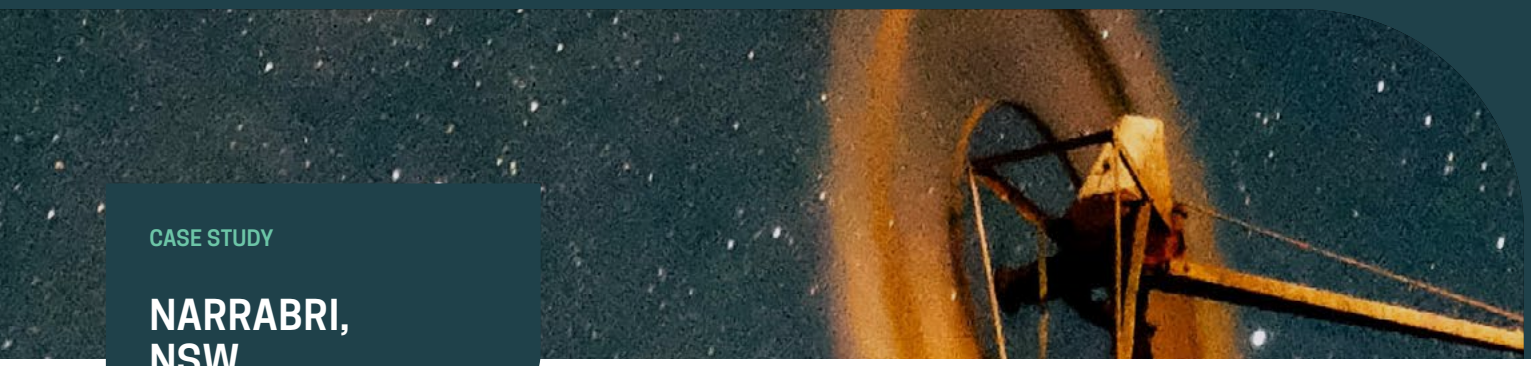
Second, a common weakness for all LGAs in the analysis is a combination of both high levels of economic concentration and lower levels of social capital and access to services. Broad national investments should be weighted towards increasing economic diversification, growing social capital, improving access to key public services, and shifting existing innovative capacity towards non-fossil fuel sectors.

The amounts and types of government support available for past industrial transitions have differed across regions

Port Augusta and Geelong have both undergone industrial transitions in recent years. Port Augusta saw the closure of two power stations and a coal mine over 2012-2016. When the final power station closed in 2016 it was the largest employer in the region, and 200 people lost their jobs.[48] Meanwhile Greater Geelong was impacted by the end of car manufacturing in Australia by Ford, which announced the closure of its Geelong and Broadmeadows manufacturing sites in 2013. These sites in Port Augusta and Geelong made up around 1% of employment in the affected LGAs.[49]

In Port Augusta, there was little coordinated state or federal government support and no overarching transition plan for the region.[50] Notwithstanding this, a renewable energy venture has attracted investors in the Port Augusta Renewable Energy Park which has just recently, in 2022, partially come online. Overall, unemployment in Port Augusta has drifted slightly higher – from being 2.5 percentage points above the national average of 4.9% in 2011, it was 5.5 percentage points higher (9.0% vs. 3.5%) in March 2023.

In Geelong, both state and federal government provided financial support, retraining, and relocation assistance for former workers in the car industry. Businesses in the supply chain were also supported to restructure and pursue advanced manufacturing opportunities.[51] The Gillard Government pledged more than $50 million to support the workers, businesses and regions affected by the closures of manufacturing plants by Ford Australia in 2013.[52] Overall, unemployment in Geelong has gone down since 2011, and was almost one percentage point lower than the national average (2.7% vs. 3.5%) in March 2023.



CASE STUDY

NARRABRI, NSW

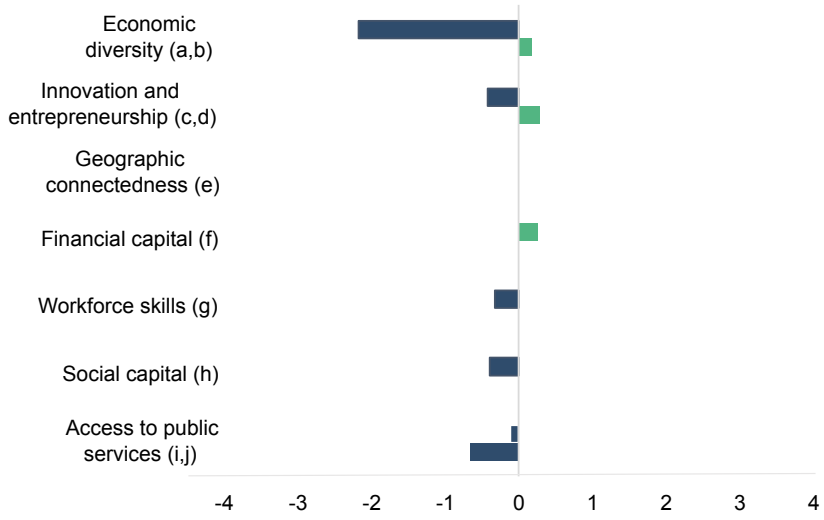
Narrabri is in the North West Slopes of NSW, roughly equidistant from both Brisbane and Sydney, and is quite similar to other non-capital-city LGAs across Australia based on all the adaptive capacity indicators. The Newell Highway passes through the area, providing a major road link between southeastern Queensland and Victoria and carrying large amounts of freight including exports of coal and agricultural products from Narrabri. Reflected in a slightly higher-than-average Hachman Index (one of the only two fossil-fuel-exposed LGAs to have this), Narrabri has several agricultural industries including cotton, high-quality wheat, beef cattle, sheep, and pulse crops.

Going forward, a place-based plan for regional transformation should seek to start creating new opportunities for employment and economic diversification now, despite local mines having goals of operating until 2040. While the longer duration until mine closure is attractive for job prospects for some people, younger generations in the area are increasingly desiring alternative employment options.

Compared to the other fossil-fuel-exposed LGAs, Narrabri has a slightly lower-than-average new business entry rate. This may reflect a lack of shovel-ready projects in the area. In the past, the fossil fuel sector has dominated the economy and may have even crowded out other local sectors like agriculture.

One possible area for future growth is an increased focus on tourism including outdoor pursuits such as mountain biking, and the construction of connected walking trails through national parks. There is also potential for electricity generation including solar and pumped hydro that makes use of existing electrical infrastructure. Research facilities located in Narrabri, including several agricultural centres and a CSIRO-led telescope facility, could be used to support innovation and the creation of new business ideas by working with local industries.

Figure CS.9. *Adaptive capacity dimensions for Narrabri*



Notes: (a) is the proportion of the workforce not in fossil fuel industries; (b) is the Hachman Index; (c) is the rate of business entries; (d) is business expenditure on R&D per 10,000 population by SA3; (e) is the straight-line distance between an LGA and the nearest capital city; (f) is the Index of Economic Resources published by the ABS; (g) is the proportion of the population with post-school education; (h) is the proportion of volunteers; bar (i) is the number of teachers per 1,000 children; (j) is the number of healthcare workers per 1,000 people in a SA3.

On the converse, investments in increasing general levels of economic resources and general education are less critical. These tend to be fairly high across the LGAs compared to the non-capital-city LGA benchmark at least in the short-term.

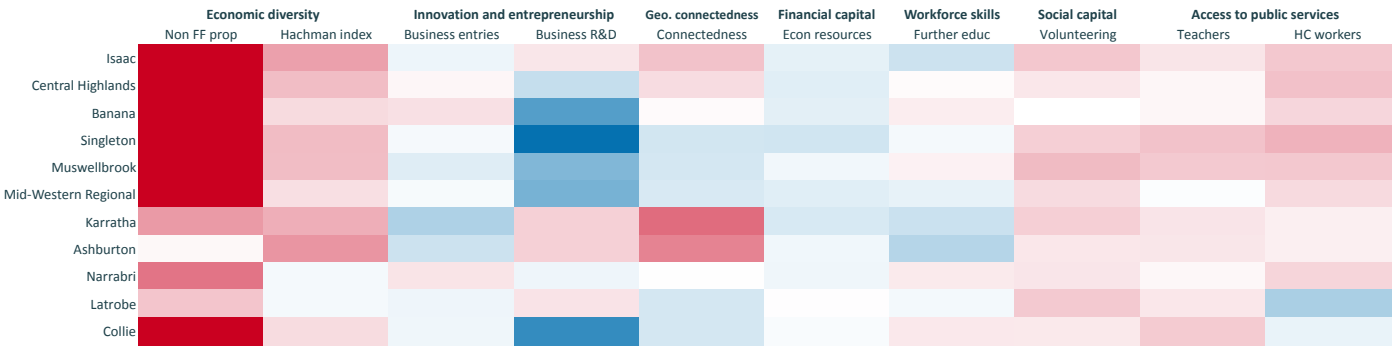
And finally, some of these findings need to be taken with a grain of salt and investigated further.

This analysis assumes that "adaptive capacity" is some underlying characteristic of a regional community, but in actual fact, adaptive capacity is dynamic and can change over time.

The values of the dimensions estimated in the report are based on the current population, and there is reason to expect that some people will emigrate away as regions undergo transition, even if new opportunities appear.

As people emigrate from the region there may be reductions in adaptive capacity based on several factors, resulting in a compounded effect, as demographic variables such as economic resources and STEM-trained workers are often highly correlated.

Figure 12. *Comparison of adaptive capacity indicators for Australian regions most exposed to declining fossil fuel demand*



Notes: Colours indicate the number of standard deviations away from the Australian average for non-capital-city LGAs. indicates positive standard deviations; indicates negative standard deviations. Maximum colour intensity is reached at +/- 4 standard deviations. See the case studies for more information.

SUPPORTING THE DEVELOPMENT OF ADAPTIVE CAPACITY IN AUSTRALIA'S FOSSIL-FUEL-EXPOSED REGIONS

People in fossil-fuel-exposed communities have many ideas for what their futures might look like, but they often lack clear and robust plans (or even frameworks to design plans) for a new type of regional economy. Such plans should be place-based: they should target the specific needs of different places in designing government services and infrastructure and engage local people throughout the process. The adaptive capacity framework presented in this report can help provide a common framework for the sorts of investments communities will need.

Robust transition plans will require support from all levels of governance, with local-level organisations being best placed to understand the needs and capabilities of communities, while state and federal governments play key roles in providing the necessary finance, policies, and frameworks.

Table 3 presents an analysis of the types of investments that will be required in each of the fossil-fuel-exposed LGAs to increase levels of adaptive capacity.

Table 3: *Examples of using the adaptive capacity framework to identify priorities*

	Examples of policies if an LGA is strong in this area	Examples of policies if and LGA is weak in this area
Economic diversity and innovation and entrepreneurship	Ensure the local fossil-fuel workforce has the skills required to move into other existing sectors	Promote new business formation and innovation, eg. by developing financing partnerships for new ventures
Geographic connectedness	Provide concessional loans to businesses to enter into new (domestic) markets; eg. if a business is well-placed to use rail/road infrastructure to tap into capital city supply chains	Identify priority infrastructure investments to connect the region to nearby markets
Financial capital	Mobilise wealth in the community towards new opportunities eg. through community co-investment schemes, blended finance programs and grassroots venture funds	Ensure families and households have access to support to smooth through bumps in the transition
Workforce skills	Capitalise on existing skills when developing new industries, eg. value-added food manufacturing	Increase numbers of TAFEs and/or rural branches of universities; scholarships for rural and remote students to attend university
Social capital	Encourage community members to work together towards an economic transition plan for their region	Provide funding for community infrastructure and groups
Access to public services	Focus on any existing weaknesses in other areas	Increase funding for core services, as well as projects that improve livability of a region

REGIONAL GROUPS AND LOCAL COUNCILS

Local organisations – for example, local councils or regional development associations – can play a key role in the transition of fossil-fuel-exposed regions by being the main drivers for the creation of regional roadmaps, increasing collaboration amongst government, industry, the workforce, educational institutions, and society as a whole, and overcoming local lock-ins and path dependencies.[53] Local-level organisations are most likely to be knowledgeable of the economic and social challenges facing their communities, to be able to identify a region's competitive advantages and the range of industries that may be able to develop, and to understand the unexpected impacts that result from policy measures.

The development of regional economic transition roadmaps should be community-led and tap into existing capital and established networks. Successful regional transition plans will be aligned with community identities as well as existing competitive advantages. For example, one participant in the development of the Gladstone economic transition plan by The Next Economy for Gladstone Regional Council remarked that they want to see their region continue to be "an area that makes things and exports to the world", demonstrating the pride that Australians in this region have in their industrial heritage.[54] In the short term, assistance from external stakeholders may be required where local experience is insufficient; in the medium to long term local capabilities and capacity should be developed so that any changes are sustainable.

A key focus of transition roadmaps for fossil-fuel-exposed regions will need to be on addressing currently low levels of economic diversity. Recent initiatives in Australia to transition fossil fuel industry workers to new jobs have focused largely on developing opportunities in the clean energy sector. Plans for the national Net Zero Authority also seem to concentrate on new clean energy industries.[55] However, replacing one energy source – fossil fuels – with another – clean energy – in a region has the potential to continue dependence on a single industry. Moreover, it is unlikely that there will be sufficient long-term jobs in the clean energy sector for a 1:1 substitution.

Instead, developing multiple industries and sectors can strengthen a region's economic base, making it more resilient and less dependent on a key industry. Gladstone aims to expand its manufacturing base by drawing on existing infrastructure and the benefits of lower, competitive energy costs from renewables. As the Mid-Western Regional LGA is an agricultural region, future industries could involve value additions to food processing – which may become competitive due to lower energy prices from renewables – and agri-voltaics (placing agriculture and solar PV on the same land).

In Germany, successful transitions away from coal have at times involved the development of entirely new industries. For example, the Ruhr region in Germany has largely successfully transitioned from a coal-based to a knowledge-based economy that focuses on energy efficiency, renewable resources, recycling and waste combustion, while the city of Dortmund has become a technology hub specialised in microsystem technologies. Other areas of Germany celebrate their heritage by welcoming tourists with museums about their local coal and steel history, hotels, and theatres.[56]

More broadly, transition roadmaps should focus not only on economic diversification but also consider the need for other types of investments for example in social and natural capital as well as access to public services.

CASE STUDY

LATROBE, VIC

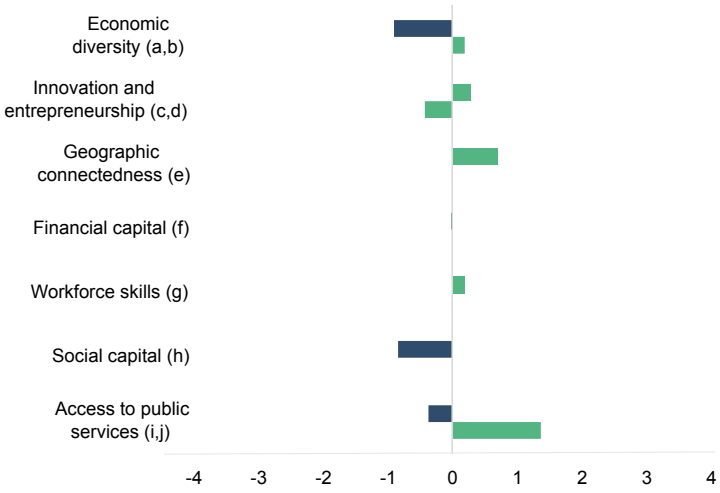
Latrobe has levels of adaptive capacity that are similar to the regional average across most indicators. A key strength of Latrobe LGA is its close proximity to Melbourne: it is around two hours by both car and train, making it possible for residents to travel to Melbourne for work and for local businesses to integrate into urban supply chains. A large existing pool of assets including human capital, transport infrastructure, and power lines, means that there is potential for a wide diversity of businesses to emerge based around the Melbourne market. The weakest indicator in our framework is lower-than-average volunteering rates, potentially indicating the need for future focus on increasing social capital and community strengthening.

The Latrobe Valley Authority has been working in the region since the closure of the Hazelwood Power Station and associated Mine in 2017. It is a formal signatory to the EU Smart Specialisation (S3) Platform, which offers its members opportunities to interact and cooperate with other regions to develop innovation plans for local economies.[70] The LVA has identified four regional strengths for the region, including energy, food and fibre, tourism economy, and health and wellbeing.

Going forward, the LVA is focusing on:

- Creating genuine collaboration and partnerships between stakeholders and building a system of regional leadership and multi-level governance
- Identifying specific competitive advantages within each regional strength
- Increasing liveability and community connections – supporting the triple bottom line
- Connecting local organisations to build knowledge and skills to underpin regional capabilities

Figure CS.10. *Adaptive capacity dimensions for Latrobe*



Notes: (a) is the proportion of the workforce not in fossil fuel industries; (b) is the Hachman Index; (c) is the rate of business entries; (d) is business expenditure on R&D per 10,000 population by SA3; (e) is the straight-line distance between an LGA and the nearest capital city; (f) is the Index of Economic Resources published by the ABS; (g) is the proportion of the population with post-school education; (h) is the proportion of volunteers; bar (i) is the number of teachers per 1,000 children; (j) is the number of healthcare workers per 1,000 people in a SA3.

STATE AND FEDERAL GOVERNMENTS

State and federal governments have a key role to play in building the adaptive capacity of Australian communities and helping them plan for economic transition. These levels of government play a key role in coordinating activities, providing funding, introducing necessary policy frameworks, and acting on policy areas within their control. A significant part of this is acknowledging and supporting community-led efforts to set priorities for economic transition.

A key and recurring theme of this report is the need for transition plans to be tailored to each community. This means engaging local leaders and stakeholders in a process of co-design – not an investment package designed in Canberra (or Brisbane or Sydney). This is important not only to give people the dignity of self-determination, but also for instrumental reasons: it leads to better outcomes.[57] The local knowledge of community stakeholders is a source of rich and intangible expertise that can be used to design better and more effective interventions.[58] A plan is also more likely to succeed when it has the buy-in and imprimatur of local leaders; the plan will have credibility with local businesses, investors and community groups who have a stake in its success.

Federal and state governments have an important role in coordination. They should support, acknowledge and encourage these local alliances and discussions – as well as auspicing them where they do not already exist. What's more, federal and state governments can provide overarching frameworks for discussion (like the adaptive capacity framework in this report), making it easier for local communities to engage without having to start from a blank piece of paper. Establishing overarching policy frameworks will also provide a common nomenclature, reducing the friction of dozens of entities trying to match their different terminologies and ways of describing their priorities.

Of course, all of this must be followed up with actual policy. State and federal governments hold the purse-strings, and they must support the implementation of transition plans. To ensure the successful transformations of regional economies, the Australian Government recently announced plans for a national Net Zero Authority.[59] The announcement of this Authority echoes decisions by several other countries to establish national mechanisms that bring together key stakeholders to facilitate a just transition. The Just Transition Mechanism in the European Union raises and directs funds to fossil-fuel-exposed regions and provides coordinated support for regions including through a helpdesk and regular seminars.[60]

The Just Transition Commission in Scotland assists communities, businesses, unions, and workers to produce just transition plans, targeting a diverse range of factors including energy poverty.[61]

In Australia, the national Net Zero Authority is in its infancy, with its final design yet to be decided upon. At its best, the Net Zero Authority can support the many initiatives that have already been established at state and local levels (such as the Collie Delivery Unit, or the Latrobe Valley Authority), providing a coordinating policy framework and an avenue for funding major transition-related investments.

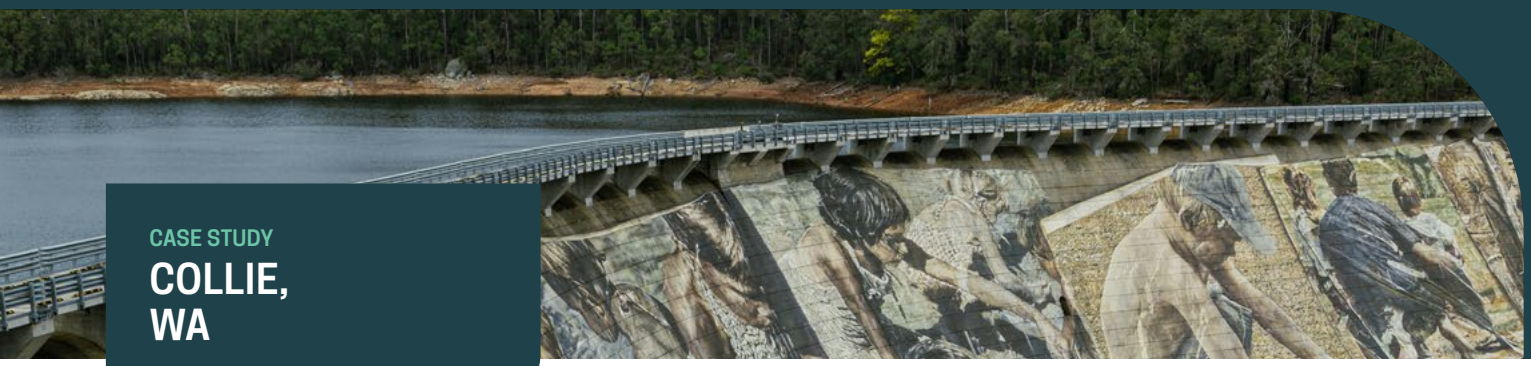
Finally, state and federal governments have control of policy areas that are highly consequential for adaptive capacity – such as immigration, education, trade policy, and tax settings. In particular, there is a strong imperative for a coordinated approach to economic diversity. At a national level, the global transition away from carbon-intensive activities poses an existential question: what industries will drive the Australian economy in 20 years' time? To assist with increasing economic diversity, state and federal governments could work to develop a coordinated and expanded approach to innovation policy in Australia that draws on the needs and capabilities of the exposed communities.

Both the EU and UK have central agencies to support place-based initiatives for innovation. The EU has linked funding from the European Structural and Investment Funds to the development of Smart Specialisation strategies by member countries and within regions. These strategies are designed by individual regions, which are encouraged to identify a limited number of long-term priorities based on their regional strengths and comparative advantages in business and research.[62] To assist with developing these R&D strategies and foster mutual learning and networking opportunities, the European Commission has established the Smart Specialisation Platform.[63] Similarly, Innovate UK has established the Catapult Network, which fosters collaborations between industry, government, and research organisations, and provides businesses with access to expertise and facilities to enable them to test and improve their ideas.[64] These types of regional innovation ecosystems enable a transition to a high-skilled economy.

In comparison, there is less coordination and funding and fewer policy frameworks to support innovation in Australia.

Levels of innovative capacity are higher-than-average for some fossil-fuel-exposed regions, however, there are few pathways to catalyse and coordinate this underlying capacity and use it to increase economic diversity and complexity. This is not for lack of trying.

The CSIRO is funding critical research under a range of missions related to the economy,[65] the Education department is funding a range of Trailblazer University projects,[66] Industry Growth Centres agglomerate experts and entrepreneurs on key industrial themes,[67] Regional University Centres help students access cutting-edge training,[68] and initiatives like the Advanced Manufacturing Research Facility (AMRF) in NSW aim to help smaller businesses access cutting-edge technology and expertise.[69] Tying these initiatives together into a cohesive national approach to economic development will help local communities plan for their economic futures, and is something that only the Commonwealth Government can do.



CASE STUDY

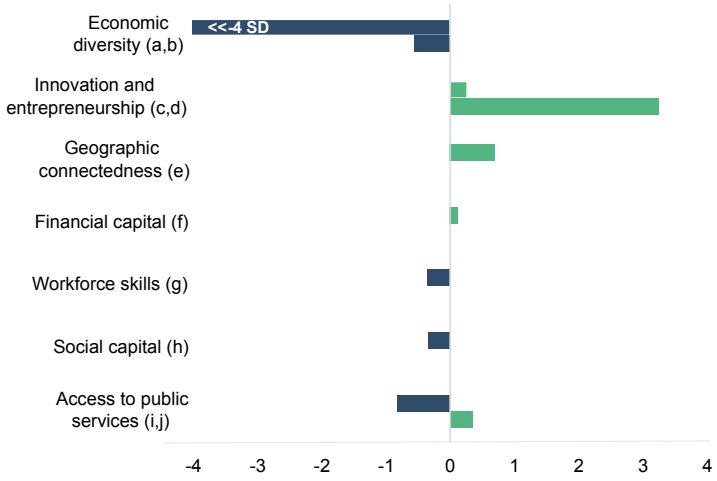
COLLIE, WA

Collie ranks quite similarly to other non-capital-city Australian LGAs in terms of the adaptive capacity indicators, with two significant exceptions. It has a high level of innovation, particularly evident in business expenditure on R&D – amongst the highest in the country (outside of capital cities). This capacity could offer a strong potential resource for transforming the economy from one that is currently largely concentrated in coal mining and timber to one that is more economically-diverse and sustainable (of course, R&D investment may be dependent on incumbent industries). For example, there have been recent attempts to increase tourism to the area, including for outdoor activities such as mountain biking and camping, and museums that showcase the region's coal mining history including a replica coal mine that shows visitors what life was like underground in historic mines. Since 2018, Collie offers one of the largest individual art prizes in regional Australia, potentially indicating there is capacity for a thriving arts hub in the region.

Collie's dynamic economy, relatively close proximity to Perth, and location at the heart of the South West Interconnected System suggest that the LGA could play an important role in developing a low-carbon future for Western Australia.

For example, jobs could be created in renewable manufacturing, sustainable building materials (such as low-carbon cement and engineered timber), and recycling of lithium-ion batteries and solar PV panels.[71] A hydrogen electrolyser, powered by low-cost renewable energy, could benefit manufacturing and minerals processing industries including green ammonia and urea for agricultural and industrial uses.

Figure CS.11. *Adaptive capacity dimensions for Collie*



Notes: (a) is the proportion of the workforce not in fossil fuel industries; (b) is the Hachman Index; (c) is the rate of business entries; (d) is business expenditure on R&D per 10,000 population by SA3; (e) is the straight-line distance between an LGA and the nearest capital city; (f) is the Index of Economic Resources published by the ABS; (g) is the proportion of the population with post-school education; (h) is the proportion of volunteers; bar (i) is the number of teachers per 1,000 children; (j) is the number of healthcare workers per 1,000 people in a SA3.

As part of the implementation of the Collie Transition Plan that was developed in collaboration with the Just Transition Working Group, the Western Australian government has also established a fund to shape this future and develop projects like the Magnium Pilot Plan.

CONCLUSION

Recent efforts to advocate for and define a just transition for Australia's fossil-fuel-exposed regions have typically focused on fossil fuel sector workers. Identifying the implications of the net zero transition for these workers is an important first step in ensuring a just transition, however, the transition will affect entire regions, not just fossil fuel workers.

These regions contain both fossil fuel workers but also large groups of people whose industries depend on the income brought to the region by the fossil fuel sector and its workers, for example through education, retail, healthcare, and public administration. The new national Net Zero Authority offers a unique opportunity for a coordinated approach to a just transition for Australia's fossil-fuel-exposed regions.

A successful transition depends on the overall resilience and adaptability of these affected communities. It is not as simple as identifying a single anchor industry to replace fossil-fuel intensive activities, but rather it requires investing in the adaptive capacity of these affected regions – from economic diversity to social capital. By doing so it will help local communities, state governments and the Commonwealth identify the types of targeted investments to help communities thrive.

From our initial analysis of seven dimensions of adaptive capacity, some clear findings emerge. Fossil-fuel-exposed LGAs in NSW and Collie in WA benefit from a combination of high levels of innovation and entrepreneurship and good connection to a large market (nearby capital city). This should present a strong base for regional economic diversification. Things are a bit less clear for LGAs in the Pilbara and Central Queensland. In these places there is a combination of economic concentration, lower levels of innovation and entrepreneurship, and high distance from nearby domestic markets. In these places it is not necessarily clear that new businesses will form and thrive without support and enabling infrastructure. This is exacerbated by an issue that affects almost every LGA in this analysis: below-average levels of social capital and access to services.

The analysis in this report is a starting point for conversations. Policymakers using this adaptive capacity framework could further refine the indicators with greater analytical capacity and access to data. There is a clear role for local governments and stakeholders in shaping and owning a vision for transition. And there is a clear role for state and federal governments to coordinate, support, and fund the investments needed to enhance the adaptive capacity of Australia's regions.

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