

Who's buying?

The impact of global decarbonisation on Australia's regions



Warwick Smith
Toby Phillips

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EXECUTIVE SUMMARY

- » Global decarbonisation could affect around 300,000 Australian jobs connected to coal, oil and gas exports
- » A handful of Local Government Areas (LGAs) bear the brunt of this impact – there are seven LGAs where more than 20 per cent of jobs are exposed
- » Global decarbonisation is a predictable, manageable, long-term industrial transition; these estimates are based on projections of global demand for fossil fuels in 2050
- » With active transition planning, these communities should be able to thrive in a post-carbon economy
- » The world in 2050 will be vastly different to the world today, with many new industries and opportunities
- » Australia can make the choice now to diversify our economy and change gear to capture the opportunities created by decarbonisation

The world has pledged dramatic decarbonisation. The impact of these commitments on Australia's fossil fuel export industries is significant but manageable. To manage these effects at a local level we must understand the likely impact so we can plan targeted diversifications for the people and communities experiencing the greatest changes over the coming decades.

Conservative future scenarios that account only for pledges made before April 2021 show that global demand for coal exports will halve by 2050. Scenarios that account for further inevitable policy responses stemming from COP26, and for demand

shifts consistent with a global net zero carbon position by 2050, see much steeper and sharper declines for fossil fuel exports.

Using a regional input-output model across Australia, we have mapped the decline in foreign demand for fossil fuel exports onto employment at an LGA level. This model extends beyond the immediate impact to coal and gas firms, accounting for the flow-on effect on connected industries and communities - for instance the shops and pubs surrounding a coal port. Importantly, this does not consider changing demand from Australia's domestic energy transition.

The impact on Australian jobs is modest. Nationally, between 100,000 and 300,000 jobs are exposed to falling export demand for affected products. These numbers include flow-on effects to jobs in areas such as finance, maintenance and hospitality. At most, it still represents around two per cent of the Australian labour market. And this is based on projections of fossil fuel demand in 2050. We have time to adapt and build new industries to absorb this change in global demand.

The impacts of global decarbonisation are not evenly spread. They affect people and communities in specific areas disproportionately; only seven LGAs (out of 537) have more than 20 per cent of their workforce affected by this trend. The most affected places include the LGAs of Isaac and Central Highlands in Queensland's Bowen Basin, and Singleton in the NSW Upper Hunter. Under scenarios of faster decarbonisation pathways among global export partners, Ashburton in Western Australia's Pilbara region is also affected due to its gas exports.

Increased certainty on decarbonisation pathways provides policymakers, industry leaders and workers' representatives with the opportunity to prepare for a post-carbon global economy. Some renewable energy investment in the Hunter Valley and central Queensland alone could replace half – or more – of the jobs affected by falling fossil fuel export demand. By understanding these opportunities, and the remaining gaps, communities can more smoothly ride the global transition.

Global decarbonisation is a predictable, manageable, long-term industrial transition. The impacts are highly concentrated, placing some communities at great risk unless long-term plans are made now. So too should our response be highly concentrated. The task ahead for Australian policymakers is to make sure that the location of projects in emerging industries, the skills profile of local workers, and the transition pathways for economies and communities, are aligned so the people and places who are most affected by changing exports are most able to benefit from emerging opportunities.



Global decarbonisation

Governments around the world are planning to decarbonise

Nations are announcing and implementing decarbonisation policies with increasing momentum towards a global goal of net-zero emissions by 2050. At the core of these efforts to decarbonise are commitments to reduce reliance on fossil fuels. At COP26 in Glasgow countries committed to “phase down” coal, Australia’s second-largest export commodity after iron ore.¹ In May 2021 the G7 countries agreed to cease new international financing of unabated coal projects by the end of 2021. Also at COP26, 42 countries set coal phase-out dates, including five of the world’s 20 largest users. South Korea, the second largest market for Australian thermal coal after Japan, was among them.

At the same time, decarbonisation and the energy transition present enormous opportunities for regional Australia with rapidly growing markets for hydrogen and energy intensive products produced with renewable energy such as aluminium, steel and ammonia.

Australian fossil fuel export industries will be heavily impacted by the resulting reduction in global demand. The exact extent and timing of this impact is still largely unknown but there are a range of plausible published scenarios, three of which are explored in this paper. These scenarios are explained further in Box 1, and range from simply analysing concrete pledges in the Announced Pledge Case (APC), to including the predicted policies based on existing targets and goals with a ramping up of pledges from 2022 in the Inevitable Policy Response (IPR), through to a scenario consistent with the requirements for global net-zero emissions by 2050 in the International Energy Agency’s Net Zero Emissions scenario (NZE).

**+
Decarbonisation and the energy transition present enormous opportunities for regional Australia with rapidly growing markets for hydrogen and energy intensive products produced with renewable energy such as aluminium, steel and ammonia.**

BOX 1

FOSSIL FUEL DEMAND SCENARIOS

The three international decarbonisation scenarios modelled in this report are as follows:

INTERNATIONAL ENERGY AGENCY: THE ANNOUNCED PLEDGE CASE (APC)²

“The Announced Pledges Case (APC) assumes that all announced national net zero pledges [as of April 2021] are achieved in full and on time, whether or not they are currently underpinned by specific policies. Global energy-related and industrial process CO₂ emissions fall to 30 Gt in 2030 and 22 Gt in 2050. Extending this trajectory, with similar action on non-energy-related GHG emissions, would lead to a temperature rise in 2100 of around 2.1°C (with a 50 per cent probability). Global electricity generation nearly doubles to exceed 50,000 TWh in 2050. The share of renewables in electricity generation rises to nearly 70 per cent in 2050.”

THE INEVITABLE POLICY RESPONSE (IPR)³

Principles for Responsible Investment, Vivid Economics and Energy Transition Advisors forecast the IPR to inform investors about the future of global fossil fuel demand. The thinking behind the IPR was to forecast an ambitious but realistic global response based on accelerating action beginning 2023 - 2025, referred to as the Paris Ratchet. Recent announcements at the Biden Climate Leaders Summit in April 2021 conform with IPR scenario projections (Fulton, 2021).⁴

The IPR research predicts that this scenario brings forecast warming to peak about 2°C above pre-industrial levels. Greater policy commitments are required to remain under 1.5°C of warming.

INTERNATIONAL ENERGY AGENCY: NET ZERO EMISSIONS SCENARIO (NZE)²

“The Net Zero Emissions by 2050 Scenario (NZE) shows what is needed for the global energy sector to achieve net zero CO₂ emissions by 2050. Alongside corresponding reductions in GHG emissions from outside the energy sector, this is consistent with limiting the global temperature rise to 1.5°C without a temperature overshoot (with a 50 per cent probability). Achieving this would require all governments to increase ambitions from current Nationally Determined Contributions and net-zero pledges.”

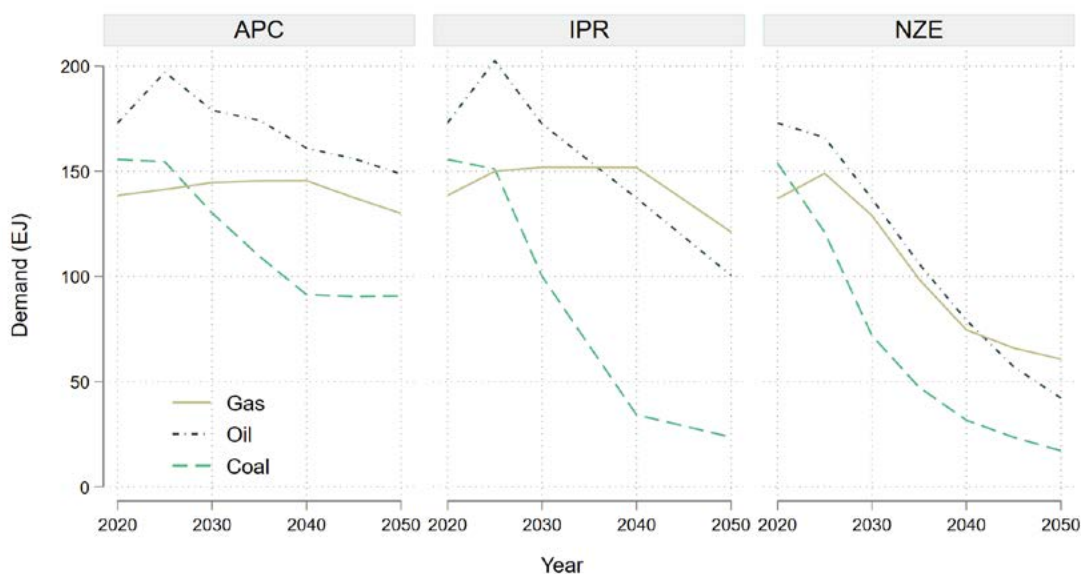
Australia's export industries are heavily exposed to global decarbonisation

Australia's export sector is dominated by a relatively small number of natural resources. Almost three quarters of Australian goods exports are fossil fuels, minerals or metals. Just focussing on fossil fuels still accounts for over 20 per cent of Australia's export basket. For Australia, a fall in global demand for fossil fuels would be a significant – but not unexpected – shock to the economy. Australia currently uses less than 30 per cent of the coal it produces and total

domestic thermal coal consumption is likely to fall as ageing power stations are retired and not replaced.⁵ This means that there is no potential for domestic demand to make up for falling export demand.

The three scenarios described above allow us to analyse the different trajectories of demand for coal, oil and gas (Figure 1).

Figure 1. Global demand for coal, gas and oil across the three scenarios from 2020 to 2050. All figures in exajoules.



Source: scenarios published by the International Energy Agency (IEA) and UN PRI, see Box 1 for details.

In all scenarios there will be a dramatic decline in demand for coal (the most important of the three to Australia's current economy in terms of employment and export income). Even under the most modest APC case – accounting only for concrete pledges announced by April 2021 – demand for coal will be almost halved by 2050. Under the other two future scenarios – now more likely after COP26 –

global demand will fall much further and faster. It is expected that demand for thermal coal will fall much faster than coking coal in all scenarios, with a small global market for coking coal remaining in 2050 even under the net-zero emissions scenario. Demand for oil and gas fare differently under different scenarios, continuing to rise for the next decade as they are used as transition fuels in the APC and IPR scenarios.

Over the next 30 years, this will have significant impact on output and employment in Australia

Projecting the reduction of fossil fuel demand onto Australia's regional economies

We have projected the above global demand reduction scenarios onto Australia's fossil fuel exports, and then used the NIEIR's (National Institute for Economic and Industry Research) LGA input-output model to calculate the impact across the whole economy (see Appendix I for more details). This allows us to identify which jobs in which LGAs are exposed to Australia's trade partners movement away from fossil fuels.

The results are based on employment, population and output in 2020 and show us what the impact on today's economy would be if these changes in global demand occurred now. We also assume no change to domestic demand for fossil fuels in order to isolate the impact of international efforts and determine the extent of industry transition that is beyond domestic control. The purpose is not to forecast future economic outcomes, nor does the work take into account any proactive transition policies, new business formation, demand from domestic energy generation, or any other adjustment to the structure of the economy.

Over \$150bn in output and 300,000 jobs currently depend upon falling demand

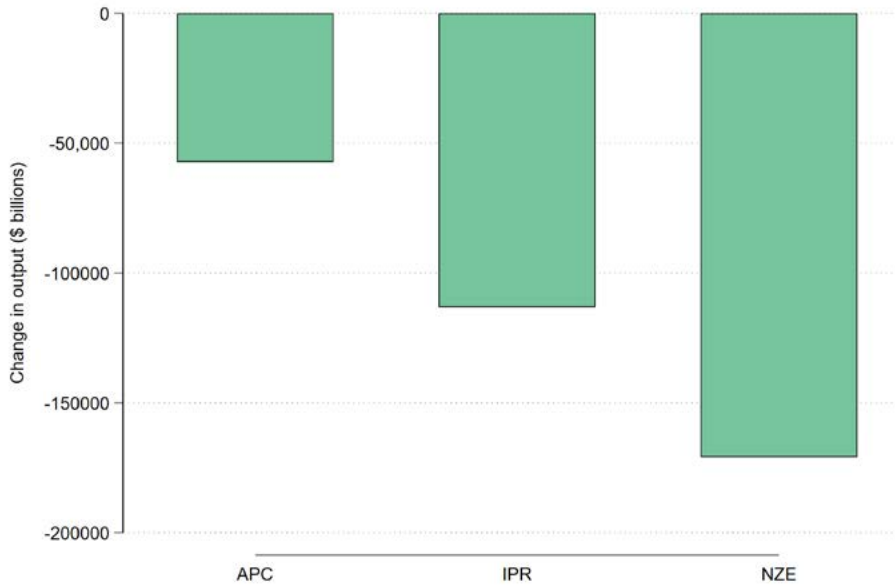
The decline in global demand for fossil fuels will ripple across the Australian economy, affecting more than the roughly 80,000 jobs in coal, oil and gas export industries. Shutting down a mine does not just affect the miners, it also affects the local pub and the retail stores in the nearest towns. Some LGAs will be affected more than others; as will some occupations.

The impact on output across the nation is substantial. Even in the minimal APC scenario, over \$50 billion of output per year (in 2020 dollars) is dependent upon global demand that will be gone by 2050. In the NZE scenario, this is \$175 billion per year (see Figure 2).

+ The decline in global demand for fossil fuels will ripple across the Australian economy, affecting more than the roughly 80,000 jobs in coal, oil and gas export industries.



Figure 2. Change in total annual output (2020 dollars) across Australia if today's global demand for fossil fuels fell to 2050 levels under the three scenarios.



Source: scenarios published by the International Energy Agency (IEA) and UN PRI, see Box 1 for details.

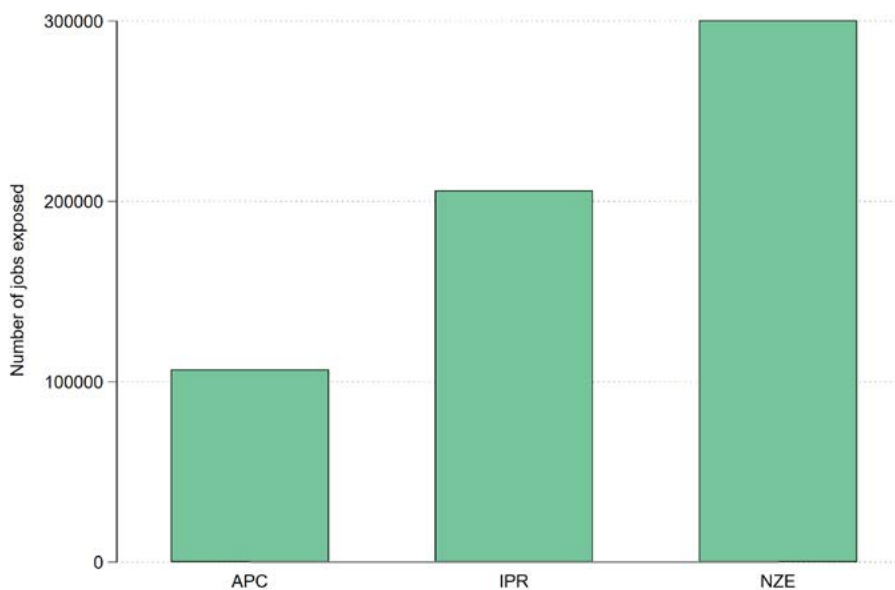
+ A transition to net zero will not be a catastrophe; and Australia has plenty of time to prepare.

The modelling finds that if global demand today was to fall to predicted 2050 levels, it would mean 100,000-300,000 fewer jobs could be supported by fossil fuel export industries (Figure 3). This must be put into context: at worst, this equates to around two per cent of the labour force. A transition to net zero will not be a catastrophe; and Australia has plenty of time to prepare.

While many of these jobs are in the fossil fuel sector, the impacts flow through to every industry. For instance, there are over 20,000 exposed jobs in food and beverage services, 10,000 in repairs and maintenance and 7,600 in finance.

A lot could change between now and 2050, so these projected scenarios come with a high degree of uncertainty. We can also look at forecasts of 2030 levels of demand. The IEA's net-zero scenario projects that by 2030 demand for coal will have fallen by 53 per cent and demand for gas by six per cent. If this demand shock were felt today, it would impact 117,000 jobs across Australia. To put that into perspective: it is 13,000 per year between now and the end of 2030 (about 0.1 per cent of the workforce per year).

Figure 3. Total Australian jobs exposed to international decarbonisation action

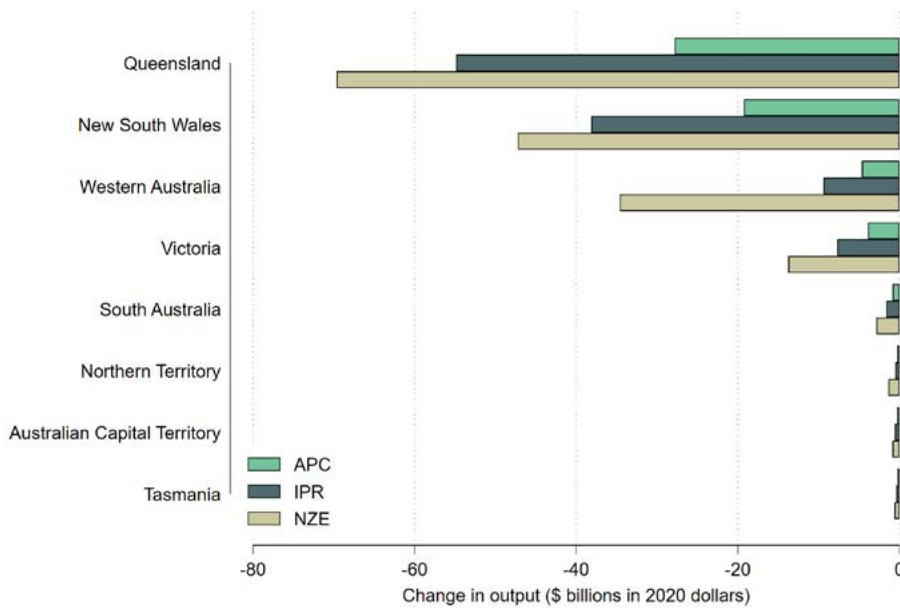


Note: this includes jobs in fossil fuel industries as well as those that will be threatened as a result of flow-on effects to other industries.

The impact is concentrated in key regions of New South Wales, Western Australia, and Queensland

Most of the impact of international decarbonisation efforts will be felt in three states: Queensland, New South Wales and Western Australia (Figure 4). The Latrobe Valley in Victoria does not feature as highly as one might expect despite its concentration of coal mines and power stations. This is because of the transitions that have already occurred and the fact that a substantial proportion of Latrobe Valley coal is used within Australia and our modelling is only concerned with the impact of international demand. We assume no substantial changes to domestic demand. In reality, this region will likely be affected as well, as Australia's own energy mix and fuel demand profile evolves.

Figure 4. Change in output by state and territory, by scenario, if today's demand for fossil fuel exports fell to projected 2050 levels



The impact within these three states is largely restricted to a handful of LGAs in the Hunter region in NSW, central Queensland and the Pilbara in WA. The very concentrated nature of the impact can be seen in Figures 5 and 6, with just ten local government areas accounting for a third of total jobs exposed and almost half of total output loss.



Figure 5. Percent of jobs exposed by LGA.

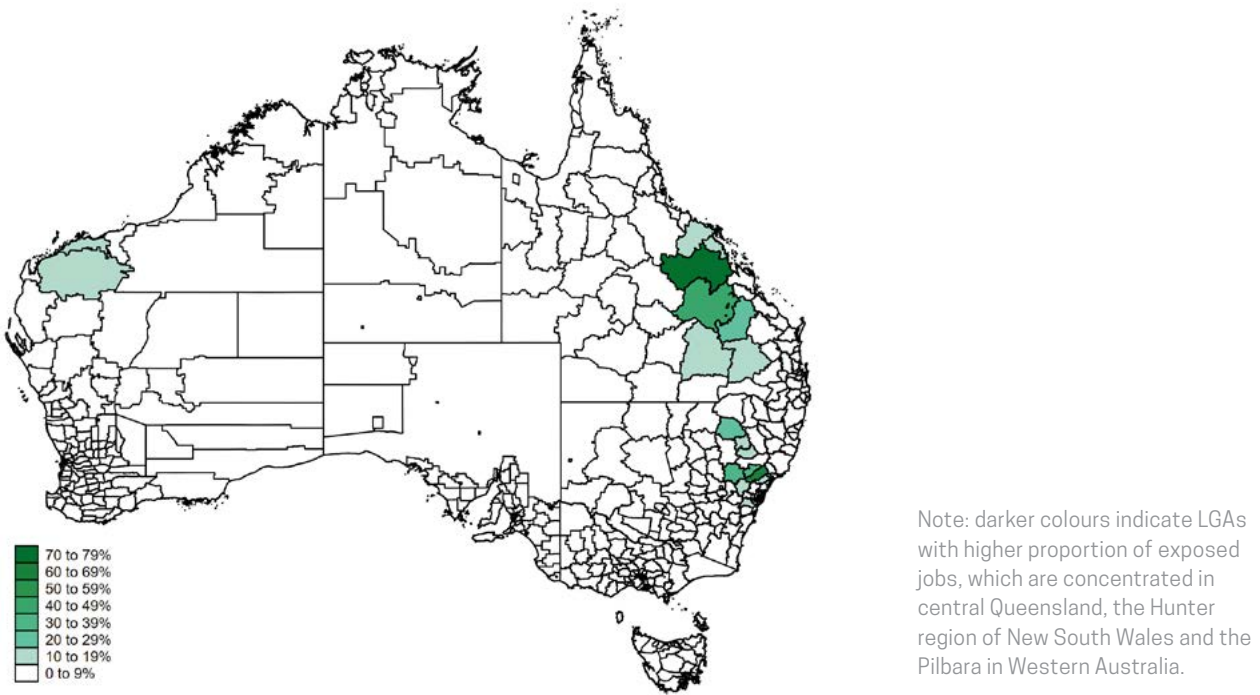
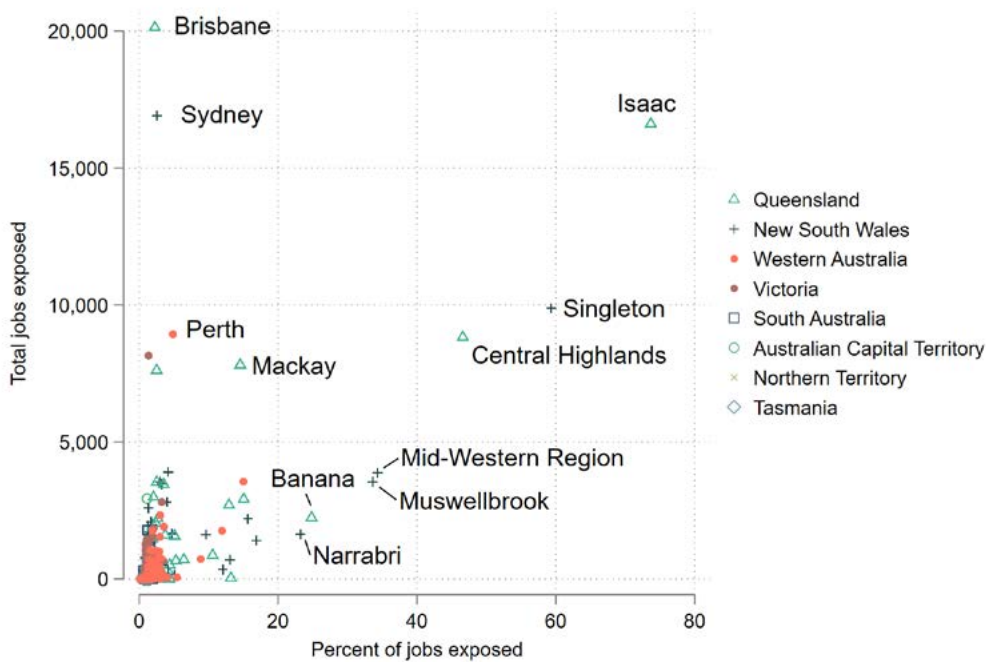


Figure 6. Number of jobs exposed to international decarbonisation trends and percentage of jobs exposed for all Australian LGAs under the NZE 2050 demand scenario.



Central Queensland

With a population of 403,000, central Queensland⁶ is Australia's second largest coal producing region with the two coal terminals at Hay Point near Mackay currently exporting more than a hundred million tonnes per year. The Shire of Isaac alone has 27 active coal mines. The LGAs most exposed to international decarbonisation are Isaac (see Box 2), Central Highlands and Banana (see Figure 7). About two thirds of central Queensland's Bowen Basin coal is coking coal, which will make the demand decline less abrupt than it will be for the Hunter Valley but will have little impact on the long-term outcomes.

Figure 7. Percentage of jobs in Queensland exposed to international decarbonisation, by LGA

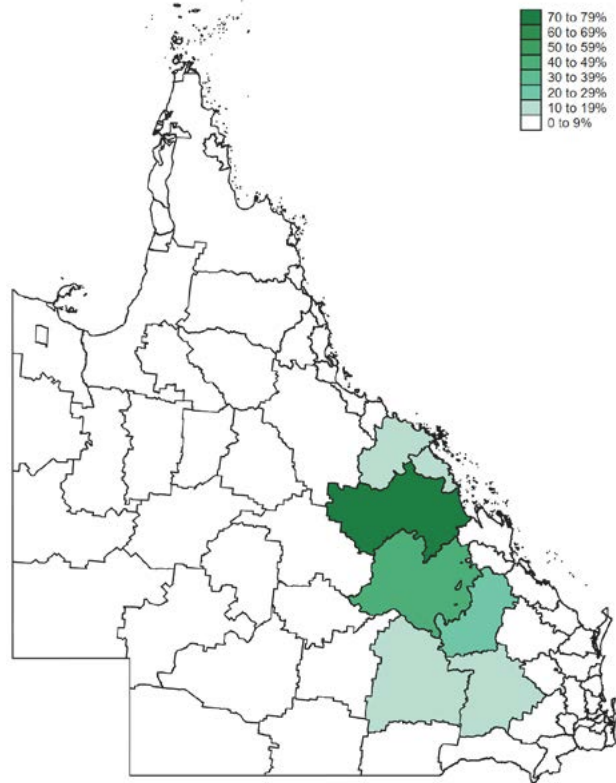
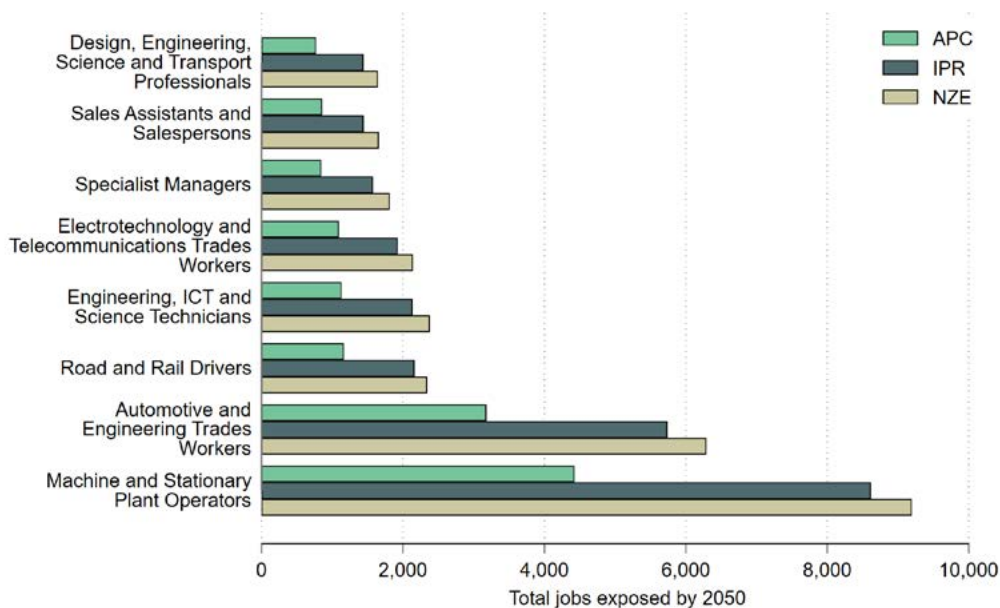


Figure 8. Percentage total jobs affected by international decarbonisation in central Queensland for the eight most exposed occupations.



The most exposed occupations in central Queensland are directly associated with coal mining and transport (Figure 8). However, the impacts flow through to many other occupations spread throughout the regional economy.

BOX 2

LGA SPOTLIGHT - ISAAC

The central Queensland shire of Isaac has a population of 20,987 (2020 ABS estimate) and with 27 coal mines, Isaac has the greatest proportion of workers dependent upon international fossil fuel demand of any LGA in Australia. Because coal mining is the key anchor industry for the shire, if global coal demand declines as expected, the impact will flow onto virtually all of Isaac's other industries and occupations. Figures presented here are for jobs that are located in Isaac, not employment of people who live in Isaac – many people who work in Isaac live in adjacent LGAs.

Figure 9. The shire of Isaac in central Queensland has nearly seventy-five percent of jobs exposed to international decarbonisation, the highest proportion of any LGA in Australia.

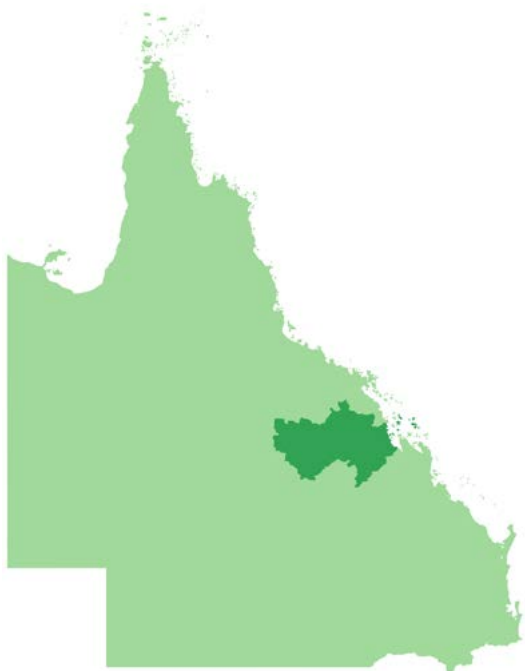
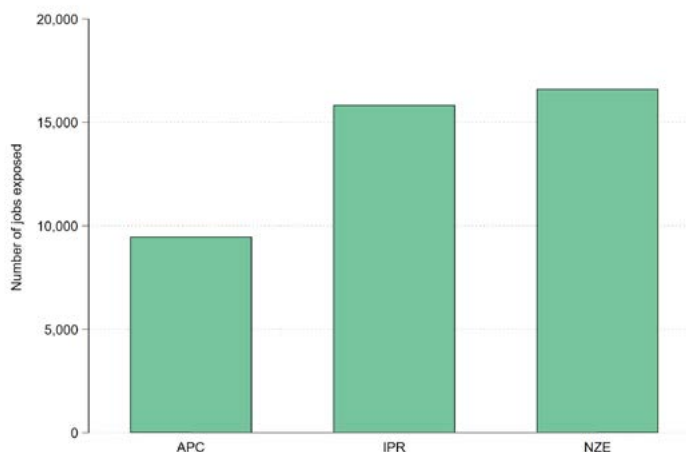


Figure 10. Number of jobs in Isaac that are exposed to changes in international coal demand. Even in the scenario with the least amount of change (APC) almost half of jobs in Isaac are exposed to international decarbonisation.



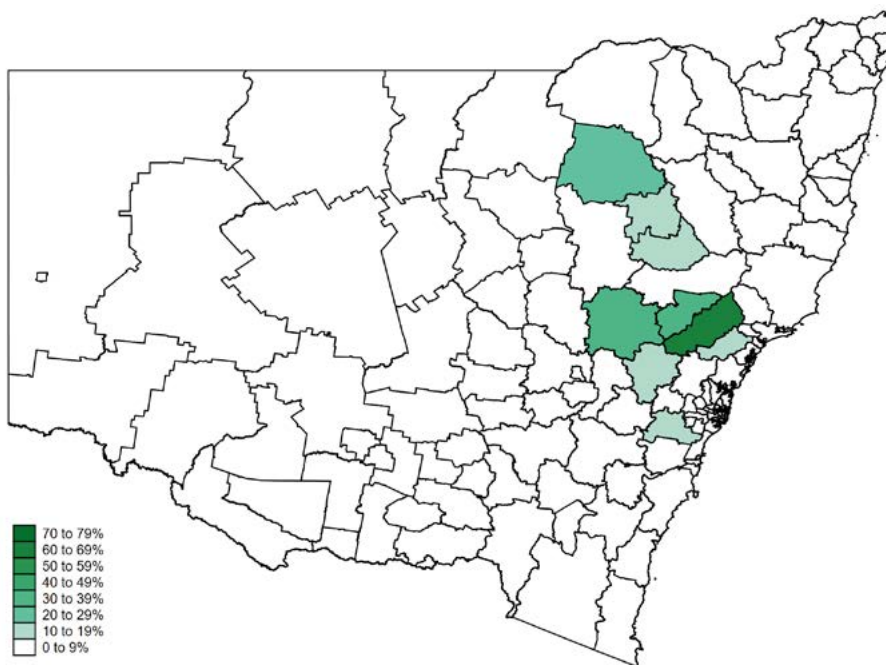
A very broad range of industries and occupations in Isaac are exposed to international decarbonisation. About 10,000 of the affected jobs are employed by the mining industry, the other 6,000 are spread throughout the broader community. To name just a few examples of the flow-on effects, our modelling finds that 265 sales positions are exposed, 179 hospitality roles, 101 storepersons and 30 legal, social and welfare professionals.

The Hunter (NSW)

The port of Newcastle services more than forty coal mines across the broader Hunter region (population 667,000)⁷ and is the world's largest coal export port with over 150 million tonnes exported per year.

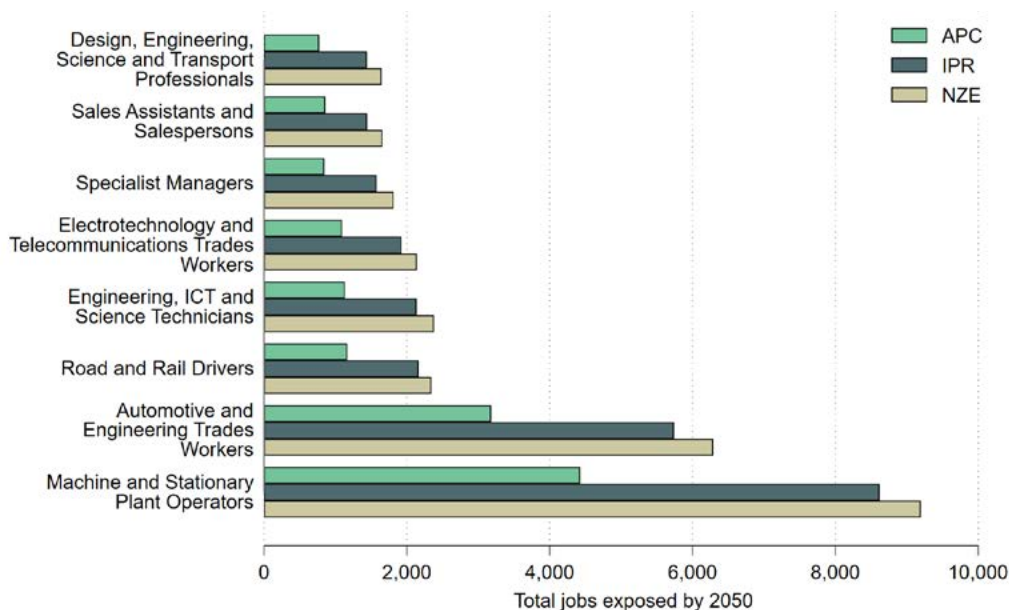
This region has a diverse economy and, as a whole, is not heavily reliant on fossil fuel industries for employment with only 23,000 jobs affected by international decarbonisation trends. However, these jobs are very heavily concentrated in the regional LGAs of Singleton, Muswellbrook, Newcastle, and the adjacent Mid-Western Regional Council. This again illustrates that falls in global fossil fuel demand will have highly localised impacts, even below the regional level.

Figure 11. Percentage of jobs in NSW exposed to international decarbonisation, by LGA.



Note: Darker colours indicate more job losses, which are concentrated in the Hunter region of NSW with the Armidale region also significantly exposed.

Figure 12. Total jobs affected by international decarbonisation in the Hunter region for the eight most exposed occupations.



As in central Queensland, the list of most exposed occupations in the Hunter region is dominated by those directly involved in coal mining and transport (Figure 12).

The Pilbara (WA)

Alongside iron ore, natural gas (for export and domestic use) forms a key part of the Pilbara economy of 98,800 people.⁸ Onshore pipelines from across much of outback Western Australia bring gas to the Pilbara ports and four out of five of Western Australia's major offshore gas fields are off the nearby coast. The population of the region is much smaller than that of the Hunter Valley or central Queensland and many of the fossil fuel industry employees live in Perth and work on a two week on, two week off 'fly in fly out' (FIFO) basis.⁹ This means that many of the local jobs identified through the input-output economic impact model are in services and retail. The most affected LGAs in Western Australia are Ashburton, the centre of the gas export industry, and in Perth, the home of many head offices and fly-in-fly-out workers. That said, iron ore exports are forecast to remain strong, largely unaffected by international decarbonisation commitments and this should buffer the regions somewhat from the impact.

Figure 13. Percentage of jobs in WA exposed to international decarbonisation, by LGA.

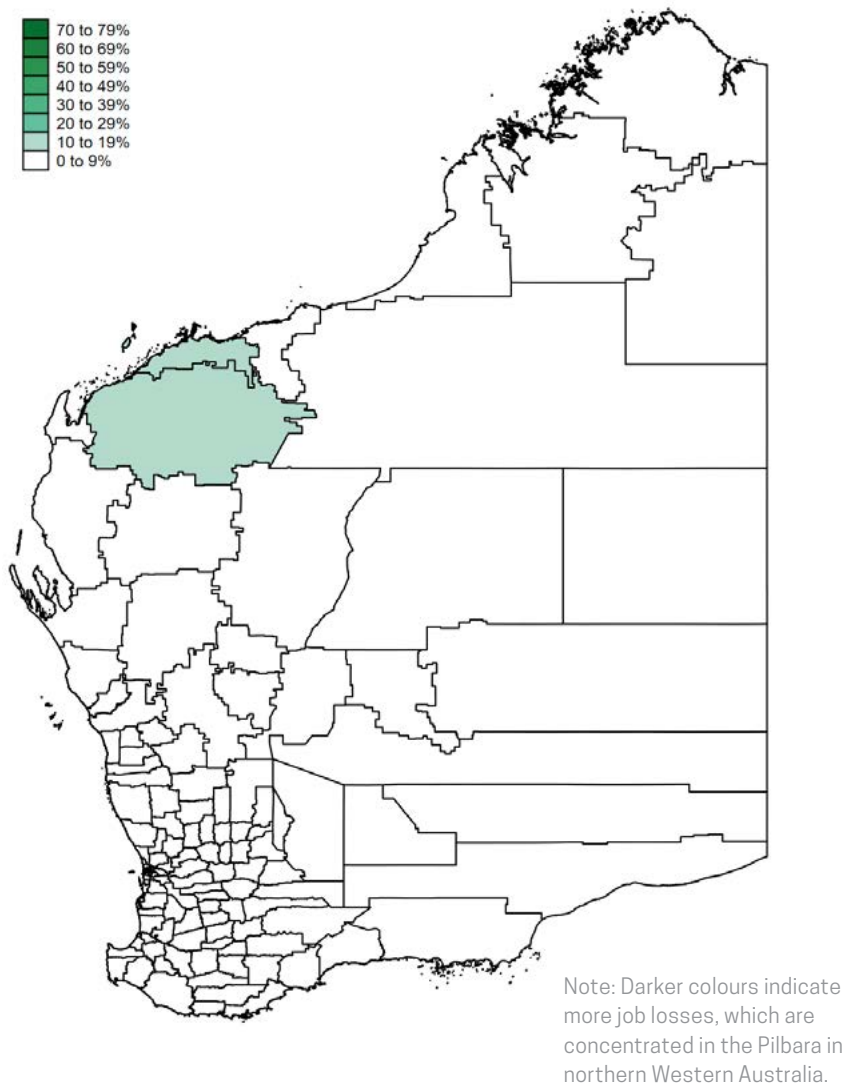
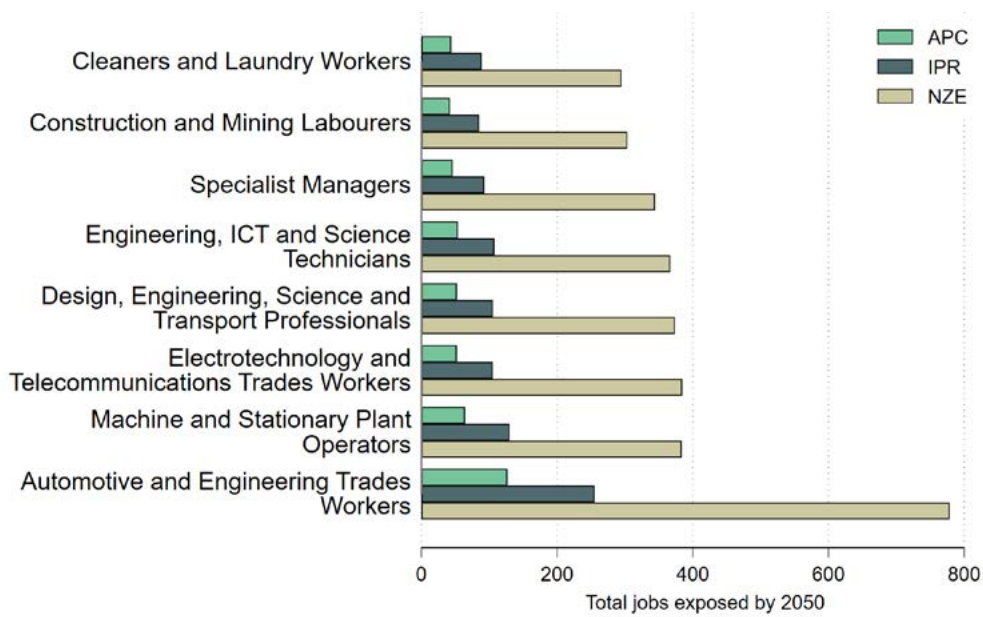


Figure 14. Total jobs exposed to international decarbonisation in the Pilbara region by occupation for the eight most exposed occupations.



Under existing global commitments and goals (the APC and IPR scenarios), there will be only a minor impact in the Pilbara because gas demand will remain relatively strong (Figure 1). Demand for gas is only significantly affected under the NZE scenario. The dominance of the gas industry in the Pilbara means that the list of most exposed occupations is markedly different from those for central Queensland and the Hunter (Figure 14).

New opportunities can ease this transition

The world in 2050 will be vastly different to the world today. This is not just a matter of energy transition, but of ongoing changes to the global industrial landscape from forces like digitalisation, automation, and globalisation. Indeed, even in the absence of global decarbonisation, it would be reasonable to expect a significant decline in fossil fuel employment over the next 30 years as many aspects of natural resource extraction and processing are automated.

The pace of global change presents immense opportunities for an economy with a strategic need to diversify. As new industries and sectors emerge to prominence, Australia can get in on the ground floor. Below, we explore what this could look like in green industries – where the new opportunity is a direct result of global decarbonisation. But these aren't the only opportunities that will exist; as global value chains continue to be reshaped after COVID-19, there are opportunities in niche high-value-added manufacturing, biomedical production, and digital trade in services. Governments don't need to pick winners, but they do need to plan for and support economic diversification.

New green industries will be able to absorb workers

All three of the regions highlighted in this report are well placed to take advantage of opportunities in a post-carbon economy. There is a substantial body of work that highlights the great potential for Australia to benefit from both domestic and international decarbonisation, with the potential for hundreds of thousands of new jobs to be created in the process.

Beyond Zero Emissions has proposed fourteen priority locations for Renewable Energy Industrial Precincts (REIPs), including the Hunter Valley, central Queensland and the Pilbara.¹⁰ REIPs are regions wherein a cluster of existing or new industrial businesses (eg. manufacturers) are powered by 100 per cent renewable energy (which could include both renewable electricity and renewable heat). Businesses within a REIP would have access to low-cost renewable energy due to the precinct either being located within a Renewable Energy Zone (REZ) or connected to renewable energy generation through high voltage transmission lines. REIPs could also have access to renewable hydrogen production and infrastructure.

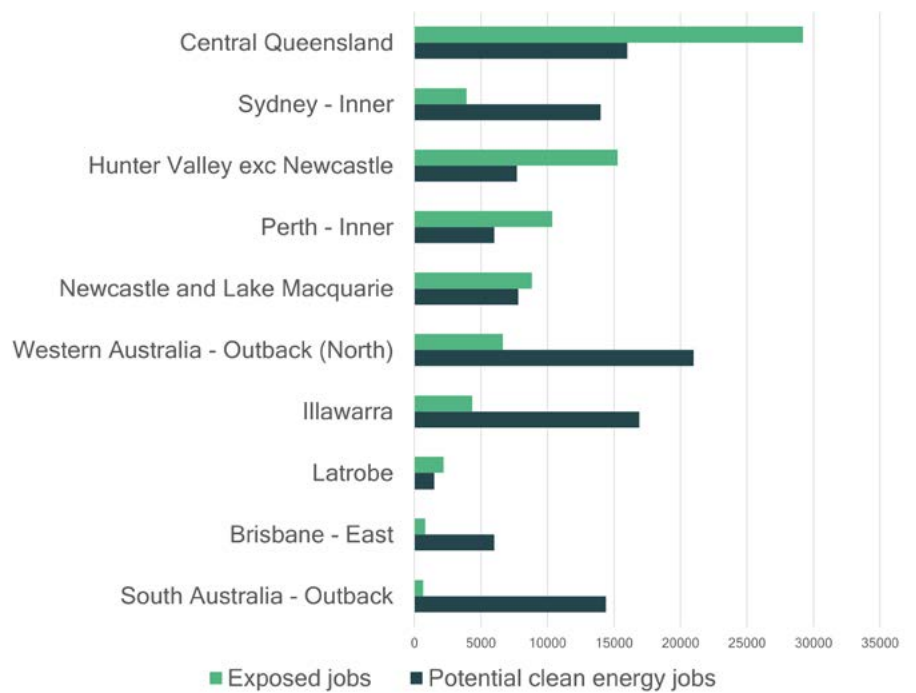
+
There are opportunities in niche high-value-added manufacturing, biomedical production, and digital trade in services

Detailed modelling for the Hunter and Central Queensland REIPs estimate the creation of 33,958 and 10,719 jobs respectively.¹¹

The Business Council of Australia, the Australian Council of Trade Unions, the World Wildlife Fund and the Australian Conservation Foundation commissioned a report on clean export opportunities. The report identified ten key carbon exposed regions (which included the three key regions identified in this report) and modelled potential job creation in clean export industries. New export opportunities included batteries and battery raw materials, hydrogen, low emissions steel, alumina and aluminium, and clean energy professional services. All up this report estimated 395,000 jobs could be created across the ten identified regions.

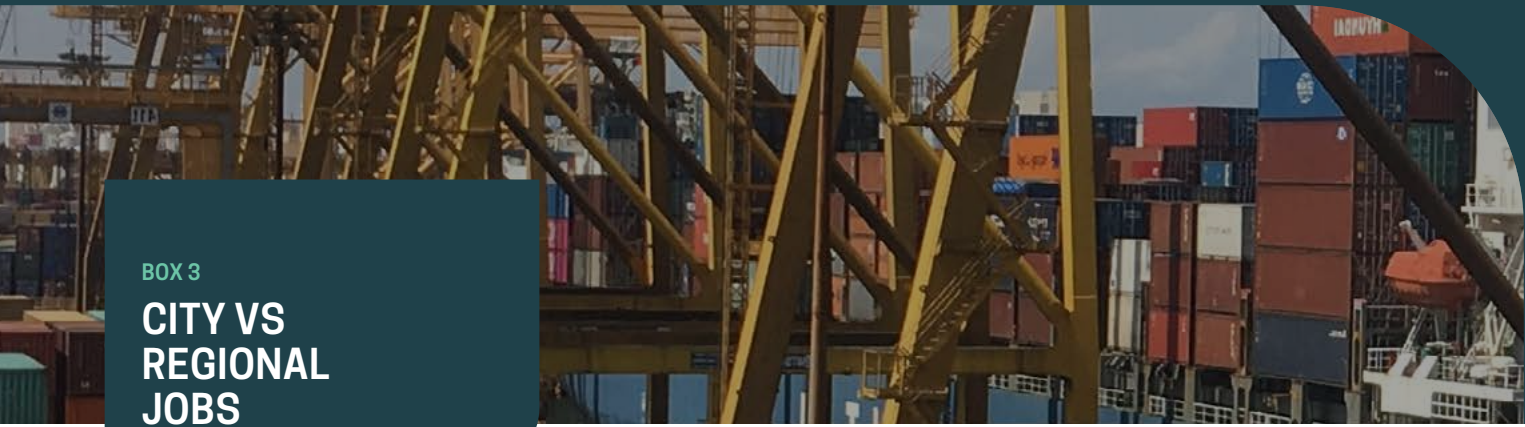
When we compare the number of jobs exposed to international decarbonisation and the number of potential jobs created in clean energy industries for each of these ten regions, some clear disparities emerge (Figure 15). Central Queensland again stands out as potentially having many more jobs exposed than created, as does the Hunter Valley outside of Newcastle. Sydney is in a similar position, but the transition in Sydney will likely be smoother. This is because the exposed occupations in cities are less specialised (eg. managers in corporate head office) and many other opportunities exist and will emerge over time (see Box 2).

Figure 15. Number of jobs exposed to international decarbonisation and number of potential jobs created by 2040



Note: the potential clean energy jobs are based on an Accenture report, and the number of exposed jobs has been recalculated to fit the same geographic regions (ABS SA4 regions, rather than local government areas).

* Many more jobs in Brisbane are exposed to the transition but these jobs are concentrated in the CBD, not Brisbane East.



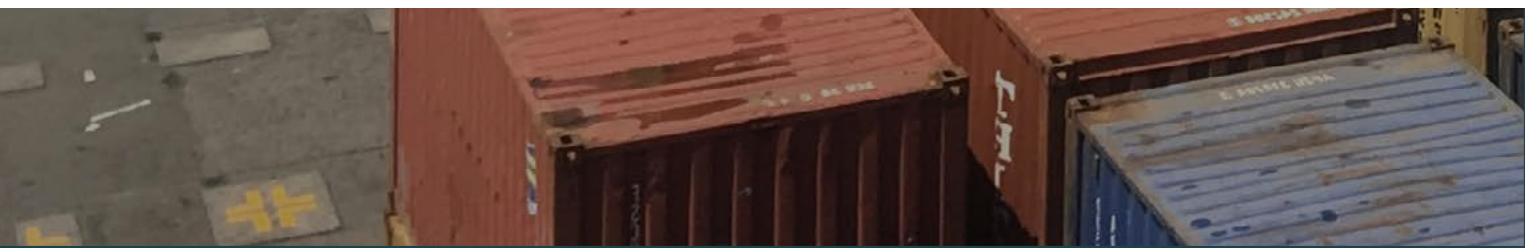
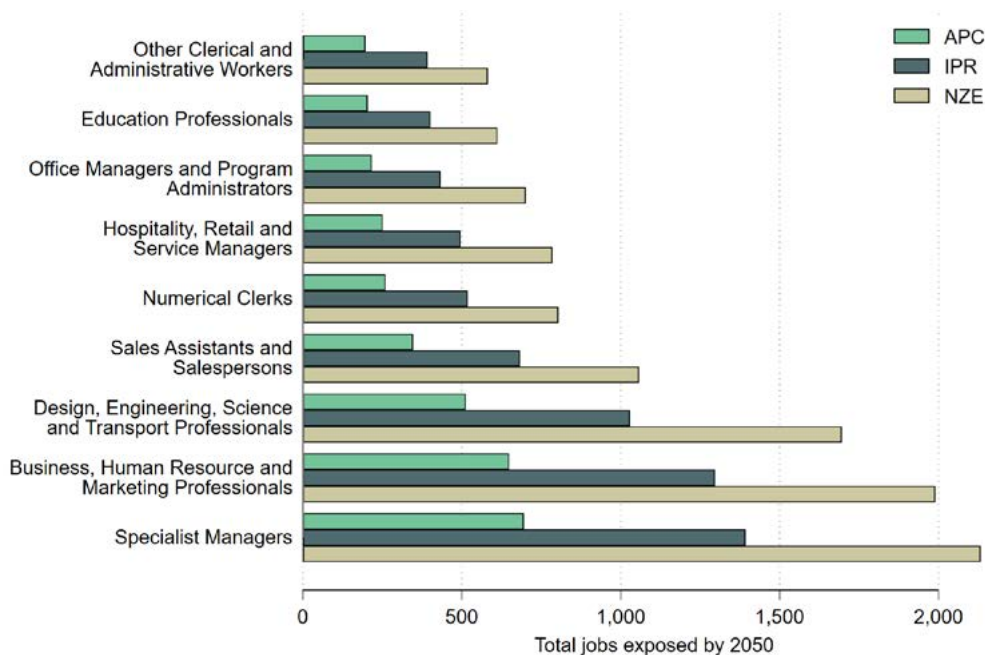
BOX 3
CITY VS REGIONAL JOBS

Many jobs in cities rely on international demand for fossil fuels, but these are in occupations that have quite generic skills. These include managers, human resources and clerical and administrative workers. These workers could readily find employment in emerging low-carbon industries.

In regional areas, however, many of the occupations at risk are very specialised within fossil fuel

industries and will likely require proactive training and skill-matching efforts if they are to find employment in the growth industries of the 21st century. In addition, in the three regional areas identified in this paper, exposed jobs make up a significant percentage of total employment. This means that the flow on impacts of those jobs ceasing to exist would be very substantial for the rest of the local economy.

Figure 16. Total jobs exposed in Brisbane for the eight most exposed occupations.



A just transition depends on identifying the gaps

Overall, the picture presented in this report is one of a robust national economy. New opportunities will emerge, and if they are nurtured, the total number of jobs in new low-carbon industries could easily exceed the number of jobs affected by falling demand for fossil fuels. However, even under this scenario, particular attention will need to be paid to those regional economies, like central Queensland and the Hunter Valley, where more jobs may be lost than created, and where many of those workers have specialised skills tailored to declining industries.

In central Queensland we estimate about 30,000 jobs exposed by 2040 in the global net-zero (NZE) scenario, with only 10,000-16,000 new jobs created from the proposed REIPs by that year. In NSW, most of the opportunities are focussed around the city of Newcastle, whereas the second-most affected LGA in NSW is the Mid-Western Regional LGA, outside the Hunter region and over three hours from Newcastle.

A smooth transition for the country requires a laser focus on identifying and plugging these gaps. It is not enough to simply identify new opportunities. The geographic spread of new

opportunities must roughly match the geographic spread of disruption. Success on aggregate – where Australia embraces new industries that create 300,000 new jobs by 2050 – will be little consolation to communities that are hollowed out in the process. It will take proactive planning to prevent this.

Policymakers need to maximise the likelihood that those same people whose jobs are exposed to international decarbonisation are those who find employment in the new industries. This is not trivial. It requires understanding the profile of skills and capital in a region and mapping this against potential opportunities. What is this place's comparative advantage in the global marketplace? What new industries will thrive here? A just transition for the country requires answering these questions in a handful of highly-specific places. This will be a focus of future work from the Centre for Policy Development.

+ Policymakers need to maximise the likelihood that those same people whose jobs are exposed to international decarbonisation are those who find employment in the new industries.

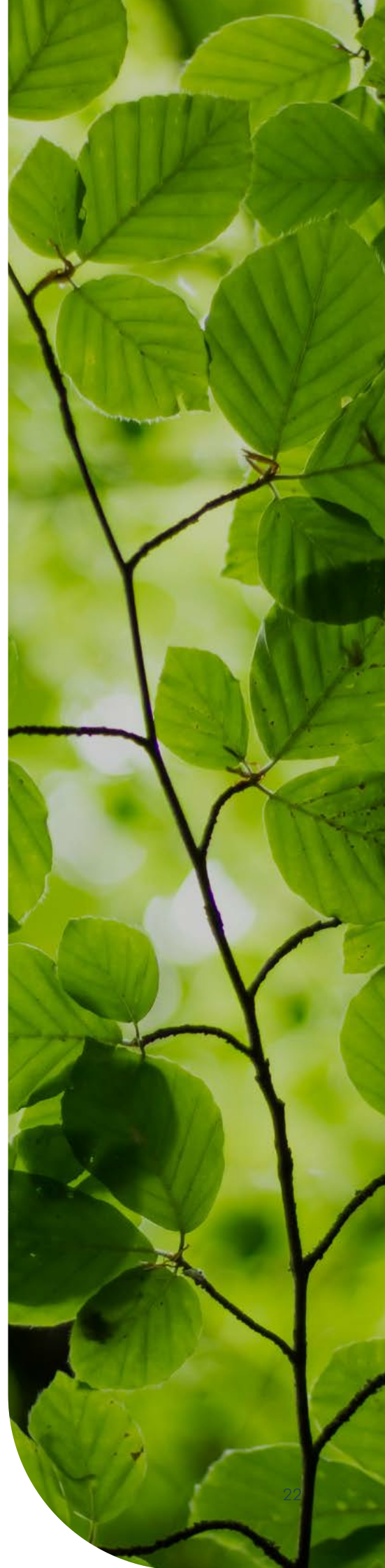
CONCLUSION

Despite their large economic output, fossil fuel industries employ relatively few Australians and this employment is very geographically concentrated. Even with the flow on effects to other industries included, only 300,000 are at risk over the next 30 years (around two per cent of the labour force). This is a small fraction of the background level of job creation and destruction in Australia and, when considered at a national level, is little cause for alarm.

However, the concentration of these jobs in particular regional areas makes this a very significant issue for those places and for those people. The significant export income also makes these industries important for the value of the Australian dollar and our balance of payments, as well as for state and federal government revenue. This is why a significant focus of any diversification strategy should be on new, growing and emerging export industries such as hydrogen, batteries and ammonia.

Of importance to policymakers is the patchy nature of past significant economic transitions in Australia, particularly poor outcomes experienced by older workers.

The key message emerging from this research is that a large-scale transition is coming to our fossil fuel dependent regions, regardless of domestic Australian politics or economics. It is critical that we plan well for this transition and seize the many opportunities it presents. We need to focus specifically on those regional economies that are currently dependent on fossil fuel industries and the skills and needs of workers in those communities. Fortunately, the places most exposed to international decarbonisation are also very well positioned to take advantage of the transition to growing and emerging renewable industries.



APPENDIX I. NIEIR MODEL DESCRIPTION

NIEIR's economic modelling system – structure and application

NIEIR's modelling system employs a database which covers all Australian Local Government Areas (LGAs). In brief, the quarterly LGA database comprises consistent series from the June quarter 1991 to June quarter 2020. The database applies the 86-industry 2-digit ANZSIC industry classification to Australia's 543 LGAs, with each industry having time series indicators for:

- » hours of work by place of work and place of residence;
- » dollars earned per hour, by place of work and place of residence;
- » employment by place of work and place of residence;
- » sales;
- » value added;
- » interregional and international exports;
- » interregional and international imports;
- » consumption expenditures by industry by households in an LGA; and
- » final demand estimates for equipment investment, construction and current government expenditures.

Household income and expenditures by LGA are structured in accordance with the National and State Household Income formation table in the Australian Bureau of Statistics' Australian National Accounts.

These data are available in the public domain on the ID-supported websites of over 300 LGAs, and are also published for 67 regions, covering all of Australia, in the ALGA/NIEIR "State of the Regions" report.

This database supports an integrated LGA modelling system, in which all variables refer to specific times, with four observations per year. The system:

- » automatically updates input-output relationships for each LGA;
- » calculates interregional and international trade flow relationships between each industry in each LGA and each of the 86 industries in each of the other LGAs in Australia; and
- » utilises investment formation and capacity expansion functions estimated from historical data for installed floor space capacity, infrastructure capital stock estimates and major individual investments time series to project increases in capacity in each industry in each LGA.

At the national level, the interregional trade flows between, and the intraregional trade flows within LGAs by industry are constrained to the relevant cell from the estimated quarterly (updated to 2020.2 and projected from that date) 2-digit ANZSIC national input-output table estimates (with direct allocation of imports). When projecting the national trade flow constraints for intra- and interregional trade flows, the key national drivers are industry technological trends (digital disruption, etc.), final demand formation (consumption, investment built up from the regional level), and behavioural functions for international import penetration by 2-digit industry.

The allocation of international and interregional imports by industry to each LGA is based on allocation rules which maintain local and global demand/supply balance.

International exports by industry are projected for each LGA based on national competitive drivers (the exchange rate) and local competitiveness indicators (based on productivity, industry cluster density, labour market scale, scope and skill density, etc.) of the LGA and its immediate surrounding region. In addition, a major driver of projected export capacity expansion in tradable goods industries is a list of identified potential major projects by scale and location that are “triggered” when appropriate by changes in the economic environment over the next three decades. Projections can also be prepared which depend on alternative specifications for the whole range of exogenous variables, including world trade, financial conditions, tax rates, population growth and the like.

Short-term multipliers

For the energy export study, the full behavioural model is not used. What is used is an “accounting” type model where the coefficients fully reflect the structure of the economy as at 2020.

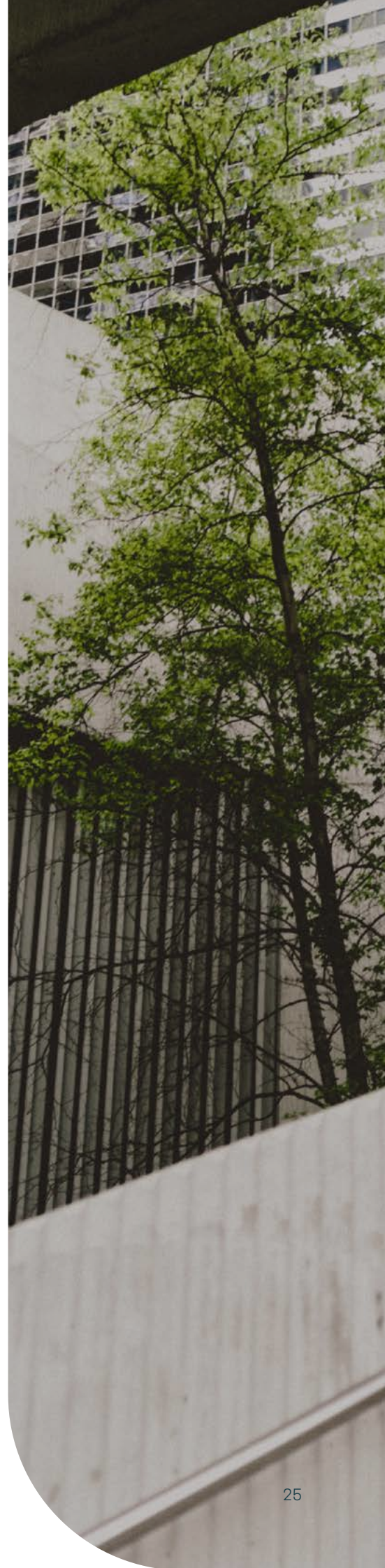
The export study imposes the structure of the economy as prevailing exactly at 2020 on the model so that the multiplier results are close to the “pure” textbook input-output inter regional multipliers. That is, the following parameter settings are imposed on the model for 2020:

- (i) the prevailing consumption to disposable income ratio by LGA;
- (ii) consumption expenditure share at 2-digit ANZSIC industry by LGA;
- (iii) hours demanded per \$m of output by 2-digit ANZSIC industry by LGA;
- (iv) employment in numbers demanded for 1,000 hours worked by 2-digit ANZSIC industry by LGA;
- (v) \$/hour by 2-digit ANZSIC industry by LGA;
- (vi) international imports per \$m of demand by 2-digit ANZSIC industry by LGA; and
- (vii) the interregional trade flow matrix coefficients fixed at average 2020 values by 2-digit industries by 567 LGAs.

To avoid the distortion of COVID-19, the average coefficients are based on the data 2019.2 to 2020.1 rather than the exact fiscal year 2020.

ENDNOTES

1. Paragraph 20 of the Glasgow Climate Pact “Calls upon Parties to accelerate the development, deployment and dissemination of technologies, and the adoption of policies, to transition towards low-emission energy systems, including by rapidly scaling up the deployment of clean power generation and energy efficiency measures, including **accelerating efforts towards the phase down of unabated coal power** and phase-out of inefficient fossil fuel subsidies, while providing targeted support to the poorest and most vulnerable in line with national circumstances and recognizing the need for support towards a just transition” [bold added].
2. IEA. (2021). Net Zero by 2050: A Roadmap for the Global Energy Sector.
3. UN PRI. (2019). The Inevitable Policy Response: 2019 Forecast Policy Scenario databook. (archived website)
4. Fulton, M. (2021). Inevitable Policy Response: Biden Climate Leaders Summit confirms momentum, Blogs, PRI.
5. For more on Australia’s domestic energy demand, see AEMO. (2021). Draft 2022 Integrated System Plan For the National Electricity Market. Australian Energy Market Operator, Melbourne.
6. In our analysis we have included the LGAs of Isaac, Whitsunday, Mackay, Gladstone, Central Highlands, Banana, Livingstone, Rockhampton, Western Downs and Woorabinda. The LGAs most exposed to international decarbonisation are Isaac, Central Highlands and Banana.
7. In this analysis we include the LGAs of Singleton, Newcastle, Lake Macquarie, Maitland, Cessnock, Muswellbrook, Port Stephens, Dungog, Liverpool Plains, Mid-Coast, Mid-Western Regional and Upper Hunter Shire.
8. For our analysis we include the LGAs of Ashburton, Karratha, Broome, Derby-West Kimberley, East Pilbara, Exmouth, Halls Creek, Port Hedland and Wyndham-East Kimberley.
9. IGCC. (2021). Empowering Communities: How Investors can Support an Equitable Transition to Net Zero. Investor Group on Climate Change.
10. Beyond Zero Emissions’ REIP proposal is detailed in: Beyond Zero Emissions. (2021). Renewable Energy Industrial Precincts.
11. See ACIL Allen. (2021a). Regional Economic Impact Analysis of Renewable Energy Industrial Precincts: Central Queensland REIP and ACIL Allen. (2021b). Regional Economic Impact Analysis of Renewable Energy Industrial Precincts: Hunter Valley REIP.
12. Accenture. (2021). Sunshot: Australia’s opportunity to create 395,000 clean export jobs.





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