

From the desk of Saxon Davidson, Research Fellow

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25 January 2023

Committee Secretary  
Senate Standing Committees on Environment and Communications  
PO Box 6100  
Parliament House  
Canberra ACT 2600

### **Submission to the Inquiry into Safeguard Mechanisms (Crediting) Amendment Bill 2022**

Dear Committee Secretary,

The purpose of this letter is to share research and analysis conducted by the Institute of Public Affairs (“the IPA”) into Australian energy policy with the Senate Standing Committees on Environment and Communications (“the committee”) as it conducts its inquiry into the Safeguard Mechanisms (Crediting) Amendment Bill 2022 (“the bill”). Attached to this are three research reports, one from February 2021 titled *Net Zero Jobs: An analysis of the employment impact of a net zero emissions target in Australia*, one from April 2022 titled *The Economic and Employment Consequences of Net Zero Emissions by 2050 in Australia*, and one from June 2022 titled *Australia’s Net Zero Energy Crisis: An Analysis of the Electricity Price Implications of Net Zero Emissions by 2050*.

On the basis of the IPA’s research, the IPA recommends the repeal of section 3H of the *National Greenhouse and Energy Reporting Act 2007* and the repeal of *The Climate Change Act 2022* in its entirety, which would have the effect of repealing Australia’s commitment to net zero emissions by 2050.

#### **Background**

The bill is part of a larger policy agenda which includes the increase of federal regulatory powers to limit greenhouse gas emissions under Part 3H of the *National Greenhouse and Energy Reporting Act 2007*. The bill and its associated regulations are a capstone policy item as part of the federal government’s aim to achieve net zero emissions by 2050.

Australia is currently experiencing an unprecedented energy crisis, with power prices surging and baseload power sources (coal and gas), of which Australia has an abundance of, being phased out to pursue the policy of net zero.

IPA research has identified that meeting the policy of net zero will require the cancellation of all 89 coal, gas, and oil projects currently in the construction pipeline. This would entail the cancellation of approximately half a million jobs, the vast majority of which are in regional Australia.

Many of these projects are, at this moment, expected to be replaced by wind and solar generated power. At mass scale, wind and solar are experimental and untested, and, as yet, do not have a demonstrated ability to provide reliable, base-load power. In addition, the jobs in the renewable sector are, on average, lower quality than jobs in mining. For example, over nine in ten jobs in the coal sector are full time, and mining pays double the economy-wide average. Jobs in solar farms, for example, are temporary, as once construction and installation is completed, the only notable ongoing jobs are in maintenance, which are typically lower paid and less likely to be full time.

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### **Over 8 in 10 Facilities Targeted by the Safeguard Carbon Tax are in Regional Australia**

IPA analysis of the 2020-21 Safeguard Facility Data reveals that 84% of the facilities that will be affected by the safeguard policy are in regional Australia. The added regulatory burden that the bill will put on these facilities will put at risk thousands of jobs. This is another example of how climate and emissions policies, such as net zero, which are developed and promoted by inner-city elites, disproportionately impact Australians living in the regions. These findings are consistent with IPA research from 2021.

The attached IPA research report, *Net Zero Jobs: An analysis of the employment impact of a net zero emissions target in Australia*, found that the policy of net zero puts over 650,000 jobs at risk, and that these jobs are unlikely to be replaced by jobs in the renewable energy sector. The vast majority of these jobs are in regional Australia, with many of them in the facilities that will be affected by the bill and the associated regulations as part of the government's net zero agenda.

Further analysis by the Institute of Public Affairs has found that 88% of the facilities that the bill and its associated regulations will target are in critical industries that are vital to Australia's prosperity and national security:

- 48% of the facilities are in coal, gas, and/or oil,
- 28% Other Mining (such as iron, copper, and gold),
- and 12% Manufacturing.

The increased regulatory burden placed on these industries will limit Australia's self-reliance in a time of regional instability and geographical uncertainty.

### **Net Zero is Making Energy Unreliable and Unaffordable**

Trends in Europe have recently pointed to an understanding that coal and gas are more reliable sources of energy than wind and solar.

In July 2022, the European Union Parliament voted to classify natural gas as a sustainable form of energy. Additionally, Germany, who had been a leading European country as a consumer of wind and solar generated energy, began reactivating coal fired power plants to halt reliance on Russian gas and prevent blackouts during their winter.

Australia has an abundance of coal and gas, enough to ensure domestic supply of energy and to export onto the global market simultaneously.

Yet, AEMO announced on the first day of the 2022 winter that gas rationing may be necessary to prevent rolling blackouts across the Australian east coast, rather than expanding the use of coal and gas. The policy of net zero is preventing businesses and even state government owned corporations from investing in Australia's domestic coal and gas market, artificially lowering Australia's energy supply and increasing energy demand.

According to the attached IPA research report '*Australia's Net Zero Energy Crisis: An Analysis of the Electricity Price Implications of Net Zero Emissions by 2050*', under the policy of net zero, Australian households can expect household prices to double by the end of the decade. This is due to the absence of equivalent replacement energy sources in the electricity grid. The replacement energy sources, wind and solar, are intermittent and cannot provide energy under all circumstances unlike coal or gas.

I wish to thank the Committee for the opportunity to provide this submission. Please do not hesitate to contact me on [REDACTED] for further consultation or discussion. We welcome the opportunity to appear before the Committee in due course.

Kind regards,

**Saxon Davidson**  
Research Fellow  
Institute of Public Affairs



February 2021



# NET ZERO JOBS

AN ANALYSIS OF THE EMPLOYMENT IMPACTS OF  
A NET ZERO EMISSIONS TARGET IN AUSTRALIA

Cian Hussey, Research Fellow  
Daniel Wild, Director of Research

 **Institute of  
Public Affairs**

# Contents

<b>Introduction</b>	<b>1</b>
<b>Jobs put at risk by net zero emissions target</b>	<b>3</b>
<b>Electoral analysis of at risk jobs</b>	<b>6</b>
<b>'Green' jobs have not offset destruction of manufacturing jobs</b>	<b>8</b>
<b>Conclusion</b>	<b>10</b>



# Introduction

Australia is facing increased international pressure to adopt a target of achieving net zero carbon equivalent emissions (CO<sub>2</sub>-e) (hereafter referred to as emissions). With the election of President Joe Biden in the United States, who has re-committed to the Paris Agreement, this pressure will only increase in the lead up to the Glasgow Climate Change Conference in late 2021.

Adopting a net zero emissions target will come at great expense to Australians, who have already seen jobs destroyed and their electricity bills increase as a result of ill-conceived policies aimed at reducing emissions.

The 2019 election provided firm evidence that Australians reject the idea of risking jobs and economic prosperity for the sake of reducing emissions. The election was framed as the 'climate election' by the political left,<sup>1</sup> whose policies were rejected by the Australian people after they failed to give regard to the negative impact those policies would have on the economy and society.

Since 2019, the Coalition government has begun to shift its positioning on emissions. In January 2020, Prime Minister Scott Morrison refused to commit to a net zero emissions target, arguing that people who do so "make a glib promise about that and they can't look Australians in the eye and tell them what it will mean for their electricity prices, what it will mean for their jobs."<sup>2</sup> By early 2021, however, the Prime Minister conceded that the government's goal was to achieve net zero emissions, although there is yet to be a commitment to doing so by 2050.<sup>3</sup>

This report presents an analysis of the effects of a net zero emissions target on jobs. It is broken up into three sections.

The first section finds that a target of net zero emissions would impose significant and irreparable economic and social damage due to the infliction of mass job losses. This report estimates that up to 653,600 jobs would be directly put at risk from a net zero emissions target. This estimate does not include potential indirect job losses which could occur in related industries and the communities where at risk jobs are vital.

Potential job losses are concentrated, in order, in the agricultural sector (306,000 jobs), the primary metal and metal product manufacturing sector (74,100 jobs), the electricity supply sector (64,100 jobs), coal mining (62,000 jobs), and air and space transport sector (38,100 jobs).

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1 Adam Morton, "The climate change election: where do the parties stand on the environment?," *The Guardian*, 12 May 2019, <https://www.theguardian.com/australia-news/2019/may/12/the-climate-change-election-where-do-the-parties-stand-on-the-environment>.

2 Andrew Tillett and Mark Ludlow, "No net zero emissions target if it hurts jobs: PM," *Australian Financial Review*, 20 January 2020, <https://www.afr.com/politics/federal/no-net-zero-emissions-target-if-it-hurts-jobs-pm-20200120-p53f18>.

3 Greg Brown, "Politics of carbon has ended, Scott Morrison declares," *The Australian*, 22 January 2021, <https://www.theaustralian.com.au/nation/politics/politics-of-carbon-has-ended-scott-morrison-declares/news-story/fa662d7b2af40426f852b9f1c18946b8>; Phillip Coorey, "PM inches closer to net zero by 2050," *Australian Financial Review*, 1 February 2021, <https://www.afr.com/politics/federal/pm-inches-closer-to-net-zero-by-2050-20210201-p56ybg>.

The second section provides an analysis of Commonwealth electoral divisions and ranks electorates by those which contain the most jobs put at risk from a net zero emissions target. This report finds that 17 of the top 20 electorates with jobs put at risk by a net zero emissions target are currently held by the Coalition government. Two (Hunter and Lyons) are held by the Labor Party and one is held by Katter's Australian Party (Kennedy). The top 10 seats with jobs at risk are all Coalition-held.

The Coalition is also over-represented in the bottom 20 electorates ranked by at risk jobs, holding a total of 12 seats. This reveals an underlying tension within the Coalition as it relates to their stance on a net zero emissions policy: the Coalition holds the majority of seats which are likely to suffer the most job losses as a result of a net zero emissions target, but it also holds the majority of seats which are least likely to suffer job losses as a result of such a target.

The final section outlines recent changes in the labour force, demonstrating that for each new renewable activity job created between 2009-10 and 2018-19, five manufacturing jobs were destroyed. Renewable activity jobs are those principally engaged in the production of renewable energy, or the design, construction or operation and maintenance of renewable energy infrastructure.<sup>4</sup> The majority of jobs created since the election of the Rudd government in 2007 have been in industries with high public sector employment, and the promise of new, green jobs to replace manufacturing ones has not materialised.

A net zero emissions target would destroy communities where there is a high reliance on relatively more energy-intensive jobs. Adopting such a target in the wake of the largest economic contraction and employment crisis in recent memory, caused by lockdowns implemented in response to COVID-19, would be devastating for Australian workers.

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<sup>4</sup> Australian Bureau of Statistics, "Employment in Renewable Energy Activities, Australia methodology," April 2020, <https://www.abs.gov.au/methodologies/employment-renewable-energy-activities-australia-methodology/2018-19>.

## Jobs put at risk by net zero emissions target

This report uses data from the *National Greenhouse Gas Inventory by Economic Sector* report published by the Department of Industry, Science, Energy and Resources, along with industry employment data from the Australian Bureau of Statistics, to estimate how many jobs would be placed at risk from a net zero emissions target.

A net zero emissions target will have the greatest impact on jobs that are relatively more energy intensive. As such, 'at risk' jobs are calculated as the total number of jobs in industries where emissions per job are above the economy-wide average of 0.22 kt CO<sub>2</sub>. There are 10 industries in Australia where emissions per job are higher than this average, and the jobs in these industries are deemed at risk.

The industries where jobs would be placed at risk by a net zero emissions target are: agriculture; forestry and logging; coal mining; oil and gas extraction; petroleum and coal product manufacturing; non-metallic mineral product manufacturing; primary metal and metal product manufacturing; electricity supply; waste collection, treatment and disposal services; and air and space transport.

Agriculture refers to the growing and cultivation of horticultural and other crops, along with the controlled breeding, raising, or farming of animals. A typical worker in this industry could be employed as a beef cattle or dairy farmer.

Forestry and logging includes logging native or plantation forests, including felling, cutting, and roughly chopping logs into products such as railway sleepers or posts. Also includes cutting trees and scrubs for firewood. A typical worker in this industry could be employed cutting or felling trees.

Coal mining refers to the extraction of coal, and includes underground and open cut mining, along with operations related to mining activities (such as crushing, screening, washing). A typical worker in this industry could be employed as an excavator operator on a coal mine.

Oil and gas extraction refers to producing crude oil, natural gas or condensate through the extraction of oil and gas deposits. This includes activities such as natural gas extraction, petroleum gas extraction, and oil shale mining. A typical worker in this industry could be employed as a drill rig operator on an oil rig.

Petroleum and coal product manufacturing refers to transforming crude petroleum and coal into intermediate and end products, for example petroleum refineries, asphalt paving mixture and block manufacturing, and petroleum lubricating oil and grease manufacturing. A typical worker in this industry could be employed as a mechanical technician in a petroleum refinery.

Non-metallic mineral product manufacturing includes the manufacturing of glass, ceramic, cement, lime, plaster, and other non-metallic mineral products. A typical worker in this industry could be employed as a cement crusher operator in a cement manufacturing plant.

Primary metal and metal product manufacturing includes activities such as iron smelting and steel manufacturing, copper, silver, lead, and zinc smelting and refining, and aluminium smelting. A typical worker in this industry could be employed as a steel cutter in a steel manufacturing plant.

Electricity supply includes electricity generation, transmission, distribution, on selling electricity, and electricity market operation. A typical worker in this industry could be employed as a lineworker maintaining power lines.

Waste collection, treatment and disposal services includes the collection, treatment and disposal of solid, liquid, and other waste types, including hazardous waste; this includes landfills, combustors, incinerators, and compost dumps, but does not include sewage treatment facilities. A typical worker in this industry could be employed as a garbage truck driver.

Air and space transport includes air freight and passenger transport services, along with aircraft charter, lease or rentals with crew. A typical worker in this industry could be employed as a flight attendant.

Table 1 below shows the total number of people employed in each of these industries, and therefore how many jobs are placed at risk by a net zero emissions target.<sup>5</sup> Together, these industries are responsible for 78.3% of total emissions,<sup>6</sup> and employ 653,600 Australians. A list of all industries and the emissions per job is shown in Table 2.

**Table 1: Industries with above average emissions per job**

Industry	Jobs at risk
Agriculture	306,200
Primary Metal and Metal Product Manufacturing	74,100
Electricity Supply	64,100
Coal Mining	62,000
Air and Space Transport	38,100
Waste Collection, Treatment and Disposal	37,800
Oil and Gas Extraction	32,400
Non-Metallic Mineral Product Manufacturing	28,900
Petroleum and Coal Product Manufacturing	6,300
Forestry and Logging	3,800
Total	653,600

Source: IPA, ABS.

Note: Numbers may not add to the total due to rounding.

5 Australian Bureau of Statistics, "Labour Force, Australia, Detailed, December 2020," January 2021, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/dec-2020>.

6 Department of Industry, Science, Energy and Resources, "National Greenhouse Gas Inventory by Economic Sector: 2018," Australian Government, May 2020, <https://www.industry.gov.au/data-and-publications/national-greenhouse-gas-inventory-by-economic-sector-2018>.



**Table 2: Average emissions per job by industry**

Industry	Emissions per job (kt CO <sub>2</sub> )
Electricity Supply	2.7205251
Oil and Gas Extraction	1.4474496
Petroleum and Coal Product Manufacturing	0.772735
Coal Mining	0.5702873
Forestry and Logging	0.3472612
Non-Metallic Mineral Product Manufacturing	0.3464191
Primary Metal and Metal Product Manufacturing	0.3440861
Agriculture	0.338292
Waste Collection, Treatment and Disposal Services	0.2595126
Air and Space Transport	0.2369107
<b>AVERAGE</b>	<b>0.22</b>
Gas Supply	0.1624972
Chemical, Polymer and Rubber Product Manufacturing	0.1321899
Aquaculture	0.1020797
Rail Transport	0.0786029
Metal Ore & Non-Metallic Mineral Mining & Quarrying	0.0751363
Water Supply, Sewerage and Drainage Services	0.0729917
Fishing, Hunting and Trapping	0.0556844
Road Transport	0.0474011
Other Transport, Services, Postal and Storage	0.0301497
Food Product, Beverage and Tobacco Product Manufact.	0.0189193
Agriculture, Forestry and Fishing Support Services	0.0144851
Wood, Pulp, Paper and Printing	0.0134398
Textile, Leather, Clothing and Footwear Manufacturing	0.0129719
Fabricated Metal Product Manufacturing	0.0119534
Heavy and Civil Engineering Construction	0.011543
Construction Services	0.0104959
Information Media and Telecommunications	0.0060873
Administration, Public Administration and Services	0.00592
Building Construction	0.0032787
Wholesale and Retail Trade	0.0024282
Finance, Insurance, Rental, Hiring and Real Estate	0.0024063
Transport and Machinery Equipment Manufacturing	0.0022129
Other Services	0.0018086
Accomm., Food Services, Education and Health Services	0.0010584
Professional, Scientific and Technical Services	0.0008304
Furniture and Other Manufacturing	0.0005159
Arts and Recreation Services	-0.0034578

Source: IPA, ABS, Department of Industry, Science, Energy and Resources.

Note: This is the most granular breakdown of emissions data by industry/sub-industry available from the Department of Industry, Science, Energy and Resources. As such, not all industries are at the same ANZSIC classification level.

## Electoral analysis of at risk jobs

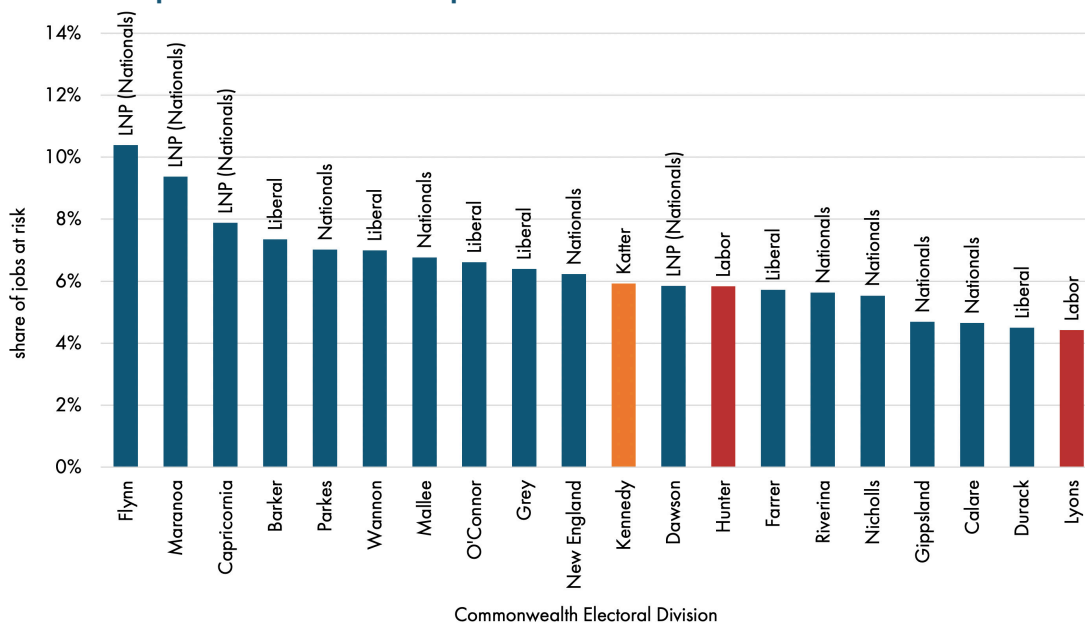
While the 653,600 jobs placed at risk by a net zero emissions target should be concerning for all members of parliament, the burden of these job losses will not fall equally across electorates.

Chart 1 below shows the top 20 electorates ranked by the share of jobs in that electorate which are placed at risk by a net zero emissions target. For example, in Flynn, 10.4% of all employment is in at-risk industries.

Strikingly, 17 of the 20 electorates are Coalition seats, held either by the Liberal Party (Barker, Wannon, O'Connor, Grey, Farrer, Durack), the National Party (Flynn, Parkes, Mallee, New England, Riverina, Nicholls, Gippsland, and Calare), or the Liberal National Party (Maranoa, Capricornia, and Dawson). Only two seats are held by the Labor Party (Hunter and Lyons), and the final seat is held by Katter's Australian Party (Kennedy). All of the top 10 electorates are held by a Coalition party, and while the Coalition have ten electorates where more than 6% of all jobs are at risk, Labor have none. Of these top 10 electorates, six are currently held by the Nationals Party Room. Additionally, 73% of the seats in federal parliament held by the Nationals are 'at risk' seats, compared with just 10% of seats held by the Liberals, and 3% of seats held by the Labor Party.

Of these 20 electorates, six are in New South Wales, five are in Queensland, four are in Victoria, there are two each in South Australia and Western Australia, and one in Tasmania.

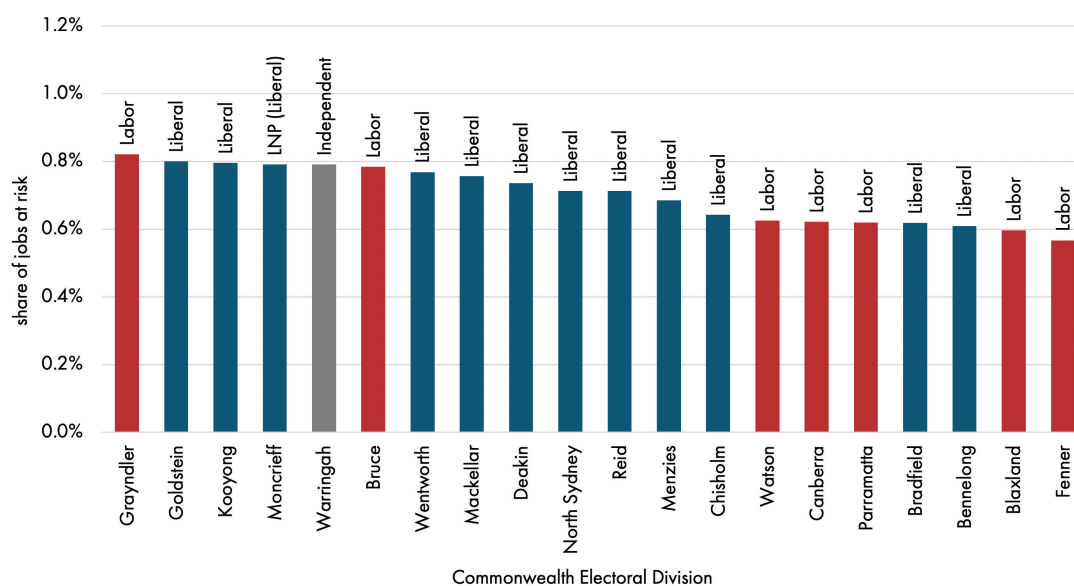
**Chart 1: Top 20 electorates with jobs at risk**



Source: IPA, ABS.

While the Coalition dominates the top 20 electorates ranked by at risk jobs, it is also over-represented in the bottom 20 electorates ranked by at risk jobs, as shown in Chart 2 below. Of these electorates, 12 are Coalition (Goldstein, Kooyong, Moncrieff, Wentworth, Mackellar, Deakin, North Sydney, Reid, Menzies, Chisholm, Bradfield, and Bennelong), seven are Labor (Grayndler, Bruce, Watson, Canberra, Parramatta, Blaxland, and Fenner), and one is independent (Warringah). This reveals an underlying tension within the Coalition as it relates to emissions reduction policies: the Coalition holds the majority of the seats which are likely to suffer the most job losses as a result of a net zero emissions target, but it also holds the majority of seats which are least likely to suffer job losses as a result of such a target.

**Chart 2: Bottom 20 electorates with jobs at risk**



Source: IPA, ABS.

## 'Green' jobs have not offset destruction of manufacturing jobs

Workers are often assured that their livelihoods will not be put at risk by a net zero emissions target because, while such a target will destroy jobs, this will be offset by the creation of new jobs in renewable and related industries. The effort to reduce emissions to date, however, has seen relatively few jobs created in 'renewable activities', as measured by the Australian Bureau of Statistics and shown in Chart 3 below. Renewable activity jobs are those principally engaged in the production of renewable energy, or the design, construction or operation and maintenance of renewable energy infrastructure.<sup>7</sup>

There are two key concerns with the effect that a net zero emissions target will have on jobs.

Firstly, while some jobs may be created by renewable energy activities and other emission reduction efforts, many of these jobs will not go to those who lose their jobs in the agricultural, manufacturing, and other at-risk industries. According to the *Clean Jobs Plan* set out by the Climate Council, for example, 70% of the 76,000 jobs estimated to be created under the plan are in construction and administrative services. Additionally, one-third of the jobs require minimal training, which means they are low-skill and therefore likely low-paying.<sup>8</sup>

Secondly, these new job creations are unlikely to outweigh the job losses seen in at risk industries. There are a range of estimates for how many jobs could be created by a net zero emissions target, however these fail to consider the negative effect such a target would have on the industries identified in this report. For example, the Australian Greens' *Jobs Plan* taken to the 2019 federal election states that 179,770 jobs could be created under their "renewable energy future" policy.<sup>9</sup> Another estimate, found in Beyond Zero Emissions' *The Million Jobs Plan* claims that 207,100 ongoing jobs could be created by investing in a low-carbon economy.<sup>10</sup> Even if all these jobs were created under a net zero emissions target, they would not outweigh the significant job losses likely to occur in at risk industries.

Past experience shows that while the push for emissions reduction may create some jobs, such as in renewable activities, these will not be enough to offset job losses in other, more energy-intensive industries. Between 2009-10 and 2018-19 employment

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7 Australian Bureau of Statistics, "Employment in Renewable Energy Activities, Australia methodology," April 2020, <https://www.abs.gov.au/methodologies/employment-renewable-energy-activities-australia-methodology/2018-19>.

8 AlphaBeta, "Clean Jobs Plan," Climate Council, July 2020, [https://www.climatecouncil.org.au/wp-content/uploads/2020/07/Climate-Council\\_AlphaBeta-Clean-Jobs-Plan-200720.pdf](https://www.climatecouncil.org.au/wp-content/uploads/2020/07/Climate-Council_AlphaBeta-Clean-Jobs-Plan-200720.pdf).

9 The Australian Greens, "Creating the Jobs of the Future: The Greens' Jobs Plan, Election 2019," <https://greens.org.au/sites/default/files/2019-05/Greens%202019%20Policy%20Platform%20-Creating%20the%20jobs%20of%20the%20future.pdf>.

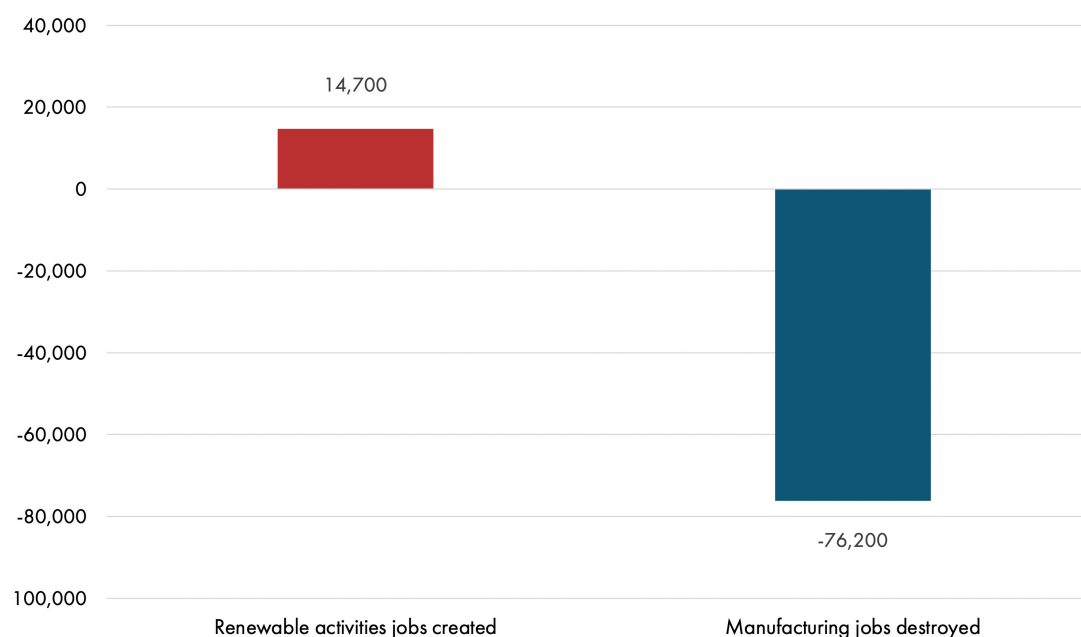
10 Beyond Zero Emissions, "The Million Jobs Plan," June 2020, <https://bze.org.au/wp-content/uploads/2020/11/BZE-The-Million-Jobs-Plan-Full-Report-2020.pdf>.



in renewable activities increased by 14,700, but 76,200 manufacturing jobs were destroyed.<sup>11</sup> This means that for every job created in renewable activities over this time, five manufacturing jobs were lost. The period 2009-10 to 2018-19 is used as that is the entire time series available from the Australian Bureau of Statistics.

It is also worth noting that many of the estimates of jobs created under a net zero emissions target would be created directly through government policy and taxpayer support. This indicates that the share of the workforce directly reliant on private sector workers would increase, requiring either higher taxes or fewer government services elsewhere to fund them. By contrast, the industries placed at risk by a net zero emissions target tend to have very high levels of private sector employment, suggesting that these workers are vital contributors to the taxation pool which funds the public sector. For example, 99.6% of jobs in the agriculture, forestry and fishing industry are in the private sector, 100% of mining jobs are in the private sector, and 99.7% of manufacturing jobs are in the private sector.<sup>12</sup>

**Chart 3: Job changes between 2009-10 and 2018-19**



Source: IPA, ABS.

<sup>11</sup> Australian Bureau of Statistics, "Employment in Renewable Energy Activities, Australia, 2018-19 Financial Year," April 2020, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/employment-renewable-energy-activities-australia/2018-19>; Australian Bureau of Statistics, "Labour Force, Australia, Detailed, December 2020," January 2021, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/dec-2020>.

<sup>12</sup> Ibid.

## Conclusion

The 2019 federal election delivered a clear message to Australia's political class: mainstream Australians care about their livelihoods and are not willing to risk losing their jobs in pursuit of economically and socially devastating emissions reduction policies.

Despite the clear, democratic mandate to maintain a relatively less-destructive emissions policy, the federal government has changed course since its re-election.

In January 2020 Prime Minister Scott Morrison refused to commit to a net zero emissions target, arguing that people who do so "make a glib promise about that and they can't look Australians in the eye and tell them what it will mean for their electricity prices, what it will mean for their jobs."<sup>13</sup>

One year later, the Prime Minister said that the government's "goal is to reach net zero emissions as soon as possible, and preferably by 2050."<sup>14</sup>

Adopting such a target would be devastating for the Australians whose livelihoods will be placed at risk.

As this report has outlined, a net zero emissions target will directly place up to 653,600 jobs at risk. This does not account for indirect job losses as a result of reduced economic activity.

These job losses would place an enormous strain on mainstream Australians, and as outlined in this report, the electorates which will suffer most are disproportionately held by Coalition parties. At the same time, the majority of the seats which are least likely to suffer job losses as a result of a net zero emissions target are also held by the Coalition, which reveals an internal tension within the government.

It is also unlikely that jobs lost as a result of a net zero emissions target will be replaced by 'green' jobs. As this report highlights, between 2009-10 and 2018-19, five manufacturing jobs were destroyed for each renewable activity job created.

A net zero emissions target would destroy communities where there is a high reliance on relatively more energy-intensive jobs. Adopting such a target in the wake of the largest economic contraction and employment crisis in recent memory, caused by COVID-19 and resulting lockdowns, would be devastating for Australian workers.

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<sup>13</sup> Andrew Tillet and Mark Ludlow, "No net zero emissions target if it hurts jobs: PM," *Australian Financial Review*, 20 January 2020, <https://www.afr.com/politics/federal/no-net-zero-emissions-target-if-it-hurts-jobs-pm-20200120-p53t18>.

<sup>14</sup> Phillip Coorey, "PM inches closer to net zero by 2050," *Australian Financial Review*, 1 February 2021, <https://www.afr.com/politics/federal/pm-inches-closer-to-net-zero-by-2050-20210201-p56ybg>.



# NET ZERO JOBS AN ANALYSIS OF THE EMPLOYMENT IMPACTS OF A NET ZERO EMISSIONS TARGET IN AUSTRALIA

## About the Institute of Public Affairs

The Institute of Public Affairs is an independent, non-profit public policy think tank, dedicated to preserving and strengthening the foundations of economic and political freedom.

Since 1943, the IPA has been at the forefront of the political and policy debate, defining the contemporary political landscape.

The IPA is funded by individual memberships and subscriptions, as well as philanthropic and corporate donors.

The IPA supports the free market of ideas, the free flow of capital, a limited and efficient government, evidence-based public policy, the rule of law, and representative democracy. Throughout human history, these ideas have proven themselves to be the most dynamic, liberating and exciting. Our researchers apply these ideas to the public policy questions which matter today.

## About the author

**Cian Hussey** joined the Institute of Public Affairs as a Research Associate in 2019. He is interested in the impacts of red tape on small businesses and the broader economy. His work at the IPA focuses on using RegData Australia to quantitatively analyse the impacts of regulation. He has published a number of opinion pieces in *The Australian*, *The Daily Telegraph*, *The West Australian*, *The Spectator*, and regularly appears on Sky News. Cian received a Bachelor of Arts from The University of Notre Dame Australia, majoring in Politics and International Relations.

**Daniel Wild** is the Director of Research at the Institute of Public Affairs. He specialises in red tape, regulation, economic policy, the philosophy of free enterprise, and criminal justice. Daniel has authored research papers on economic policy, environmental regulation, and criminal justice reform. Daniel frequently appears in the media, and has published a number of opinion pieces in *The Australian*, *The Daily Telegraph*, *The Sydney Morning Herald*, *The Courier Mail*, and *The Spectator*. Daniel has also made a number of radio and television appearances, including on 2GB, 3AW, Sky News, and Channel 7 News. Daniel previously worked at the Commonwealth Department of the Prime Minister and Cabinet where he analysed global and domestic macroeconomic policy. Prior to that he worked at the Commonwealth Department of Finance where he worked on regulatory reform. Daniel holds an honours qualification in economics and a degree in international studies from the University of Adelaide.







# THE ECONOMIC AND EMPLOYMENT **CONSEQUENCES** OF NET ZERO EMISSIONS BY 2050 IN AUSTRALIA

April 2022



Daniel Wild  
Director of Research, Institute of Public Affairs





# Contents

<b>Introduction</b>	<b>2</b>
<b>The economic impact of a ban on new coal, gas, and oil projects across Australia</b>	<b>6</b>
<b>State and regional economic impact of a ban on new coal, gas, and oil projects</b>	<b>9</b>
<b>Conclusion</b>	<b>15</b>

## Introduction

In the lead up to the 2021 United Nations Climate Change Conference (COP26) held in Glasgow, Scotland from 31 October to 13 November 2021, the Australian government committed to adopting a target of net zero emissions by the year 2050.

Following the conference, the government published *Australia's Long-Term Emissions Reduction Plan: A whole-of-economy plan to achieve net zero emissions by 2050* which outlined the broad policies the government would implement for Australia to meet the net zero by 2050 target.

Modelling published as a part of the plan claims that meeting the net zero emissions target will increase Gross National Income per capita by \$2,000 in the year 2050, with the vast majority of the claimed benefit the result of 'advanced technology'.

However, there has been little analysis or discussion of the costs of a net zero emissions by 2050 target in terms of employment or forgone economic output and growth.

In February 2021 the Institute of Public Affairs (IPA) was among the first organisations to provide an estimate of the potential employment impact of a net zero emissions target, with research finding that up to 653,600 existing jobs would be put at risk. The research report, *Net Zero Jobs: An analysis of the employment impact of a net zero emissions by 2050 target*, also identified that the majority of jobs at risk would be in the agriculture, mining, and manufacturing sectors.

Subsequent research by the IPA, *Net Zero Emissions Will Divide Australians: A state-based electoral analysis of the impact of net zero emissions*, identified the inequitable impact of a net zero emissions target, with a worker in a typical electorate represented by the Nationals being more than three times as likely to lose their job as a result of net zero compared with a worker in a typical electorate represented by the Liberal Party. This is because the overwhelming majority of jobs placed at risk by net zero are located in the regions and outer-metropolitan areas of major cities.

Specifically, that research identified that up to 24% of jobs in the electorate of Flynn, 22% of jobs in Maranoa, and 18% of jobs in Capricornia could be put at risk by a net zero emission by 2050 target - all three of which are represented by the Nationals.

This study builds on previous IPA research by analysing the potential economic and employment impact of a ban on all new coal, gas, and oil projects – which at a minimum would be required for Australia to meet its net zero emissions by 2050 commitment.

The cost estimate is based on the investment value of coal, gas, and oil projects which would be prohibited from proceeding as a result of a ban. The data is drawn from Commonwealth Department of Industry, Science, Energy, and Resource's (DISER's) report: *2021 Resources and Energy Major Projects Report*, which categorises resources and energy projects into four categories: 'publicly announced', 'feasibility', 'committed', and 'completed'. The publicly announced stage refers to projects which

are 'are usually very early in their development, and are typically undergoing an initial feasibility study to assess the commercial aspects of developing an identified resource'. The feasibility stage refers to the stage of the project development cycle when the 'initial feasibility study for a project has been completed and the results support further development.' The committed stage refers to projects which have 'have completed all commercial, engineering and environmental studies, received all necessary government regulatory approvals, and finalised the financing of the project to allow construction.' And the completed stage refers to projects where construction is completed and the operation has reached commercial production.

A ban on all new coal, gas, and oil projects would affect those projects which are in the publicly announced and feasibility stages, and it is the investment values of these projects as identified in the *2021 Resources and Energy Major Projects Report* which are analysed in this study. In addition, this report also utilises the Australian Bureau of Statistics' (ABS') Input-Output Table to estimate the multiplier effects of the economic output and jobs put at risk by the proposed ban.

The economic multiplier refers to the economic activity which is generated as a result of the flow-on effects from another activity (like a coal project), for example through the creation of more jobs and higher wages which generate more consumer spending.

This is a conservative approach to estimating the potential forgone economic output of a ban on new coal, gas, and oil projects, as it doesn't include projects which are in the committed state. As DISER noted, 'Projects at the committed stage have completed all commercial, engineering and environmental studies, received all necessary government regulatory approvals, and finalised the financing of the project to allow construction. Such projects are considered to have received a positive final investment decision from the owner(s).'

While many of these projects will be constructed, some will not. As the department states, 'Most projects that progress to the committed stage will eventually commence production. Nevertheless, post-final investment decision, there are still technical and financial risks that, if realised, can result in delays, scope changes and cost overruns, or even affect the commercial viability of a project and possibly lead to its cancellation.' Policies such as net zero emissions by 2050, by adding to the potential cost of projects, increase the likelihood that 'committed' projects will later be cancelled.

The approach also only includes projects which are *currently* being considered. However, a permanent ban on all new coal, gas, and oil projects would not just affect projects currently being considered, but all future projects that would otherwise have been considered but would not proceed as a result of the ban.<sup>1</sup>

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<sup>1</sup> Note: "oil projects" are defined as "LNG and petroleum projects" as per the *2021 Resources and Energy Major Project Report*

**Table 1: Summary of economic costs of coal, gas, and oil ban**

State/Region	Number of Projects	Cost Estimate <sup>1</sup> (\$b)	Total Industrial Output Value <sup>2</sup> (\$b)	Annual Regional Product <sup>3</sup> (\$b)	Cost as % of Annual Regional Product (%)	Total Project Employment Impact <sup>4</sup> (Persons)	Regional Employed <sup>5</sup> (Persons)	Employment Impact as % of Employed Persons (%)
Australia	89	167.18	273.78	2030	13.49	478,673	13,255,000	3.60
Western Australia	12	75.41	114.76	320.65	35.79	186,276	1,452,061	12.78
Queensland	45	68.30	119.61	368.98	32.42	221,916	2,647,000	8.38
North Qld	23	37.46	66.58	75.88	87.74	125,005	347,948	35.93
Central Qld	13	10.81	19.38	22.69	85.41	36,656	115,261	31.80
South-West Qld	9	20.02	33.65	20.77	162.01	60,154	135,306	44.50
New South Wales	21	13.70	23.52	633.64	3.71	42,899	4,094,693	1.05
Hunter	15	6.43	11.50	59.31	20.30	21,789	324,012	6.72
Other NSW	6	7.02	11.62	592.94	1.96	21,110	3,770,681	0.54
Other States/Territories	11	9.78	15.89	643.45	2.47	27,532	4,712,000	0.58

**Notes**

1 DISER Report, mid value estimate used when cost range provided.

2 ABS, Australian National Accounts: Input-Output Tables 2018-19, ABS 5209.0.55.001. Simple output multiplier effect.

3 REMPLAN, Gross regional product by Statistical Area Level 4, 2020-21.

4 NSW Treasury Employment Calculator, NSW Treasury analysis based on ABS 5209.0, 5246.0, TPP09-7 and TRP09-3. Simple multiplier effect and type 2 consumption effect.

5 ABS, Labour Force, detailed, Australia 6291.0.55.001, 6291.0.55.003.

As summarised in Table 1, the economic cost of a ban on all new coal, gas, and oil projects is immense. The total cost across Australia is estimated to be \$273.78 billion in terms of forgone economic output, which is equivalent to 13.5% of annual GDP. This corresponds with an estimated 478,673 forgone jobs, equating to approximately 3.6% of Australia's total workforce.

Detailed analysis was undertaken of the impact of a ban on all new coal, gas, and oil projects by regions that would host the vast majority of those projects. Specifically, the costs would be as follows:

- **North Queensland:** \$66.58 billion in foregone economic output which is the equivalent to 87.74% of annual gross regional product. This will prevent the creation of approximately 125,000 jobs, which is the equivalent to around 35.9% of the current local workforce. This is the equivalent to 25 years' worth of job creation.
- **Central Queensland:** \$19.38 billion in foregone economic output which is the equivalent to 85.4% of annual gross regional product. This will prevent the creation of approximately 36,650 jobs which is the equivalent to around 31.8% of the current local workforce. This is the equivalent to 18 years' worth of job creation.

- *South-West Queensland*: \$33.65 billion in foregone economic output which is the equivalent to 162% of annual gross regional product. This will prevent the creation of approximately 60,154 jobs which is equivalent to around 44.5% of the current local workforce. This is the equivalent to over 50 years' worth of job creation.
- *Hunter-Newcastle*: \$11.5 billion in foregone economic output which is the equivalent to 20% of annual gross regional product. This will prevent the creation of approximately 21,800 jobs which is the equivalent to around 6.7% of the current local workforce. This is the equivalent to 4 years' worth of job creation.

The geographic definition of regions is taken from the ABS statistical-area 4 delineations. North Queensland is defined as the regional towns of Mackay (which includes Mackay, Isaac, and Whitsunday), Townsville, and Cairns. Central Queensland takes in the regional towns Rockhampton, Gladstone, and Emerald. South-West Queensland takes in the Darling Downs-Maranoa region (which includes Warwick, Dalby, St. George, and Roma) as well as Toowoomba. And Hunter-Newcastle takes in the Newcastle and Lake Macquarie region.

Analysis was also undertaken of the economic impact of a ban on new coal, gas, and oil projects on the three major resources states: Western Australia, Queensland, and New South Wales (NSW). The estimated costs to these states are as follows:

- *Western Australia*: \$114.76 billion in foregone economic output which is the equivalent to 35.8% of annual gross state product. This will prevent the creation of 186,000 jobs which is the equivalent to around 12.8% of Western Australia's current workforce. This is the equivalent to 8.5 years' worth of job creation.
- *Queensland*: \$119.61 billion in foregone economic output which is the equivalent to 32.4% of annual gross state product. This will prevent the creation of around 221,900 jobs which is the equivalent to around 8.4% of Queensland's current workforce. This is the equivalent to almost 5 years' worth of job creation.
- *NSW*: \$23.52 billion in foregone economic output which is the equivalent to 3.7% of annual gross state product. This will prevent the creation of around 42,900 jobs which is the equivalent to around 1% of NSW's workforce. This is the equivalent to almost a year's worth of job creation.



# The economic impact of a ban on new coal, gas, and oil projects across Australia

This study utilises data provided by DISER’s 2021 *Resources and Energy Major Projects Report*, which provides the estimated investment values of key projects included in the study. It also utilises the ABS’ Input-Output Table to estimate the multiplier effects of the economic output and jobs put at risk by the proposed ban. As noted in the introduction, the department classifies projects as being in one of four stages: ‘publicly announced’, ‘feasibility’, ‘committed’, and ‘completed’. Only projects which are in the publicly announced and feasibility stages are considered in this report.

The 2021 *Resources and Energy Major Projects Report* details 89 oil, gas, and coal projects currently in the publicly announced and feasibility stages valued at approximately \$167 billion.<sup>2</sup>

**Table 2: Coal, gas, and oil projects in Australia in ‘publicly announced’ and ‘feasibility’ stages**

Publicly Announced and Feasibility Stage Projects	NSW		VIC		QLD		SA	
	Number	Value A\$m	Number	Value A\$m	Number	Value A\$m	Number	Value A\$m
Coal	19	\$9,849	0	\$0	40	\$57,866	1	\$3,750
LNG, Gas, Petroleum	2	\$3,850	7	\$1,575	5	\$10,425	1	\$200
Total	21	\$13,699	7	\$1,575	45	\$68,291	2	\$3,950
Publicly Announced and Feasibility Stage Projects	WA		TAS		NT		Total National Projects at Risk	
	Number	Value A\$m	Number	Value A\$m	Number	Value A\$m	Number	Value A\$m
Coal	0	\$0	0	\$0	0	\$0	60	\$71,465
LNG, Gas, Petroleum	12	\$75,412	1	\$500	1	\$3,750	29	\$95,712
Total	12	\$75,412	1	\$500	1	\$3,750	89	\$167,177

Data sourced from 2021 *Resources and Energy Major Projects Report* published by DISER.  
Mid value is used in calculations where a range is provided in the report.

While thermal coal production remains more controversial than metallurgical coal production - given its perceived contribution to greenhouse gas emissions, particularly carbon dioxide - it is important to clarify that many of the coal projects in the pipeline intend to produce both thermal and metallurgical coal.

The potential investments in coal, gas and petroleum projects all across the nation total \$167 billion. But an analysis of the supply and use of goods and services as well as inter-industry flows in the economy suggests a more considerable economic impact. A detailed analysis using simple multipliers derived from the ABS’ Input – Output Tables for the Australian economy in 2018-19 estimates the contribution of these investments, including the intermediate transactions and supply linkages between various product

<sup>2</sup> Australian Government DISER, 2021, *Resources and Energy Major Projects: 2021*. Available <https://www.industry.gov.au/data-and-publications/resources-and-energy-major-projects-2021>

categories, to be almost \$274 billion in national output excluding taxes. This is equivalent to around 13.5% of Australia’s Gross Domestic Product.<sup>3,4</sup>

**Table 3: Economic impact of ban on new coal, gas, and oil projects**

Resource	Sub-industry	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4) = (2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)
Coal	Coal Mining	1.00	0.37	0.42	0.79	1.79
LNG, Gas, Petroleum	Oil and gas extraction	1.00	0.26	0.26	0.52	1.52
Resource	A\$m Value of Publicly Announced and Feasibility Stage Projects	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4) = (2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)
Coal	\$71,465	\$71,465	\$26,396	\$30,269	\$56,665	\$128,130
LNG, Gas, Petroleum	\$95,712	\$95,712	\$24,646	\$25,294	\$49,940	\$145,652
Total Contribution to National output	\$167,177	\$167,177	\$51,042	\$55,563	\$106,605	\$273,782

Source: ABS, Australian National Accounts: Input-Output Tables 2018-19, ABS 5209.0.55.001.

The output multipliers are derived from the ABS Input-Output Tables of the Australian Economy

The initial effect (1) describes relative labour-intensity of the industry.

The first-round effect multiplier (2) and the industrial support effect (3) describes the relationship between intermediate cross-industry inputs and final industry outputs.

The first-round effect and the industrial support effect (3) together give the production-induced multiplier (4).

The initial effect and the production-induced multiplier represent the simple employment multiplier (5).

An analysis using the NSW Treasury Employment Calculator, which derives employment multipliers from the ABS Input-Output Tables, shows the \$167 billion in investment projects is estimated to produce around 294,817 full-time equivalent (FTE) positions comprising 98,328 direct jobs and a further 196,489 indirect jobs from backward linkages of intermediate cross-industry inputs as well as industry support.<sup>5</sup>

The modelling also shows that 183,856 jobs are estimated to be generated from household consumption expenditure resulting in a total of 478,673 new jobs foregone if a ban on new coal, gas and oil projects were implemented.

3 ABS, 2021, Australian National Accounts, Input-Output Tables, 2018-19. Available <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-input-output-tables>

4 ABS, 2022, Australian National Accounts: National Income, Expenditure and Product. Available <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-national-income-expenditure-and-product/latest-release#data-download>

5 NSW Treasury, 2020, AUS Input-Output Employment Multipliers. Available <https://www.treasury.nsw.gov.au/sites/default/files/2020-10/AUS%20IO%20Model%2013102020.xlsx>

**Table 4: Employment Impact of a ban on new coal, gas, and oil projects**

Resource	Sub-industry	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4)=(2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)	Consumption Multiplier (6)	Total Employment Multiplier (7)=(5)+(6)
Coal	Coal Mining	0.80	0.79	0.58	1.37	2.17	1.22	3.39
LNG, Gas, Petroleum	Oil and gas extraction	0.43	0.52	0.51	1.03	1.46	1.01	2.47
Resource	A\$m Value of Publicly Announced and Feasibility Stage Projects	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4)=(2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)	Consumption Multiplier (6)	Total Employment Multiplier (7)=(5)+(6)
Coal	\$71,465	57,172	56,457	41,449	97,906	155,078	87,187	242,265
LNG, Gas, Petroleum	\$95,712	41,156	49,770	48,813	98,583	139,739	96,669	236,408
<b>Total FTE Jobs</b>	<b>\$167,177</b>	<b>98,328</b>	<b>106,227</b>	<b>90,262</b>	<b>196,489</b>	<b>294,817</b>	<b>183,856</b>	<b>478,673</b>

Source: NSW Treasury Employment Calculator, NSW Treasury analysis based on ABS 5209.0, 5246.0, TPP09-7 and TRP09-3.

## State and regional economic impact of a ban on new coal, gas, and oil projects

The states where planned investments are most at risk from a ban on coal, gas, and oil projects are Queensland, Western Australia, and NSW.

Queensland has 40 coal projects in the publicly announced and feasibility stages valued at \$57.87 billion and 5 oil and gas projects worth \$10.43 billion.

Employment associated with the investment projects planned in Queensland includes around 46,300 direct and 79,300 indirect jobs in the coal industry as well as 4,500 direct and 10,700 indirect jobs in the oil and gas industries. Together, this totals around 140,800 FTE positions across the whole sector.

Furthermore, household consumption expenditures generated by these projects in Queensland can be expected to generate an additional 70,600 jobs economy-wide from the coal projects and 10,500 from the oil and gas projects, resulting in a total of approximately 221,900 FTE jobs representing around 8.4% of Queensland's entire labour force.

**Table 5: Employment of a ban on new coal, gas, and oil projects in Queensland**

Resource	Sub-industry	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4)=(2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)	Consumption Multiplier (6)	Total Employment Multiplier (7)=(5)+(6)
Coal	Coal Mining	0.80	0.79	0.58	1.37	2.17	1.22	3.39
LNG, Gas, Petroleum	Oil and gas extraction	0.43	0.52	0.51	1.03	1.46	1.01	2.47
Resource	A\$m Value of Publicly Announced and Feasibility Stage Projects	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4)=(2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)	Consumption Multiplier (6)	Total Employment Multiplier (7)=(5)+(6)
Coal	\$57,870	46,293	45,714	33,562	79,276	125,569	70,597	196,166
LNG, Gas, Petroleum	\$10,425	4,483	5,421	5,317	10,738	15,221	10,529	25,750
<b>Total FTE Jobs</b>	<b>\$68,295</b>	<b>50,776</b>	<b>51,135</b>	<b>38,879</b>	<b>90,014</b>	<b>140,790</b>	<b>81,126</b>	<b>221,916</b>

Source: NSW Treasury Employment Calculator, NSW Treasury analysis based on ABS 5209.0, 5246.0, TPP09-7 and TRP09-3.

A breakdown of the coal, oil, and gas projects tabled in the DISER report shows there are 20 coal projects in the publicly announced and feasibility stages in Queensland's northern region which represents half of all coal projects in the state. The estimated \$35.33 billion of investments are associated with 119,775 FTE jobs when consumption expenditures are included. There are also 3 gas projects in the northern region worth an estimated \$2.13 billion, which is associated with 5,228 FTE jobs. The combined coal, oil and gas projects in northern Queensland are associated with 125,000 FTE jobs (35.9% of total regional jobs).

In Central Queensland, there are 13 coal projects in the publicly announced and feasibility stages worth an estimated \$10.81 billion associated with 36,650 FTE positions which is equivalent to 31.8% of jobs in the SA4 region.

There are 7 coal projects in the pipeline in South-West Queensland worth \$11.72 billion which are associated with 39,736 jobs across the Darling Downs, Maranoa and Toowoomba regions. There are also 2 oil and gas projects worth \$8.3 billion associated with 20,418 FTE jobs.

Together, the \$20 billion in coal, oil, and gas projects would attract approximately 60,150 jobs, representing 44.5% of total employed persons across the South-West Queensland region.

**Table 6: Economic cost of ban on new coal, gas, and oil projects in Queensland**

Queensland Coal, Oil and Gas Projects	Project	Location		Region	Cost Estimate (A\$m)	GVA Produced (A\$m)
Thermal coal	Alpha (mine and rail)	120 km SW of Clermont	Feasibility	Northern	\$10,800	\$19,363
Thermal and metallurgical coal	Caval Ridge Mine Horse Pit Extension	155 km SW of Mackay	Publicly announced	Northern	\$1,000	\$1,793
Metallurgical coal	Codrilla	62 km SE of Moranbah	Publicly announced	Northern	\$750	\$1,344
Metallurgical coal	Colton	11 km N of Maryborough	Publicly announced	Northern	\$375	\$671
Metallurgical coal	Dysart East	5 km NE of Dysart	Feasibility	Northern	\$200	\$359
Thermal coal	Galilee Coal Project (formerly China First)	36 km NE of Jericho	Feasibility	Northern	\$6,400	\$11,475
Metallurgical coal	Grosvener Phase 2	4 km SE of Moranbah	Feasibility	Northern	\$125	\$223
Thermal and metallurgical coal	Ironbank No. 1	35 km NE of Moranbah	Feasibility	Northern	\$125	\$223
Thermal coal	Kevin's Corner	Galilee Basin	Feasibility	Northern	\$5,200	\$9,323
Metallurgical coal	Lake Vermont Extension	160 km SW of Mackay	Publicly announced	Northern	\$100	\$179
Thermal coal	Moorlands	25 km W of Clermont	Publicly announced	Northern	\$148	\$265
Metallurgical coal	Moranbah South	10 km SE of Moranbah	Feasibility	Northern	\$2,000	\$3,586
Thermal and metallurgical coal	New Lenton	20 km E of Moranbah	Feasibility	Northern	\$375	\$671
Metallurgical coal	Olive Downs (Phase 2)	25 km S of Coppabella	Feasibility	Northern	\$587	\$1,052
Metallurgical coal	Red Hill Mining	20 km N of Moranbah	Feasibility	Northern	\$1,250	\$2,240
Metallurgical coal	Saraji East	30 km N of Dysart	Publicly announced	Northern	\$2,400	\$4,303
Thermal and metallurgical coal	Talwood	35 km N of Moranbah	Publicly announced	Northern	\$700	\$1,255
Metallurgical coal	Wards Well	29 km SW of Glenden	Feasibility	Northern	\$1,500	\$2,689
Thermal and metallurgical coal	Willunga/ Vermont East	75 km NE of Clermont	Feasibility	Northern	\$300	\$538
Metallurgical coal	Winchester South	150 km SW of Mackay	Feasibility	Northern	\$1,000	\$1,793



Gas	Bowen Gas Project	150 km SW of Mackay	Publicly announced	Northern	\$500	\$761
Gas	Glenaras Gas Project	Galilee Basin	Publicly announced	Northern	\$1,500	\$2,283
Gas /LNG	Mahalo Gas Project	Bowen Basin	Publicly announced	Northern	\$125	\$190
<b>Northern Regions Total</b>					<b>\$37,460</b>	<b>\$66,579</b>
Thermal and metallurgical coal	Belview	10 km E of Blackwater	Publicly announced	Central	\$907	\$1,626
Metallurgical coal	Wilton-Fairhill	70 km NW of Blackwater	Feasibility	Central	\$375	\$671
Metallurgical coal	Washpool	60 km NE of Emerald	Feasibility	Central	\$368	\$660
Thermal and metallurgical coal	Valeria	27 km NW of Emerald	Feasibility	Central	\$1,500	\$2,689
Metallurgical coal	Walton	20 km E of Bluff	Feasibility	Central	\$125	\$223
Thermal coal	Taraborah	22 km W of Emerald	Feasibility	Central	\$560	\$1,004
Thermal and metallurgical coal	Teresa	17 km N of Emerald	Feasibility	Central	\$375	\$671
Thermal coal	South Galilee	160 km W of Emerald	Feasibility	Central	\$4,200	\$7,530
Thermal coal	Springsure Creek	40 km S of Emerald	Feasibility	Central	\$1,250	\$2,240
Thermal and metallurgical coal	Styx (Central Queensland Coal)	139 km NW of Rockhampton	Feasibility	Central	\$240	\$430
Thermal coal	Rolleston (phase 2)	16 km W of Rolleston	Feasibility	Central	\$400	\$717
Thermal coal	Minyango	3 km S of Blackwater	Publicly announced	Central	\$390	\$699
Thermal and metallurgical coal	Comet Ridge	20 km S of Comet	Feasibility	Central	\$125	\$223
<b>Central Regions Total</b>					<b>\$10,815</b>	<b>\$19,383</b>
Thermal coal	The Range	24 km SE of Wandoan	Feasibility	South-West	\$780	\$1,398
Thermal coal	Wandoan	60 km N of Miles	Publicly announced	South-West	\$7,000	\$12,550
Thermal coal	Elimatta	45 km SW of Taroom	Feasibility	South-West	\$750	\$1,344
Thermal coal	New Acland (Stage 3 extension)	177 km W of Brisbane	Feasibility	South-West	\$900	\$1,614
Thermal coal	North Surat - Collingwood	12 km NE of Wandoan	Publicly announced	South-West	\$652	\$1,169
Thermal coal	North Surat - Taroom	3 km SE of Taroom	Publicly announced	South-West	\$1,120	\$2,008
Thermal coal	North Surat - Woori	19 km S of Wandoan	Publicly announced	South-West	\$520	\$932
Gas	Surat Gas Project (Phases 2-5)	160 km W of Brisbane	Feasibility	South-West	\$8,000	\$12,174
Gas	Tipton	30 km west Dalby, Surat Basin	Feasibility	South-West	\$300	\$457
<b>Southern Regions Total</b>					<b>\$20,022</b>	<b>\$33,646</b>

Source: 2021 Resources and Energy Major Projects Report published by DISER.

ABS, Australian National Accounts: Input-Output Tables 2018-19, ABS 5209.0.55.001.

NSW Treasury Employment Calculator, NSW Treasury analysis based on ABS 5209.0, 5246.0, TPP09-7 and TRP09-3.

Western Australia has 12 oil and gas projects in the publicly announced and feasibility stages worth around \$75.41 billion. Industry employment associated with Western Australia’s planned oil and gas projects is estimated to be around 110,100 FTE jobs comprising 32,430 direct and 76,670 indirect jobs, with household consumption expenditures expected to generate an additional 76,170 jobs across the broader economy - taking the total to approximately 186,500 FTE positions.

**Table 7: Employment impact of ban on new coal, gas, and oil projects in Western Australia**

Resource	Sub-industry	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4)=(2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)	Consumption Multiplier (6)	Total Employment Multiplier (7)=(5)+(6)
Coal	Coal Mining	0.80	0.79	0.58	1.37	2.17	1.22	3.39
LNG, Gas, Petroleum	Oil and gas extraction	0.43	0.52	0.51	1.03	1.46	1.01	2.47
Resource	A\$m Value of Publicly Announced and Feasibility Stage Projects	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4)=(2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)	Consumption Multiplier (6)	Total Employment Multiplier (7)=(5)+(6)
Coal	\$0	-	-	-	-	-	-	-
LNG, Gas, Petroleum	\$75,412	32,427	39,214	38,460	77,674	110,101	76,166	186,267
<b>Total FTE Jobs</b>	<b>\$75,412</b>	<b>32,427</b>	<b>39,214</b>	<b>38,460</b>	<b>77,674</b>	<b>110,101</b>	<b>76,166</b>	<b>186,267</b>

NSW Treasury Employment Calculator, NSW Treasury analysis based on ABS 5209.0, 5246.0, TPP09-7 and TRP09-3.

**Table 8: Economic Cost of ban on new coal, gas, and oil projects in Western Australia**

West Australia LNG, Oil and Gas Projects	Project	Location		Cost Estimate (A\$m)	GVA Produced (A\$m)
Gas/LNG/condensate/LPG	Browse to North West Shelf	Browse Basin	Feasibility	\$30,000	\$45,653
Oil	Buffalo	Bonaparte Basin	Publicly Announced	\$53	\$81
LNG	Cash Maple Development	Timor Sea	Publicly Announced	\$10,000	\$15,218
LNG	Clio-Acme	Browse Basin	Publicly Announced	\$3,800	\$5,783
LNG	Crux LNG	700 km W of Darwin	Feasibility	\$3,750	\$5,707
Oil	Dorado	Carnarvon Basin	Feasibility	\$3,750	\$5,707
Gas/LNG/condensate	Equus	200 km NW Onslow, WA	Publicly Announced	\$6,000	\$9,131
LNG	Pluto Expansion (Train 2)	190 km NW of Karratha	Feasibility	\$8,400	\$12,783
Oil	Pyrenees Infill (Phase 4)	Northern Carnarvon Basin	Publicly Announced	\$334	\$508

Gas/LNG	Scarborough	220 km NW of Exmouth	Feasibility	\$7,600	\$11,565
Gas/LNG	Transborders Energy's Generic FLNG Solution	n/a	Feasibility	\$1,600	\$2,435
Gas	West Erregulia (Phase 1)	Perth Basin	Feasibility	\$125	\$190
<b>Total WA</b>				<b>\$75,412</b>	<b>\$114,761</b>

Source: 2021 Resources and Energy Major Projects Report published by DISER.  
ABS, Australian National Accounts: Input-Output Tables 2018-19, ABS 5209.0.55.001.  
NSW Treasury Employment Calculator, NSW Treasury analysis based on ABS 5209.0, 5246.0, TPP09-7 and TRP09-3.

NSW has 19 coal projects in the publicly announced and feasibility stages worth around \$9.85 billion as well as 2 oil and gas projects worth around \$3.85 billion. Industry employment associated with NSW's planned coal, oil and gas projects is estimated to be around 42,900, comprising 9,540 direct and 17,460 indirect jobs, with household consumption expenditures expected to generate an additional 15,900 jobs across the broader economy.

**Table 9: Employment impact of ban on new coal, gas, and oil projects in NSW**

Resource	Sub-industry	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4)=(2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)	Consumption Multiplier (6)	Total Employment Multiplier (7)=(5)+(6)
Coal	Coal Mining	0.80	0.79	0.58	1.37	2.17	1.22	3.39
LNG, Gas, Petroleum	Oil and gas extraction	0.43	0.52	0.51	1.03	1.46	1.01	2.47
Resource	A\$m Value of Publicly Announced and Feasibility Stage Projects	Initial Effect (1)	First-round Effect Multiplier (2)	Output Multipliers Industrial Support Effect (3)	Production-induced effect (4)=(2)+(3)	Simple Multiplier (5)=(1)+(2)+(3)	Consumption Multiplier (6)	Total Employment Multiplier (7)=(5)+(6)
Coal	\$9,849	7,879	7,781	5,712	13,493	21,372	12,016	33,388
LNG, Gas, Petroleum	\$3,850	1,656	2,002	1,964	3,966	5,622	3,889	9,511
<b>Total FTE Jobs</b>	<b>\$13,699</b>	<b>9,535</b>	<b>9,783</b>	<b>7,676</b>	<b>17,459</b>	<b>26,994</b>	<b>15,905</b>	<b>42,899</b>

Investments in NSW's Hunter region are expected to produce a total of 21,789 jobs representing 6.7% of the total labour force of the Hunter and Newcastle SA4 regions. The \$11.5 billion total industrial output value of proposed projects in the regions is equivalent to 20% of the combined \$59.31 billion of gross regional product.

**Table 10: Economic Cost of ban on new coal, gas, and oil projects in NSW**

NSW Coal Projects	Project	Location		Region	Cost Estimate (A\$m)	GVA Produced (A\$m)
Metallurgical Coal	Ashton South East opencut	14 km NW of Singleton	Feasibility	Upper Hunter Region	\$125	\$223
Thermal and Metallurgical Coal	Bulga Optimisation Project mod 3	15 km SW of Singleton	Feasibility	Upper Hunter Region	\$657	\$1,178
Thermal Coal	Dartbrook	6 km NW of Muswellbrook	Publicly Announced	Upper Hunter Region	\$750	\$1,344
Thermal and Metallurgical Coal	Glendell Continued Operations	20 km N of Singleton	Feasibility	Upper Hunter Region	\$125	\$223
Thermal Coal	Mangoola Continued Operations	20 km W of Muswellbrook	Publicly Announced	Upper Hunter Region	\$150	\$269
Metallurgical Coal	Maxwell Underground Mine	15 km SW of Muswellbrook	Publicly Announced	Upper Hunter Region	\$509	\$913
Thermal Coal	Mt Pleasant Optimisation Project	3 km NW of Muswellbrook	Feasibility	Upper Hunter Region	\$750	\$1,344
Thermal and Metallurgical Coal	Spur Hill	15 km SW of Muswellbrook	Feasibility	Upper Hunter Region	\$750	\$1,344
Thermal Coal	Chain Valley Extension	40 km S of Newcastle	Publicly Announced	Hunter Region	\$125	\$223
Thermal and Metallurgical Coal	HVO Continuation	90 km NW of Newcastle	Publicly Announced	Hunter Region	\$500	\$896
Thermal and Metallurgical Coal	Mt Arthur	105 km NW of Newcastle	Publicly Announced	Hunter Region	\$750	\$1,344
Thermal and Metallurgical Coal	Mt Thorley	73 km NW of Newcastle	Feasibility	Hunter Region	\$125	\$223
Thermal and Metallurgical Coal	Newstan Mine Extension	20 km SW of Newcastle	Publicly Announced	Hunter Region	\$170	\$305
Thermal Coal	Wallarah 2	30 km SW of Newcastle	Feasibility	Hunter Region	\$945	\$1,694
<b>Hunter Region Total</b>					<b>\$6,431</b>	<b>\$11,523</b>
Thermal and Metallurgical Coal	Narrabri (Stage 3)	70 km W of Gunnedah	Feasibility	North West Slopes	\$1,250	\$2,240
Thermal and Metallurgical Coal	Vickery	22 km N of Gunnedah	Feasibility	North West Slopes	\$700	\$1,255
Thermal and Metallurgical Coal	Boggabri Coal Extension	Gunnedah	Publicly Announced	North West Slopes	\$513	\$920
Thermal and Metallurgical Coal	Dendrobium Extension	13 km SW of Wollongong	Feasibility	Illawara	\$750	\$1,344
Thermal Coal	Angus Place West	15 km NW of Lithgow	Publicly Announced	Central Tablelands	\$210	\$377
<b>Other Regions Total</b>					<b>\$3,423</b>	<b>\$6,136</b>
<b>NSW Gas Projects</b>						
Gas	LMG import terminal - Newcastle GasDock	Newcastle	Feasibility	Hunter Region	\$250	\$380
Gas	Narrabri coal steam gas project	Narrabri	Feasibility	North West Slopes	\$3,600	\$5,478
<b>All Regions Total</b>					<b>\$3,850</b>	<b>\$5,858</b>
<b>All NSW Projects Total</b>					<b>\$13,704</b>	<b>\$23,517</b>

Source: 2021 Resources and Energy Major Projects Report published by DISER.

ABS, Australian National Accounts: Input-Output Tables 2018-19, ABS 5209.0.55.001.

NSW Treasury Employment Calculator, NSW Treasury analysis based on ABS 5209.0, 5246.0, TPP09-7 and TRP09-3.

## Conclusion

The economic consequences of a ban on new coal, gas, and oil projects in Australia would be immense, with the total cost across Australia estimated at approximately \$274 billion, which is the equivalent to 13.5% of Australia's annual GDP. This corresponds to an estimated 478,673 jobs put at risk, equating to approximately 3.6% of Australia's total workforce.

The impact of a ban on new coal, gas, and oil projects would be most heavily concentrated in the major resources states of Queensland, Western Australian, and NSW - especially in the northern, central, and south-western parts of Queensland as well as NSW's Hunter region. Specifically, the economic and job implications are as follows:

- *North Queensland*: \$66.58 billion in foregone economic output which is the equivalent to 87.74% of annual gross regional product. This will prevent the creation of approximately 125,000 jobs, which is the equivalent to around 35.9% of the current local workforce. This is the equivalent to 25 years' worth of job creation.
- *Central Queensland*: \$19.38 billion in foregone economic output which is the equivalent to 85.4% of annual gross regional product. This will prevent the creation of approximately 36,650 jobs which is the equivalent to around 31.8% of the current local workforce. This is the equivalent to 18 years' worth of job creation.
- *South-West Queensland*: \$33.65 billion in foregone economic output which is the equivalent to 162% of annual gross regional product. This will prevent the creation of approximately 60,154 jobs which is equivalent to around 44.5% of the current local workforce. This is the equivalent to over 50 years' worth of job creation.
- *Hunter-Newcastle*: \$11.5 billion in foregone economic output which is the equivalent to 20% of annual gross regional product. This will prevent the creation of approximately 21,800 jobs which is the equivalent to around 6.7% of the current local workforce. This is the equivalent to 4 years' worth of job creation.

Analysis was also undertaken of the economic impact of a ban on new coal, gas, and oil projects on the three major resources states: Western Australia, Queensland, and NSW. The cost estimates are as follows:

- *Western Australia*: \$114.76 billion in foregone economic output which is the equivalent to 35.8% of annual gross state product. This will prevent the creation of 186,000 jobs which is the equivalent to around 12.8% of Western Australia's current workforce. This is the equivalent to 8.5 years' worth of job creation.
- *Queensland*: \$119.61 billion economic in foregone economic output which is the equivalent to 32.4% of annual gross state product. This will prevent the creation of around 221,900 jobs which is the equivalent to around 8.4% of Queensland's current workforce. This is the equivalent to almost 5 years' worth of job creation.
- *NSW*: \$23.52 billion in foregone economic output which is the equivalent to 3.7% of annual gross state product. This will prevent the creation of around 42,900 jobs which is the equivalent to around 1% of NSW's workforce. This is the equivalent to almost a years' worth of job creation.





# THE ECONOMIC AND EMPLOYMENT CONSEQUENCES OF NET ZERO EMISSIONS BY 2050 IN AUSTRALIA

## About the Institute of Public Affairs

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Throughout human history, these ideas have proven themselves to be the most dynamic, liberating and exciting. Our researchers apply these ideas to the public policy questions which matter today.

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**Daniel Wild** is the Director of Research at the Institute of Public Affairs. He specialises in red tape, regulation, economic policy, the philosophy of free enterprise, and criminal justice. Daniel has authored research papers on economic policy, environmental regulation, and criminal justice reform. Daniel frequently appears in the media, and has published a number of opinion pieces in *The Australian*, *The Daily Telegraph*, *The Sydney Morning Herald*, *The Courier Mail*, and *The Spectator*. Daniel has also made a number of radio and television appearances, including on 2GB, 3AW, Sky News, and Channel 7 News. Daniel previously worked at the Commonwealth Department of the Prime Minister and Cabinet where he analysed global and domestic macroeconomic policy. Prior to that he worked at the Commonwealth Department of Finance where he worked on regulatory reform. Daniel holds an honours qualification in economics and a degree in international studies from the University of Adelaide.





# AUSTRALIA'S NET ZERO ENERGY CRISIS

AN ANALYSIS OF THE ELECTRICITY PRICE  
IMPLICATIONS OF NET ZERO EMISSIONS BY 2050

June 2022

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Daniel Wild, Director of Research

 **Institute of  
Public Affairs**

# Contents

<b>Introduction</b>	<b>2</b>
<b>The price impact of decommissioning coal-fired power stations</b>	<b>4</b>
<b>Conclusion</b>	<b>9</b>



## Introduction

The policy of net zero emissions by 2050 presents a significant risk to job growth, economic development, and Australia's energy reliability and affordability.

In April, the Institute of Public Affairs published a landmark study, *The Economic and Employment Consequences of Net Zero Emissions by 2050*, which identifies that to reach net zero emissions by 2050, at a minimum, all 89 coal, gas and oil projects currently in the construction pipeline must be cancelled. It was estimated that this could come at a cost of approximately \$274 billion in lost economic output over the next decade and prevent the creation of approximately 478,000 jobs, the majority of which would be in regional Australia.

The significant economic and humanitarian consequences of the policy of net zero emissions by 2050 are already materialising. Net zero is directly responsible for "the rapidly changing conditions in the National Electricity Market" cited by Origin Energy as the reason for the early closure of the Eraring coal-fired power station,<sup>1</sup> Australia's largest electricity provider which is responsible for more than 20% of New South Wales' electricity production.<sup>2</sup>

A more recent report published by the IPA in May 2022, *The Employment Consequences of the Early Closure of the Eraring Power Station*, identifies that job losses from the early closure of Eraring are likely to be at least 40% higher than the originally expected 1,000-job lay-offs in the Hunter Valley region. Moreover, the overwhelming majority of jobs lost will be permanent, full-time, high-paying positions, which are characteristic of jobs in coal mines and coal-fired power generation facilities.

But the consequences of the closure of Eraring as well as the closures of other coal-fired generators will be more widespread.

Under the policy of net zero emission by 2050, six coal-fired power stations are set to close in Australia by 2030. The capacities of these six facilities account for close to half of the total coal-based capacity of the NEM. They also account for over 20 per cent of the total energy capacity of the NEM. The coal-fired power stations due to close are: Yallourn W, Eraring, Bayswater, Liddell, Vales Point B and Callide B.

The purpose of this report is to estimate the impacts that the closures of these six coal-fired power stations could have on wholesale and retail electricity prices by 2030.

To do this, the report undertakes a quantitative event analysis on the wholesale price implications of the closures of the ten coal-fired power generators decommissioned from 2010 to 2020. This is achieved by measuring the average national wholesale electricity price changes in the quarters immediately before and after the closures

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1 Origin Energy (2022, February 17) *Origin proposes to accelerate exit from coal-fired generation*, Origin Energy, <https://www.originenergy.com.au/about/investors-media/origin-proposes-to-accelerate-exit-from-coal-fired-generation/>

2 Eraring is the largest coal-fired power station in Australia if Loy Yang A and Loy Yang B are counted as separate stations.

of the power stations. The results are then extrapolated to provide an estimate of the potential price impact of the closures of the six coal-fired power stations set for decommissioning by 2030. A detailed explanation of the methodology is provided in the body of the report.

Our research estimates that the closures of the six coal-fired generation facilities set to be decommissioned by 2030, in the absence of equivalent replacements in the electricity grid, could result in a 310% increase in wholesale electricity prices by 2030. Since the wholesale component makes up approximately one-third of retail electricity costs, this translates to a 103% increase in retail electricity prices.

This means that a typical Australian family will see its electricity bill more than double as a result of the closures of the six coal-fired power stations under the policy of net zero emissions by 2050.

The average annual electricity bill for a typical Australian family is approximately \$1,600 per year, which is \$400 per quarter. An increase of 103% translates into an average annual increase of \$1,648, which would see the average annual electricity bill increase to approximately \$3,248 per year which is \$812 per quarter. The figures by states are as follows:

- Queensland families face the prospect of a 110% increase in retail electricity bills, rising from \$1,200 to around \$2,500 p.a.
- NSW families face the prospect of a 100% increase in retail electricity bills, rising from \$1,300 to around \$2,600 p.a.
- Victorian families face the prospect of a 95% increase in retail electricity bills, rising from \$1,300 to around \$2,500 p.a.
- South Australian families face the prospect of a 90% increase in retail electricity bills, rising from \$1,700 to around \$3,200 p.a.
- Tasmanian families face the prospect of a 125% increase in retail electricity bills, rising from \$2,000 to around \$4,500 p.a.

In Australia, the average disposable household income in the 2019/20 financial year was \$1,124 per week<sup>3</sup> or \$58,448 p.a. according to the Australian Bureau of Statistics. An annual bill of \$3,248 or a quarterly bill of \$812 will make up 5.6% of the average household disposable income, up from around 2.7% today.

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<sup>3</sup> Gross income minus tax, the Medicare levy and the Medicare levy surcharge, and equivalised for statistical purposes. Based on this, the non-equivalised figure for a family with one child under 15 was \$2,023 and \$2,360 for a family with two children under 15. The non-equivalised figure for a couple without any children was \$1,686.

# The price impact of decommissioning coal-fired power stations

Over the next decade, six coal-fired power stations are scheduled to be decommissioned: Yallourn W in Victoria; Liddell, Vales Point B, Bayswater and Eraring in NSW; and Callide B in Queensland. The combined capacity of these facilities is close to 11 GW and makes up 44% of the total installed capacity of coal-powered generation facilities in the NEM. It makes up 21% of the total capacity of the NEM.

**Table 1: Coal-fired power stations scheduled for decommissioning by 2030**

Generator	State	Exp Closure	Capacity
Liddell	NSW	2023	2000 MW
Eraring	NSW	2025	2880 MW
Yallourn W	Victoria	2028	1450 MW
Callide B	Queensland	2028	700 MW
Vales Point B	NSW	2029	1320 MW
Bayswater	NSW	2030	2640 MW

This study focuses on the impact that the closures will have on the average wholesale price of electricity,<sup>4</sup> changes to which will have a flow-on effect on retail prices affecting households.

To estimate the price impact of the closures of the six coal-fired power stations, we performed a quantitative event analysis on the wholesale price implications of the closures of the ten coal-fired power plants decommissioned between the years 2010 and 2020. The full list of all ten coal-fired power plants decommissioned since 2010 is presented in Table 2.

Specifically, we measured the change in the average national wholesale price of electricity in the quarter immediately prior to and in the quarter immediately following the decommissioning of each station or group of stations decommissioned in the same year.

As can be seen from Table 2, a number of coal-fired power stations closed at around the same time. This makes it difficult to attribute a price change to the closure of a given station. For this reason, we aggregate data arising from the closures of stations decommissioned in the same year. In each case where the data need to be aggregated, the pre-closure average price used as the basis of the price change calculation is the average nationwide price in the quarter immediately preceding the first plant closure of the year; the post-closure average price is the average nationwide price in the quarter immediately following the last plant closure of the year.

<sup>4</sup> Average (nationwide) wholesale price is here defined as the average of wholesale spot prices (per MWh) in the states which participate in the NEM: Queensland, NSW, Victoria, South Australia and Tasmania.

The aggregate reduction in capacity for each year a plant was decommissioned is the sum of the capacities of the plants shut down within that calendar year. For example, the generation capacity removed from the NEM in 2012 was 1,280 MW, comprising of Munmorah's 600 MW capacity, Swanbank B's 500 MW capacity and Collinsville's 180 MW capacity.

**Table 2: List of coal-fired power stations closed between 2010 and 2020**

State	Station	Year of Commissioning	Date of Closure	Capacity
Queensland	Swanbank B	1970-1973	May 2012	500 MW
NSW	Munmorah	1969	Jul 2012	600 MW
Queensland	Collinsville	1968-1998	Dec 2012	180 MW
NSW	Redbank	2001	Aug 2014	143 MW
Victoria	Morwell	1958-1962	Aug 2014	189 MW
NSW	Wallerawang C	1976-1980	Nov 2014	1,000 MW
Victoria	Anglesea	1969	Aug 2015	160 MW
South Australia	Northern	1985	May 2016	546 MW
South Australia	Playford	1960	May 2016	240 MW
Victoria	Hazelwood	1964-1971	Mar 2017	1,760 MW

Source: Senate Environment and Communications References Committee - Retirement of coal fired power stations final report, 2017.

The reason that quarterly rather than annual price changes are analysed in this study is that the shorter-term analysis better enables the identification of the price impact of the closure of a specific coal-fired power station or group of stations. The limitation with an annual price change analysis is that one coal-fired power station is closed each year on average over the decade from 2010 to 2020. Thus, the annual price impact of a given decommissioning will be affected by the decommissioning of the next station.

Price changes following the decommissioning events are added up and subsequently divided by the total amount of coal-powered capacity removed between 2010 and 2020 to arrive at a figure indicating the price increase per MW capacity taken off the NEM. This figure is then multiplied by the amount of capacity to be removed from the NEM by 2030. Doing so provides an expected wholesale price increase associated with the upcoming closures.

**Table 3: Price changes from coal-fired power station closures**

Year	Station/s Closed	Capacity Removed	Pre-closure Quarter	Pre-closure Price/MWh	Post-closure Qtr	Post-closure Price/MWh	Δ Price
2012	Collinsville, Swanbank, Munmorah	1,280 MW	Q1 2012	\$30	Q1 2013	\$66	\$36
2014	Redbank, Wallerawang, Morwell	1,332 MW	Q2 2014	\$48	Q1 2015	\$50	\$2
2015	Anglesea	160 MW	Q2 2015	\$37	Q4 2015	\$54	\$17
2016	Northern, Playford	786 MW	Q1 2016	\$58	Q3 2016	\$70	\$12
2017	Hazelwood	1,760 MW	Q4 2016	\$56	Q2 2017	\$104	\$48

Table 3 above outlines the price change before and after the decommissioning of a given coal-fired power station or group of coal-fired power stations.<sup>5</sup>

We find that for every MW of coal-generated capacity removed from the NEM over the period between 2010 and 2020, average wholesale prices on the NEM increased by approximately 2.2¢/MWh.

The next step is to apply this result to estimate the potential price changes resulting from the closures of coal-fired power stations scheduled for decommissioning in the next decade, which provides the result outlined in Table 4.

**Table 4: Estimating the impact of coal-fired plant closures by 2030**

Generator	State	Exp Closure	Capacity	Exp Δ Price/MWh	Exp %Δ Price*
Yallourn W	Victoria	2028	1450 MW	\$31.9	41%
Eraring	NSW	2025	2880 MW	\$63.4	81%
Bayswater	NSW	2030	2640 MW	\$58.1	74%
Liddell	NSW	2023	2000 MW	\$44.0	56%
Vales Point B	NSW	2029	1320 MW	\$29.0	37%
Callide B	Queensland	2028	700 MW	\$15.4	20%
Aggregated Total			10,990 MW	\$241.8	310%

\* Expected percentage change in price over the average wholesale spot price of electricity since the closure of Hazelwood.

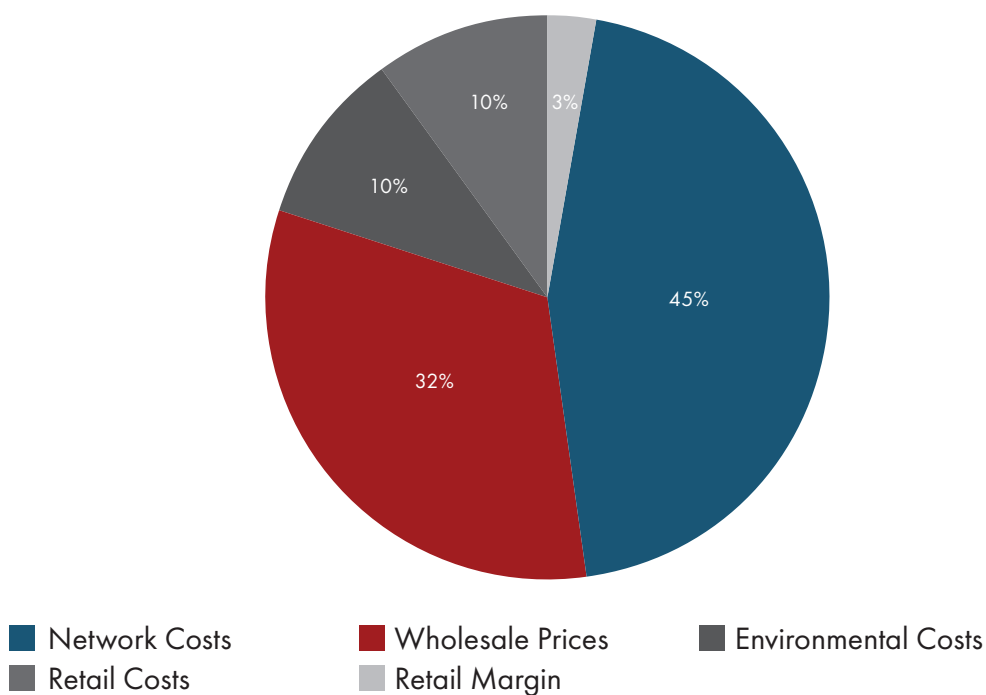
The point of comparison for the expected price increase is the average wholesale price in the five years following the closure of the Hazelwood coal-fired power station in the year 2017.

5 The Tasmanian component of the average national wholesale price of electricity in the first quarter of 2016 was normalised to control for the 2016 Tasmanian energy crisis, which resulted in unusual power disruptions and price increases.

The sum of the expected change in wholesale price, resulting from the decommissioning of the six coal-fired power stations at the centre of this study, is \$242 per MWh. The average nationwide wholesale spot price over the post-Hazelwood years, between the third quarter of 2017 and the fourth quarter of 2021 (inclusive), was \$78 per MWh. The estimated increase represents an increase of 310%.

The wholesale component of the cost of supplying electricity to households amounts to approximately a third, with the rest being made up of network maintenance costs, environmental and environmental compliance costs, retail operational costs and the retail margin.<sup>6</sup> An increase in the wholesale cost of electricity can therefore be expected to increase household electricity prices by 103%.

**Graph 1: Components of retail electricity supply cost to households**



Source: Australian Competition and Consumer Commission

The average annual price of electricity per household in the financial year ending June 2021 was approximately \$1,600.<sup>7</sup> A 103% increase amounts to an increase of \$1,648, which translates to an expected annual electricity bill of \$3,248 per household.

### State by state breakdown

- The sum of the expected change in wholesale price amounts to around a 330% increase in Queensland’s average wholesale price for the relevant period. Queensland households face the prospect of a 110% increase in retail electricity bills, rising from \$1,200 to around \$2,500 p.a.

<sup>6</sup> ACCC (2021, November 22), Inquiry into the National Electricity Market: November 2021 Report, Australian Competition and Consumer Commission.

<sup>7</sup> AEMC (2021, November 25), Residential Electricity Price Trends, Australian Energy Market Commission.



- The sum of the expected change in wholesale price amounts to around a 300% increase in NSW's average wholesale price for the relevant period. NSW households face the prospect of a 100% increase in retail electricity bills, rising from \$1,300 to around \$2,600 p.a.
- The sum of the expected change in wholesale price amounts to around a 285% increase in Victoria's average wholesale price for the relevant period. Victorian households face the prospect of a 95% increase in retail electricity bills, rising from \$1,300 to around \$2,500 p.a.
- The sum of the expected change in wholesale price amounts to around a 280% increase in South Australia's average wholesale price for the relevant period. South Australian households face the prospect of a 90% increase in retail electricity bills, rising from \$1,700 to around \$3,200 p.a.
- The sum of the expected change in wholesale price amounts to around a 370% increase in Tasmania's average wholesale price for the relevant period. Tasmanian households face the prospect of a 125% increase in retail electricity bills, rising from \$2,000 to around \$4,500 p.a.

## Conclusion

The closures of coal-fired power stations scheduled for decommissioning by 2030 will take 11 GW of generation capacity off the NEM, resulting in an expected price upsurge of 310% over the post-Hazelwood national wholesale spot price average. This is expected to increase retail electricity prices by approximately 103%.

In the absence of reliable and affordable replacement baseload power supply facilities in the next decade, consumers can expect to see more than a doubling in their electricity bills as a result of the closures.

The average annual price of electricity per household in the financial year ending June 2021 was around \$1,600. A 103% increase amounts to an increase of \$1,648, which translates to an expected annual electricity bill of \$3,248 for the average household.

The figures by states are as follows:

- Queensland families face the prospect of a 110% increase in retail electricity bills, rising from \$1,200 to around \$2,500 p.a.
- NSW families face the prospect of a 100% increase in retail electricity bills, rising from \$1,300 to around \$2,600 p.a.
- Victorian families face the prospect of a 95% increase in retail electricity bills, rising from \$1,300 to around \$2,500 p.a.
- South Australian families face the prospect of a 90% increase in retail electricity bills, rising from \$1,700 to around \$3,200 p.a.
- Tasmanian families face the prospect of a 125% increase in retail electricity bills, rising from \$2,000 to around \$4,500 p.a.

Australia's average disposable household income in the 2019/20 financial year was \$1,124 per week or \$58,448 p.a. according to the ABS. An annual bill of \$3,248 or a quarterly bill of \$812 will make up 5.6% of the average household disposable income, up from around 2.7% today.

The electricity cost relief promised by an increasing uptake in renewable sources of energy has never come to fruition. Prices are continuing to climb and this, combined with the reliability gap arising from the ongoing pressure faced by the decommissioning of reliable and affordable power stations, is putting unwelcomed additional pressure on Australian households.

# AUSTRALIA'S NET ZERO ENERGY CRISIS: AN ANALYSIS OF THE ELECTRICITY PRICE IMPLICATIONS OF NET ZERO EMISSIONS BY 2050

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