AUSTRALIA'S NET ZERO ENERGY CRISIS

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

June 2022

Dr Kevin You, Research Fellow
Daniel Wild, Director of Research

Institute of Public Affairs

Contents

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,[1] Australia's largest electricity provider which is responsible for more than 20% of New South Wales' electricity production.[2]

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

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 decomissioning 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[3] 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.

3 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,[4] 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.

4 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.[5]

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.

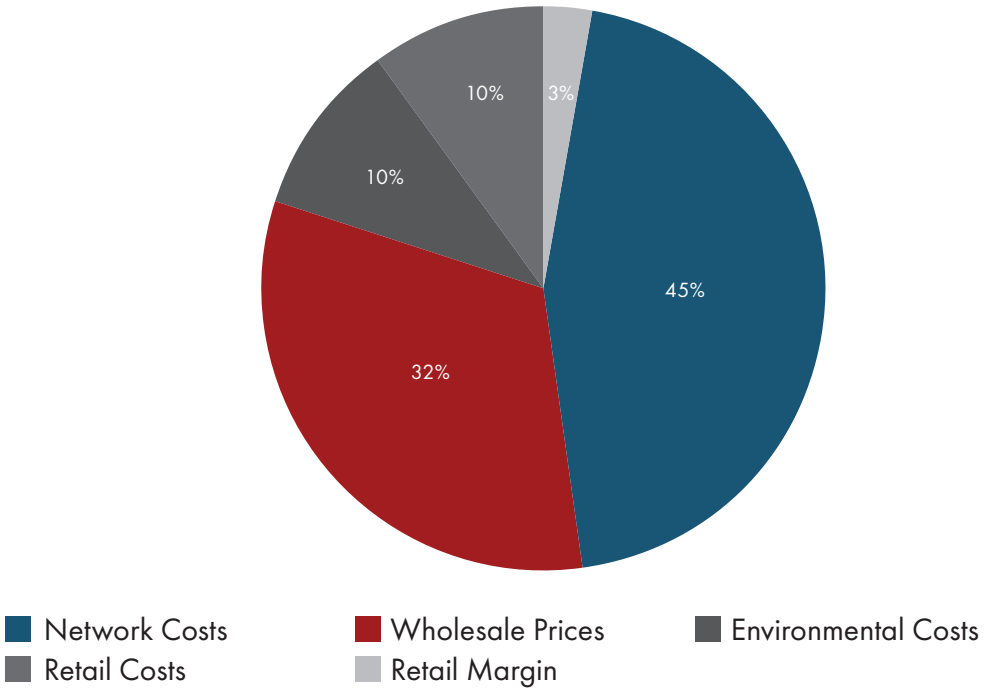
The point of comparison for the expected price increase is the average wholesale price in the five years following the closure of the Hazelwood coal-fired power station in the year 2017.

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.[6] 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.[7] 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.

6 ACCC (2021, November 22), Inquiry into the National Electricity Market: November 2021 Report, Australian Competition and Consumer Commission.
7 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

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, as well as individual 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

Dr Kevin You is a research fellow at the IPA. His background is in the fields of political economy, industrial relations and organisational studies. Prior to joining the IPA, Kevin worked in academia - both as a teacher and research associate. His articles have been published in such periodicals as the Review of Social Economy, Journal of Industrial Relations, Journal of Global Responsibility, Labour and Industry, and International Journal of Employment Studies.

Daniel Wild is the Director of Research at the IPA. 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.


Institute of
Public Affairs