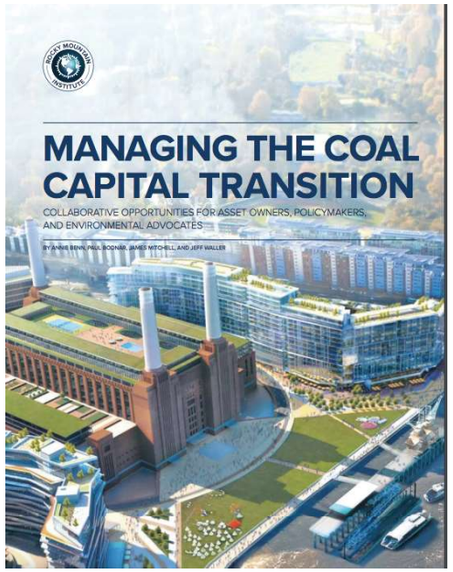
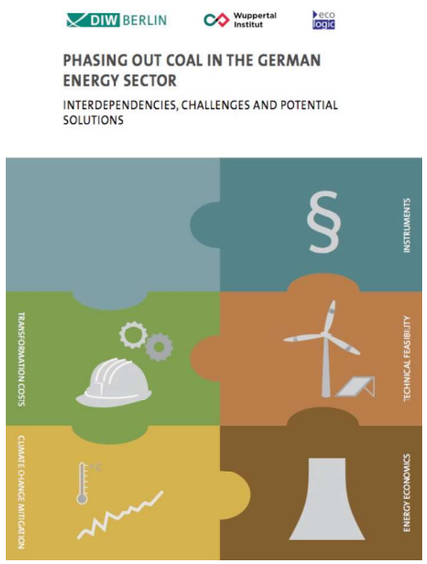
Creating a well managed, just transition from coal fired power to a secure and prosperous zero-carbon economy

Prof John Wiseman, University of Melbourne & ANU

Power and Pollution National Summit, 7 February 2020


MANAGING THE COAL CAPITAL TRANSITION
COLLABORATIVE OPPORTUNITIES FOR ASSET OWNERS, POLICYMAKERS, AND ENVIRONMENTAL ADVOCATES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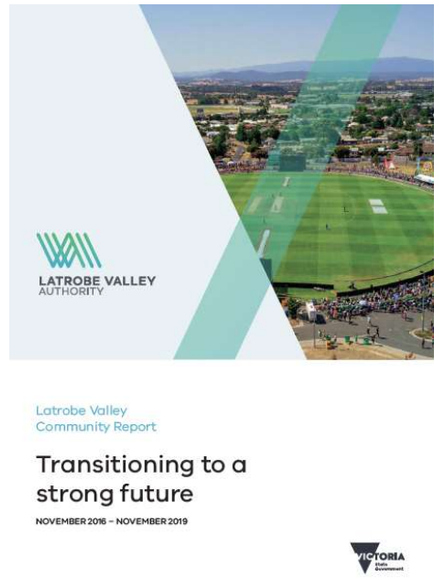
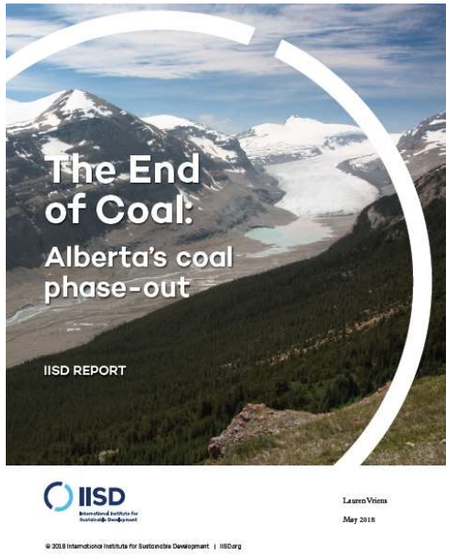
eco logic
PHASING OUT COAL IN THE GERMAN ENERGY SECTOR
INTERDEPENDENCIES, CHALLENGES AND POTENTIAL SOLUTIONS
INSTRUMENTS
TECHNICAL FEASIBILITY
ENERGY ECONOMICS
CLIMATE CHANGE MITIGATION
TRANSFORMATION COSTS

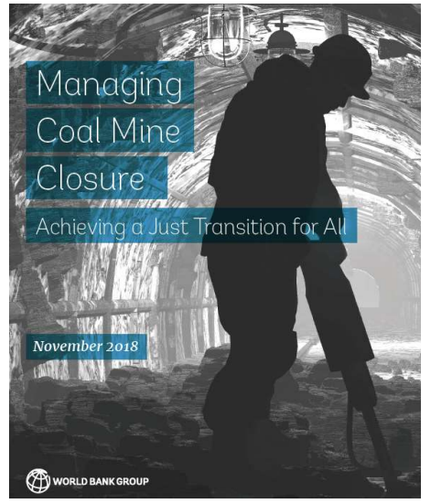

Australian National University
CRAWFORD SCHOOL OF PUBLIC POLICY
Coal transitions in
Australia
Preparing for the looming domestic coal phase-out and falling export demand
2018
Authors
Frank Jotzo, Salim Mazouz, John Wiseman
Climate Strategies
IDDRI
COAL TRANSITIONS

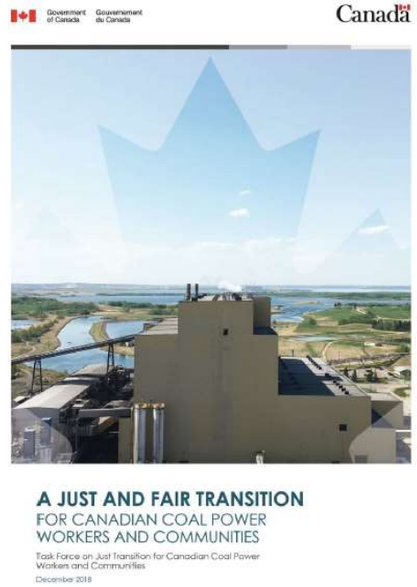

Real People, Real Change
Strategies for just energy transitions
GSI REPORT
IISD
Global Subsidies Initiative

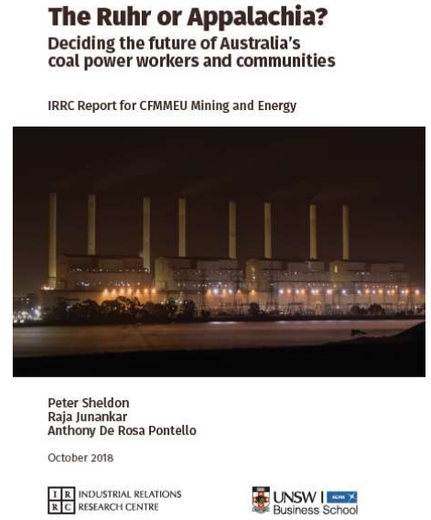

LATROBE VALLEY AUTHORITY
Latrobe Valley Community Report
Transitioning to a strong future
NOVEMBER 2016 – NOVEMBER 2019
VICTORIA


RESEARCH REPORT
Mapping Just Transition(s) to a Low-Carbon World
Including case studies from
Brazil
Canada
Germany
Kenya
South Africa
United States
A REPORT OF THE JUST TRANSITION RESEARCH COLLABORATIVE


The End of Coal:
Alberta's coal phase-out
IISD REPORT
IISD
Lauren Vriens
May 2018


Managing Coal Mine Closure
Achieving a Just Transition for All
November 2018
WORLD BANK GROUP


Government of Canada
Gouvernement du Canada
Canada
A JUST AND FAIR TRANSITION
FOR CANADIAN COAL POWER WORKERS AND COMMUNITIES
Task Force on Just Transition for Canadian Coal Power Workers and Communities
December 2018


The Ruhr or Appalachia?
Deciding the future of Australia's coal power workers and communities
IRRC Report for CFMMEU Mining and Energy
Peter Sheldon
Raja Junankar
Anthony De Rosa Pontello
October 2018
INDUSTRIAL RELATIONS RESEARCH CENTRE
UNSW Business School

A proactive, well planned strategy for managing the just and orderly phase out of coal fired power will achieve far better emission reduction, economic and employment outcomes than an unplanned, reactive approach.

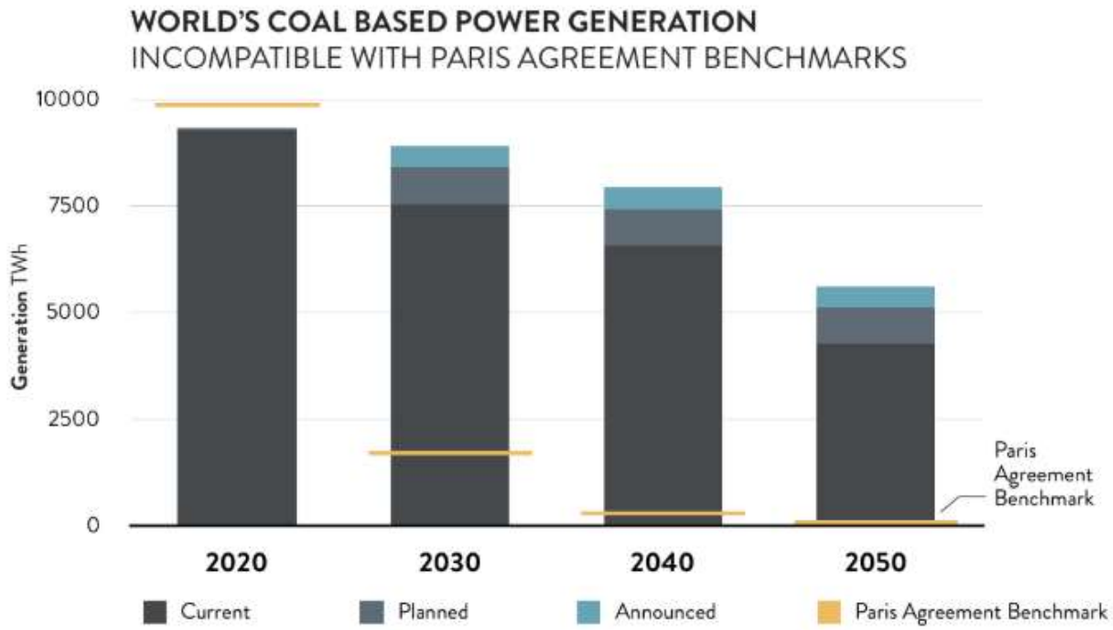
1. A well managed, just transition from coal fired power to renewables is an essential component of emission reductions needed to keep global warming close to 1.5°C.
2. The timetable for closure of Australian coal fired power stations likely to be faster than assumed.
3. Australia's solar and wind resources can, with well targeted investment provide the reliable and affordable electricity required to create high quality jobs in a prosperous zero-carbon economy.
4. Key success factors for a well managed, just transition to a zero-carbon economy include:
   - Proactive, collaborative, well-coordinated planning
   - Respectful and inclusive engagement with workers and communities
   - Well planned, well funded reemployment, retirement and retraining programs
   - Long term policy leadership and investment in economic and social infrastructure
   - Economic and community renewal strategies building on regional strengths

ENERGY TRANSITION HUB

1. A well managed, just transition from coal fired power to renewables is an essential basis for keeping global warming close to 1.5 degrees.

Global and regional coal phase-out requirements of the Paris Agreement: Insights from the IPCC Special Report on 1.5°C

September 2019

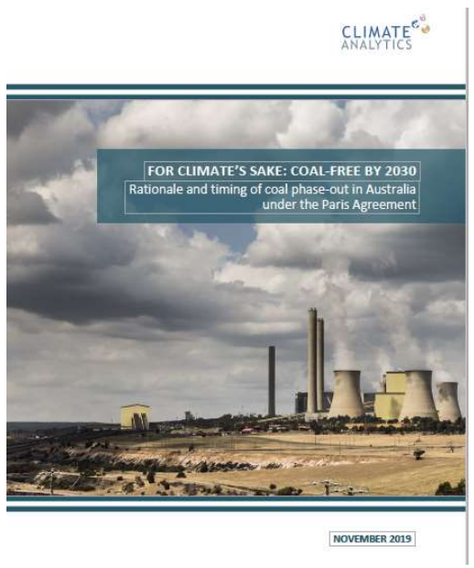


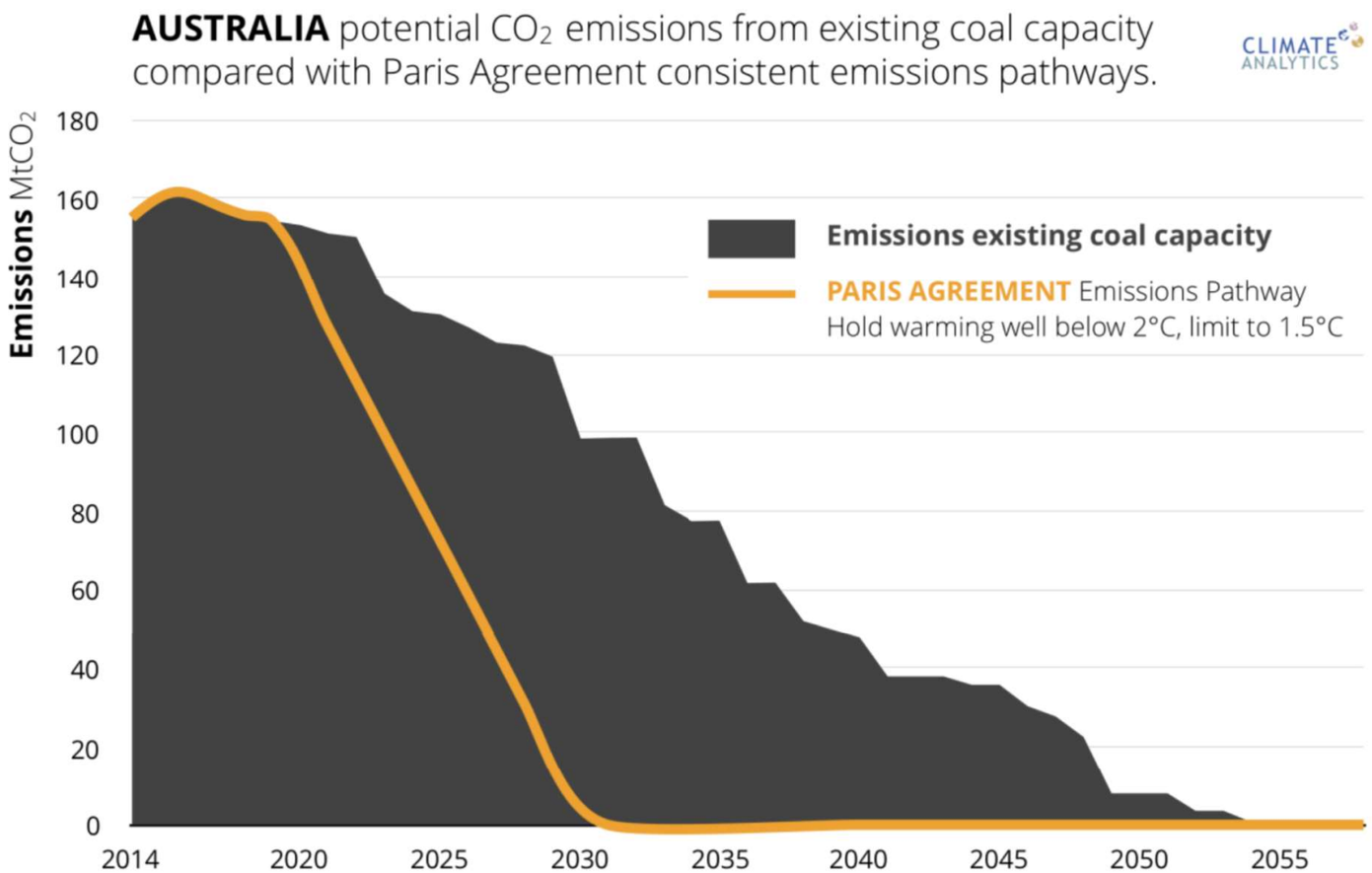
Coal emissions milestones for keeping global warming below 1.5

- Global coal emissions should peak in 2020
- Global coal use in electricity generation must fall by 80% below 2010 levels by 2030
- OECD nations should end coal use entirely by 2030
- All coal-fired power stations must be shut by 2040 at the latest

ENERGY TRANSITION HUB

"Coal power generation is responsible for approximately one third of Australia's total emissions. Ridding its electricity of coal is essential for getting Australia on track to meet its national emissions reduction targets and to fulfil its obligations under the Paris Agreement…."





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There is no strong, resilient Australia without deep cuts to greenhouse gas emissions

An open letter on the scientific basis for the links between climate change and bushfires in Australia.

This open letter is supported by 274 scientists with research expertise across the fields of climate, fire and weather science. This open letter is composed of the full statement, a summary statement, and lists of co-signatories and references. Co-signatures last updated: 00:00 AEST, 3rd February 2020.

The Orroral Fire on the outskirts of Canberra on Tuesday 28th January 2020. Photograph taken by Prof. Eelco Rohling.

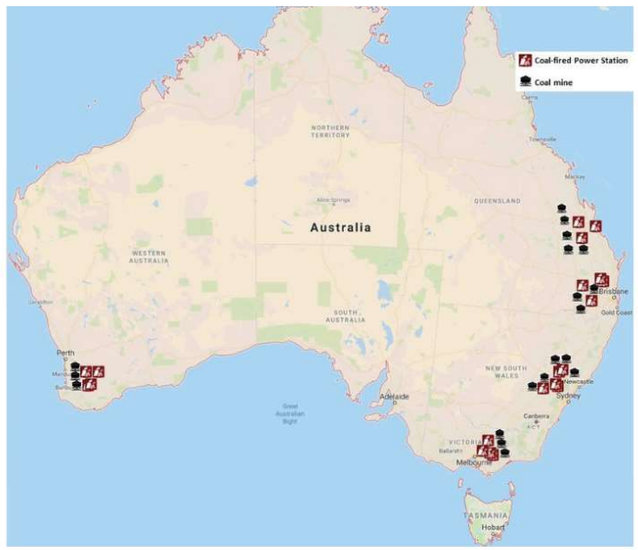
ENERGY TRANSITION HUB

2. The phase out of Australian coal fired power stations is likely to be faster than currently assumed

Table 2 - Recent coal power plant retirements

Power station	State	Capacity (MW)	Year of Closure	Age at time of closure
Morwell	VIC	189	2014	56
Playford	SA	240	2016	56
Hazelwood	VIC	1,600	2017	53
Anglesea	VIC	150	2015	46
Collinsville	QLD	190	2012	44
Munmorah	NSW	600	2012	43
Swanbank B	QLD	480	2012	42
Wallerawang	NSW	1,000	2014	38
Northern	SA	530	2016	31
Redbank	NSW	144	2014	13
Kwinana -C	WA	400	2015	39

Source: (Climate Council, 2018)



Coal-fired power stations in proximity of coal mines in Australia.

Table 1- Australia's grid connected coal power generation plants

Plant	Capacity (MW)	Opening year	Number of units	Combustion technology	Planned retirement	State
Eraring	2,880	1982-84	4	Subcritical	2031	NSW
Bayswater	2,640	1982-84	4	Subcritical	2035	NSW
Liddell	2,000	1971-73	4	Subcritical	2022-23	NSW
Mount Piper	1,400	1993	2	Subcritical	2042	NSW
Vales Point B	1,320	1978	2	Subcritical	2029	NSW
Loy Yang A	2,210	1984-87	4	Subcritical	2048	VIC
Yallourn	1,480	1975, 1982	4	Subcritical	2033	VIC
Loy Yang B	1,070	1993-96	2	Subcritical	2047	VIC
Gladstone	1,680	1976-82	6	Subcritical	2035	QLD
Tarong	1,400	1984 86	2	Subcritical	2037	QLD
Stanwell	1,460	1993-96	4	Subcritical	2043-45	QLD
Callide C	900	2001	2	Supercritical		QLD
Millmerran	852	2002	2	Supercritical		QLD
Kogan Creek	744	2007	1	Supercritical	2042	QLD
Callide B	700	1989	2	Subcritical	2028	QLD
Tarong North	450	2002	1	Supercritical	2037	QLD
Muja	815	1981, 1986	4	Subcritical		WA
Collie	318	1999	1	Subcritical		WA
Bluewaters 1&2	434	2009-10	2	Subcritical		WA
TOTAL	**24,753**		**53**			

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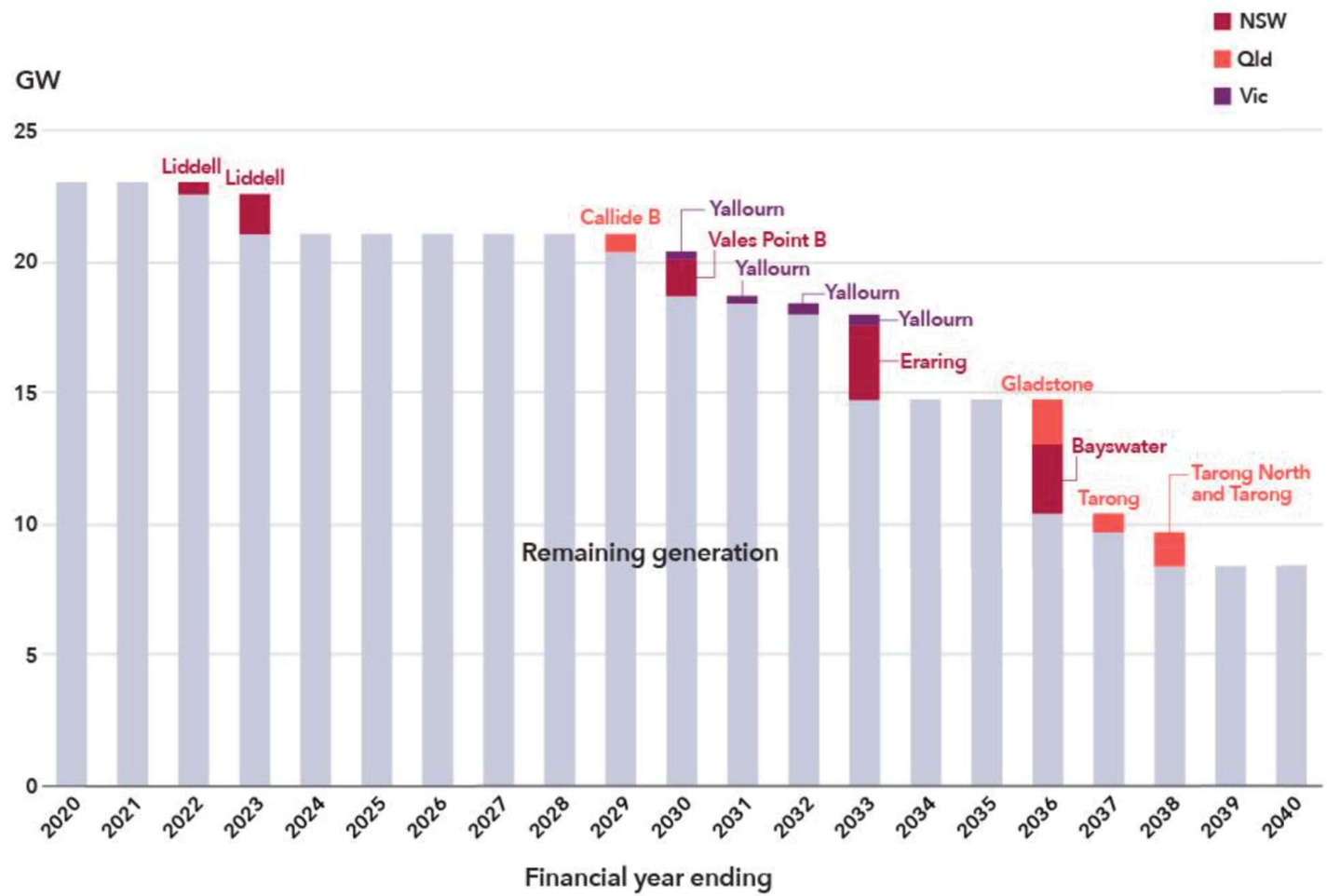
Coal-fired generation remaining as power stations retire

Based on expected closure years provided by participants as of November 2019



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Factors which could accelerate closure of coal fired power stations

Crawford School of Public Policy
Centre for Climate & Energy Policy

Coal transition in Australia: an overview of issues

CCEP Working Paper 1811
Sep 2018

Frank Jotzo
Crawford School of Public Policy, The Australian National University

Salim Mazouz
Crawford School of Public Policy, The Australian National University

John Wiseman
University of Melbourne

With Fergus Green, LSE; Stephanie Campbell, University of Melbourne, Lars Coenen, University of Melbourne; Paul Burke, ANU; Rohan Best, ANU

- Lower overall energy demand
- Reduced demand for coal fired power as renewables increase
- Higher investment, faster innovation and reduced costs in renewable energy and storage
- Higher coal plant operations and maintenance costs
- Lower overall energy price due to increased competition
- Climate policy decisions (eg. explicit or implicit price on carbon)

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"These factors suggest that in future there will be a higher propensity for coal fired power stations to be closed before they reach the end of their originally assumed technical or economic lifetime.

Such closures would then be likely to occur at a point in time when major repairs or refurbishment becomes necessary, unless policy or regulatory mechanisms are in place to facilitate a more predictable exit."

Jotzo, J., Malouz, S. & Wiseman, J. 'Coal Transition in Australia, Centre for Climate and Energy Working Paper 1811, ANU, 2018

Figure 17. Australian coal demand, Moderate Scenario and Faster Scenario

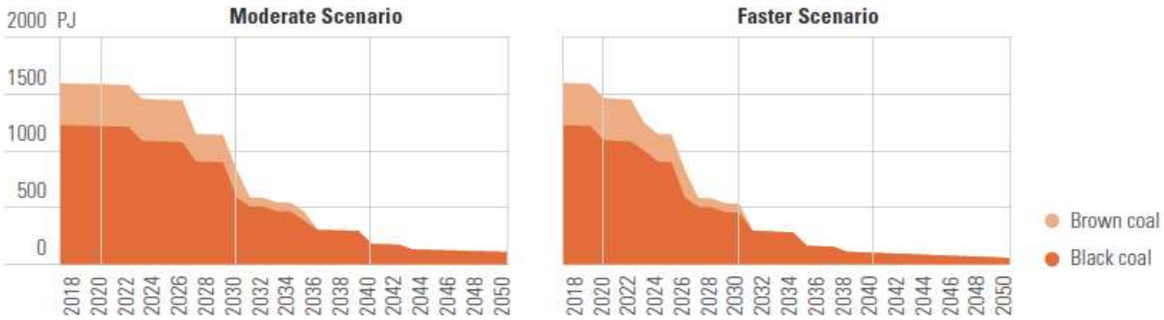
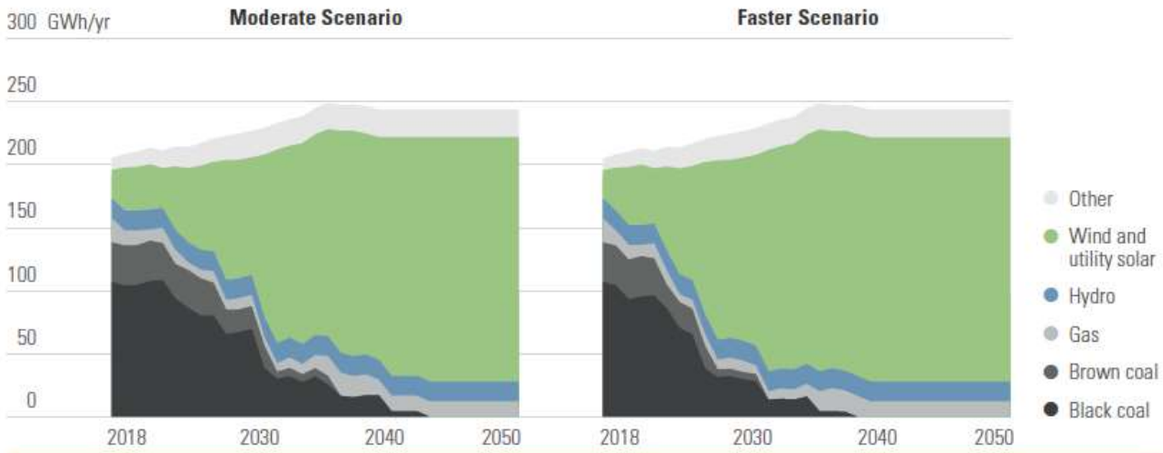


Figure 18. Generation (NEM), MWh, Moderate Scenario and Faster Scenario



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GenCost 2019-20: preliminary results for stakeholder review

Draft for review

Paul Graham, Jenny Hayward, James Foster and Lisa Havas
December 2019

"Our data confirms that while existing fossil fuel power plants are competitive due to their sunk capital costs, solar and wind generation technologies are currently the lowest cost ways to generate electricity for Australia, compared to any other new build technology,"

CSIRO chief energy economist, Paul Graham

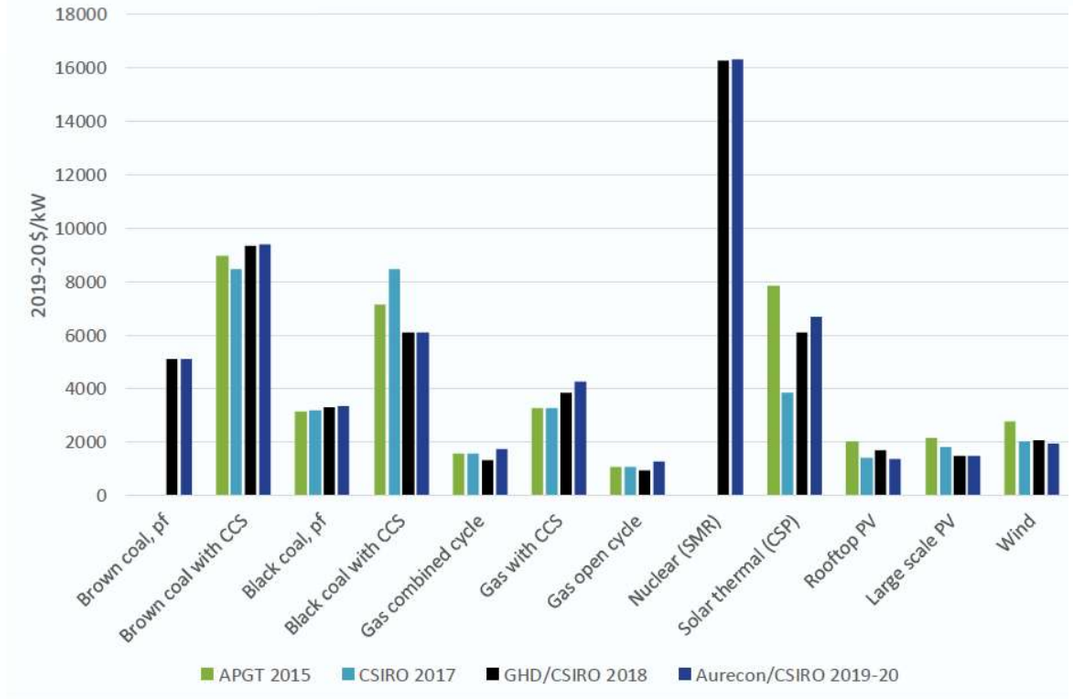
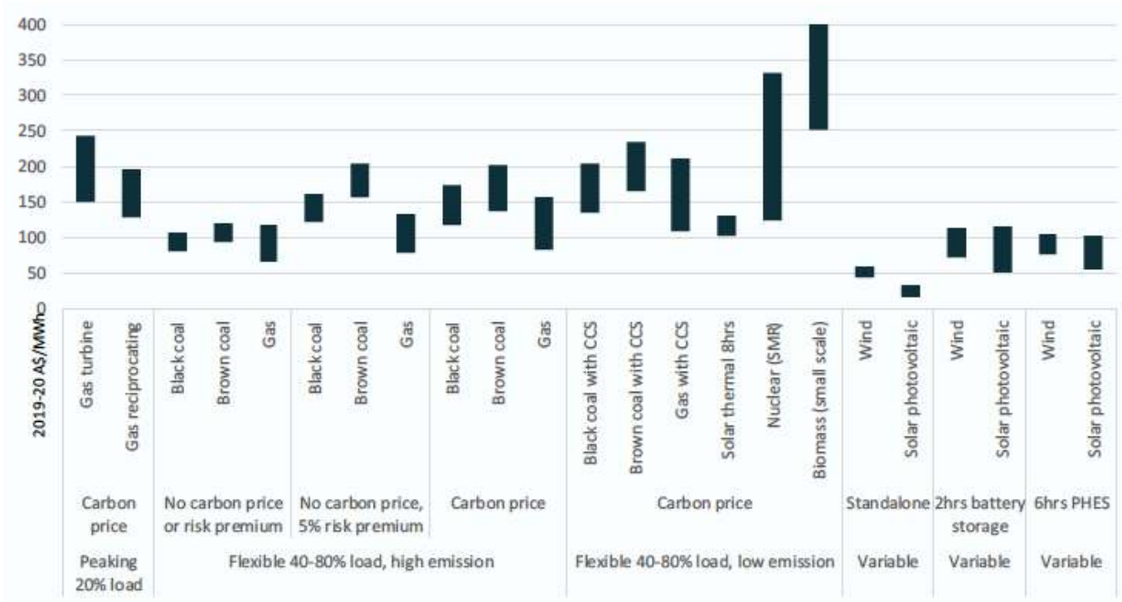


Figure 2-1 Comparison of generation technology capital cost estimates for 2019-20

Figure 4-2 Calculated LCOE by technology and category for 2030



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AEMO: Power system transition scenarios

Central: Pace determined by market forces and current federal and state government policies

Slow Change: Economic growth and emission reductions slow

High DER: More rapid consumer adoption of distributed energy resources

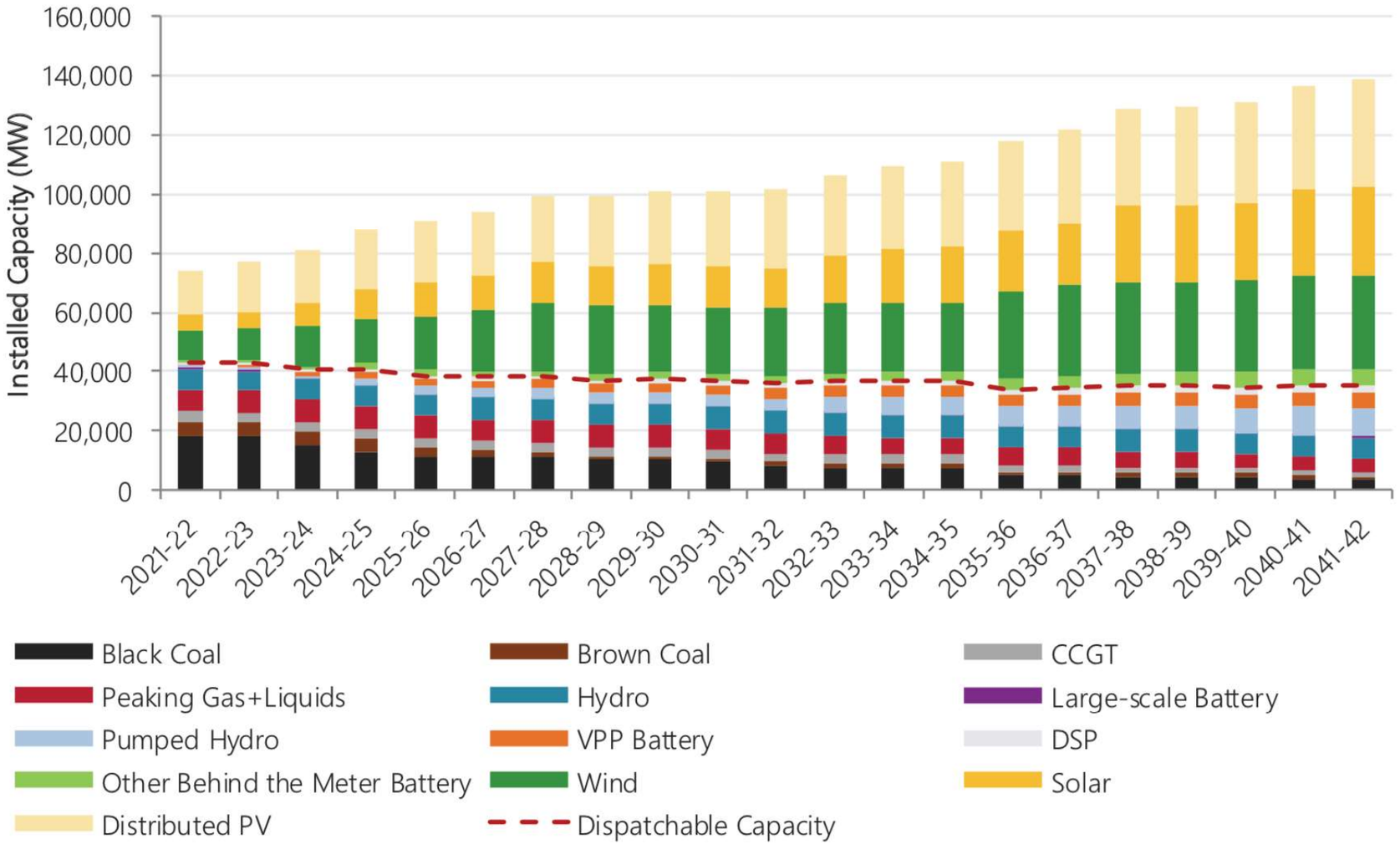
Fast Change: Greater investment in grid-scale technology

Step Change: Consumer-led and technology-led transitions with aggressive global decarbonisation

ENERGY TRANSITION HUB

AEMO Step Change scenario: 89% renewable energy by 2040

Figure 20 Forecast NEM generation capacity to 2041-42, Step Change scenario



ENERGY TRANSITION HUB

AEMO Step Change scenario: 89% renewable energy by 2040

Figure 21 Forecast coal retirements to 2041-42, Step Change scenario

ENERGY TRANSITION HUB

AEMO Step Change scenario: Generation capacity for NEM regions

Figure 24 Forecast annual 'as-generated' generation for each NEM region to 2041-42, Step Change scenario

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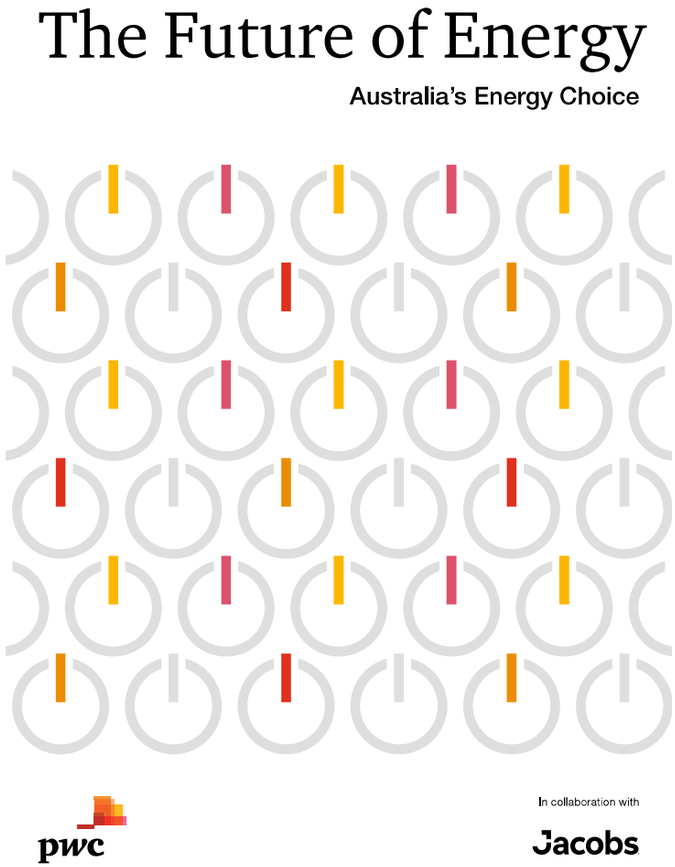
3. Australia's solar and wind resources can, with well targeted investment provide the reliable, secure and affordable electricity supply required to create high quality jobs in a strong and prosperous zero-carbon economy.



"Our findings will surprise many. A power generation mix dominated by renewables by 2040 can deliver reliable and affordable electricity, as well as drive an increase in Australia's economic welfare.

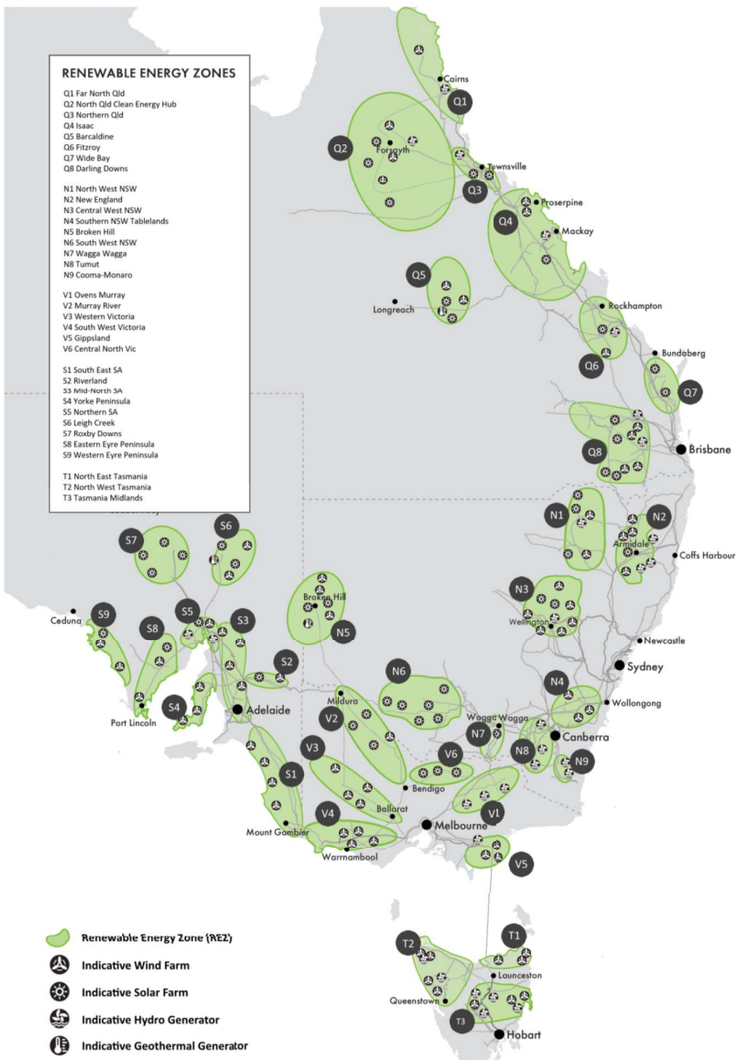
Conversely replacing retired coal-fired thermal plant with new High Efficiency coal plants would result in comparatively poorer economic outcomes.

For Australia to harness the potential economic benefits of moving to a more reliable and renewable future, Australia's supply mix, networks and wholesale market need to undergo a significant and well planned transition."

ENERGY TRANSITION HUB

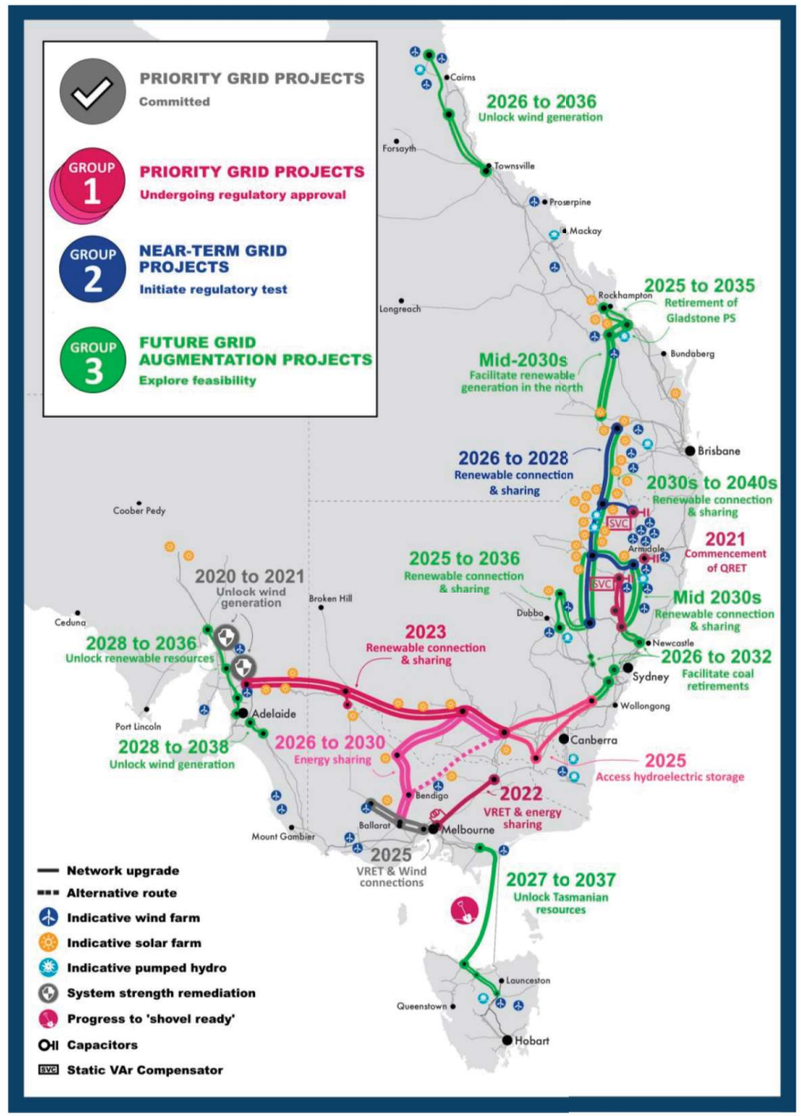
AEMO: Investment priorities for transitioning 80% of Australian energy system to renewables by 2040

Figure 186 2020 ISP Renewable Energy Zone candidates



- Small-scale distributed energy resources to at least double
- 30 GW of new grid-scale renewables
- 21 GW of new dispatchable resources: pumped hydro, batteries, virtual power plants, demand side policies
- Transmission grid augmentation
- Innovative power system services
- Regulatory and market reforms

Figure 127 Summary of the ISP optimal development plan



Maximising high quality employment opportunities in the transition to a zero-carbon economy

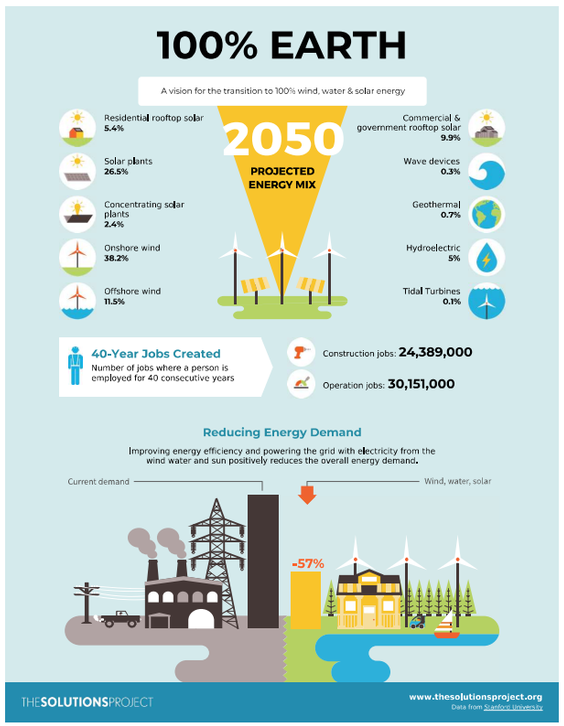
One Earth
Article

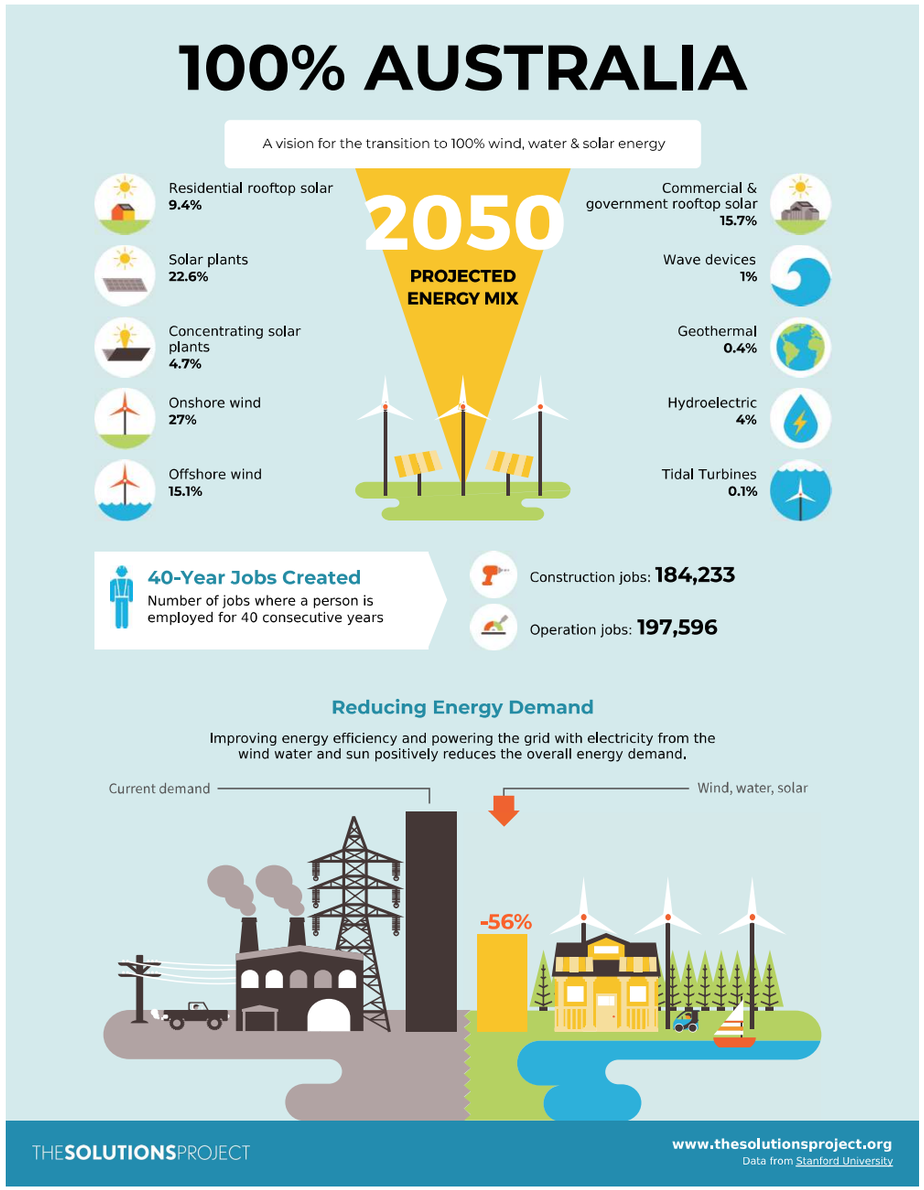
Gold Standard for the Global Goals | 3 tons of CO_2 offset

CellPress

Impacts of Green New Deal Energy Plans on Grid Stability, Costs, Jobs, Health, and Climate in 143 Countries

Mark Z. Jacobson,[1,4,*] Mark A. Delucchi,[2] Mary A. Cameron,[1,3] Stephen J. Coughlin,[1] Catherine A. Hay,[1] Indu Priya Manogaran,[1] Yanbo Shu,[1] and Anna-Katharina von Krauland[1]
[1]Department of Civil and Environmental Engineering, Stanford University, Stanford, CA 94305-4020, USA
[2]Institute of Transportation Studies, University of California at Berkeley, Berkeley, CA 94804-3580, USA
[3]Hivemapper, Burlingame, CA 94010, USA
[4]Lead Contact
*Correspondence: jacobson@stanford.edu
https://doi.org/10.1016/j.oneear.2019.12.003





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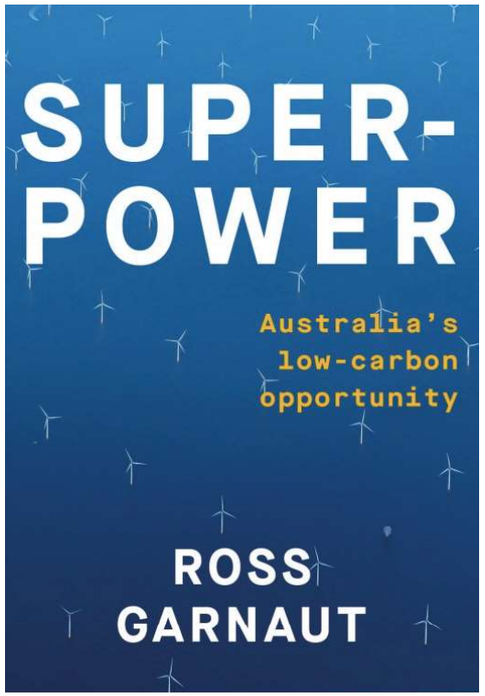


"The fog of Australian politics on climate change has obscured a fateful reality: Australia has the potential to be an economic superpower of the future post-carbon world….

Australia has by far the richest endowment per person of renewable energy resources. This makes us naturally the country with lowest energy costs in the emerging zero emissions world."

Prof Ross Garnaut

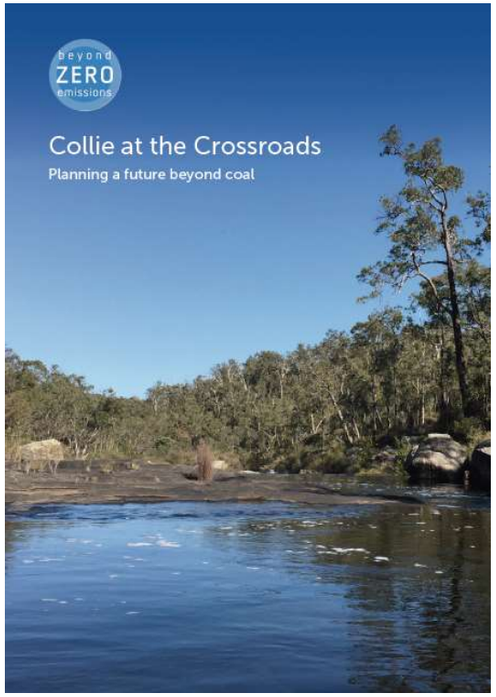
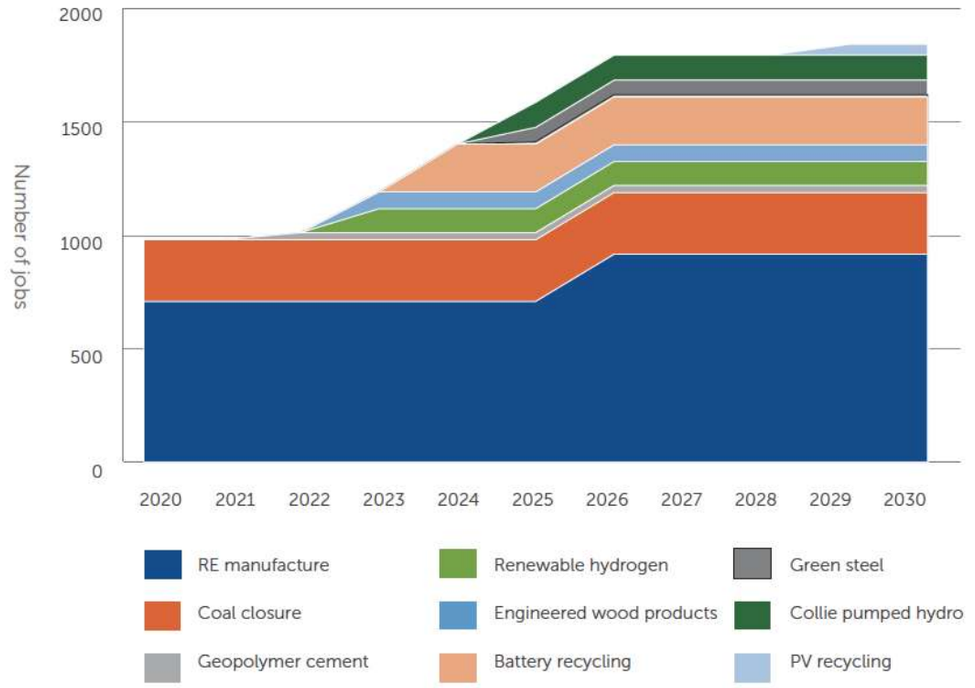


Figure 7: Employment impacts of *Collie at the Crossroads* proposals 2020-30



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Australian National University
Crawford School of Public Policy

ENERGY TRANSITION HUB an Australian-German innovation partnership

Centre for Climate Economics & Policy

Closures of coal-fired power stations in Australia: Local unemployment effects

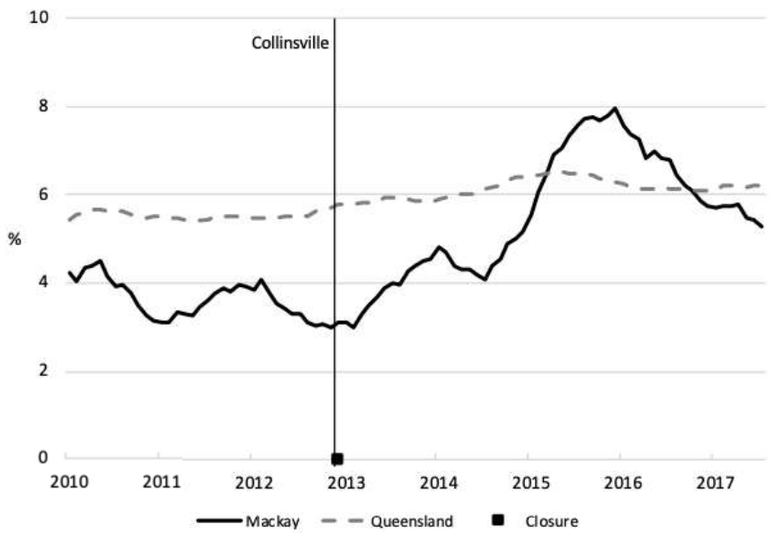
CCEP Working Paper 1809
September 2018

Paul J Burke
Crawford School of Public Policy, The Australian National University

Rohan Best
Department of Economics, Macquarie University

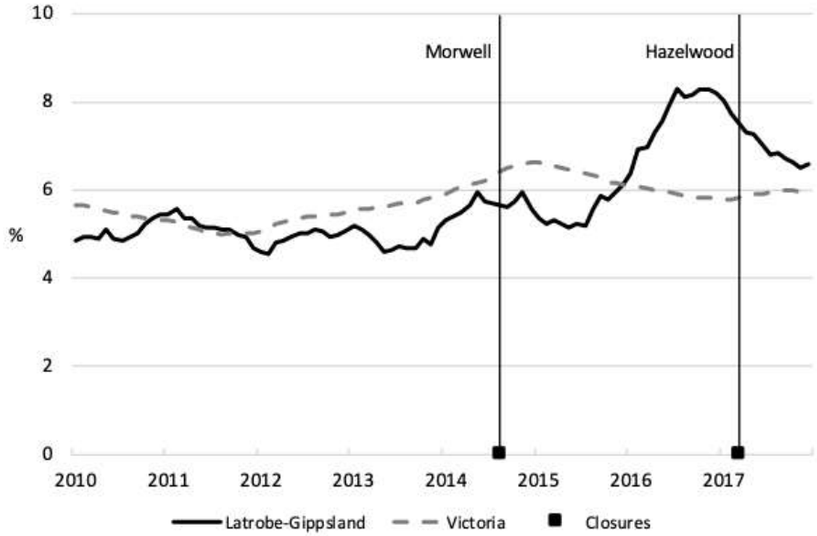
Frank Jotzo
Crawford School of Public Policy, The Australian National University

Figure 8. Twelve-month moving average unemployment rate, Mackay, January 2010–December 2017



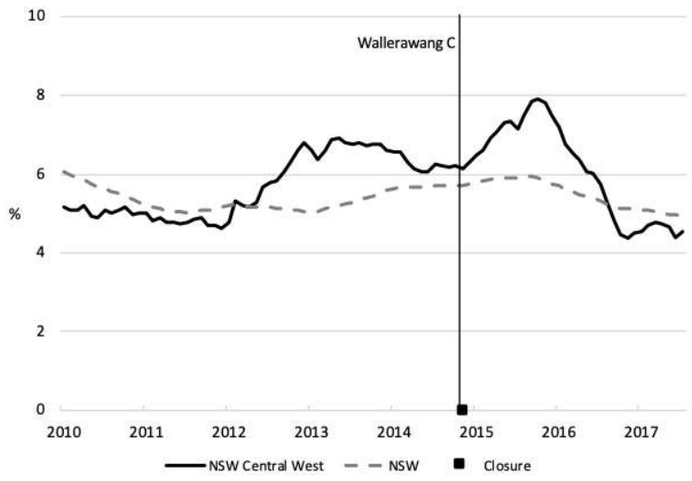
Source: (ABS 2018a).

Figure 6. Twelve-month moving average unemployment rate, Latrobe-Gippsland, January 2010–December 2017



Source: (ABS 2018a).

Figure 7. Twelve-month moving average unemployment rate, NSW Central West, January 2010–December 2017



Source: (ABS 2018a).

LATROBE VALLEY AUTHORITY

Latrobe Valley
Community Report

Transitioning to a strong future

NOVEMBER 2016 – NOVEMBER 2019

VICTORIA
State Government

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Current employment data

Job creation is the result of many factors and is influenced by government and private sector investment as well as wider industry changes.

The overall trend from both a Gippsland-wide and Latrobe Valley perspective indicates consistently that the regional economy has been resilient following the closure of Hazelwood power station, providing a strong basis for future growth and improvement.

Local Government Area unemployment rates

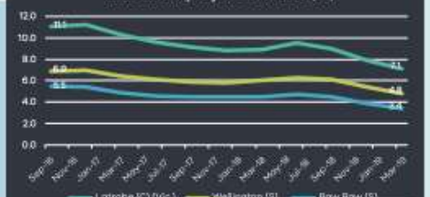
Baw Baw (S)
3.4%
2.1 percentage points
Since Sep 2016

Wellington (S)
4.8%
2.1 percentage points
Since Sep 2016

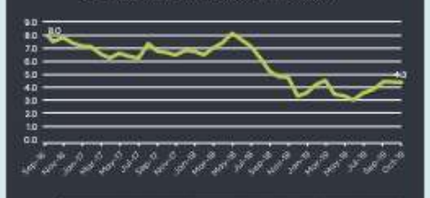
Latrobe (C)
7.1%
4.0 percentage points
Since Sep 2016

Employment
Gippsland
127,000
Employed at October 2019
10,600
Since September 2016

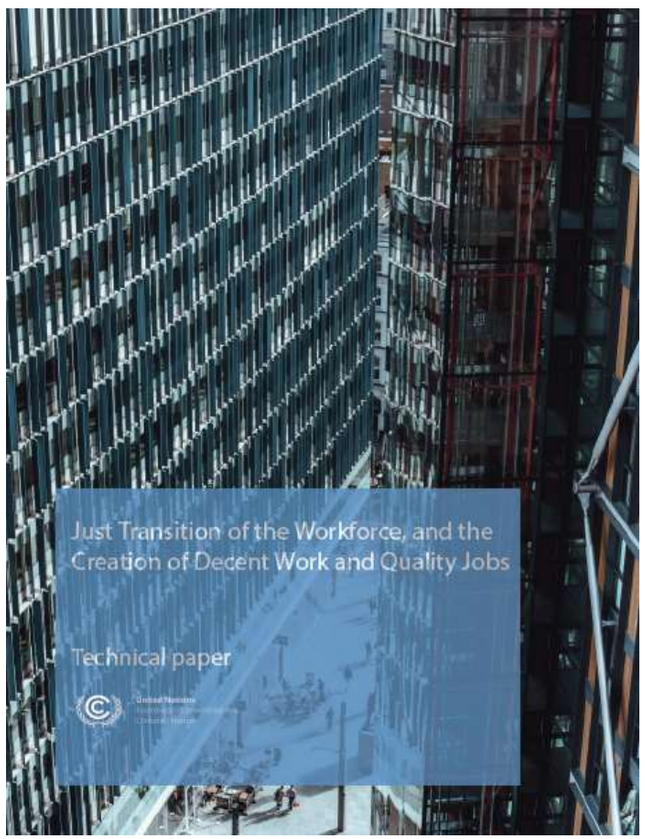
LGA unemployment rates (%)



Gippsland unemployment rate (%)



"The job-creating potential of environmental sustainability is not a given: the right policies are needed to promote green industries while ensuring decent work within them."



"Jobs created in the transition to a low-carbon economy must be 'decent'. This means jobs that provide adequate incomes and social protection, safe working conditions, respect for rights at work and effective social dialogues."

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Hunter
Joint Organisation

Parliament of New South Wales

Committee on Environment and Planning

Committee Manager

Parliament House

6 Macquarie Street

SYDNEY, NSW 2000

By email: environmentplanning@parliament.nsw.gov.au

SUBMISSION: SUSTAINABILITY OF ENERGY SUPPLY AND RESOURCES IN NSW

Hunter Joint Organisation of Councils

Regional Economic Transition Standing Committee

ENERGY TRANSITION HUB

"The Hunter is ideally placed to benefit from the transition to a sustainable low carbon future.

It has the natural assets, infrastructure and skills to become Australia's 'new energy' powerhouse, capitalizing on the global momentum behind clean energy, sustainable food and bio innovation to create new industries, new jobs and a new path to prosperity for Hunter communities."

Key opportunities:

- **Wind generation**
- **Pumped Hydro Energy Storage**
- **Bio-fuels and green chemicals**
- **Hydrogen**
- **Unlocking the potential of mining buffer and rehabilitation land**

Weathering the storm: The case for transforming the Hunter Valley

Neil Perry
Senior Research Lecturer in Corporate Social Responsibility and Sustainability
School of Business
Western Sydney University

Gillian Hewitson
Senior Research Assistant
School of Business
Western Sydney University

January 29, 2018

SCHOOL OF BUSINESS
WESTERN SYDNEY UNIVERSITY

ENERGY TRANSITION HUB

"This analysis outlines a scenario which would see 595 more jobs created than are lost from coal mining and local wages and salaries increase by $35M in 2040

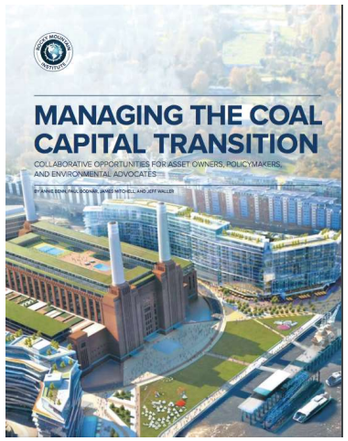
The Hunter can develop more labour-intensive industries than coal mining, providing jobs and income for the region, even as coal production declines.

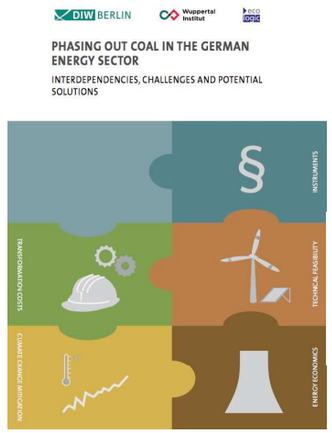
Crucial to such a positive and fair transition coming to fruition is immediate action from governments to establish a transition process that involves all stakeholders, to invest substantial resources in key industries and to prioritise workforce re-training and skills development."

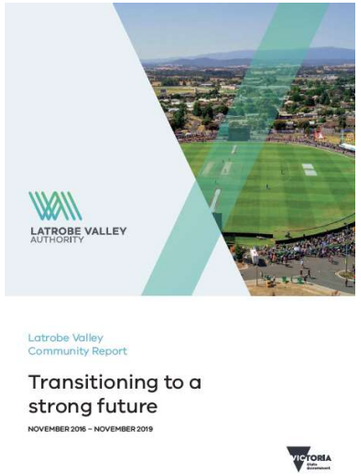
Key opportunities:

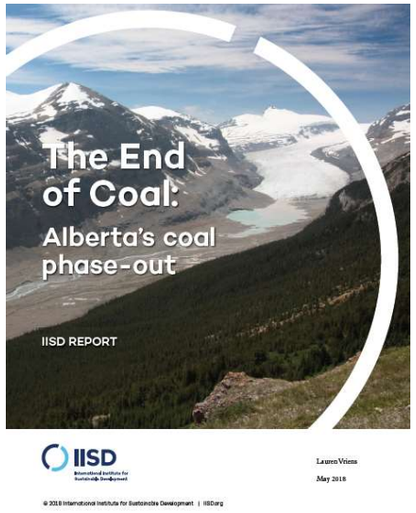
- **Agriculture**
- **Replacement of power stations with renewable energy and storage**
- **Exporting renewable energy products and skills**
- **Tourism, manufacturing, transport and warehousing**
- **Environmental remediation and mine rehabilitation**

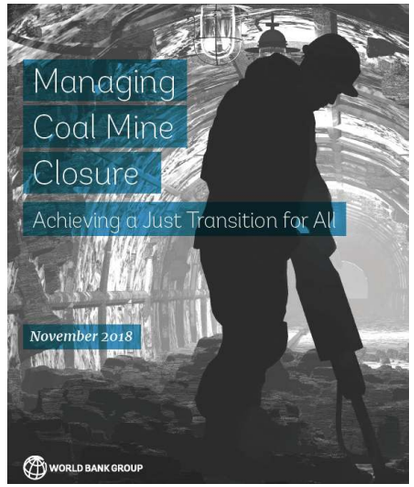
4. Key success factors for a well managed, just transition to a strong and prosperous zero-carbon economy

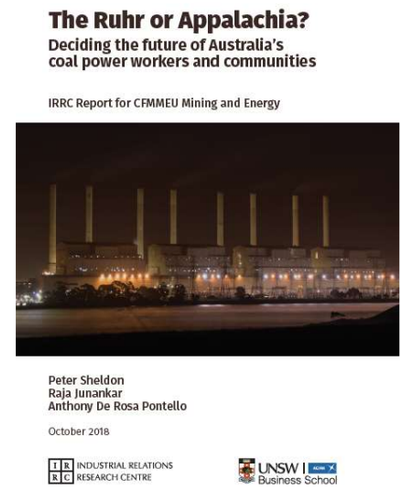












Key success factors for a well managed, just transition to a strong and prosperous zero-carbon economy

- Proactive, collaborative, well-coordinated planning
- Respectful and inclusive engagement with workers and communities
- Well planned, well funded re-employment and retraining programs
- Long term policy leadership and investment in economic and social infrastructure
- Economic and community renewal strategies building on regional strengths

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NEWCASTLE HERALD
newcastleherald.com.au

JANUARY 23 2020 - 6:30PM

Politics, not lack of technology, is holding back climate change action, says Hunter summit speaker

Joanne McCarthy Local News

"The biggest roadblocks preventing implementation of large-scale de-carbonisation strategies at the speed required to prevent runaway climate change are primarily political, not technological"

Post Carbon Pathways Report, 2013

POST CARBON PATHWAYS

TOWARDS A JUST AND RESILIENT POST CARBON FUTURE

Learning from leading international post-carbon economy researchers and policy makers

John Wiseman, Taegen Edwards and Kate Luckins
Melbourne Sustainable Society Institute, University of Melbourne

CPD Discussion Paper
April 2013

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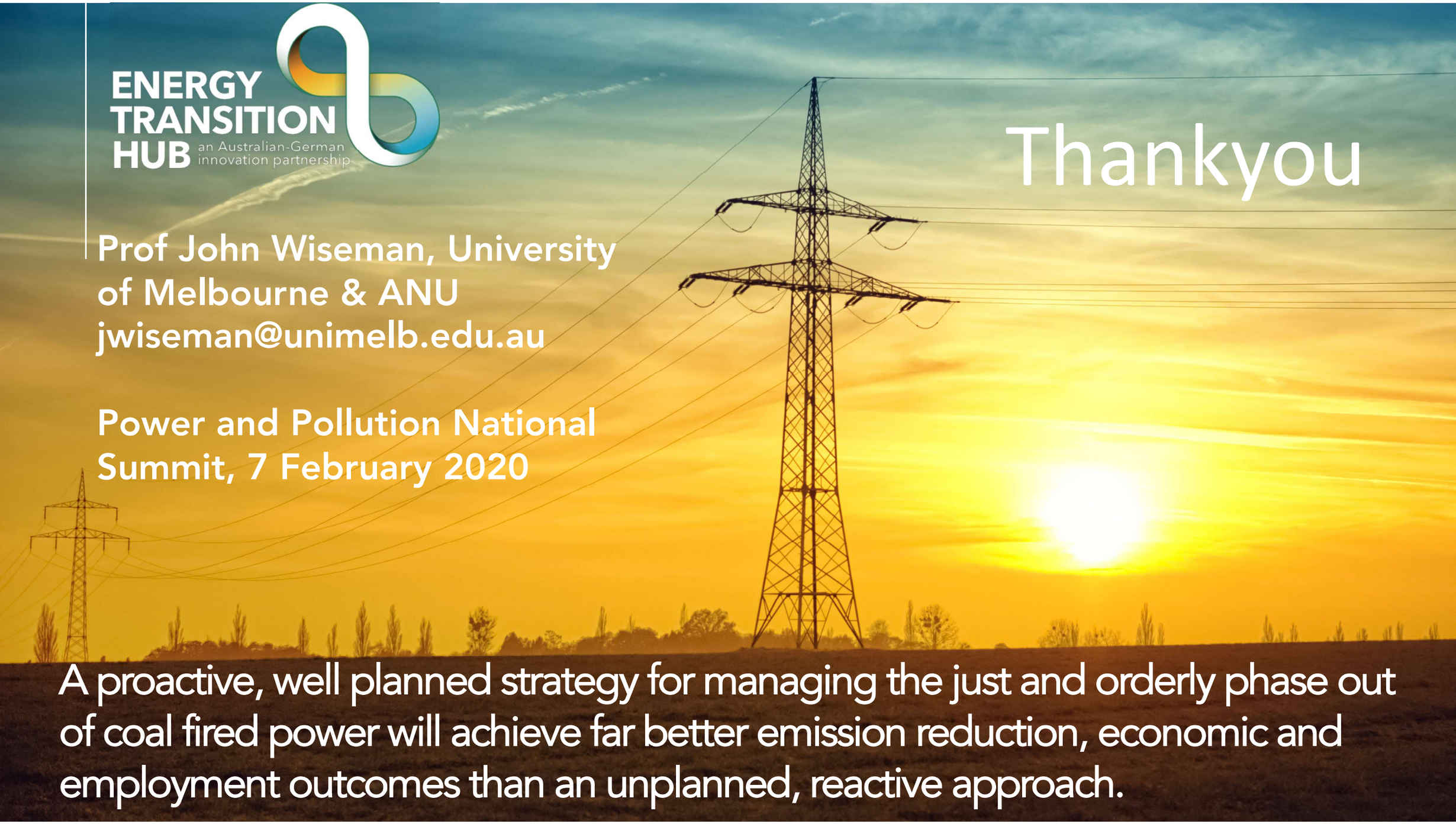
CPD CENTRE FOR POLICY DEVELOPMENT

THE UNIVERSITY OF MELBOURNE MELBOURNE SUSTAINABLE SOCIETY INSTITUTE


ENERGY TRANSITION HUB
an Australian-German innovation partnership
Thankyou
Prof John Wiseman, University of Melbourne & ANU
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Power and Pollution National Summit, 7 February 2020
A proactive, well planned strategy for managing the just and orderly phase out of coal fired power will achieve far better emission reduction, economic and employment outcomes than an unplanned, reactive approach.