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Making the future plausible?

Putting coal industry claims in context

The Minerals Council of Australia has launched a coal-focused ad campaign titled 'Making the future possible'. Some of the claims are not supported by evidence; most are implausible or not persuasive when put in context. The MCA's future for coal implies a future of potentially catastrophic climate impacts.

Rod Campbell
Bill Browne
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SUMMARY

The Minerals Council of Australia (MCA) has released a new advertising campaign titled 'Making the future possible'.[1] The campaign involves two videos and a website promoting mining's role in the Australian economy and the benefits of new coal-fired electricity generators. However, some claims are incorrect and many are misleading, being presented without context and conflating coal with the wider mining industry.

- The "future tech" supercritical power stations that the MCA sees as a "game changer for coal" have been in existence since the 1950s.
- The 4 "supercritical" power plants in Australia have far higher emissions than renewables or gas-fired power. Industry groups say no more will be built.
- The MCA claims that Australian coal exports will be needed in 1,142 "planned or proposed" coal-fired generators. They ignore that 163 of these have recently been cancelled and many others are unlikely to be built.
- Coal is a small employer in Australia. ABS data shows coal accounts for just 0.3% of employment. 99.7% of Australians don't work in the coal industry.
- 100% of the MCA's ads star women. Female employment in Australian coal peaked in 2008 at 15.9%. Since then it has declined to a current rate of 9.5%.
- While mining is a large exporter, only 9% of Australia's exports are thermal coal. 80% of the coal industry is foreign owned, meaning that profits are largely exported too.
- As the mining industry claims to have paid $177 billion in taxes and royalties in the last decade, only a fraction would relate to thermal coal. If accurate, this represents just 4.2% of Australian governments' $4.125 trillion in revenue over this period.
- MCA figures show that the mining industry spends half of one percent of turnover on training. While claiming to "underpin higher education", MCA figures suggest its members contributed 0.009% of the higher education budget, beyond tax and royalty payments, far lower than the training subsidies they received.
- If the world adopts policies to limit climate change to two degrees, coal will account for 20% of Asian electricity in 2040, not 63% as implied by the MCA.

What kind of future is made possible by the MCA and the thermal coal industry? One of rampant climate change. In the meantime, their multinational members make a small contribution to Australia's employment, budgets and education. To top it off,

[1] MCA (2017) *Making the Future Possible* http://www.makingthefuturepossible.info/

their gender balance is declining. It is not surprising these facts are not included in their advertising.

Introduction

The Minerals Council of Australia has recently released a new advertising campaign titled 'Making the future possible'. [2] This briefing note looks at just what kind of future the Minerals Council and its advocacy for the coal industry is really likely to produce.

The campaign features two videos, starring 'Rayleen' and 'Carrie' and online information relating to:

- Future tech
- Australia's energy mix
- Asia's energy mix
- Growth, jobs and exports
- Australia's #1 export industry
- Tax contribution
- Jobs and communities
- Skills, training and innovation

Most of the statistics in the MCA's material are accurate. Almost all are presented without context, or in a context that gives a misleading impression of the role that mining generally, and coal in particular, plays in Australia and the world. This briefing note puts some of these statistics in context.

FUTURE TECH

The Minerals Council site claims that "advanced technology is a game changer for coal". What they mean by coal is thermal coal that is used in power stations, as opposed to higher-quality metallurgical coal that is used to make steel. The steel industry faces its own challenges in a carbon-constrained world, but the MCA is focused only on coal-fired electricity generation.

What the MCA means by 'advanced technology' is 'high efficiency low emissions' (HELE) power plants that operate at temperatures and pressures above what physicists call a critical point. Beyond this point, the behaviours of fluids and gasses change and the plant runs more efficiently, producing energy with lower levels of coal input. The coal industry refers to 'supercritical', and 'ultra-supercritical' power stations that operate at these high pressures and temperatures.

[2] MCA (2017) *Making the Future Possible* http://www.makingthefuturepossible.info/

Excitingly, the MCA site says that "cleaner coal is already here". It certainly is. Supercritical coal-fired power stations have existed since 1957.[3] Some have used pulverised coal since at least the early 1960s, while "ultrasupercritical" power plants have been around since the 1990s.[4]

Unfortunately, even cutting-edge "clean" coal technology is not "low emissions". Oil is less emission intensive than supercritical coal and gas is less emissions intensive than supercritical coal, ultra-supercritical coal and even "advanced ultra-supercritical" coal, which is yet to be commercially deployed.

Figures commissioned by the Australian Energy Market Operator (AEMO) estimate that each megawatt hour of electricity generated by a supercritical coal fired power station produces direct (scope 1) carbon emissions of 0.76 t (black coal) or 0.83 t (brown coal). When indirect emissions (scope 3) are included this would bring the total for black coal to 0.78–0.80 t CO2-e/MW h.[5]

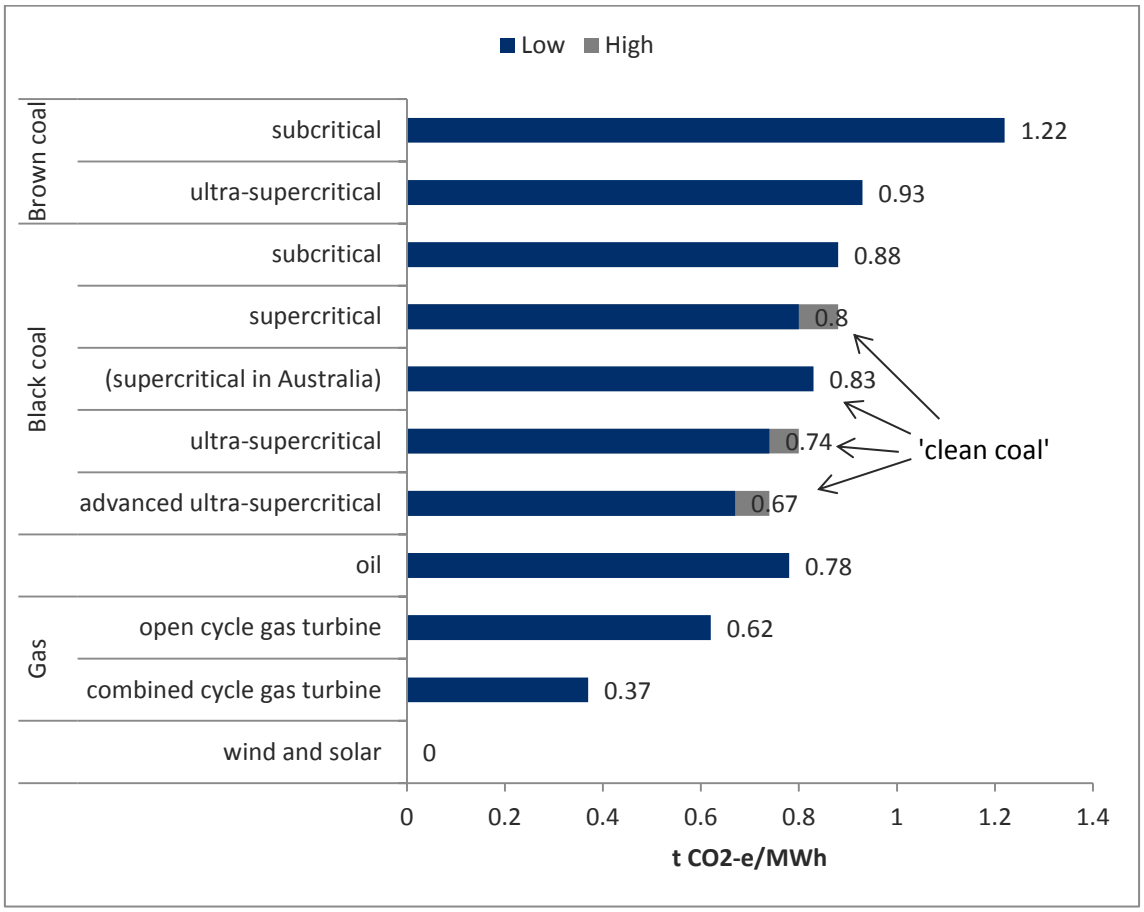
The 'cleanest' coal plants are dirtier than any gas plant, as shown in Figure 1:

[3] American Society of Mechanical Engineers (n.d.) *Philo 6 Steam-Electric Generating Unit*, https://www.asme.org/about-asme/who-we-are/engineering-history/landmarks/228-philo-6-steam-electric-generating-unit

[4] Nalbandian (2009) Performance and risks of advanced pulverised coal plants, http://www.caer.uky.edu/energeia/pdf/vol20_1.pdf

[5] ACIL Allen (2016) *Emissions Factors, Assumptions Guide* https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/National-Transmission-Network-Development-Plan/-/media/76109DEF94684C3C84035625EEC5EFFB.ashx

Figure 1: Emissions intensity of power generators



Sources: Molyneaux (2017) *Is 'clean coal' power the answer to Australia's emissions targets?*; Climate Change Authority (2013) *Analysis of electricity consumption, electricity generation emissions intensity and economy-wide emissions*, p 68;[6] CO2CRC (2016) *Australian power generation technology report,* p 68;[7] Minerals Council of Australia (2017) *New generation coal technology*, p 4;[8] Parliament of Australia (2011) *Performance standards to reduce energy emissions*.[9]

[6] Climate Change Authority (2013) Target Progress Review http://climatechangeauthority.gov.au/files/files/Target-Progress-Review/Analysis-of-electricity-consumption-electricity-generation-emissions-intensity-and-economy-wide-emissions/Australia%20electricity%20and%20emissions%20final%20report%202013%2010%2018.pdf

[7] CO2CRC (2015) *Australian Power Generation Technology Report* http://www.co2crc.com.au/wp-content/uploads/2016/04/LCOE_Report_final_web.pdf

[8] MCA (2017) *New Generation Coal Technology Why Hele Coal-Fired Power Generation Is Part Of Australia's Energy Solution* http://www.minerals.org.au/file_upload/files/publications/Why_HELE_is_part_of_Australias_energy_solution_FINAL.pdf

[9] Talberg (2011) *Performance standards to reduce energy emissions,* Parliamentary Library http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BN/1011/PerformanceStandardsemissions

The MCA site claims that "carbon capture and storage (CCS) is a proven, safe technology used around the world." At the time of writing in February 2017, CCS was only operating on one coal power station in the world. Boundary Dam in Canada was an existing plant retrofitted for CCS. The project cost CAD $1.5 billion, which Brian Toohey describes in the *Australian Financial Review* as "about three times the capital cost of a standard coal plant. It also has higher operating costs".[10] Since then, one additional power station has come online: Petra Nova. Both plants recover some of their costs by selling the captured CO2 to be used to recover more oil from oil wells, which will itself release CO2 emissions when burned.

CCS certainly isn't operating in Australia. That is despite the promise by the Australian Coal Association in 2009 that we will "have commercial scale demonstration plants with carbon capture and storage in operation in Australia by 2015", a commitment that has "the whole G8 behind it".[11] Those plants are nowhere to be seen.

The closest thing Australia has to CCS is the Callide prototype, which operated with carbon capture, but not storage, for less than three years. It cost $245 million and captured 27,000 tonnes of CO2 per annum.[12] While the carbon price operated, an offset of 27,000 tonnes of CO2 was worth about $0.7 million.

CO2CRC, a CCS research centre established by industry and the Australian Government outlines domestic and international CCS coal projects. It lists five projects in the power sector as "Define", "Evaluate" and "Identify", with just one "Under construction" and the aforementioned Boundary Dam as the only "Operational" project. For many of these projects, the cost is "Unknown" or "Not yet finalised".[13]

If CCS does become commercially viable, Australia will still be limited in how much CO2 it can store. Carbon storage capacity would be in high demand from gas plants and industrial processes like steelmaking, cement, industrial chemistry and paper and pulp,

[10] Toohey (2014) *Clean coal dream little more than dust* http://www.afr.com/business/energy/electricity/clean-coal-dream-little-more-than-dust-20141107-11iz1d

[11] ABC (2009) *Ralph Hillman and Richard Denniss join Lateline* http://www.abc.net.au/lateline/content/2008/s2575402.htm

[12] Greig, Bongers, Stott, Byrom (2016) *Overview of CCS Roadmaps and Projects,* University of Queensland http://www.co2crc.com.au/wp-content/uploads/2017/02/WP3_CCS-Roadmaps-and-Projects.pdf p16,
Global CCS Institute (2015) *Callide Oxyfuel Project* http://www.globalccsinstitute.com/sites/www.globalccsinstitute.com/files/content/page/122975/files/Callide%20Oxyfuel%20Project.pdf p1

[13] Greig, Bongers, Stott, Byrom (2016) *Overview of CCS Roadmaps and Projects* http://www.co2crc.com.au/wp-content/uploads/2017/02/WP3_CCS-Roadmaps-and-Projects.pdf

which make up about one-fifth of global emissions and will compete with coal plants for storage space.[14]

The future tech of the MCA either dates back to the 1950s or doesn't exist in a commercial form.

AUSTRALIA'S ENERGY MIX

According to the MCA site 'HELE' coal plants are already here in Australia:

The statement "HELE is *already* making a difference at 4 power stations in Queensland" (emphasis added) implies that HELE technology is likely to be applied to existing or new Australian coal plants in the future. This has been contradicted by industrial generators and electricity consumers. For example, Tennant Reed of the Australian Industry Group says "Electricity sector investors are unlikely to finance a new coal-fired power station in Australia again".[15] There has been little discussion of financing a retrofit of existing stations with cleaner technology.

The key reason investors are not willing to invest in HELE plants is that they are expensive. Ultra-supercritical coal is much more expensive than the electricity Australians are currently buying. Ultra-supercritical coal is expected to cost $80/MWh,

[14] For a consideration of heavy industry in the context of CCS, see: International Energy Agency (2013) *Global Action to Advance Carbon Capture and Storage: A Focus on Industrial Applications,* https://www.iea.org/publications/freepublications/publication/CCS_Annex.pdf

[15] Reed (2017) *Should we be looking at new coal-fired power stations?,* http://blog.aigroup.com.au/should-we-be-looking-at-new-coal-fired-power-stations/

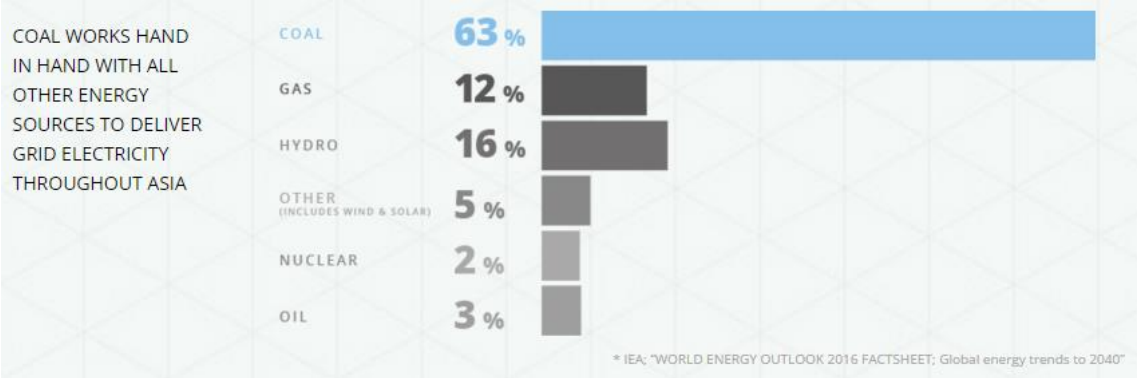
45% more than the current average wholesale cost of electricity.[12, 16] With CCS, there is much uncertainty with current estimates around $155/MWh.[15]

If Australia replaced or retrofitted all 25 GW of current black and brown coal generation with ultra-supercritical generation (at great expense), it would result in a 16% reduction in coal emissions, for a total of a 5% reduction in Australia's overall emissions. Alternatively, we could wait for advanced ultra-supercritical coal (described as 10 to 15 years away, five years ago), which would be a 7.7% overall reduction.[15]

This emissions reduction is, of course, far smaller than is required for Australia to contribute its share to global emission reductions and far less than if renewable technologies are pursued.

ASIA'S ENERGY MIX

The MCA site claims that "growing energy demand especially in Asia needs high quality coal for reliable affordable, energy." This claim is above a chart that purports to come from an International Energy Agency (IEA) factsheet on Global energy trends to 2040:



The claimed source for this chart is the IEA World Energy Outlook 2016 Factsheet. This factsheet does not have this information.[17]

The full edition of the IEA's World Energy Outlook estimates that non-OECD Asia's current power generation is 76% coal, which will fall to 55% under their central (new policies) scenario in 2040. In the situation where the world acts on policy commitments to provide a 50 percent chance of limiting global warming to under 2

[16] Molyneaux (2017) *Is 'clean coal' power the answer to Australia's emissions targets?* https://theconversation.com/is-clean-coal-power-the-answer-to-australias-emissions-targets-71785

[17] IEA (2016) *Fact Sheet: World Energy Outlook 2016*, https://www.iea.org/media/publications/weo/WEO2016Factsheet.pdf

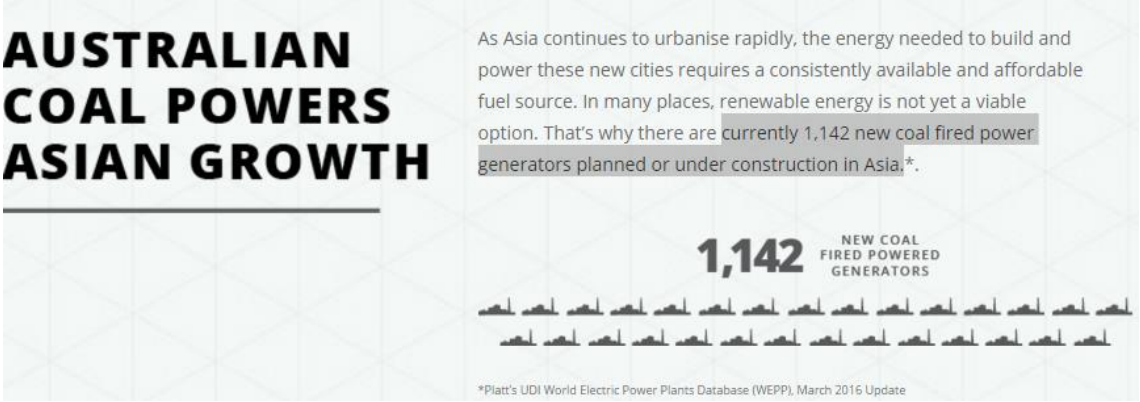
degrees, coal's share of global power generation falls to 20% in 2040, or falls to 67% if no policy change is made.[18]

In the IEA scenario consistent with a 50 percent chance of meeting the agreed two degree limit, existing thermal coal mines are sufficient to meet global demand. No new coal mines are needed; new coal production is inconsistent with the world's climate goals.[19]

If the future in Asia is for 63% of power generation to be from coal, supercritical or otherwise, we are almost certainly heading for a future that tries to ignore climate change, which will result in severe climate impacts. This is the future the MCA wants to make possible.

GROWTH, JOBS, EXPORTS

The MCA site claims that "Australian coal powers Asian growth" and that:



The source of this claim is not publicly available, but we note it is nearly 1 year old. Since that time, China cancelled 163 coal-fired power plants that were planned or under construction: 103 in January 2017,[20] four months after it cancelled 60 plants.[21] 1,142 coal plants may be planned, but in the future, far fewer will be built.

[18] IEA (2016) *World Energy Outlook 2016*, see annex A p594-595, http://www.worldenergyoutlook.org/publications/weo-2016/

[19] Carbon Tracker (2015) *The $2 trillion stranded assets danger zone: How fossil fuel firms risk destroying investor returns* http://www.carbontracker.org/report/stranded-assets-danger-zone/

[20] Forsythe (2017) *China cancels 103 coal plants, mindful of smog and wasted capacity*, https://www.nytimes.com/2017/01/18/world/asia/china-coal-power-plants-pollution.html

[21] Myllyvirta and Mills (2016) *China starts cancelling under-construction coal plants*, https://energydesk.greenpeace.org/2016/10/21/china-coal-crackdown-cancel-new-power-plants/

Almost half of Australia's coal exports are metallurgical coal: 184 million tonnes compared to 200 million tonnes of thermal coal in 2016.[22] Australia's metallurgical coal exports will be largely unaffected by the development or cancellation of Asia's planned coal fired power stations.

AUSTRALIA'S #1 EXPORT INDUSTRY

The MCA claims that "our mineral exports power Australia's economy" and that:

This of course depends on what they mean by "worth" and "our". The Department of Industry's Office of the Chief Economist has forecast that the sale value of resources and energy exports will hit $204 billion this financial year. Thermal coal makes up 9% of this, estimated at $18.3 billion.[23]

However, this gross value doesn't account for the inputs the mining sector used. In value added terms, the ABS estimates that the mining industry created value "worth" $115 billion.[24]

Regardless, Australians do not own most of "our" mining industry, let alone our thermal coal industry, which is around 80% foreign owned.[25] This means that 80% of the profits generated by "our" exports are exported too. Taxes, royalties and employment are the main benefits that Australians get out of our mining industry, not the dollar value of thermal coal exports.

[22] Office of the Chief Economist (2016) *Resources and Energy Quarterly December 2016*, https://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Pages/Resources-and-energy-quarterly.aspx

[23] ibid.

[24] ABS (2016) 5206.0 - Australian National Accounts: National Income, Expenditure and Product, Sep 2016, http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5206.0Sep%202016?OpenDocument

[25] Campbell (2014) *The mouse that roars: Coal in the Queensland economy*, http://www.tai.org.au/sites/defualt/files/The%20Mouse%20That%20Roars%20-%20Coal%20in%20the%20Queensland%20economy.pdf

TAX CONTRIBUTION

The MCA site claims the mining industry paid $177 billion to governments in the decade to 2015-16, citing research likely commissioned by them, conducted by Deloitte Access Economics. It is important to note that around 42% of these payments are royalties. Royalties are not a tax, but a payment to the public to buy the minerals that we own. Claiming royalties as a tax is like a baker who makes bread claiming the flour he/she buys is a tax.[26]

Regardless, $177 billion is a lot of money. However, it needs to be seen in the context of Australian federal and state government budgets.

Federal government revenue in the last decade was $3,261 billion, or $3.3 trillion.[27]

State governments also raise revenue in various ways, in addition to federal government. For example, in 2014-15 State and Territory governments raised $120.2 billion in addition to the $374.3 billion in revenue raised by the Commonwealth, an extra 25%. In 2015-16 the states raised $131.7 billion in addition to the Commonwealth's $388 billion, an extra 33%.[28]

Assuming that state governments raise an additional 25% of Commonwealth revenue, all Australian governments raised $3.3 trillion x 1.25 = $4.125 trillion over the decade. The mining industry's contribution of $177 billion represents 4.2% of government revenue.

Given the mining industry's impressive ability to campaign against efforts to tax it, it is possible that in the future mining will contribute less than 4 cents in every dollar worth of services delivered to Australian people. Thermal coal would be a fraction of this.

JOBS AND COMMUNITIES

While mining jobs are important for particular regions and towns, for Australia overall, mining is a very small employer. The MCA emphasises on its site that mining employs 225,900 people. This is actually slightly lower than the latest ABS data estimates of

[26] It is unclear where the $177 billion figure comes from. In Deloitte (2015) *Minerals industry tax survey 2015*, the decade total is $165 billion. The 42% figure above is based on Table 3.1 Estimated tax payments, minerals sector. The 2016 review does not tally total taxes and royalties. See Deloitte (2015) *Minerals industry tax survey 2015*, http://www.minerals.org.au/file_upload/files/publications/MCA_2016_Tax_Survey.pdf

[27] Calculated from Budget Papers, available at http://www.budget.gov.au/past_budgets.htm

[28] Calculated from state and territory government budget papers, available via Treasury or budget websites for each state and territory.

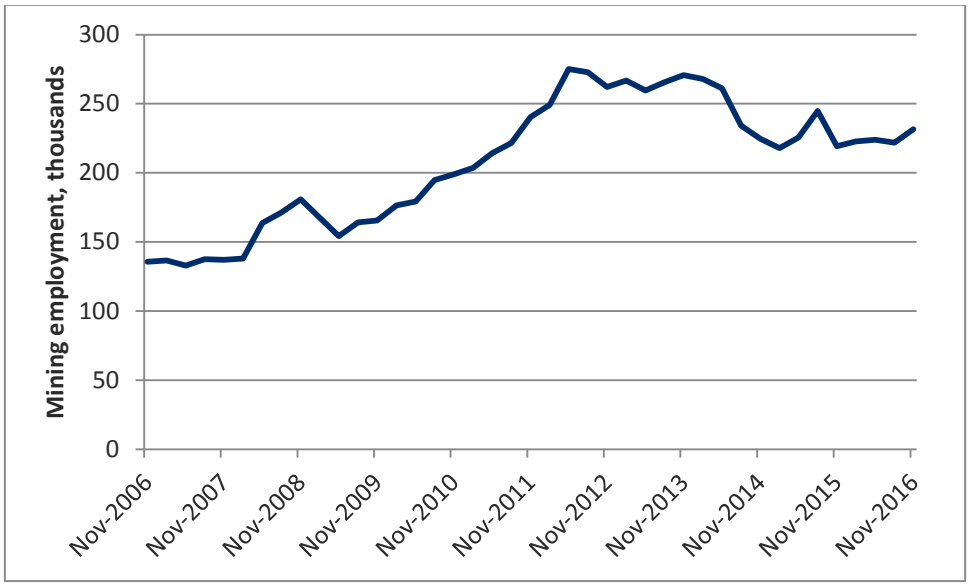
231,600 people. Either way, this represents just 1.9% of the 12 million people employed in Australia.

In other words, 98% of Australians don't work in the mining industry.

Coal is even smaller with just 0.3% of employment: 99.7% of Australians don't work in the coal industry.

The MCA claims that "There are now more than 3 times as many Australians employed in the mining industry compared to a decade ago." This isn't true. ABS data on mining employment is presented in Figure 1 below:

Figure 2: Mining employment in Australia



Source: ABS (2016) 6291.0.55.003 - Labour Force, Australia, Detailed, Quarterly, Nov 2016

Figure 1 shows that while there was a substantial increase in mining employment between 2006 and the latest available data in 2016, this increase was only from 135,700 to 231,600, an increase of 71%. At its peak in May 2012, mining employed 275,200 people, meaning over 40,000 people have lost jobs in the last 5 years – the equivalent of the entire coal industry has been lost since 2012.

Regardless of these variations, mining is a small employer that rarely employs more than 2% of the Australian workforce. This has not tripled in the last decade.

Mining is a capital intensive industry and is likely to become more so in the future, with mine executives like Adani Mining CEO Jeyakumar "JJ" Janakaraj saying:

> We will be utilizing at least 45, 400-tonne driverless trucks. All the vehicles will be capable of automation. When we ramp up the mine, everything will be autonomous from mine to port. In our eyes, this is the mine of the future.[29]

Even today, mine sites are implementing "remote operations", where major parts of the mining operation are conducted from a desk in a town instead of at the mine site.[30] The implementation of automation makes it entirely possible that mining will provide fewer jobs in the future than it does today.

SKILLS, TRAINING AND INNOVATION

The MCA claims that the mining industry invests over $1 billion in training every year. As the site itself points out, this represents around half of one percent of their $200 billion in turnover.

The industry offers very few apprenticeships, which has led to concerns that a skills shortage may arise when older tradespeople retire.[31]

The claim that "mining underpins higher education" is difficult to believe:

$50 million over the 18 years since 1999 represents $2.7 million per year funding for higher education. The MCA's own research suggests the industry receives an annual training subsidy of $26 million, almost ten times its contribution to higher education.[32]

[29] Business Review Australia (2015) *Adani Mining: Investing in Queensland*, http://www.businessreviewaustralia.com/Adani-Mining-Pty-Ltd/profiles/137/Adani-Mining:-Investing-in-Queensland

[30] See for example Australian Mining (2016) *BHP launch coal remote operations centre,* https://www.australianmining.com.au/news/bhp-launch-coal-remote-operations-centre/ and Diss (2015) *Driverless trucks move all iron ore at Rio Tinto's Pilbara mines, in world first,* http://www.abc.net.au/news/2015-10-18/rio-tinto-opens-worlds-first-automated-mine/6863814

[31] See for example Smith (2017) *'Train more apprentices' to avoid skills shortage: union,* http://www.abc.net.au/news/2015-10-18/rio-tinto-opens-worlds-first-automated-mine/6863814

Australian government spending on higher education each year is over $30 billion, so the Minerals Council claim to 'underpin' higher education with $2.7 million per year (0.009%) seems a major exaggeration.[33]

WOMEN IN MINING

Rayleen and Carrie, the stars of the two MCA ads may well be real people. They are not, however, representative of the mining industry in general, or the coal industry. While 100% of the MCA ads feature women in the industry, women make up only 15% of total mining industry employment, 34,900 out of a total of 231,600 people. This compares to 47% women for total Australian employment.[34]

Coal mining has even fewer women. 90.5% of coal mining workers are men. There are just 4,300 women like Rayleen, compared to 40,700 men.[35]

Female employment in Australian coal mining has traditionally been very low. It peaked in at the height of the mining boom in November 2008 at 15.9%. Since then it has declined to a current rate of 9.5%. A future with low and declining female participation is very possible in the Australian coal industry.

CONCLUSION

While the economic importance of Australia's mining industry is often overstated, the industry does make a valuable contribution to the national economy, and provides materials used in almost all other industries. Mining also relies on many other industries – construction, manufacturing, financial services, agriculture, health services, education, etc. The idea that mining alone is "making the future possible", is a simplification and exaggeration.

As well as some claims that are not support by the evidence, the advertising risks misleading its audience by failing repeatedly to put its claims in context. Mining is a small employer, provides a modest contribution to government revenues, and while it is a large export earner, it also exports most of its profits to foreign owners.

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[32] National Centre For Vocational Education Research (2013) *Training and education activity in the minerals sector*, http://www.minerals.org.au/file_upload/files/reports/Final_Report_Minerals_Council_2013.pdf

[33] ABS (2016) *Government Finance Statistics, Education, Australia, 2014-15,* http://www.abs.gov.au/ausstats/abs@.nsf/mf/5518.0.55.001

[34] ABS (2016) *6291.0.55.003 - Labour Force, Australia, Detailed, Quarterly, Nov 2016*, http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Nov%202016?OpenDocument

[35] Ibid

More importantly, Australia's thermal coal industry is placing the future at risk. Coal is a major contributor to climate change and needs to be phased out, no matter what years of propaganda about "clean coal" power stations may suggest.

While it is unsurprising the Minerals Council does not highlight these points, it is disappointing that it seems to work almost exclusively in the interests of the thermal coal industry. It tars the rest of its members with the same brush when it conflates the coal industry with the wider mining industry. This conflation occurs repeatedly in the "Making the future possible" site. More disappointing still is that so many of Australia's politicians seem to believe it.