



Good afternoon ladies and gentlemen. Thank you for joining me this afternoon.

I am very pleased to have this opportunity to talk to you and it is my intention to convince you that, contrary to the opinion of some media and some politicians, coal does matter and will continue to be a major part of the global energy mix for a long time to come.

I am also going to take this opportunity to express my concern for the future of our industry.

A deliberate strategy, over the years, of trying to fly below the radar has left us severely exposed to those who would like to see our industry shutdown.

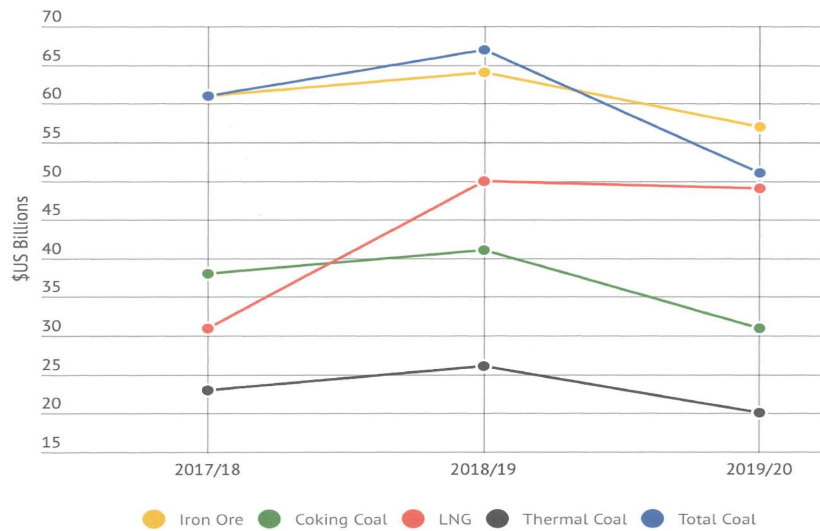
Today, my focus will be on our coal industry but what I am saying applies equally to the resource industry in general and includes both mining and petroleum.

What is particularly galling is our Australian resource industry faces these challenges despite its massive contribution to our nation's economy.

So, let's take a closer look at the contribution to our economy.

In 2018 coal (coking and thermal) was Australia's largest commodity export revenue earner at ~\$66 Billion

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Source: Sydney Morning Herald 21 December 2018

This information, sourced from the Australian Government and reproduced in the Sydney Morning Herald shows the forecast value of exports of coal, iron ore and LNG for the current financial year.

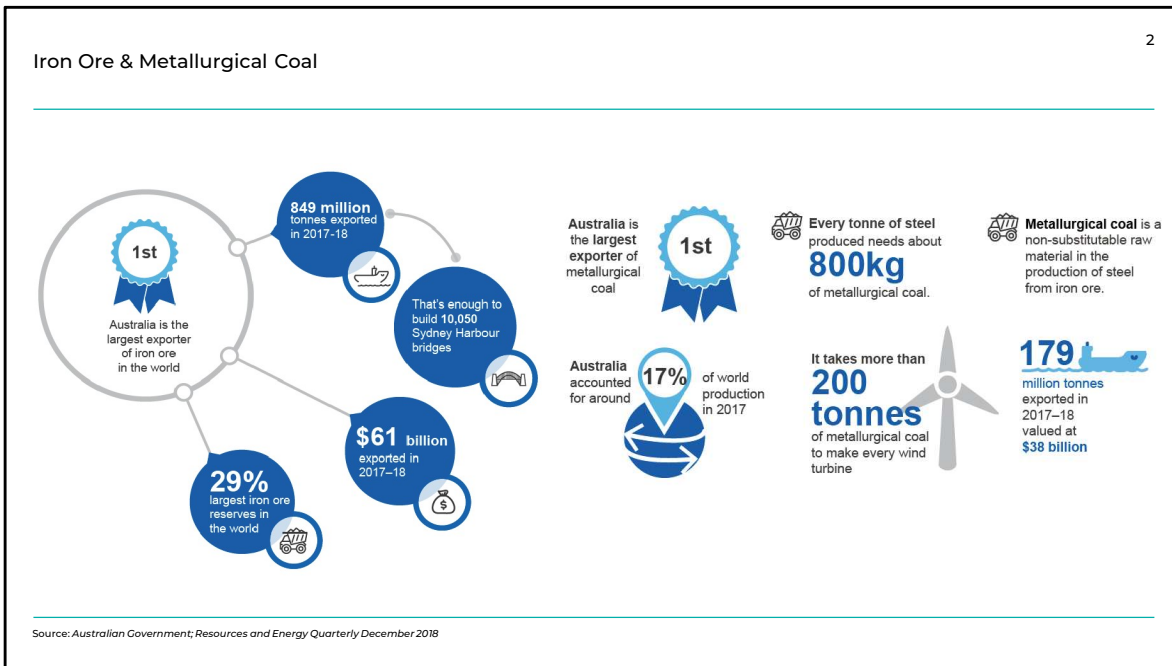
As you can see, the value of coal exports will rise from \$61Bn in FY18 to \$67 Bn in FY19.

Likewise, the value of iron ore exports for that same period will rise from \$61 Bn to \$64 Bn and LNG exports will rise from \$31 Bn to \$50 Bn.

Together, the value of our top 3 mining and petroleum exports for this current financial year is forecast to be \$178 Bn. This is about 67% of our country's total export revenue which is forecast to be \$264 Bn for this financial year.

Indeed, when one takes into account the value of Copper, Aluminium and Alumina, Petroleum and Gold, the resource industry will contribute more than 75% of our total export revenue in this financial year.

Now, let's take a closer look at coal.



Firstly – Met Coal

It is convenient for our opponents to forget that for every tonne of steel produced, at least 1.4 tonnes of iron ore and 800 kilograms of metallurgical coal are required.

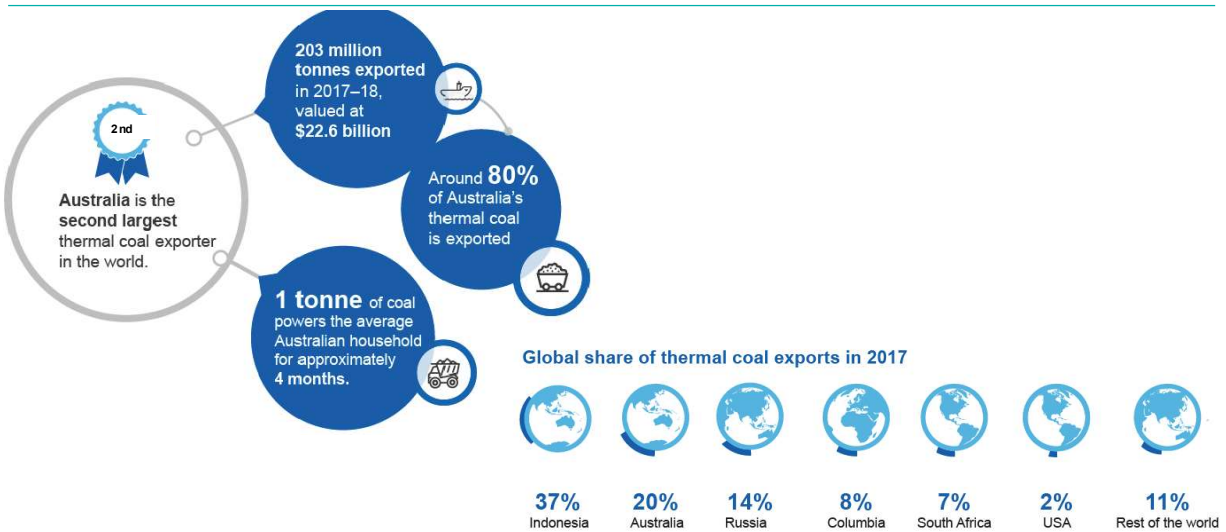
And global steel production will continue to rise with the most notable increases in China, India and Brazil as these economies continue to develop and urbanise.

This all translates into continued and increasing demand for Australian iron ore and metallurgical coal.

And, we should not forget that, increasing calls the world over for more renewable energy will further boost the mining industry, given that metallurgical coal, copper, nickel and cobalt are all essential elements for wind, solar and battery technologies.

In fact, it takes more than 200 tonnes of metallurgical coal to make a single wind turbine.

Thermal Coal



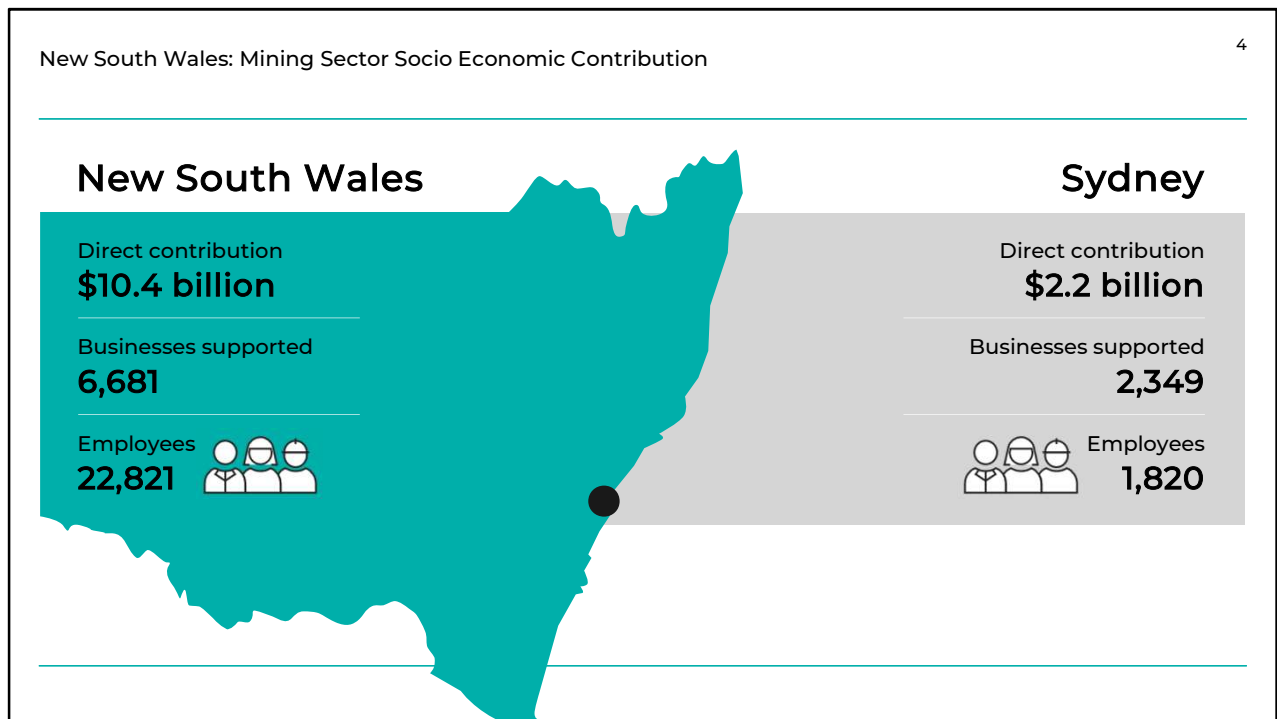
Source: Australian Government; Resources and Energy Quarterly December 2018

If we look at energy or thermal coal, Australia is the second largest exporter having been overtaken by Indonesia.

However, while Indonesia may have increased its global share of thermal coal exports our Australian thermal coal tends to be of a far higher quality.

All credible energy scenarios indicate that thermal coal will continue to play a critical role in providing energy for industry and households – this is particularly true for economies in South East Asia as they continue to develop and urbanise.

In Australia, coal currently provides 70% of our domestic electricity – but more on that later.



Now to most people in the street it's hard to put these export revenue numbers into context and I suspect if we went outside right now and walked down the street, the reaction would be "so what?" or "why does that matter to me"?

This is where our industry has failed.

Where our politicians, NGO activists, the media and social media reduces every issue into a story about a hero, a victim and a villain, our industry has allowed itself to be cast as the villain too often. We have allowed the vacuum, about what we do and how we do it, to be filled by celebrity scientists and radical activists whose purpose is not to seek solutions but to divide and destroy.

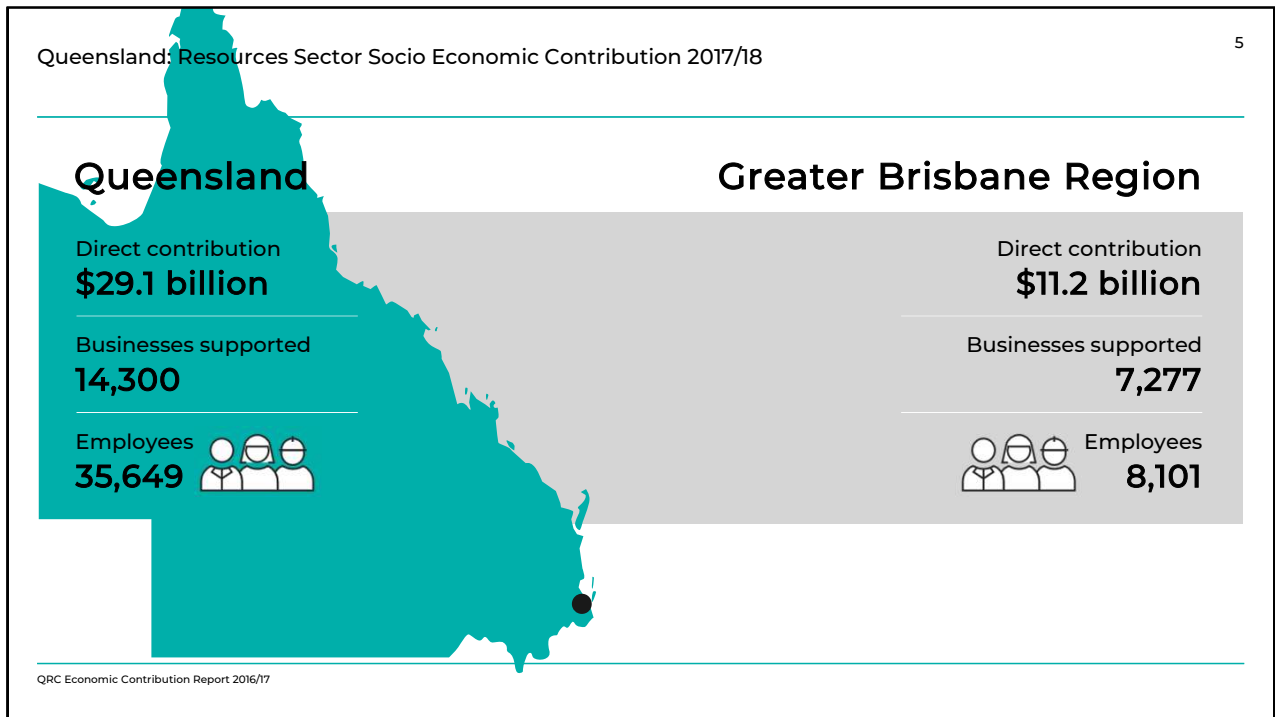
The Australian mining sector should be a source of national pride not just for the 200,000 miners it employs but also for the prosperity it brings for all Australians.

According to the New South Wales Minerals Council, the mining sector in New South Wales, for the 2016/17 financial year, directly contributed \$10.4 billion.

This was made up of:

- \$1.7 Bn to the State Government in the form of royalties, payroll tax etc
- \$2.9 billion in wages and salaries to almost 23,000 employees.
- \$5.9 billion in community contributions and purchases of goods and services from over 6,500 local businesses.

For those in Sydney including Macquarie Street - who think that mining only affects the regions, Sydney benefited from \$2.2 billion in direct spending from the mining sector, employed nearly 2,000 people and supported 2,349 local businesses.



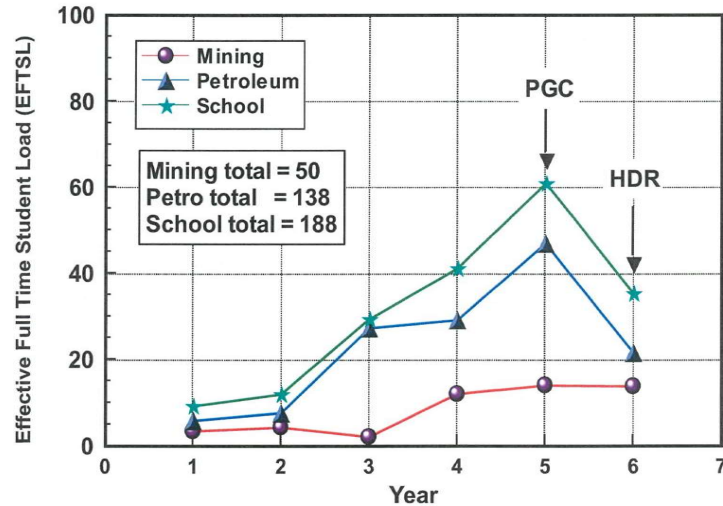
In the sunshine state of Queensland, according to the Queensland Resources Council, the resource sector including CSG, directly contributed around \$29.1 billion in 2017/18. Made up of:

- \$4.4 Bn to the State Government in the form of royalties, payroll tax etc.
- \$5.2 Bn in wages for over 35,000 employees and
- \$19.5 billion in purchases of goods and services from almost 14,300 local businesses.

In the Brisbane region, which is often referred to as Queensland’s largest mining town, our sector directly employs over 8,000 people and made \$11.2 billion in purchases of goods and services from local businesses, community contributions and local government payments.

In 2018, the coal sector alone put over \$3.7 billion in royalties into the state’s coffers but you wouldn’t know it from the near silence coming from the state government in acknowledging the efforts of the thousands of Queensland coal miners.

School of Mineral and Energy Resources Engineering – Student Numbers



Discussion paper - Future resource professionals

How can it be then, that an industry which contributes so greatly to the wealth of the country, can be so starved for university undergraduates that, without the enrolment of international students, our schools of Mining and Petroleum could not survive.

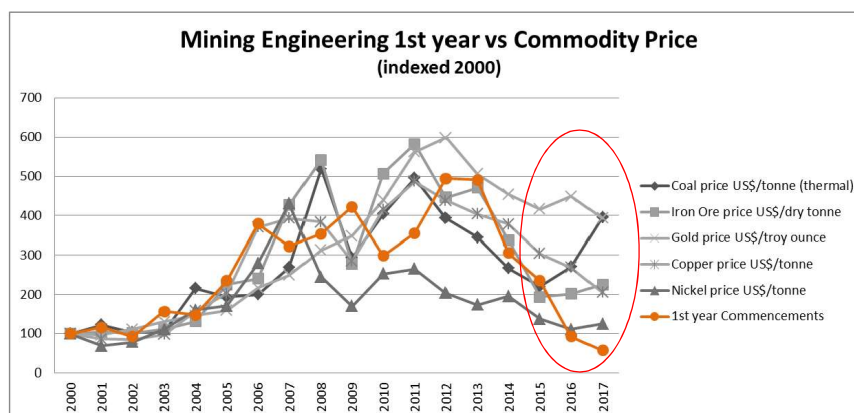
Mining Engineering enrolments have dropped each year for 5 consecutive years and have now plummeted to less than 1/3 of 2013 enrolments.

In fact, in 2018, the University of NSW's School of Minerals and Energy Resource Engineering, which covers both the Mining and Petroleum Schools, had the equivalent of 9 full time students in year 1 and 12 in year 2.

Interest in the Mining and Petroleum disciplines, which peaked during the 2012/13 mining boom, has deteriorated to critical levels ever since.

Student Enrolments and Commodity Prices

- Historically, enrolments in resources related tertiary degrees have followed the boom/bust cycle of the industry
- That relationship has been broken in the last 3 years with persistently low and decreasing enrolment despite positive industry macros



Discussion paper - Future resource professionals

Historically, enrolments in Resource disciplines tended to follow the price cycle, but not any longer.

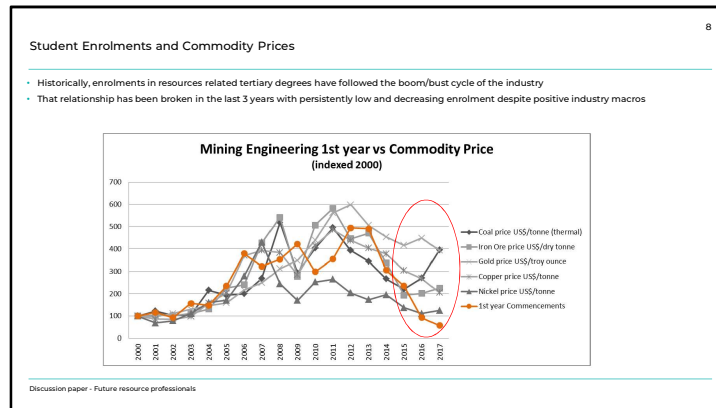
It is worth noting that whilst we may not call the current resource market a boom market, prices for our key commodities are good and providing a sustainable base for our businesses.

Despite the consequent healthy job market, there is little interest by students.

It appears to me that despite the enormous contribution the Resource Industry makes to the Australian economy, there appears to be little genuine appreciation or concern for the well-being of our industry.

School children from a very early age are being conditioned to believe that mining in general is bad and that coal mining and gas recovery, in particular, are very bad.

At the same time, State Governments are reaping a bonanza from surging mining royalties, mainly coal, iron ore and LNG, yet many politicians spend their time denigrating our industry and actively opposing or obstructing its development.



The recent decision by the Land and Environment Court in rejecting the DA for the Rocky Hill mine at Gloucester has set a new precedent in terms of consideration of scope 3 greenhouse gas emissions ; this decision could have ramifications beyond the coal sector.

This is a boon for anti-mining NGOs who care less about the mining jobs and families who ultimately bear the economic consequences.

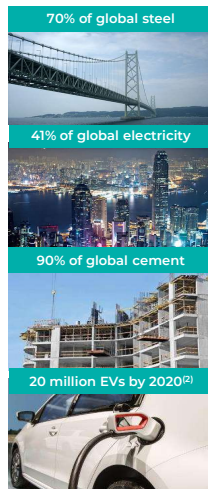
On top of this, the climate change debate has become so illogical that those trying to force a particular course of action are latching onto any disastrous event and trying to blame it on coal.

Senator Di Natalie blamed the recent heat wave and fires in Tasmania on the coal industry and intimated that there was an immediate link between coal mining and the fires. In other words, stop mining coal and the heat waves and fires will stop.

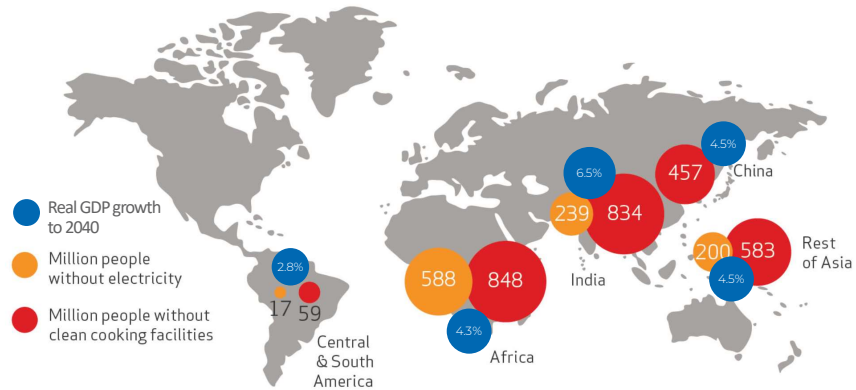
The climate activists even managed to blame the loss of power on the coal fired power stations. Regardless of the fact that parts of our coal power plant fleet in Australia have deferred critical maintenance to literally and figuratively keep the lights on for everyone.

Little wonder our next generation are easily convinced by the negative reporting and hysteria spread rapidly by the mainstream media and social media. The fossil fuel industry is a soft target for activists when we have heatwaves, prolonged droughts, floods and cyclones.

The rhetoric has become so bad that even some of our country's foremost mining companies have divested or are considering divesting their coal interests.



- 1 billion people have no access to electricity⁽¹⁾
- 2.7 billion (40% world) rely on traditional fuels for cooking⁽¹⁾
- Non-OECD projected economic growth of 4.5%; extensive urbanisation still to occur



Notes: (1) International Energy Agency World Energy Outlook 2017. (2) 40% powered by electricity generation from coal, International Energy Agency World Energy Outlook 2017

So, returning to coal where are we today?

Well, based on the latest IEA report, coal is used to produce:

- 70% of the world's steel,
- 38% of the world's electricity and
- 90% of the world's cement

and even today we have 1 billion people who have no access to electricity and 2.7 billion or 40% of the world's population, rely on traditional fuels for cooking.

In 2016, 81% of primary energy demand was from coal, oil and gas.

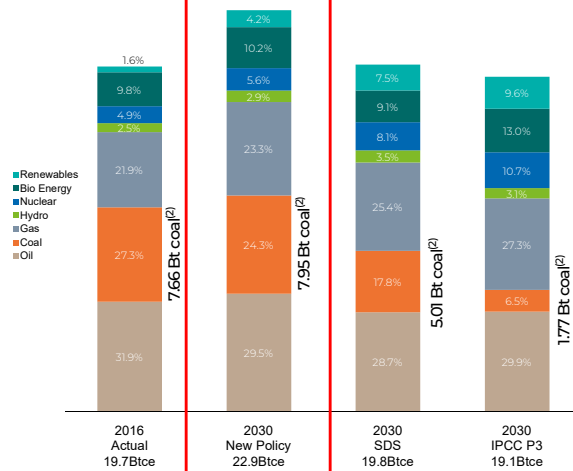
Despite \$2 Trillion of investment since 2010, only 1.6% of primary energy was from renewables.

It is clear that there is a significant gap between the popular climate policy target scenarios and the economic energy reality.

Now, let's take a look at various International Energy Agency and the Intergovernmental Panel on Climate Change scenarios for 2030

- 2016 Actual**
- 81% of primary energy demand from coal, oil and gas
 - 1.6% primary energy from new renewable energy despite \$2.0 trillion investment since 2010
- 2030 New Policy Scenario – Government ambition**
- Energy demand to 2030 still grows by 16%
 - 77% of primary energy demand from coal, oil and gas
 - Includes Paris Agreement Nationally determined contributions (NDCs) and subsequent policy
 - 7.1% of primary energy demand from renewables (including hydro)
- 2030 SDS – required targets to meet Paris Agreement**
- Energy demand in 2030 no higher than today
 - 72% of primary energy demand from coal, oil and gas
 - 11% of primary energy demand from renewables*
 - 21GW pa of CCS capacity must be installed from 2030
- 2030 IPCC – required targets to meet 1.5°C**
- P3 – no or low overshoot
 - middle road scenario in which societal and technological development follows historical patterns
 - BECCS rollout from 2040; 15Gt CO₂/yr by 2080

Global primary energy demand (Btce)⁽¹⁾



The IEA **New Policy Scenario** is their base case which assumes all “Nationally Determined Commitments” (NDCs) are met. In this scenario, energy demand grows by 16% with 77% of primary energy demand met by coal, oil and gas.

Even though coal reduces from current 27.3% of the mix to 24.3% by 2030, the actual amount of coal consumed increases under this scenario.

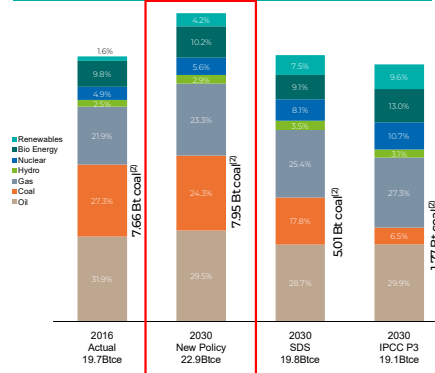
It is important to point out that this New Policy Scenario is based on the assumption that all NDCs are met. However, the developing world’s commitment to the NDCs is only based on them receiving \$100 Bn in compensation from the developed world to assist them with the cost of meeting these NDCs.

To date, only \$1Bn has been committed and the USA which was carrying the lion’s share of the cost has announced it will formally withdraw from the agreement to provide the funds. Without the US, other countries will not contribute and India has pointed out that their commitment is waning in light of the refusal of the developed world to commit the funds.

The IEA **Sustainable Development Scenario** assumes CO₂ emissions are constrained so the global temperature rise by 2100 is limited to 1.5 degrees rather than the original 2 degree target. Importantly, this scenario is reverse engineered based on a carbon budget. In order for this scenario to be met, the IEA has constrained energy demand in 2030 such that it is not higher than today (in other words a large proportion of the global population remains in energy poverty).

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Global primary energy demand (Btce)⁽¹⁾



2018 Sell-side analyst site visit - Coal ESG Notes: (1) Source: IEA WEO 2017 and IPCC SRES (Oct 2008). Btce: billion tonnes of coal equivalent – standardised coal quantity using coal with energy content of 7000kcal/kg or 29.31 GJ/t (2) Physical tonnes. SDS: Sustainable Development Scenario

None-the-less, in 2030, 72% of primary energy demand is still met by coal, oil and gas.

Renewables contribute only 11% to primary energy demand.

An important aspect of this scenario is that the IEA analysis indicates that 21GW of CCS capacity must be installed by 2030.

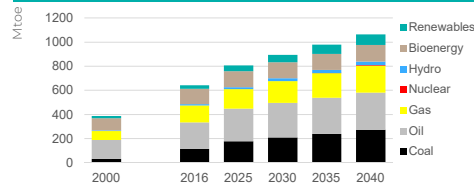
The IPCC’s P3 scenario is similarly reverse engineered and includes the assumption that the consumption of meat and meat products are substantially reduced and that Australia’s livestock herd are wiped out. It also does not allow for the urbanisation and access to 24/7 power in the developing world.

In my view, none of these scenarios are realistic. The most realistic is some variant of the **New Policy Scenario** which assumes some realistic recognition of the needs of the developing world.

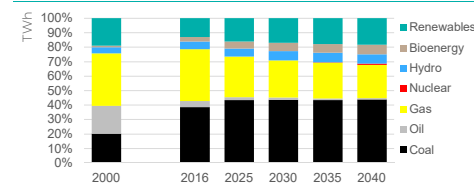
South-east Asia energy demand outlook

- South East Asia region economy will triple in size by 2040
- Urban population set to grow by over 150 million people by 2040
- Energy demand will grow by almost two thirds to 2040
- Coal will account for 40% of energy growth
- Total coal demand more than doubles by 2040
- Demand for high quality thermal and coking coal will rise

Primary energy demand in South-east Asia in the New Policies Scenario⁽¹⁾



Electricity generation by type in South East Asia in the New Policies Scenario⁽¹⁾



2018 Sell-side analyst site visit - Coal ESG

Notes: (1) Source: IEA South East Asia Energy Outlook 2017; WEO Special Report

Here is the reality:

The industrialisation and urbanisation of developing economies, particularly in Asia, will continue to drive significant growth in global energy demand

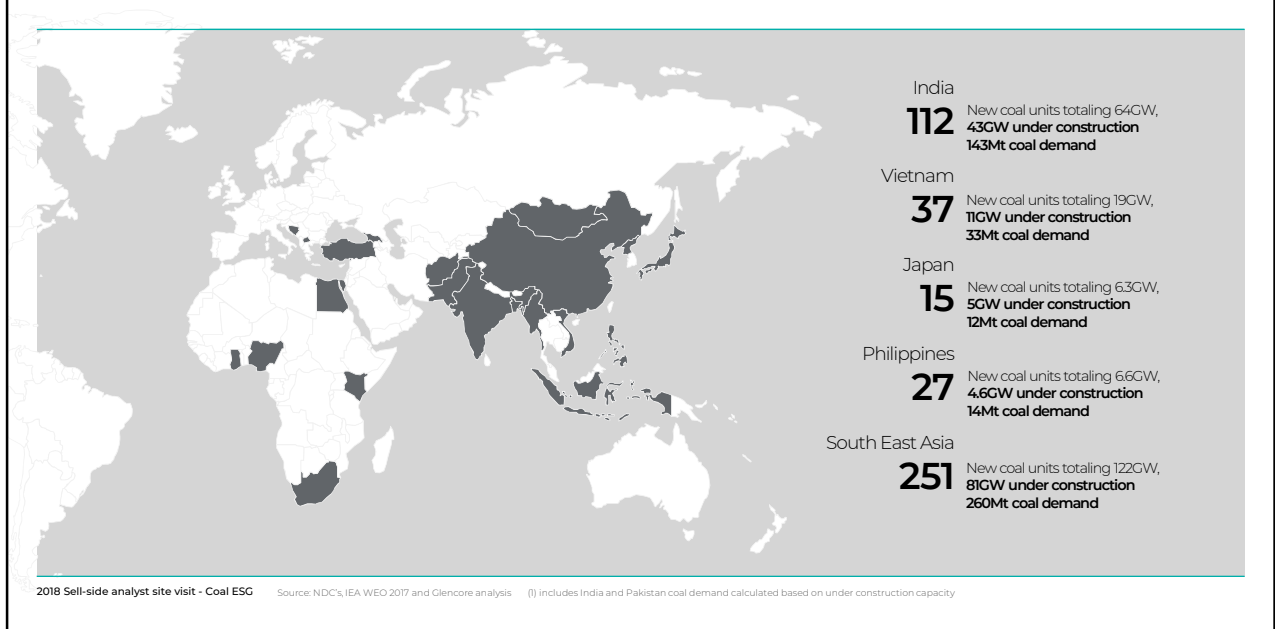
This will continue to be largely met by coal, oil and gas for the foreseeable future.

In simple terms, by 2040, the South East Asian economy will triple in size, the urban population will grow by over 150 million, energy demand will grow by two thirds and importantly coal is their lowest cost option and is central to their energy policies and will account for 40% of energy growth.

The total South East Asian demand for coal will more than double by 2040.

Under most credible energy scenarios, coal will continue to play a major role because it is a competitive, safe, secure and reliable base load source of energy.

Coal fired power generation is included in the Paris commitments of 24 countries responsible for more than 50% of global emissions ¹³



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This is re-enforced by what we know today which is that:

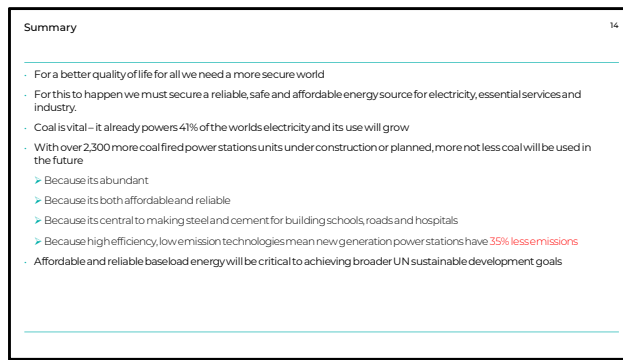
- India has planned for 64 GW of new coal of which 43 GW are under construction.
- Vietnam has 19 GW of new coal planned with 11 GW currently under construction and
- Japan has 6.3 GW of new coal with 5 GW under construction.

If we include Indonesia, Malaysia, Thailand and Bangladesh, South East Asia has 122 GW of coal fired power stations planned with 81 GW under construction.

It is important to note that I have not included North Asia, Japan and China, in the South East Asia figures quoted.

China is building new coal fired power stations under its 13th 5 year plan.

They are on a pathway from 993 GW of coal fired power capacity to 1100 GW of coal fired capacity. Their total build of coal fired stations is close to 260 GW but about 153 GW is replacing old, small and dirty stations with new ultra-super critical and ultra clean power stations. Most of this demand growth in China will be met by Chinese domestic coal from the Western provinces.



The real situation is far removed from what the climate activists and the alarmist media would have us believe.

Renewables are not capable of providing the essential base load power supply capacity thereby supporting economic growth in developing economies.

Coal remains the lowest cost option and is the energy source of choice for the developing world.

Australia is the real anomaly. We are a developed economy, yet our plan for meeting high energy demand is to rely on load shedding. In other words, stifle demand.

The last time this happened was in the early 70s and we responded to that situation by building the Mt. Piper and Bayswater power stations in NSW and the Callide C, Millmerran and Tarong B stations in Queensland. There has been no investment in base load power since that time. We need stable policy, not subsidies.

In Summary

With over 2,300 more coal fired power stations units under construction or planned, more not less coal will be used in the future

- Because its abundant
- Because its both affordable and reliable
- Because its central to making steel and cement for building schools, roads and hospitals
- Because high efficiency, low emission technologies mean new generation power stations have 35% less emissions

The reality is that affordable and reliable baseload energy will be critical to achieving broader UN sustainable development goals

-
- For a better quality of life for all we need a more secure world
 - For this to happen we must secure a reliable, safe and affordable energy source for electricity, essential services and industry.
 - Coal is vital – it already powers 41% of the worlds electricity and its use will grow
 - With over 2,300 more coal fired power stations units under construction or planned, more not less coal will be used in the future
 - Because its abundant
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 - Because high efficiency, low emission technologies mean new generation power stations have **35% less emissions**
 - Affordable and reliable baseload energy will be critical to achieving broader UN sustainable development goals
-

So Ladies and Gentlemen, what do we do about this. How can we help?

One thing you can do is support initiatives like the QRC's Queensland Minerals and Energy Academy that successfully introduces students into science, technology, engineering and maths (STEM) industries.

It is one of Australia's largest and most successful industry-led, schools/industry initiatives.

The Academy's programs and experiences broaden students' and teachers' knowledge of the resources sector and provide a talent pipeline of employees into Vocational Educational Training (VET) and STEM-related careers, with a strong focus on female and indigenous students.

I understand that the NSW resources sector is looking to develop a similar approach and would encourage everyone to strongly support this.

Thank you for your time.

Thank You

- 8.2% of Australia's GDP (2017/18)
- 18% of Australia's GDP (Sept18)
- 55% of Australia's goods and services exports (2017/18)
- 70% of Australia's exports of goods (2017/18)
- 242,600 of Australians employed

Australia's resources and energy exports, A\$ billion

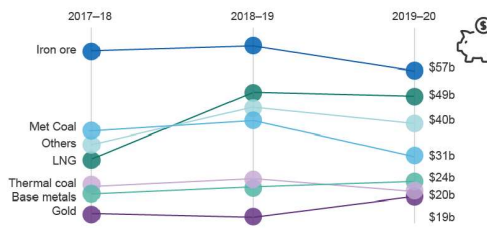
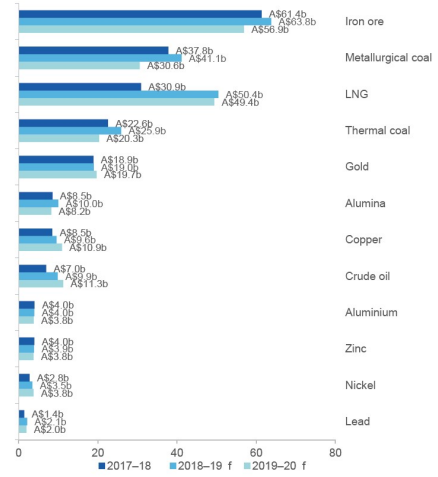


Figure 1.10: Australia's major resource & energy commodity exports



Source: Australian Government; Resources and Energy Quarterly December 2018