Presentation
to the
NSW Government
Independent Planning Commission
concerning the

D532-18 – Bylong Coal Project

Determination

by: Geoffrey Miell

07 November 2018

I think key issues are being deliberately ignored

We are currently living in a "Fool's Paradise", ignoring critical issues that will specifically affect NSW, along with Australia, in both the short-term and the long-term.

Irrespective of politics and ideology, **the key drivers of our society and economy from now on will be:**

- **Climate change**; and
- **Energy**.

These two drivers are inter-connected.

This presentation highlights evidence of the growing risks to our energy security and prosperity, and why **the Bylong Coal Project is highly likely to be a "stranded asset".**

I oppose the Bylong Coal Project based upon evidence.

Gillespie Economics misrepresents IEA's *WEO* to justify Bylong Project

Gillespie Economics, in their *Response to IEEFA's Submission*, dated Jul 2018, p7:

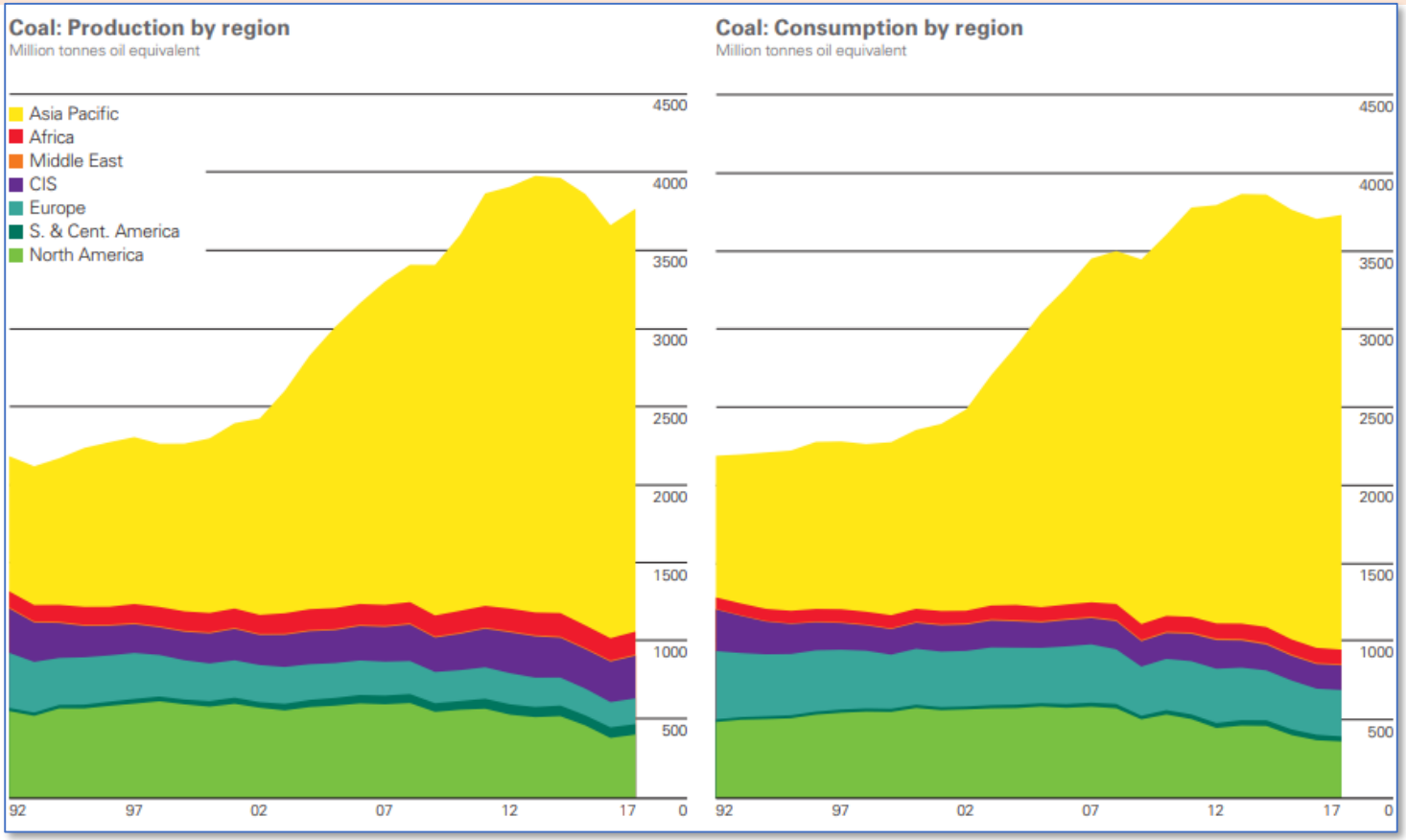
> ***"Summary Response:***
>
> - *The IEA forecasts an **INCREASE** in the quantity of coal demanded in the world to 2040 under both the Current Policy Scenario (CPS) and the more speculative New Policies Scenario (NPS).*
> - *The IEA forecasts an **INCREASE** in the quantity of thermal coal traded in the world to 2040 under the CPS, and a very slight decline under the more speculative NPS.*
> - *The IEA forecasts an **INCREASE** in the quantity of coal demanded in the world to 2040 for power generation under both the CPS and NPS."*

The IEA states in its *World Energy Outlook 2017* (*WEO-2017*), p40, *Spotlight* box:

> *"The scenario results presented in the WEO are sometimes **mischaracterised as forecasts. They are not. Each scenario depicts an alternative future, a pathway along which the world could travel if certain conditions are met.** The IEA does provide short- to medium-term forecasts for different fuels and technologies, **but there are no long-term forecasts**; in our judgement, **there are simply too many variables in play for this to be a viable approach."***

The IEA does not have long-term forecasts because of policy uncertainty.

Global coal production & consumption both peaked in 2013



In 2017, world coal production increased by 105 mtoe, or 3.2%. Production rose by 56 mtoe in China and 23 mtoe in the US. Global coal consumption grew by 25 mtoe, or 1%, the first growth since 2013. Growth was driven largely by India (18 mtoe), with China consumption also up slightly (4 mtoe).

Source: ***BP Statistical Review of World Energy 2018***, p40

2017 world coal + top 5 country rankings
(all coal: anthracite, bituminous, sub-bit. & lignite)

All coal in year 2017	World	Rank #1 Country	Rank #2 Country	Rank #3 Country	Rank #4 Country	Rank #5 Country
Reserves (proved)		USA	Russian Fed.	Australia	China	India
(*x10^6 tonnes*)	1 035 012	250 916	160 364	144 818	138 819	97 728
(*% world share*)	**100**	**24.2**	**15.5**	**14.0**	**13.4**	**9.4**
R/P (*years*)	134	357	391	301	39	136
Production		China	USA	Australia	India	Indonesia
(*mtoe in 2017*)	3 768.6	1 747.2	371.3	297.4	294.2	271.6
(*% world share*)	**100**	**46.4**	**9.9**	**7.9**	**7.8**	**7.2**
Consumption		China	India	USA	Japan	Russian Fed.
(*mtoe in 2017*)	3 731.5	1 892.6	424.0	332.1	120.5	92.3
(*% world share*)	**100**	**50.7**	**11.4**	**8.9**	**3.2**	**2.5**

In year-2017, the top 5 coal countries held: 76.6% share of global Proved Reserves; 79.1% share of global Production; and 76.7% share of global Consumption.

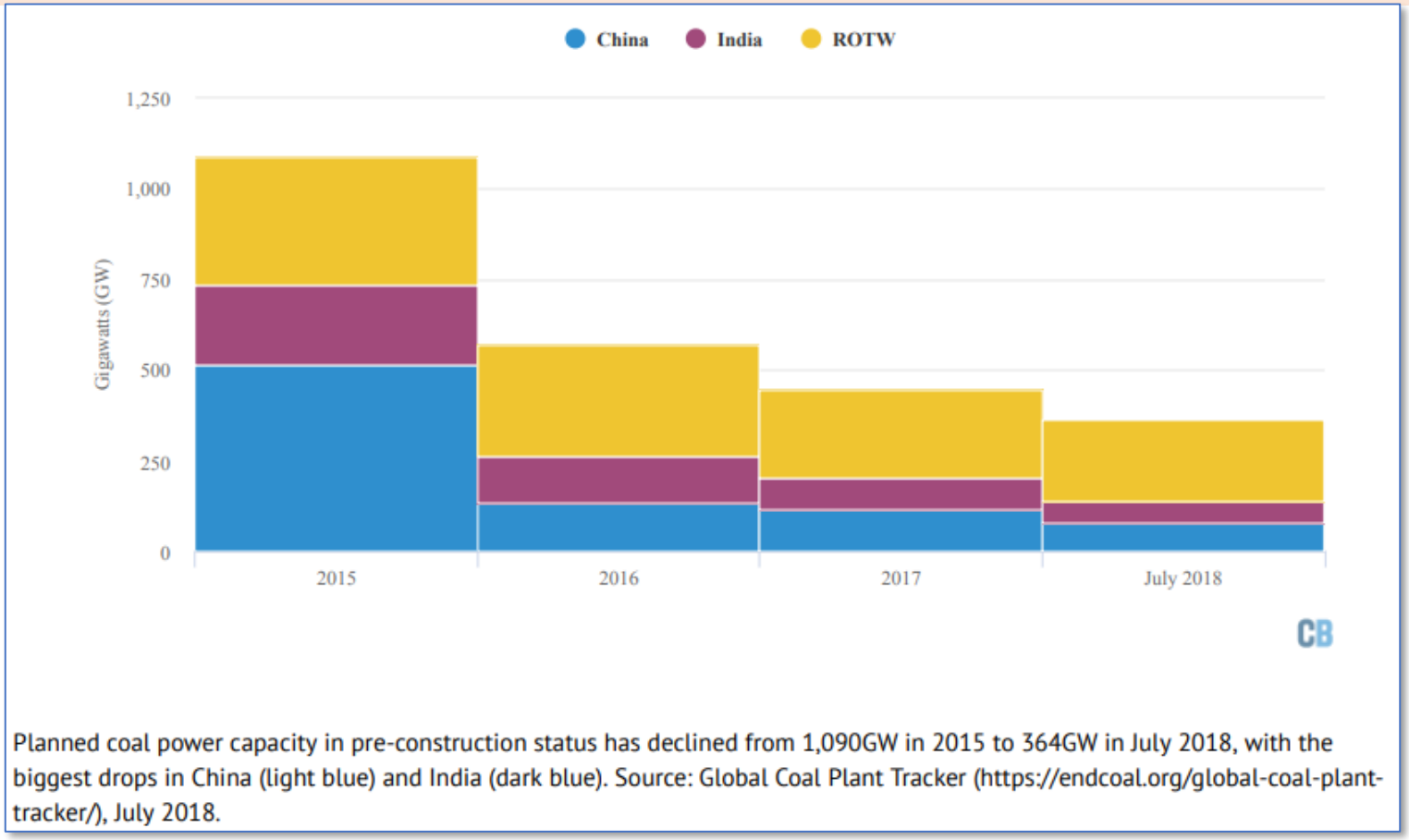
The global coal industry is heavily concentrated among only a few key countries.

mtoe = million tonnes oil equivalent = 41.87 petajoules (IEA); R/P = Reserves-to-Production.

Source: ***BP Statistical Review of World Energy 2018***, pp36, 38, 39.

Production rate isn't sustainable

The pipeline of proposed new coal power capacity is shrinking quickly



Planned coal power capacity in pre-construction status has declined from 1,090GW in 2015 to 364GW in July 2018, with the biggest drops in China (light blue) and India (dark blue). Source: Global Coal Plant Tracker (https://endcoal.org/global-coal-plant-tracker/), July 2018.

At the end of 2015, China planned to build 515GW of new coal capacity. That figure, at July 2018, stood at 76GW. In India, the pre-construction pipeline shrank from 218GW to 63GW, during the same period.

Source: https://www.carbonbrief.org/guest-post-peak-coal-is-getting-closer-latest-figures-show

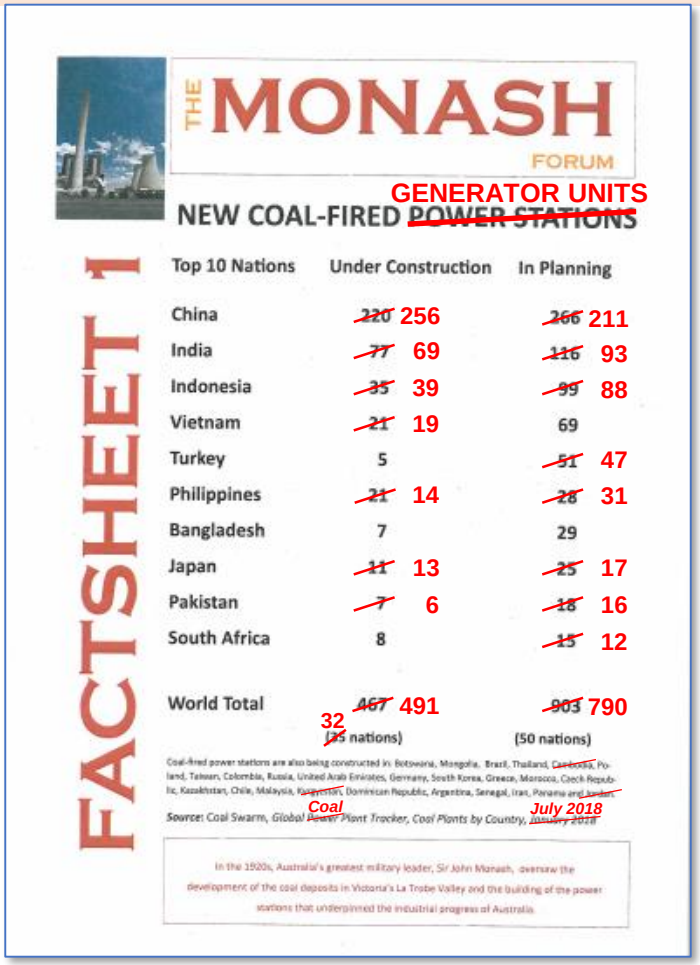
CoalSwarm's Global Coal Plant Tracker: widely cited, documents rapid changes

The Global Coal Plant Tracker (GCPT) is an online database that identifies, maps, describes, and categorises every known coal-fired generating unit and every new unit proposed since 01 January 2010 (30MW and larger). Developed by CoalSwarm, **the tracker uses footnoted wiki pages to document each plant and is updated biannually.**

See: https://endcoal.org/global-coal-plant-tracker/

CoalSwarm is a global network of researchers developing collaborative informational resources on fossil fuels and alternatives.

Source: ***Boom and Bust 2018: Tracking the Global Coal Plant Pipeline***, Mar 2018



THE MONASH FORUM

FACTSHEET 1

NEW COAL-FIRED ~~POWER STATIONS~~ GENERATOR UNITS

Top 10 Nations	Under Construction	In Planning
China	~~220~~ 256	~~266~~ 211
India	~~77~~ 69	~~116~~ 93
Indonesia	~~35~~ 39	~~99~~ 88
Vietnam	~~21~~ 19	69
Turkey	5	~~51~~ 47
Philippines	~~21~~ 14	~~28~~ 31
Bangladesh	7	29
Japan	~~11~~ 13	~~25~~ 17
Pakistan	~~7~~ 6	~~18~~ 16
South Africa	8	~~15~~ 12
World Total	~~467~~ 491	~~903~~ 790
	32 (35 nations)	(50 nations)

Coal-fired power stations are also being constructed in Botswana, Mongolia, Brazil, Thailand, Cambodia, Poland, Taiwan, Colombia, Russia, United Arab Emirates, Germany, South Korea, Greece, Morocco, Czech Republic, Kazakhstan, Chile, Malaysia, Kyrgyzstan, Dominican Republic, Argentina, Senegal, Iran, Panama and Jordan.

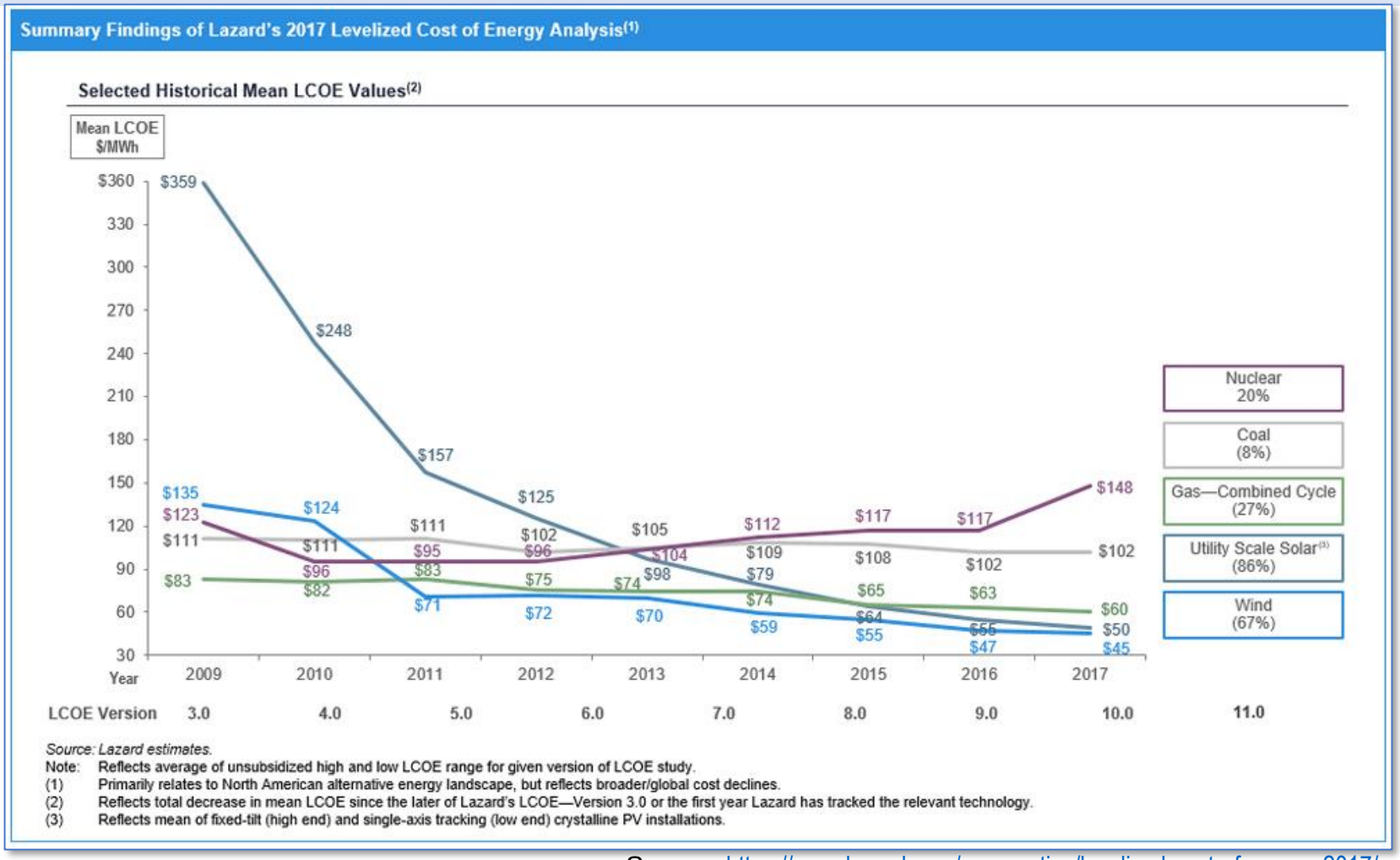
Source: Coal Swarm, *Global Power Plant Tracker, Coal Plants by Country*, January 2018 — Coal — July 2018

In the 1920s, Australia's greatest military leader, Sir John Monash, oversaw the development of the coal deposits in Victoria's La Trobe Valley and the building of the power stations that underpinned the industrial progress of Australia.

Within the timeframe of six months (01 Jan – 30 Jun 2018), the GCPT has documented the amount of coal power capacity in pre-construction planning stages has declined from 903 to 790 generator units; a reduction of 113 units (or 12.5%). Proposed capacity dropped 18.3%, from 447GW to 365GW. Although the pre-construction pipeline for new coal has declined, coal power capacity under construction increased from 467 to 491 generator units; an increase of 24 units (or 5.1%). Capacity increased 13%, from 209GW to 237GW.

Monash Forum's Coal *FACTSHEET 1* sourced from *The Australian* article headlined **Monash Forum MPs release coal 'fact sheets'**, by Joe Kelly, 21 Jun 2018

New renewables are now cheaper than new nuclear, coal & gas technologies



Source: https://www.lazard.com/perspective/levelized-cost-of-energy-2017/

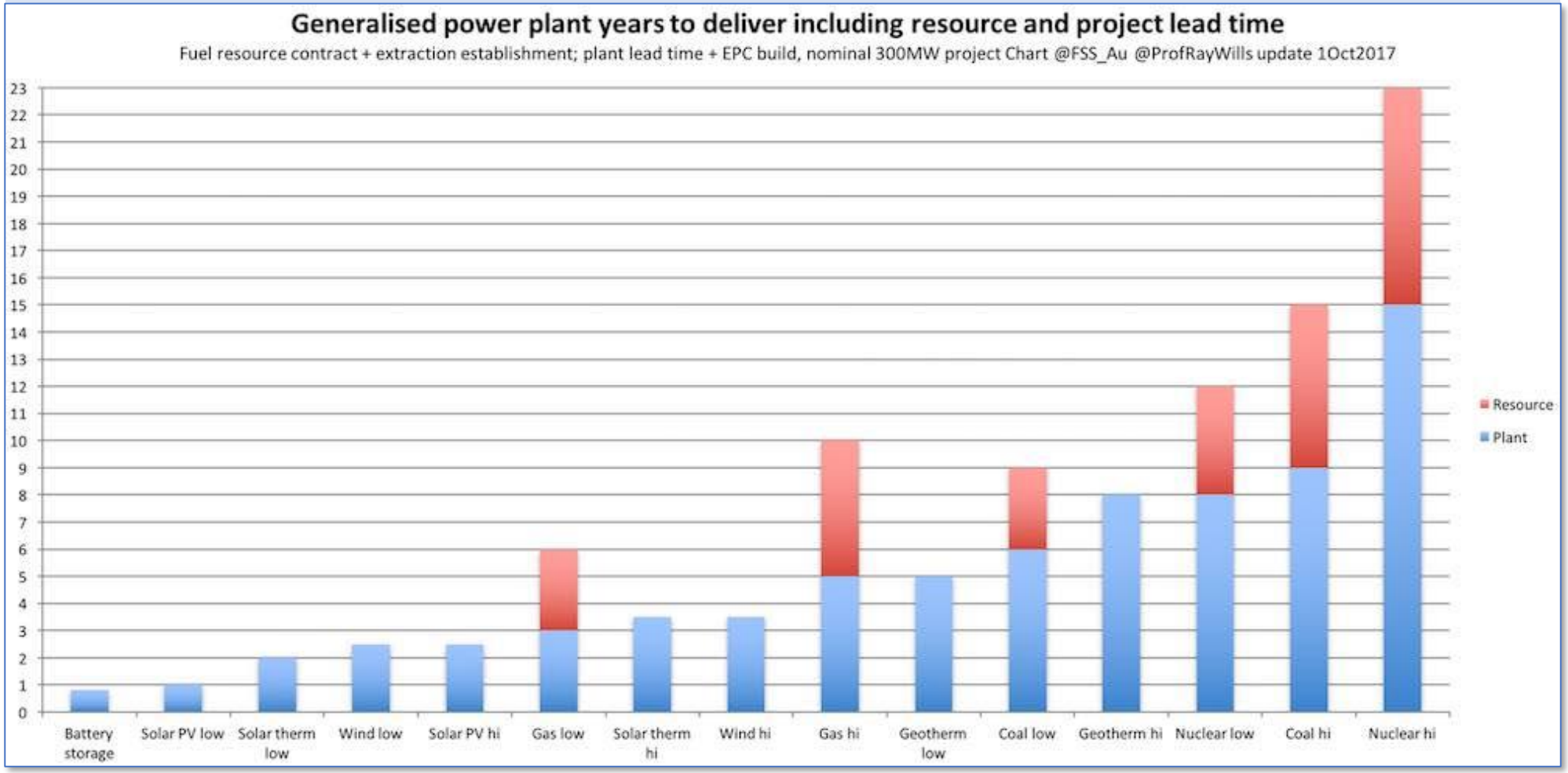
If you want cheap electricity you push renewables as hard as you can

ANU Professor of Engineering, Andrew Blakers, provided expert sworn testimony at the NSW Parliament Select Committee on Electricity Supply, Demand and Prices in NSW public hearing on 21 February 2018, including:

"The key point that I would like to get across is that the game is up—wind and solar photovoltaics [PV] have won the race. It is a lay-down misere. **The number one new generation technology being installed around the world is solar PV, number two is wind, and coal is a distant third.** This year, roughly 200 gigawatts of PV and wind new generation capacity will go in around the world, while only 50 gigawatts of coal will go in. That is a difference factor of four between PV and wind and coal. In Australia, virtually all new generation capacity is PV and wind. **The reason for this is that PV and wind are decisively cheaper than coal, even when one adds the additional costs to stabilise a variable renewable energy supply, such as storage, primarily in the forms of batteries and pumped hydro; stronger interconnection; and some spillage of wind and PV.** That is the basic message I have. **If you want cheap electricity you push renewables as hard as you can.**"

Source:
https://www.parliament.nsw.gov.au/lcdocs/transcripts/2031/Transcript%20%E2%80%93%2021%20February%202018%20%E2%80%93%20CORRECTED.PDF, p53

Energy technology deployment: wind fast, solar faster, batteries fastest



Source: https://reneweconomy.com.au/graphs-day-wind-fast-solar-faster-batteries-fastest-68311/

Concentrating solar power (CSP): an emerging 'dispatchable' solar tech

The emerging benefits provided by CSP with molten salt thermal energy storage technology:

- **Energy & Capacity Value:** CSP with molten salt energy storage enables the transition from fossil fuel- to renewable energy-based generation, providing energy security, network strengthening and wholesale price stability. **With enough storage, CSP enables reliable capacity supply, to replace baseload generators like coal-fired & nuclear power plants, & operate at high capacity factor.**
- **Ancillary Services:** CSP with storage is capable of providing frequency regulation, "spinning reserve", non-spinning reserve, load following services, and black start capability.
- **Intrinsic Stability:** CSP with storage offers fault ride-through capability, frequency response, and voltage / Volt-Amp Reactive support, complementing high penetrations of intermittent renewables.
- **Risk Management:** CSP hedges against future electricity price increases (as it has no fuel cost). CSP hedges against the future cost of integrating a high penetration of renewables into the grid – typically socialised in the cost of transmission upgrades and interconnectors and the implementation of higher reserve margins. **Weather conditions will only affect the number of operating hours – the MWh delivered per day – but will not affect the MW capacity that the system produces.** CSP can also change its behaviour mid-life, 10 or 20 years after commencing operations, to adapt to new market realities.
- **Affordable, 'dispatchable' electricity:** South Australia's lone 150MW capacity generator unit with 8 hours (1100MWh) storage CSP Aurora project, due to begin construction shortly, is contracted to supply electricity **capped at AU$78/MWh**. Multiple concurrent-built CSP generator units, with larger capacity and more storage may supply wholesale electricity at significantly lower prices in future.

Source: https://www.parliament.nsw.gov.au/lcdocs/submissions/61424/SolarReserve%20Australia%20Pty%20Ltd.pdf

IPCC SR1.5°C warns: Climate change is an existential threat to humanity

Countries that accept or 'ratify' the Paris Climate Agreement submit pledges for how they intend to address climate change. **Current pledges are not on track to limit global warming to 1.5°C above pre-industrial levels.**

A world that is consistent with holding warming to 1.5°C would see greenhouse gas emissions rapidly decline in the coming decade, with strong international cooperation and a scaling up of countries' combined ambition beyond current Nationally Determined Contributions (NDCs). **In contrast, delayed action, limited international cooperation, and weak or fragmented policies that lead to stagnating or increasing greenhouse gas emissions would put the possibility of limiting global temperature rise to 1.5°C above pre-industrial levels out of reach.**

Source: ***IPCC SR1.5°C FAQ 2.1***

Approving the Bylong Coal Project contributes to increasing an existential risk to humanity. Why risk our families' futures; our lives?

If Australia does nothing to reduce emissions, why should anyone else do anything? The IPCN has a fiduciary duty to protect us.

2017 world oil + top 5 country rankings

Crude Oil in year 2017	World	Rank #1 Country	Rank #2 Country	Rank #3 Country	Rank #4 Country	Rank #5 Country
Reserves (proved)		Venezuela	Saudi Arabia	Canada	Iran	Iraq
(x10^9 *barrels*)	1 696.6	303.2	266.2	168.9	157.2	148.8
(*% world share*)	**100**	**17.9**	**15.7**	**10.0**	**9.3**	**8.8**
R/P (*years*)	50.2	393.6	61.0	95.8	86.5	90.2
Production		USA	Saudi Arabia	Russian Fed.	Iran	Canada
(x10^3 *barrels/d*)	92 649	13 057	11 951	11 257	4 982	4 831
(*% world share*)	**100**	**14.1**	**12.9**	**12.2**	**5.4**	**5.2**
Consumption		USA	China	India	Japan	Saudi Arabia
(x10^3 *barrels/d*)	98 186	19 880	12 799	4 690	3 988	3 918
(*% world share*)	**100**	**20.2**	**13.0**	**4.8**	**4.1**	**4.0**

In year-2017, the top 5 oil countries held: 61.6% share of global Proved Reserves; 49.7% share of global Production; and 46.1% share of global Consumption.

Other Reserves: #6 Russian Fed. 6.3%, R/P 25.8 years; #7 Kuwait 6.0%, R/P 91.9 years; #8 UAE 5.8%, R/P 68.1 y; #9 USA 2.9%, R/P 10.5 years; #10 Libya 2.9%, R/P 153.3 y.

Reserves include gas condensate and NGLs as well as crude oil. **Production** (annualised average/day) includes crude oil, shale oil, oil sands and NGLs. **Consumption** (annualised average/day) includes international aviation and marine, biofuels, Coal-to-Liquids and Gas-to-Liquids.

Source: ***BP Statistical Review of World Energy 2018***, pp12, 14, 15.

Production rate isn't sustainable

2017 world gas + top 5 country rankings

Natural Gas in year 2017	World	Rank #1 Country	Rank #2 Country	Rank #3 Country	Rank #4 Country	Rank #5 Country
Reserves (proved)		Russian Fed.	Iran	Qatar	Turkmenistan	USA
($x10^{12}$ m^3)	193.5	35.0	33.2	24.9	19.5	8.7
(*% world share*)	**100**	**18.1**	**17.2**	**12.9**	**10.1**	**4.5**
R/P (*years*)	52.6	55.0	148.4	141.8	314.1	11.9
Production		USA	Russian Fed.	Iran	Canada	Qatar
($x10^9$ m^3 *in 2017*)	3 680.4	734.5	635.6	223.9	176.3	175.7
(*% world share*)	**100**	**20.0**	**17.3**	**6.1**	**4.8**	**4.8**
Consumption		USA	Russian Fed.	China	Iran	Japan
($x10^9$ m^3 *in 2017*)	3 670.4	739.5	424.8	240.4	214.4	117.1
(*% world share*)	**100**	**20.1**	**11.6**	**6.6**	**5.8**	**3.2**

In year-2017, the top 5 gas countries held: 62.7% share of global Proved Reserves; 52.9% share of global Production; and 47.3% share of global Consumption.

Other Gas Producers: #6 China 6.3%, R/P 36.7 years; #7 Norway 3.3%, R/P 13.9 years; #8 Australia 3.1%, R/P 32.0y; #9 Saudi Arabia 3.0%, R/P 72.1y; #10 Algeria 2.5%, R/P 47.5y.

Production includes gas consumed for Gas-to-Liquids transformation, excludes gas flared or recycled. **Consumption** includes derivatives of coal and gas for Gas-to-Liquids transformation, excludes gas converted to liquid fuels.

Source: ***BP Statistical Review of World Energy 2018***, pp26, 28, 29.

Production rate isn't sustainable

In summary:

- Gillespie Economics has misrepresented the EIA's *WEO-2017*. The IEA does not have long-term forecasts (out to 2040) because of many uncertainties.
- Global coal production & consumption both peaked in 2013 and are now lower.
- China's current coal production rates are unlikely to be sustained for much longer due to resource depletion. Global coal production rates are thus not sustainable.
- Global coal power capacity could peak by 2022, perhaps sooner.
- New renewables are now cheaper than new nuclear, coal and gas technologies.
- Renewables can be deployed much faster than nuclear and coal power.
- CSP is an emerging technology that's demonstrating around the world that it can provide affordable, reliable, 'dispatchable' capacity supply, that can displace baseload generators like coal-fired and nuclear-fission power plants quickly.
- Humanity must leave petroleum oil, before oil leaves us.
- Humanity must leave fossil natural gas, before gas leaves us.
- *IPCC SR1.5°C* warns that climate change is an existential threat to humanity.
- We must leave oil, gas & coal, before 2050, to mitigate dangerous climate change.

Why start new mines like the Bylong Coal Project? NSW needs a planned, orderly, just/fair exit from coal. The IPCN has a fiduciary duty to protect NSW citizens.

End the Bylong Coal Project

Thank you.

Digging deeper for more knowledge:

1. **AFR Article:** ***BlackRock says coal is dead as it eyes renewable power splurge***, by Jenny Wiggins, 26 May 2017, https://www.afr.com/business/mining/coal/blackrock-says-coal-is-dead-as-it-eyes-renewable-power-splurge-20170524-gwbuu6
2. **Video:** ***No More Bad Investments forum – Ian Dunlop***, Former Chair, Australian Coal Association & Member of The Club of Rome, Ian T. Dunlop outlines the case for emergency action on climate change, 23 Nov 2017, duration: **1:02:18**, https://www.youtube.com/watch?v=_ZNjhnVOQN4
3. **Video:** ***2017 CURF Annual Forum – Andrew Blakers keynote***, ANU Professor Andrew Blakers delivered the keynote speech '100% Renewable Energy Futures' at the 2017 CURF annual forum at the University of Canberra, on 30 Nov 2017, duration: **37:54**, https://www.youtube.com/watch?v=y1IC6TiNDRc
4. **Report:** ***Shale Reality Check: Drilling into the US Government's Rosy Projections for Shale Gas & Tight Oil Production Through 2050***, by J. David Hughes, Post Carbon Institute, Feb 2018, http://shalebubble.org/
5. **Report:** ***What Lies Beneath: The Understatement of Existential Climate Risk***, by David Spratt & Ian Dunlop, Breakthrough, Aug 2018, https://www.breakthroughonline.org.au/whatliesbeneath
6. **SMH Article:** ***'Overwhelming' economics favour accelerating shift from coal, reports say***, by Peter Hannam, 5 Sep 2018, https://www.smh.com.au/environment/climate-change/overwhelming-economics-favour-accelerating-shift-from-coal-reports-say-20180905-p501w0.html
7. **IEEFA update:** ***As Marubeni distances itself from coal, other industrial behemoths will follow***, by Simon Nicholas, 19 Sep 2018, http://ieefa.org/ieefa-update-as-marubeni-distances-itself-from-coal-other-industrial-behemoths-will-follow/
8. **Report:** ***A Coal Phase-Out Pathway for 1.5°C: Modeling a Coal Power Phase-Out Pathway for 2018-2050 at the Individual Plant Level in Support of the IPCC 1.5°C Findings on Coal***, by Ted Nace, CoalSwarm, Oct 2018, https://endcoal.org/wp-content/uploads/2018/10/CoalPathway.pdf
9. **Report:** ***Comparison of Dispatchable Renewable Electricity Options: Technologies for an orderly transition***, by Keith Lovegrove *et al.*, prepared for ARENA by ITP Thermal Pty Ltd, Oct 2018, https://arena.gov.au/projects/comparison-of-dispatchable-renewable-electricity-options/

To be read in conjunction with the companion Presentation Slides

SLIDE 1 – title page

I thank the Independent Planning Commission New South Wales (IPCN) members for the opportunity to speak here today.

My name is **Geoff Miell**. I have no political affiliations.

I am a resident and rate payer in the Lithgow Local Government Area (LGA).

SLIDE 2 – I think key issues are being deliberately ignored

I think key issues are being deliberately ignored. They're very difficult to deal with. Well-funded, powerful vested interests are resisting. We're in a "Fool's Paradise".

Climate change and energy from now on will be the key drivers of our society and economy. These drivers are inter-connected.

On 11th May 2017, I made a presentation, as registered Speaker #23, at the NSW PAC [Planning Assessment Commission] public hearing concerning the Bylong Coal Project. My Slides and Script are still publicly available on the IPCN website.

Following the PAC public hearing, Hansen Bailey produced a document titled *PLANNING ASSESSMENT COMMISSION Public Hearing Response Development Application SSD 14-6367*, dated 19 May 2017, "to respond to queries from the PAC during the site inspection on 10 May 2017 (and subsequent queries) and the public hearing on 11 May 2017." This document **did not respond at all to any of the issues and objections raised by me** at the PAC public hearing. In my opinion, this is an example of deliberately ignoring key issues.

This presentation today highlights more recent compelling evidence of the growing risks to our energy security and prosperity, and why the Bylong Coal Project is highly likely to be a "stranded asset".

I oppose the Bylong Coal Project. I strongly urge you to do so too.

SLIDE 3 – Gillespie Economics misrepresents IEA's *WEO* to justif…

In KEPCO's *Supplementary Information – Appendix M: Response to IEEFA's Submission*, prepared by Gillespie Economics in July 2018, on page 7, below the **Summary Response**, it falsely asserts that the IEA **forecasts** coal demand will increase, as indicated by the selected quotes shown on this slide.

The IEA, in its *World Energy Outlook 2017*, **clearly says otherwise** on page 40, in the *Spotlight* box, as indicated by the selected quote also shown on this slide.

The IEA does not have long-term forecasts "*as far out as 2040*" because of policy uncertainty, as well as other uncertainties.

In my opinion, Gillespie Economics clearly misrepresented the IEA's *WEO-2017* and consequently misinformed and misled the NSW Department of Planning and Environment (DPE) and IPCN. I ask: Was that due to incompetence, or intentional?

Presentation Script for the **Independent Planning Commission NSW (IPCN)** public hearing concerning **D532-18 Bylong Coal Project** at **Parklands Resort and Conference Centre**, 121 Ulan Road, Mudgee NSW 2850 on Wednesday, **07 November 2018**

SLIDE 4 – Global coal production & consumption both peaked in…

Global coal production and consumption both peaked in year-2013, and then both declined through three successive years. Then in 2017, both increased as indicated in the graphs shown on this slide.

OECD demand fell for the fourth year in a row (-4 million tonnes oil equivalent). Australia, Canada, Japan, South Korea, and USA are some of the OECD members.

Global thermal coal demand is threatened by the decline in pre-construction of proposed new coal power plant capacity, and existing coal power plants being increasingly under-utilized, due to increasing competition from renewable power.

SLIDE 5 – 2017 world coal + top 5 country rankings (all coal: anth…)

At a glance, this table shows that the global coal industry is heavily concentrated among only a few key countries.

More than three-quarters of global coal reserves at the end of 2017 were held by only five countries: USA, the Russian Federation, Australia, China and India. Almost four-fifths of global coal production in 2017 were supplied by only five countries: China, USA, Australia, India and Indonesia.

The belief that USA has a multi-century supply of coal is based on the faulty reporting by the US Energy Information Administration (EIA) of US coal deposits as "reserves", per some analyses. Most US coal is buried too deeply to be mined at a profit and should not be categorised as reserves, but rather as "resources". United States Geological Survey (USGS) studies have typically found that less than 20% of US coal formations will be economically recoverable.

And China's Reserves-to-Production estimate of 39 years suggests that the current enormous coal production rates cannot be sustained in China for much longer.

SLIDE 6 – The pipeline of proposed new coal capacity is shrinkin…

According to CoalSwarm's latest Global Coal Plant Tracker results, completed in July 2018, it confirms that the global coal plant sector is amidst rapid change.

This graph shows the amount of coal power capacity in pre-construction stages has declined every year since 2015. The first half of 2018 has been no exception, with proposed capacity dropping nearly 20%; a decline of almost 82GW.

The most dramatic changes are taking place in China (the blue bars) and India (the purple bars), which are both dealing with a growing number of coal plants operating well below optimal levels or are frozen in construction. The tan bars represent the rest of the world.

From January through to June 2018, nearly 20GW of new coal capacity was commissioned: 12GW in China, 5GW in India, and 3GW in the rest of the world (South Africa, Pakistan, Vietnam, Philippines and Japan). This was nearly matched by the amount retired (16GW), **for a net increase of just 4GW** – the slowest rate of growth on record. 4GW represents only two NSW Liddell power stations. If the slowdown continues, **global coal capacity should peak by 2022, if not sooner.**

In the first six months of 2018, 43 coal-fired generator units were added and 52 retired, meaning **the global coal fleet shrank by nine units**.

SLIDE 7 – CoalSwarm's GCPT: widely cited, documents rapid cha…

The Global Coal Plant Tracker is an online database that identifies, maps, describes, and categories every known coal-fired generating unit and every new unit proposed since 1st January 2010 (30 megawatts and larger). Developed by CoalSwarm, the tracker uses footnoted wiki pages to document each plant and is updated biannually.

In June, the Monash Forum, a pro-coal group of Coalition MP's, released the first of their "fact sheets" outlining the number of new coal-fired power stations across the globe, referencing data sourced from CoalSwarm's Global Coal Plant Tracker, dated to January 2018, and shown here on this slide. I have annotated the Monash Forum's *FACTSHEET 1* to update it with the more recent CoalSwarm data, to July 2018, to highlight the significant changes that have occurred during the first six months of this year.

As discussed in the previous slide, during the first half of this year, pre-construction planning stages has declined by nearly 20% (or almost 82GW) in power capacity terms. In generator unit terms (apparently favoured by the Monash Forum), the reduction was 113 units (or 12.5%).

Within the same timeframe, coal power capacity under construction has increased by 24 generator units (or 5.1%), or from 209GW to 237GW.

SLIDE 8 – New renewables are now cheaper than nuclear, coal & …

Lazard's Levelized Cost of Energy Analysis – Version 11.0, published November 2017, provides a recent comparative "levelized cost of energy" analysis for various electricity generation technologies on a US$/MWh basis, including sensitivities, as relevant, for US federal tax subsidies, fuel costs, geography and costs of capital, among other factors. Lazard provides Levelized Cost of Energy (LCOE) analysis updates annually.

The graph shown in this slide presents the average of the **unsubsidised** high and low LCOE range for nuclear, coal, gas combined cycle, utility-scale solar-PV, and wind, for given versions of Lazard's LCOE studies.

In the USA, unsubsidised new renewable energy electricity generation technologies are now decisively cheaper than new nuclear, gas and coal technologies.

Presentation Script for the **Independent Planning Commission NSW (IPCN)** public hearing concerning **D532-18 Bylong Coal Project** at **Parklands Resort and Conference Centre**, 121 Ulan Road, Mudgee NSW 2850 on Wednesday, **07 November 2018**

SLIDE 9 – If you want cheap electricity you push renewables…

Australian National University researchers: Professor Andrew Blakers, Dr Matthew Stocks and Bin Lu; won this year's NSW Office of Environment and Heritage Eureka Prize for Environmental Research, for their work on modelling a 100% renewable energy future. Their research included identifying 22,000 potential pumped-hydro energy storage locations across Australia, providing a pathway to an affordable, secure, 100% renewable energy future.

On 21 February 2018, Professor Blakers provided expert sworn testimony at a public hearing conducted by the NSW Parliament Select Committee on Electricity Supply, Demand and Prices in New South Wales. This slide shows Blakers' opening statement, sourced from the Committee transcript. His key points were:

The number one new generation technology being installed around the world is solar-PV, number two is wind, and coal is a distant third.

The reason for this is that **PV and wind are decisively cheaper than coal**, even when one adds the additional costs to 'firm' a variable renewable energy supply.

If you want cheap electricity you push renewables as hard as you can.

SLIDE 10 – Energy technology deployment: wind fast, solar faster…

This chart shows how long it takes to deploy a range of different types of electricity supply technologies.

Batteries can be operational in less than one year;
Solar-PV: 1 to 2½ years;
Solar-thermal: 2 to 3½ years;
Wind: 2½ to 3½ years;

Gas: 3 to 5 years (plus gas resource development);

Geothermal: 5 to 8 years;

Coal: 6 to 9 years (plus coal resource development);
Nuclear: 8 to 15 years (plus fuel resource development).

Renewables can be deployed substantially quicker than coal and nuclear.

SLIDE 11 – Concentrating solar power (CSP): an emerging tech

Concentrating solar power is an emerging 'dispatchable' solar energy technology that offers emissions-free, affordable, reliable capacity supply, to replace baseload generators like coal-fired power plants and operate at high capacity factor.

South Australia's CSP Aurora project, due to begin construction early next year, is contracted to supply electricity capped at AU$78/MWh. I think there's scope for new CSP projects to deliver significantly lower prices in future.

Contrast this with then Federal Treasurer Scott Morrison's comments at a conference in April 2018, referring to new coal-fired generation: "*A new HELE plant, five, six or seven years down the track, it is estimated it would be bidding at around $70 or $80*[/MWh]."

SLIDE 12 – *IPCC SR1.5°C* warns: Climate change is existential threat

Climate change is an existential threat to humanity. **Current pledges are not on track to limit global warming to 1.5°C above pre-industrial levels.**

Approving the Bylong Coal Project contributes to increasing an existential risk to humanity. Why risk our families' futures; our lives?

If Australia does nothing to reduce emissions, why should anyone else do anything? The IPCN has a fiduciary duty to protect New South Wales citizens.

SLIDE 13 – 2017 world oil + top 5 country rankings

In 2017, USA was the world's largest oil producer, yet it's estimated that USA has a proved Reserves-to-Production of only 10.5 years. The Russian Federation was the world's third largest oil producer, and it has an R/P estimated at only 25.8 years.

This suggests global oil production is unlikely to be sustainable at current rates for much longer. Global oil prices are likely to continue to rise. Some energy analysts suggest crude oil prices could exceed US$100 per barrel soon.

Rising petroleum fuel costs will increase production and transport costs of coal.

Scarce, disrupted, and/or increasingly unaffordable petroleum-based global fuel supplies are likely to amplify the Bylong Coal Project becoming a "stranded asset".

This issue was raised in my PAC presentation last year, and it seems to have been conveniently ignored. Will the IPCN ignore this issue too, or do their fiduciary duty?

SLIDE 14 – 2017 world gas + top 5 country rankings

Similarly, global fossil natural gas production is unlikely to be sustainable at current rates for much longer. Global gas prices are likely to rise higher as US unconventional (i.e. shale and CSG) gas productions peak, then begin sustained declines.

Presentation Script for the **Independent Planning Commission NSW (IPCN)** public hearing concerning **D532-18 Bylong Coal Project** at **Parklands Resort and Conference Centre**, 121 Ulan Road, Mudgee NSW 2850 on Wednesday, **07 November 2018**

SLIDE 15 – In summary

The evidence indicates Gillespie Economics has misrepresented the IEA's *World Energy Outlook 2017* as presenting forecasts for continued increase in global thermal coal demand. The *WEO-2017* specifically states that it **does not have long-term forecasts (out to 2040)** because of many uncertainties.

Credible data indicates global coal production & consumption both peaked in year-2013 and are now lower.

China is the world's largest coal producer and consumer by far, but China's current production rates are unlikely to be sustained for much longer due to resource depletion. **Current global coal production rates are therefore not sustainable.**

The pipeline of proposed new global coal-fired electricity generator capacity is shrinking rapidly. Global coal power capacity could peak by 2022, perhaps sooner.

New renewables are now decisively cheaper than new nuclear, coal and gas technologies. If you want cheap electricity you push renewables as hard as you can.

Renewables can be deployed much faster than nuclear and coal power.

CSP is an emerging technology that is demonstrating around the world that it can provide affordable, reliable, 'dispatchable' capacity electricity supply that can displace baseload generators like coal-fired and nuclear-fission power plants quickly.

Humanity must leave petroleum oil, before oil leaves us. This creates an enormous challenge for the mining and transport sectors, including the production and transportation of coal.

Humanity must leave fossil natural gas, before gas leaves us.

The *IPCC SR1.5°C* warns that climate change is an existential threat to humanity. **A world that is consistent with holding warming to 1.5°C would see greenhouse gas emissions rapidly decline in the coming decade (2020s).**

We (i.e. humanity) must leave petroleum oil, fossil natural gas, and coal, before 2050, to mitigate dangerous climate change.

These are humanity's energy security and climate change challenges.

Why start new mines like the Bylong Coal Project? NSW needs a planned, orderly, just/fair exit from coal extraction and consumption.

New thinking is required that is informed by **evidence, science and economics.**

The Independent Planning Commission New South Wales has a fiduciary duty to protect New South Wales citizens.

The proposed Bylong Coal Project is highly unlikely to remain viable with the emerging realities and challenges highlighted here in my Presentation.

I strongly urge the IPCN to stop this project before more damage is done!

Thank you for your attention.

Slide 16 has a list of additional information. Dig deeper. Avoid 'heads-in-the-sand'.