Queensland Climate Transition Bill 2023

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Submission to State Development and Regional Industries Committee Queensland Parliament

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May 8, 2023

The Chair,
State Development and Regional Industries Committee
Parliament House
George Street
Brisbane Qld 4000

Dear Chair,

The Australian Institute for Progress is an Australian think tank based in Queensland, with a particular interest in energy. We thank the committee for this opportunity to make a submission on the *Queensland Climate Transition Bill 2023*.

Should you have any queries you may contact me by email [redacted], or by phone [redacted].

Regards,

[redacted]

GRAHAM YOUNG
EXECUTIVE DIRECTOR

Introduction

We view the bill with alarm. It extends the measures Queensland must take in the energy transition well-beyond what even the government has proposed and legislated, and beyond the official plans of the federal government.

If this bill were to be passed it would lead to:

- a collapse of the Queensland economy involving a decrease in productivity and living standards, lower wages, the loss of countless jobs and unavoidable outmigration;
- a collapse of the Queensland power grid which would be unable to supply reliable 24/7 electricity;
- decreased life expectancy and increased malnutrition as a consequence of increased poverty; and

no reduction, or a slight increase, in global CO_2 emissions

We understand that our view will be contrary to many, if not most, of those you will receive. That will be as a result of other submitters:

- not understanding the engineering and resource issues involved in electrifying our economy using wind and solar;
- the speed with which changes would need to be made against the speed with which they could practically be made, if they can be made at all;
- that significant percentages of our emissions are involved in producing products for which alternative non-emitting technologies do not exist, such as fertilisers and plastics;

and the economics of fossil fuel extraction which mean reductions in our production will be substituted by production elsewhere, often with the emission of more CO_2, while the state budget and economy will be dealt a body blow.

In addition we have concerns about the Climate Transition Authority, which will have powers that take precedence over all other legislation; are wide-ranging and not subject to judicial review in important respects; and the Authority will not have appropriately qualified members.

Engineering and Resource Issues

The bill envisages CO_2 emissions being reduced to 75% of 2005 emissions by 2030 and 0% by 2035. This contrasts with the state government's policy to reduce CO_2 emissions by 30% of 2005 by 2030 and 0% by 2050. What does this actually mean in reality?

State-based emissions information is only available until 2020-21, which obviously includes a period affected by COVID, which should have had some impact on emissions because it reduced economic activity. We have done our calculations on that year, but it should be borne in mind these calculations may overstate reductions in emissions.

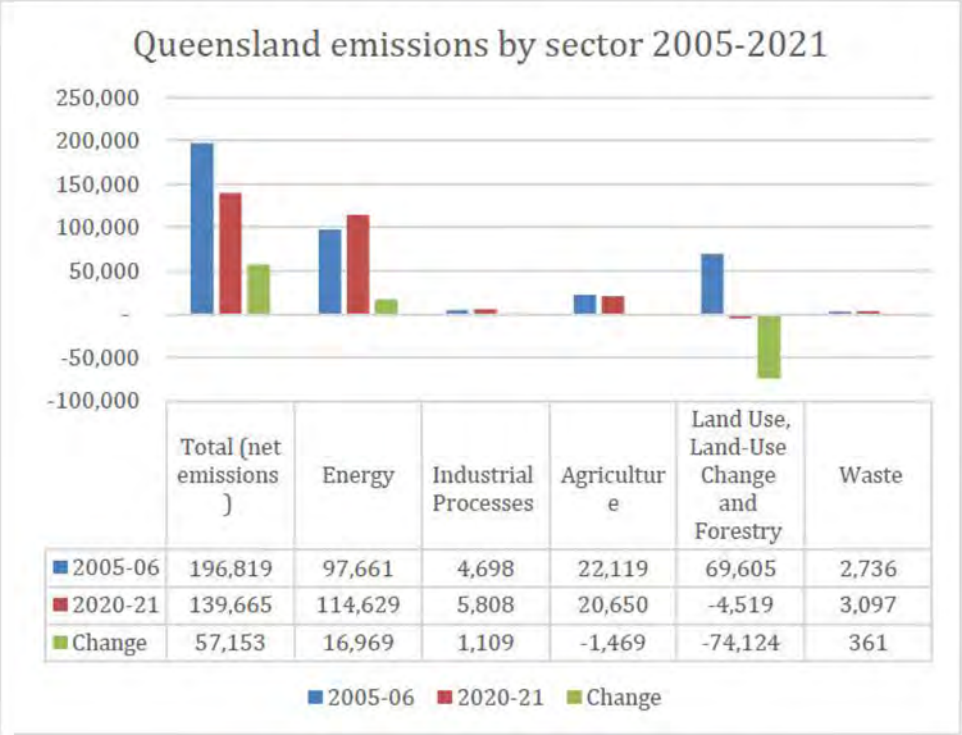
In 2005-06 Queensland's emissions were 196, 819 gigagrams of emissions in carbon dioxide equivalent.[1] By 2020-21 to 139, 665 gigagrams. This is a decrease of 29% in 18 years. The legislation's target at 40% would require a third more reduction (a total of 80, 619.54 gigagrams) in

[1] Australia's National Greenhouse Accounts (ANGA) https://greenhouseaccounts.climatechange.gov.au/

two-fifths of the time. On the face of it, this seems unlikely. The government's target of 30% is almost met on the 2020-21 figures, so is possibly unambitious, but certainly achievable.

It gets even more unlikely when you analyse the decrease in emissions, and the composition of the sectors where those decreases have been made, as well as their contribution to overall emissions.

As the first chart shows, over this time the greatest reduction in emissions has been from land use, which is actually larger than the overall decrease in emissions. This is because energy and industrial uses actually increased their emissions, as did waste.



	Total (net emissions)	Energy	Industrial Processes	Agriculture	Land Use, Land-Use Change and Forestry	Waste
2005-06	196,819	97,661	4,698	22,119	69,605	2,736
2020-21	139,665	114,629	5,808	20,650	-4,519	3,097
Change	57,153	16,969	1,109	-1,469	-74,124	361

Figure 1Source: Australia's National Greenhouse Accounts

It seems reasonable to assume that emissions from land use cannot continue to decrease at anything like that rate. So where are the emission reductions of 80, 619.54 gigagrams going to come from?

The graph below shows a breakdown of the energy sectors where fossil fuels are actually burned. If we combined the energy industries with fugitive emissions we would get close to eliminating 80,000 gigagrams. If we add some proportion of transport in, accepting that we will still need some fossil fuel power, then we would get there as well.

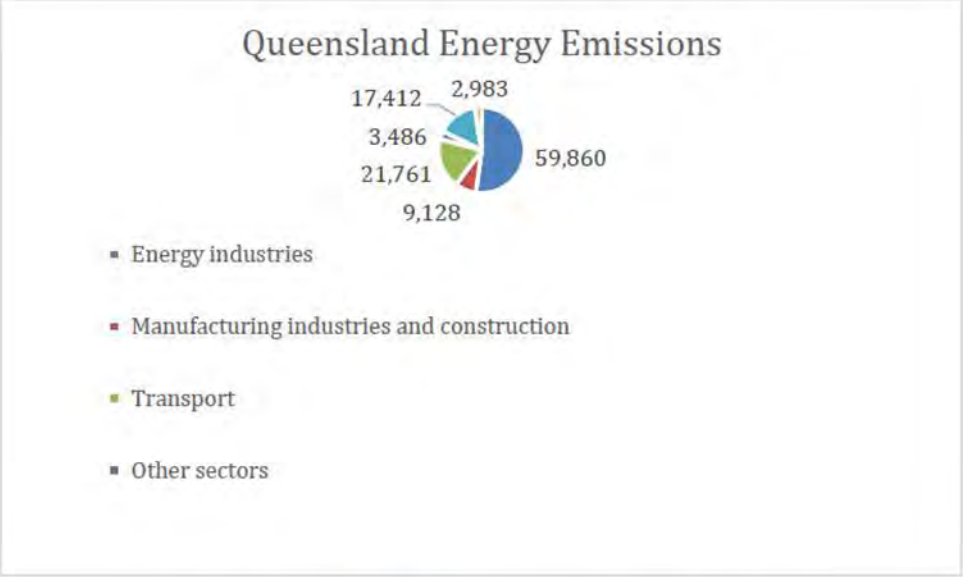


Figure 2Source: Australia's National Greenhouse Accounts

The next graph breaks down agriculture by sector. The vast amount of these emissions is from "enteric fermentation" which is the process by which ruminants produce methane through digesting their food. Short of a biological breakthrough to change their digestive process, or switching overnight to sources of protein, like kangaroos, who do not use enteric fermentation, this would appear to be difficult to change.

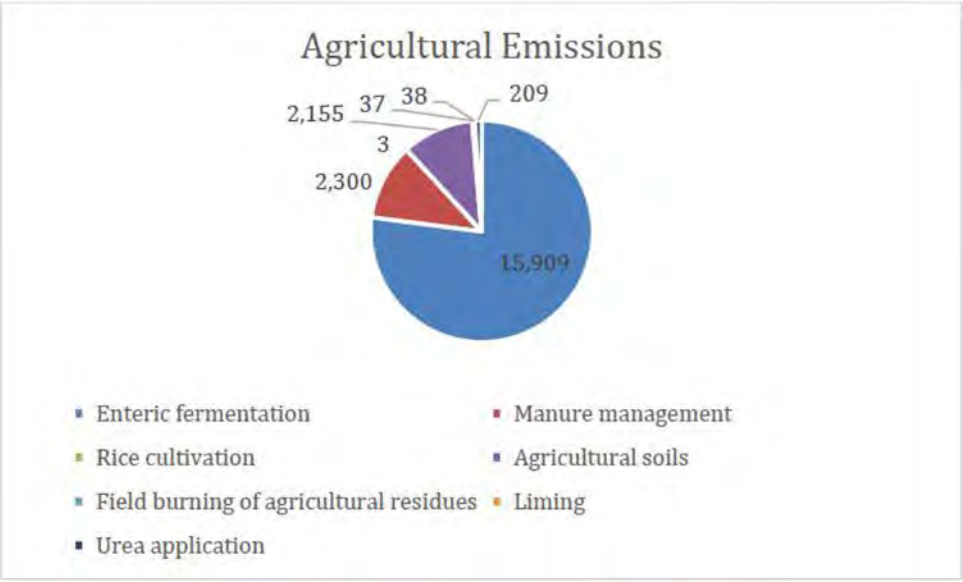


Figure 3Source: Australia's National Greenhouse Accounts

The bottom line would appear to be that our most likely path to reach the Greens target by 2030 is by completely replacing our power generation with wind and solar, so-called "renewable energy".

The further 20% reduction by 2050 would also appear to be highly unrealistic, given the need to reduce emissions from manufacturing and construction and transport. These are the sectors historically most resistant to decarbonisation, and they will adjust only slowly.

For example, the average age of a motor vehicle in Australia is 10.6 years.[2] So more than half the petrol and diesel vehicles bought today will still be on the road in 2030 and given the lack of affordable electric vehicles there will be many more internal combustion engined (ICE) cars bought between now and 2030. Unless the government is going to refuse to register these vehicles, or ban sale of petrol and diesel, the car fleet is going to be majority ICE for quite a while.

Added to this, there is virtually no long-haul electric vehicles on the market, meaning the heavy transport sector will remain dependent on fossil fuels for longer again.

What would a renewables-only grid look like?

The first thing to be stated is that no official Australian energy body of which we are aware envisages a power system consisting of only wind and solar with storage. The latest AEMO ISP, prepared to meet the government's 2050 Net Zero pledge still envisages gas-fired power generation in 2050.[3] The reason for this is that wind and solar are intermittent power sources, and will require considerable storage and overbuilding to provide 24/7 electricity. Even so, there will be a non-trivial risk that the storage and overbuilding will not be sufficient in extraordinary circumstances.

If the grid were to fail, the damage to the grid, and to civilians and business, would be catastrophic. So the system will need insurance in the shape of on-demand power generation.

There is also the colossal cost of trying to produce a system that could exist only on wind and solar.

The studies which suggest a renewables-only grid is possible assume that storage exists to store significant amounts of energy, and that while wind and solar may not work for periods of time, there are always going to be areas of the country where the wind will be blowing, and it will be possible to transport electricity from those areas, assuming they have a surplus, to the areas that are in deficit.

This is capital intensive. The capacity utilisation of renewables ranges from ~20% for commercial solar to around 35% for wind. That means you need from 3.9 GW to 5 GW of installed capacity to produce 1 GWh of electricity every hour of the day.

If every day was average, you could take your surplus power generated and store it for night, or when the wind isn't blowing. But what if we have a cyclone covering much of the state where wind speeds are too high for the turbines to operate, and clouds reduce the efficiency of solar? Little power might be generated for days, or even weeks. Without standby despatchable generation storage will need to be oversupplied, and vastly excess renewable generation will be needed to charge those batteries, in addition to what is needed for average consumption.

We may be able to access power from other states, but again, they will need to have the spare capacity available, or storage. In addition, transmission capacity will need to be built that will rarely be used, compounding the cost and efficiency problems. At some point the cost gets so high, that having some standby despatchable power is the only affordable option.

Various estimates have been made of the cost of having a renewables-only grid in various countries around the world, although we are not aware of any credible ones in Australia. However, the recent "Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035"[4] report conducted by

[2] https://www.abs.gov.au/statistics/industry/tourism-and-transport/motor-vehicle-census-australia/latest-release

[33] https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp

[4] https://www.nrel.gov/docs/fy22osti/81644.pdf

National Renewable Energy Labs and the Department of Energy in the USA confirms the need for gas or nuclear to cover the last few percent in a renewable grid.

Texas is the leading state for wind and solar energy in the US[5] and as a result of grid problems last year is legislating the Texas Energy Insurance Program[6] which will build up to 10 gigawatts of backup power generation. Texas has a population of 30 million and Queensland 5.5 million, so that would equate to 1.8 gigawatts here.

As the Greens bill would close the gas industry, and as nuclear power is illegal in Queensland, it would appear that 100% clean energy grid would be practically impossible because we would have no ability to provide insurance through standby despatchable generation apart from possibly using green hydrogen, which is an embryonic technology.

Cost

It is difficult to calculate a cost for electrifying the state as it depends on modelling the intermittency of power supply, as well as the future power needs of the state. The electrification of everything will increase the demand for power by 2.6 to 3 times, according to research conducted for us by Dr Tom Biegler (Strategic Climate/Energy Policy Issues Paper)[7]. This increase in demand will occur at the same time as the existing grid is being replaced. AEMO scenarios allow for some of this, but while they can make a reasonably good estimate of transport usage, even they cannot know how much "green" hydrogen, for example, may need to be manufactured to replace the other uses for natural gas, and at what cost.

Consultancy Wood Mackenzie calculated it would cost $4.5 trillion to completely decarbonise the US grid[8]. Scaling to Queensland this would equal $105.5 billion, or $15 billion per year between now and 2030 at an exchange rate of 0.70 USD to 1.00 AUD. As the study notes, this is likely to be optimistic because demand for materials will escalate significantly as the USA attempts to implement Net Zero by 2035 increasing their cost.

Finnish academic Assoc Prof Simon P Michaux calculates the additional minerals that will be required for electrification. We have attached a slide from a presentation by him "Assessment of the Extra Capacity Required of Alternative Energy Electrical Power Systems to Completely Replace Fossil Fuels" from August 2022 in the schedule at the end which shows just how large the exploration and production task is. Given the time to establish a mine most of the minerals cannot be brought to market within 7 years, so supply will be rationed by cost increases.

The other cost is the complete destruction of the fossil fuel industry in Queensland. Economist Gene Tunny calculated this in his paper "The cost to Queensland of closing down the coal & gas industries"[9]

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[5] https://www.eia.gov/electricity/data/browser/#/topic/0?agg=2,1,0&fuel=gft9&geo=g0fvvvvvvvvvo&sec=g&freq=Q&start=200101&end=202201&ctype=map&ltype=pin&rtype=s&maptype=0&rse=0&pin=

[6] https://legiscan.com/TX/bill/SB6/2023

[7] Strategic Climate/Energy Policy Issues Paper https://aip.asn.au/wp-content/uploads/2020/01/AIP_Climate_Energy_Final_V1.0-1.pdf

[8] "Deep decarbonisation requires deep pockets" https://www.decarbonisation.think.woodmac.com/summary/

[9] "The cost to Queensland of closing down the coal & gas industries" https://aip.asn.au/wp-content/uploads/2022/08/Coal_Oil_Gas_Final_22_07_25.pdf

Key findings of the paper are:

- The Queensland state budget would be in tatters with net debt $9 billion or 25% higher than projected at present and budget deficits 6 times larger. This translates to cumulative deficits of -$10.802 billion and cumulative fiscal deficits of -$29.271 billion resulting in net debt of -$48.242 billion and gross debt of -$89.65 billion.
- Decrease in direct and indirect Gross State Product of 9% (direct) to 20% (indirect) at last year's prices, but much more than this at this year's prices.
- An increase in statewide unemployment as high as 12.4% compared to June's 5.2%. Unemployment in the federal seats of Flynn and Dawson centred on Rockhampton, Mackay and Bowen of up to 42%.
- Decrease in the incomes of workers of $1.7 billion per annum, with a corresponding decrease in payroll tax to the state government of $630 million pa.
- Capital stock valued at $193 billion would need to be written-off.
- Permanent reduction in Gross State Product of 7.3% or $27 billion.
- Loss of most of the income from government-owned power utilities which are estimated to be ~$500 million in 2022-23 rising to over $700 million in 23-24.

No decrease in CO_2 emissions

The Climate Transition Bill envisages the closure of Queensland's fossil fuel industry on the assumption that this will lead to a decrease in global emissions. This is incorrect. The world's largest emitter is China, followed by India. Both of these countries are building new coal-fired power generation, adding 27 GW and 3.5 GW of capacity respectively last year.[10] They have domestic sources of coal, as well as other international sources, such as Indonesia.

If they substitute their own coal, or import from countries such as Indonesia, they are likely to be burning "dirtier" coals. Australian coal generally has a very high thermal, and low ash, content. So burning coal from some other countries will actually increase CO_2 emissions rather than decrease them, as per the intent of the legislation.

Further, most of Queensland's exports are metallurgical coals, used in the manufacture of steel. There will be no energy transition without steel, and it seems cavalier to demand an energy transition at the same time as you withdraw one of its necessary manufacturing components. Greens leader Michael Berkman MLA refers to "green" steel and asserts it is spreading quickly. In fact green steel is in an embryonic state and could not possibly produce the steel needed for decades, if ever. This ABC news report gives some needed context, with commercial quantities not expected until 2026, and then only from one manufacturer.[11]

Similar analysis can be applied to oil and gas.

Other consequences of stopping fossil fuel exploration, production and export

Gas is used in manufacture of fertiliser, explosives, plastics and other materials for which there is no ready substitute. If Queensland ceased production and export it would increase the price of these materials. Fertiliser is a necessary input to farming without which yields would fall. The

[10] Global Energy Monitor https://docs.google.com/spreadsheets/d/1j35F0WrRJ9dbIJhtRkm8fvPw0Vsf-JV6G95u7gT-DDw/edit#gid=647531100

[11] "Start-up promises green steel" https://www.abc.net.au/news/2022-02-08/startup-promises-green-steel-by-2025/100811450

consequences of lack of fertiliser have most recently been seen in Sri Lanka with street protests resulting in the fall of the government and widespread poverty and famine.[12]

With Russia's gas sanctioned for the foreseeable future, Queensland's exports are more crucial than ever, and have a larger price effect than they might have had. So it won't just be fertiliser that is more expensive, but the plastics required to make products more fuel efficient and explosives required for mining and construction.

Storage

Any renewables-only grid requires a lot of storage. Batteries are not suitable for grid-scale storage, and those that are in the grid at the moment are used for grid stabilisation only. The only storage system that currently exists that can operate at scale is pumped hydro. Queensland currently has one major pumped hydro scheme which is at Wivenhoe. It is 500 MW of capacity and can produce 5 GWh of output. Another at Kidston is projected to come into service in 2024 and will have 1 GWh of capacity.

The state government has plans to build two pumped hydro stations, one at Pioneer-Burdekin[13] with 120 GWh of capacity and another at Borumba with 48 GWh of capacity[14]. Both are in the early planning stages and are not expected to be operational before 2035. Queensland's current electricity generation from its power generators is approximately 158 GWh per day[15], so there is potentially 24 hours' worth of backup, **but not until 12 years' time, assuming no delays (for delays see Snowy 2.0[16]).** Under the Transition Bill this would be 5 years after the closure of all fossil fuel-fired power stations, and under both the Greens' and the governments' decarbonisation program, the storage would be needed much sooner than that.

The only way under current parameters that the grid can survive until the PHES are built is by retaining all of its current fleet of coal-fired generators, but that wouldn't be possible under this bill.

The Climate Transition Authority

The authority has powers which are too far-reaching and its board is not appropriate. A number of issues are listed below.

Section 4(1)

This section would make the act superior to any other act and take precedence in the case of any inconsistency. This would give it precedence that few other acts have and is not appropriate.

Section 16

This section acts retrospectively to refuse an application if it has been made, but not determined when the act comes into being. Retrospective legislation is a bad thing.

Section 17

The QTA can vary any existing fossil fuel authority. Again this is retrospective and bad legislation.

[12] Sri Lanka's economic crisis pushes millions into poverty as government seeks IMF bailout https://www.abc.net.au/news/2022-09-04/sri-lanka-economic-crisis-pushing-more-into-poverty/101402220
[13] https://statements.qld.gov.au/statements/96237
[14] https://www.epw.qld.gov.au/__data/assets/pdf_file/0019/17218/borumba-dam-pumped-hydro.pdf
[15] Department of Climate Change, Energy, the Environment and Water (2022) Australian Energy Statistics, Table O https://www.energy.gov.au/publications/australian-energy-update-2022
[16] https://www.abc.net.au/news/2023-05-03/snow-hydro-delayed-for-further-two-years/102295662

Section 19

This section exempts from judicial review any decision by the QTA under sections 16 and 17. This is outrageous, and, given the way that the Greens have used lawfare to delay and frustrate projects, ironic.

Section 35

This section appoints a board of management consisting of between 5 and 7 members, and while the qualifications appear to be appropriate, the selection criteria stipulating 3 must be from regional areas (potentially more than half) and one be ATSI, is unduly restrictive. Merit should be the only requirement.

Climate Emergency

The bill is predicated on the idea that there is a climate emergency, but there is no climate emergency, which is good news, because the timelines required for an energy transition are long, given the physical constraints involved, and the need to proceed at a pace which is dictated by others.

While we appreciate that spokesmen for the IPCC, the UN, various governments and action groups have made the claim that there is a climate emergency and that we near a tipping point, there is no support for this in the Working Group Reports of the IPCC. These are political, not scientific, claims.

Mr Berkman made a number of claims in his speech introducing this bill which are not supported.

- Climate models have been shown to overestimate the increase in temperature, most recently by McKitrick & Christy[17] and Zou et al[18], and there is no acceleration in their increase
- There is no trend in extreme weather events[19]
- Coral cover of the Great Barrier Reef is at record levels[20]
- There is no trend in deaths from wildfires[21]

CO_2 is a trace gas that contributes to the warming of the earth. It is 0.04% of the atmosphere and is vital to life on earth. It has been roughly half the concentration it is today, at which point it becomes dangerously low for life on earth. It has also been 5 times the current level in the last 35 million years without this level being detrimental to life on earth.[22]

The warming effect of CO_2 is logarithmic, which means that the more CO_2 is added to the atmosphere the less it has an effect on temperature. At current concentrations a doubling of CO_2 will result in something like a one degree direct temperature effect. Any greater effect can only be attributed to forcings, but these have not been observed to exist.

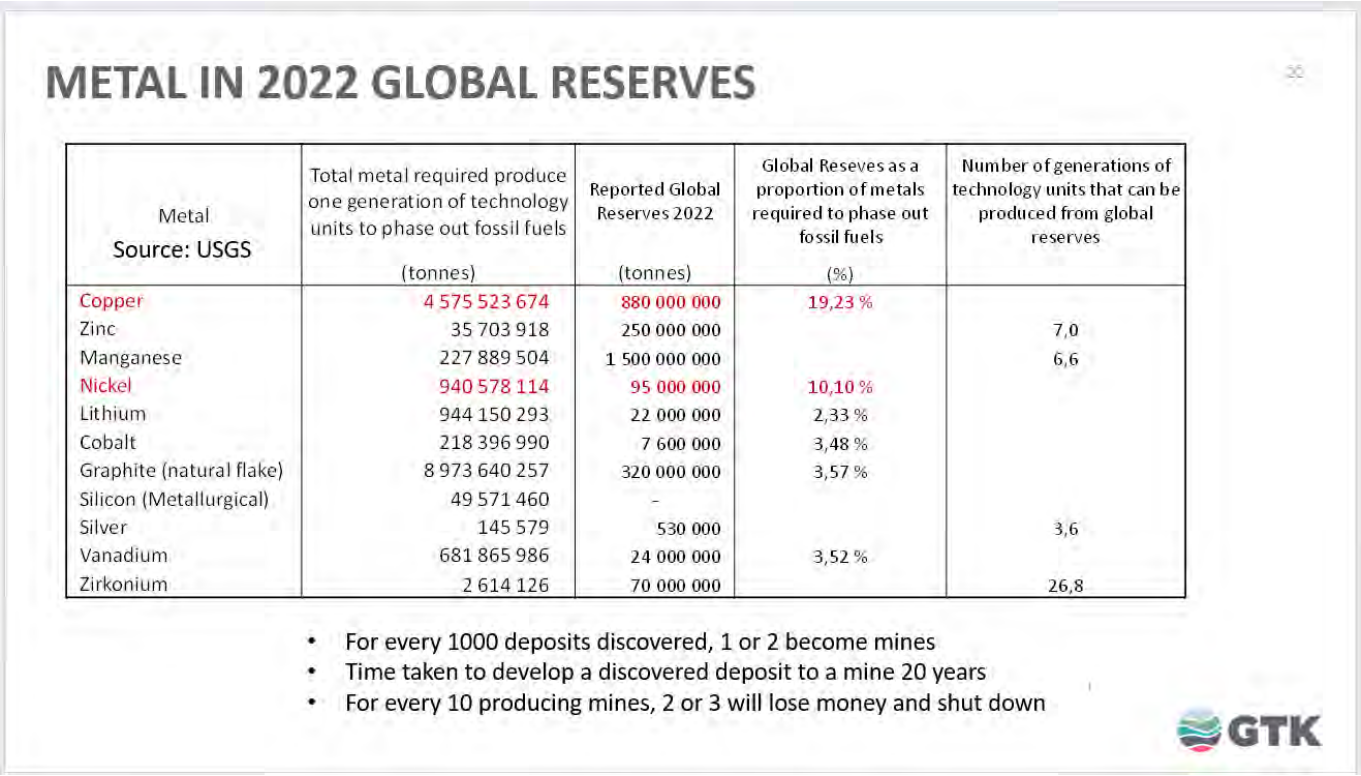
[17] "Pervasive Warming Bias in CMIP6 Tropospheric Layers " https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2020EA001281
[18] "Mid-Tropospheric Layer Temperature Record Derived from Satellite Microwave Sounder Observations with Backward Merging Approach." https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2022JD037472
[19] "How to Understand the New IPCC Report: Part 2, Extreme Events" https://rogerpielkejr.substack.com/p/how-to-understand-the-new-ipcc-report-1e3
[20] "The Good News on Coral Reefs" https://www.thegwpf.org/content/uploads/2022/08/Ridd-Record-Coral-GBR.pdf
[21] https://ourworldindata.org/natural-disasters
[22] https://www.researchgate.net/figure/Temperature-T-and-atmospheric-carbon-dioxide-CO2-concentration-proxies-during-the_fig4_320123470

At current concentrations we have a lot of time to solve the CO_2 emissions issue. That allows for proper sequencing of the replacement of fossil fuel electricity generation, and time to discover alternatives for the various technologies integral to modern life that emit CO_2.

It also gives us time to properly debate some of those alternative technologies, such as nuclear. Despite claims to the contrary, it is not dangerous, and it is cheaper than the alternatives while emitting less CO_2[23].

[23] https://www.iea.org/reports/projected-costs-of-generating-electricity-2020

Appendix



METAL IN 2022 GLOBAL RESERVES

Metal Source: USGS	Total metal required produce one generation of technology units to phase out fossil fuels (tonnes)	Reported Global Reserves 2022 (tonnes)	Global Reseves as a proportion of metals required to phase out fossil fuels (%)	Number of generations of technology units that can be produced from global reserves
Copper	4 575 523 674	880 000 000	19,23 %	
Zinc	35 703 918	250 000 000		7,0
Manganese	227 889 504	1 500 000 000		6,6
Nickel	940 578 114	95 000 000	10,10 %	
Lithium	944 150 293	22 000 000	2,33 %	
Cobalt	218 396 990	7 600 000	3,48 %	
Graphite (natural flake)	8 973 640 257	320 000 000	3,57 %	
Silicon (Metallurgical)	49 571 460	-		
Silver	145 579	530 000		3,6
Vanadium	681 865 986	24 000 000	3,52 %	
Zirkonium	2 614 126	70 000 000		26,8

- For every 1000 deposits discovered, 1 or 2 become mines
- Time taken to develop a discovered deposit to a mine 20 years
- For every 10 producing mines, 2 or 3 will lose money and shut down

GTK

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[24] Source: Michaux, Simon
https://www.researchgate.net/publication/354067356_Assessment_of_the_Extra_Capacity_Required_of_Alternative_Energy_Electrical_Power_Systems_to_Completely_Replace_Fossil_Fuels

	Region	Coal Rank	Area	HHV Btu/lb. ***	CO_2	NOx	SO_2	C in Ash	PM	Turn down
USA	Western	B*	CO	14,166	Neutral	Higher	Low	Neutral	Low	Neutral
		B*	AZ	10,800	Neutral	Low	Low	Low	Low	High
		SB**	WY	8,320	Neutral	Low	Low	Low	Low	High
		SB**	WY	9,345	Neutral	Low	Low	Low	Low	High
		B*	UT	12,600	Neutral	Low	Low	Low	Low	High
	Midwest	B*	IL	11,376	Neutral	Neutral	Higher	Neutral	Neutral	Neutral
		B*	IL	11,833	Neutral	Neutral	Higher	Neutral	Neutral	Neutral
		B*	KY	11,816	Neutral	Neutral	Higher	Neutral	Neutral	Neutral
	Eastern	B*	PA	14,313	Neutral	Higher	Neutral	High	Low	Low
		B*	PA	13644	Neutral	Higher	Higher	High	Low	Low
		B*	VA	14,350	Neutral	N.A.	N.A.	High	Low	Low
		B*	WV	12,797	Neutral	Higher	Low	Low	Low	High
		B*	KY	13,611	Neutral	Low	Higher	Low	Low	Low
Australia		B*	Qld	10,130	Neutral	Higher	Low	High	High	Low
		B*	Qld	13,000	Neutral	Higher	Low	High	Low	Low
		B*	NSW	11,620	Neutral	Higher	Low	High	Neutral	Low
Brazil	Rio Grande do Sul	SB**		6,048	Higher	N.A.	N.A.	Neutral	Low	Low
Colombia	Cerrejon Norte	B*		12,900	Neutral	N.A.	N.A.	Neutral	Low	Low
India	Renusagar	SB**		7,233	Higher	Higher	Low	High	High	Low
Indonesia	Export	SB**		9,092	Neutral	Low	Low	Low	Low	High
Russia	Kuznetsk	B*		12,926	Neutral	Higher	Low	High	Neutral	Low
South Africa		B*		10,972	Neutral	Higher	Low	Neutral	High	Low

* B: Bituminous
** SB: Subbituminous
*** BTU/lb.: British Thermal Units/pound (weight)

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[25] Source: US Department of Energy. https://www.energy.gov/sites/default/files/2020/10/f79/Thermal%20Coal%20Attributes%20FINAL%20October%2020_0.pdf