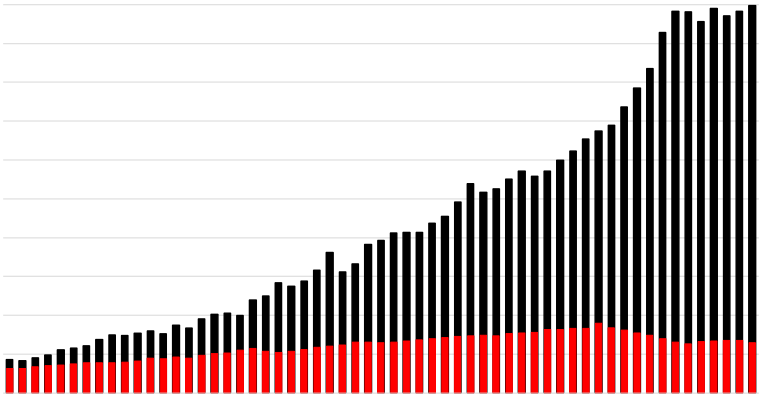
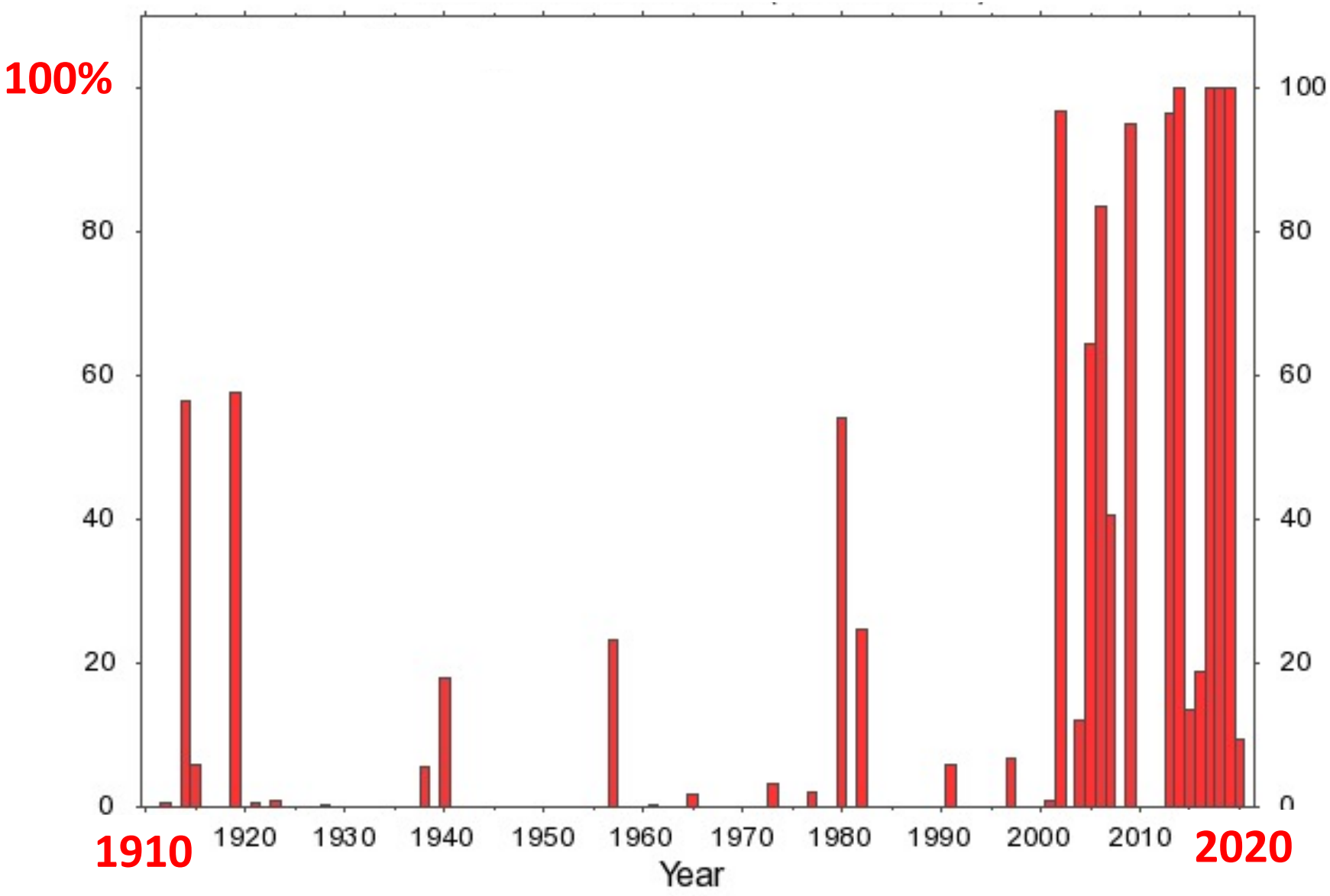
Narrabri Underground Stage 3 Project:

Greenhouse Gas and Climate Implications

Professor Penny D Sackett
ANU Institute for Climate, Energy and Disaster Solutions
Presented to NSW Independent Planning Commission
18 February 2022



Fraction of NSW area that experienced maximum annual temperature in top 10% of all records since 1910



Climate Change has arrived.

It will get worse.

How much worse depends on decisions we make this decade, this year, today.

Small rise in global temperature: Huge consequences

1.1° - 1.2°C: (now) Black Summer, 38°C in Siberia,
47% of local extinctions around world caused by climate change,
Runoff water for NSW agriculture reduced by 15% on average.

1.5°C: (virtually inevitable by ~2035) Once-in-30-year heatwaves happen every 3 years, Summer temps of 2019/20 will be an `average summer.'

2.0°C: (beyond Paris) Black Summer fire weather 4x more likely than in 1900,
50°C summer days in Sydney, 99% of all world's coral reefs gone,
Complete ecosystem transformation on 13% of Earth's surface.

3.0°C+: (where world – and particularly Australian – action is taking us.)
Most world ecosystems destroyed or heavily damaged.
Large areas of world uninhabitable. Entire global economy damaged.

https://www.ipcc.ch/report/ar6/wg1/#SPM

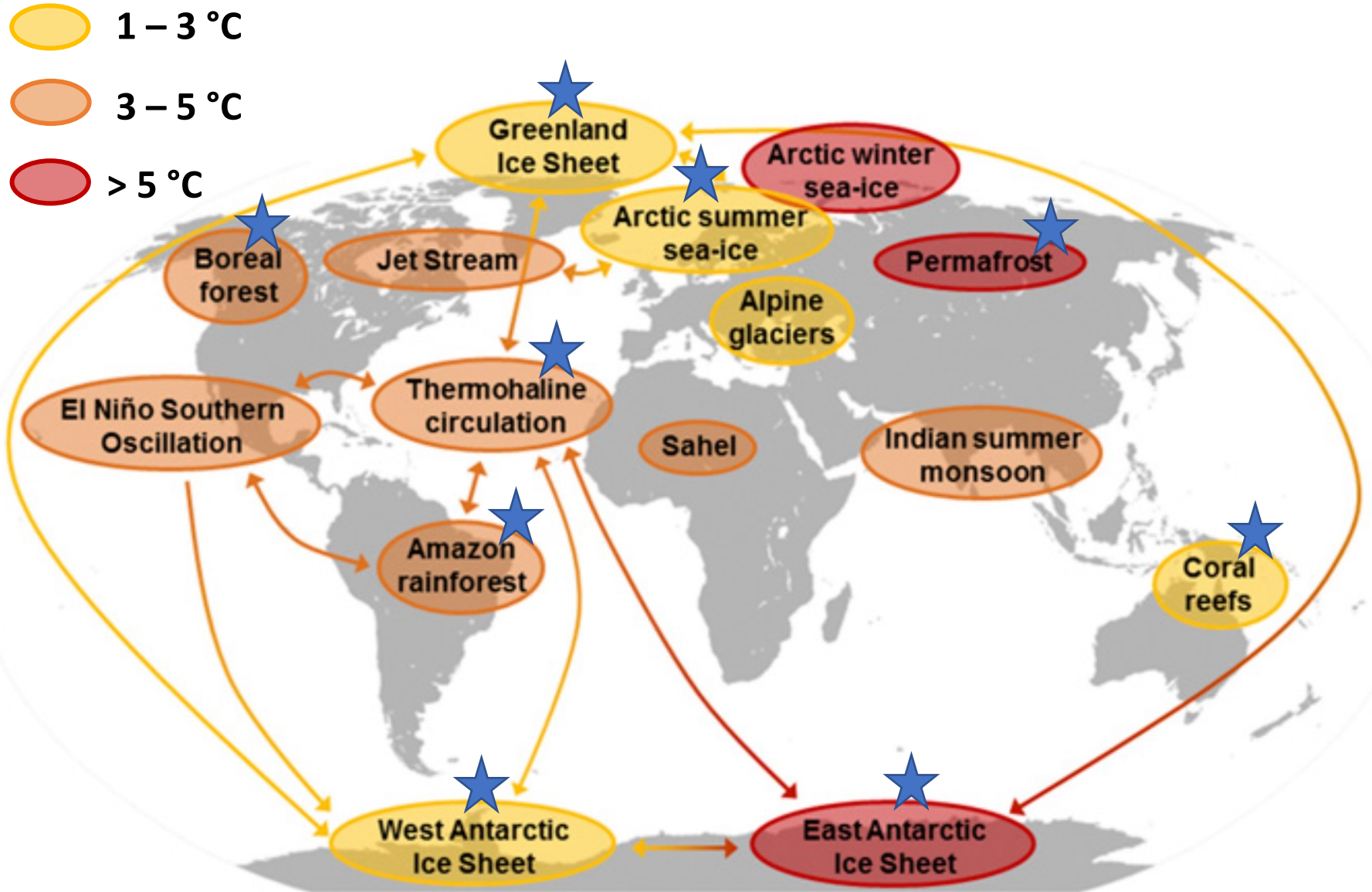
IPCC AR6 WG1

Irreversible Changes are Happening Now

- Changes global ocean temperature, deep ocean acidification, and deoxygenation are irreversible on centennial to millennial time scales.
- Mountain and polar glaciers are committed to continue melting for decades or centuries.
- Loss of permafrost carbon following permafrost thaw is irreversible at centennial timescales.
- Sea-level is committed to rise for centuries to millennia due to continuing deep ocean warming and ice sheet melt, and will remain elevated for thousands of years.

Earth System Elements at risk of `tipping'

Steffen et al (2018) PNAS, www.pnas.org/content/pnas/115/33/8252.full.pdf

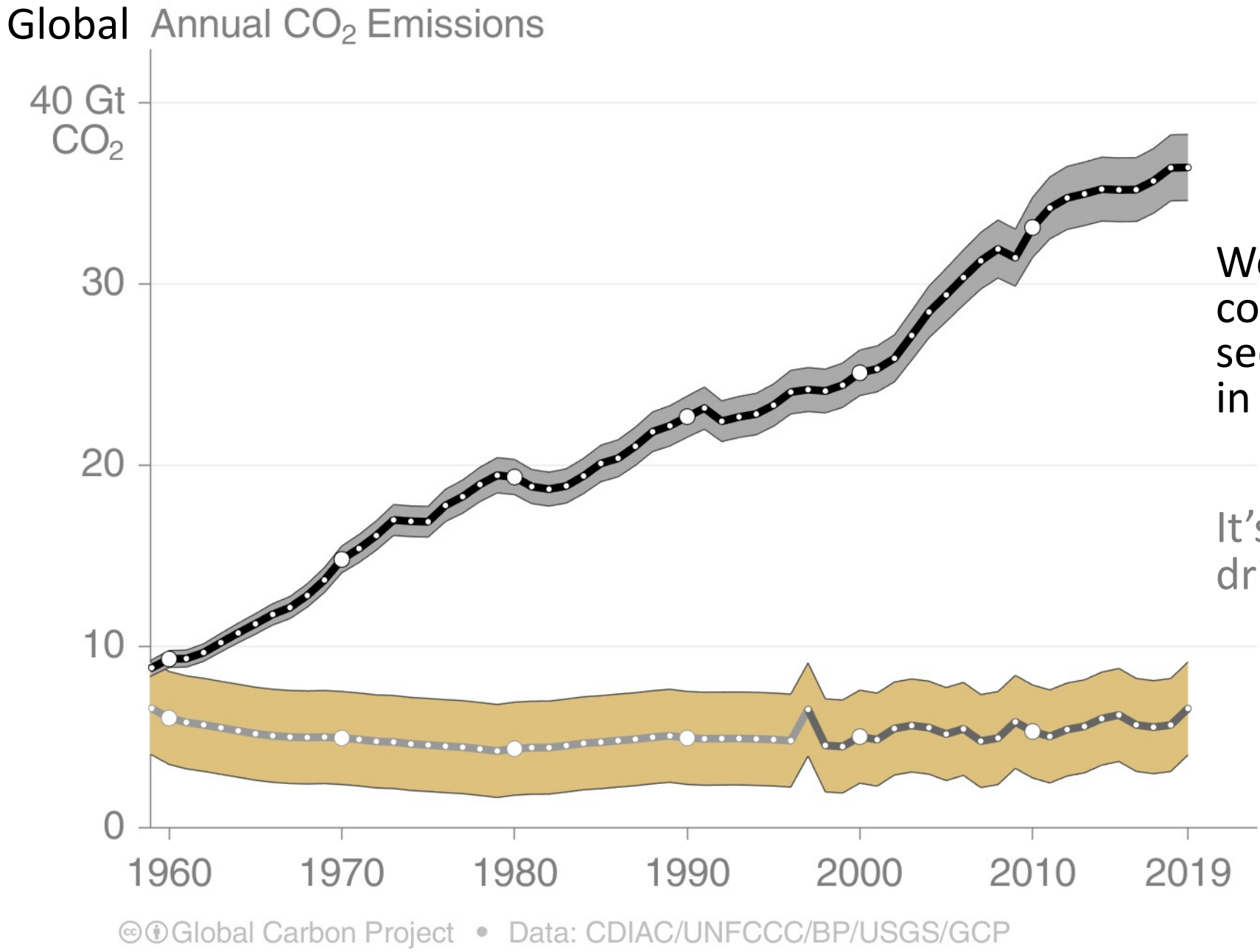


If these elements tip and then cascade in a domino effect,

the result could be a `Hothouse Earth'

with temperatures and sea levels not seen since the Stone Age, millions of years ago.

★ `On the move'



We can count emissions by country of origin, by sector, or by end user, but in the end, its all the same.

It's the fossil carbon that is driving climate change.

But what about the Paris Agreement?

- Nations that have committed to reducing emissions by 2030 have done so on average by only 7.5% (on 2010 levels), whereas a
- 30% reduction by 2030 is needed to limit warming to 2°C and
- 55% reduction by 2030 is needed to limit warming to 1.5°C.
- Based on current policies as opposed to Paris Agreement pledges, warming could go as high as 3.6°C.
- Australia's 2030 emissions reduction target is consistent with global warming of 4°C if all other countries followed a similar level of ambition.

Think carbon budget (rather than net zero)

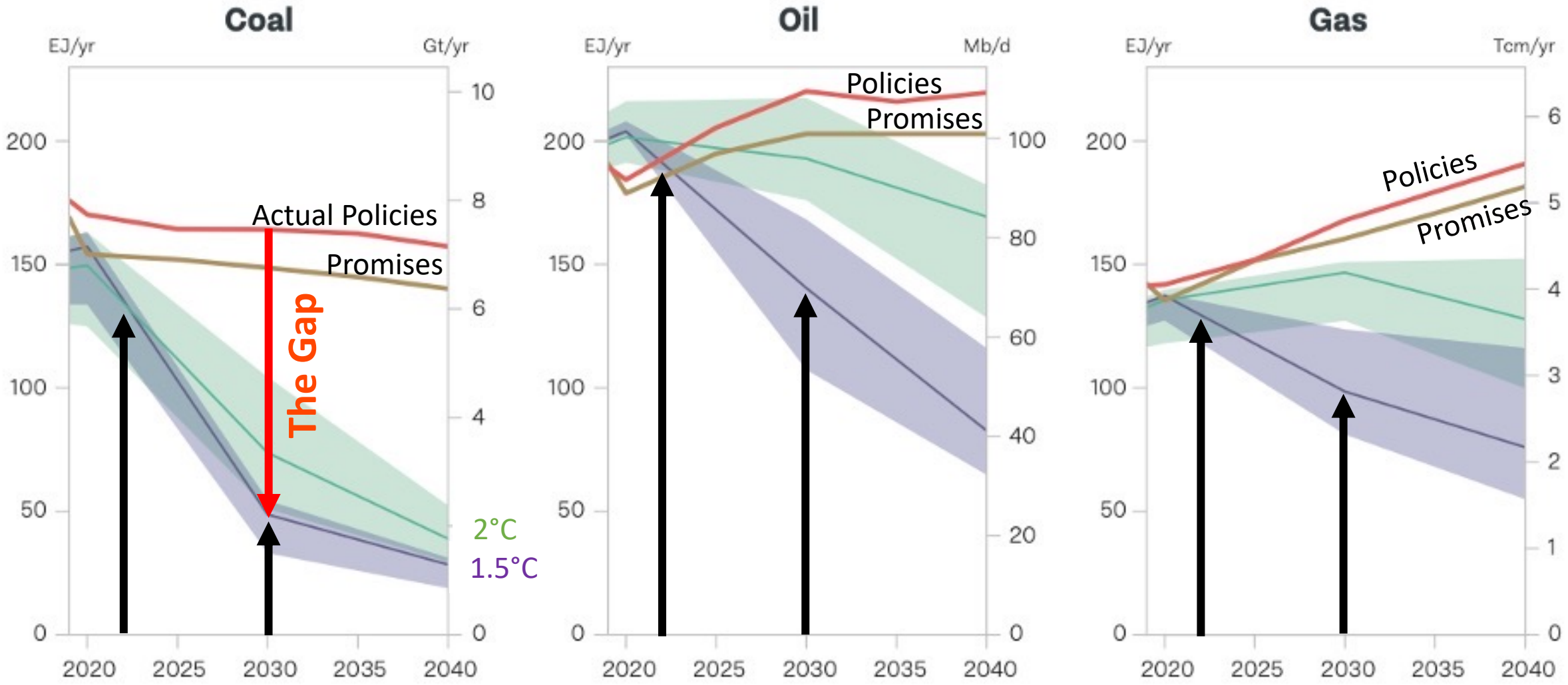
About 8 years remain at current emission levels before the remaining global carbon budget to hold warming to 1.5°C with at least a 67% chance is exhausted.

That's one reason why what we do between now and 2030 is so important.

The Fossil Fuel Gap

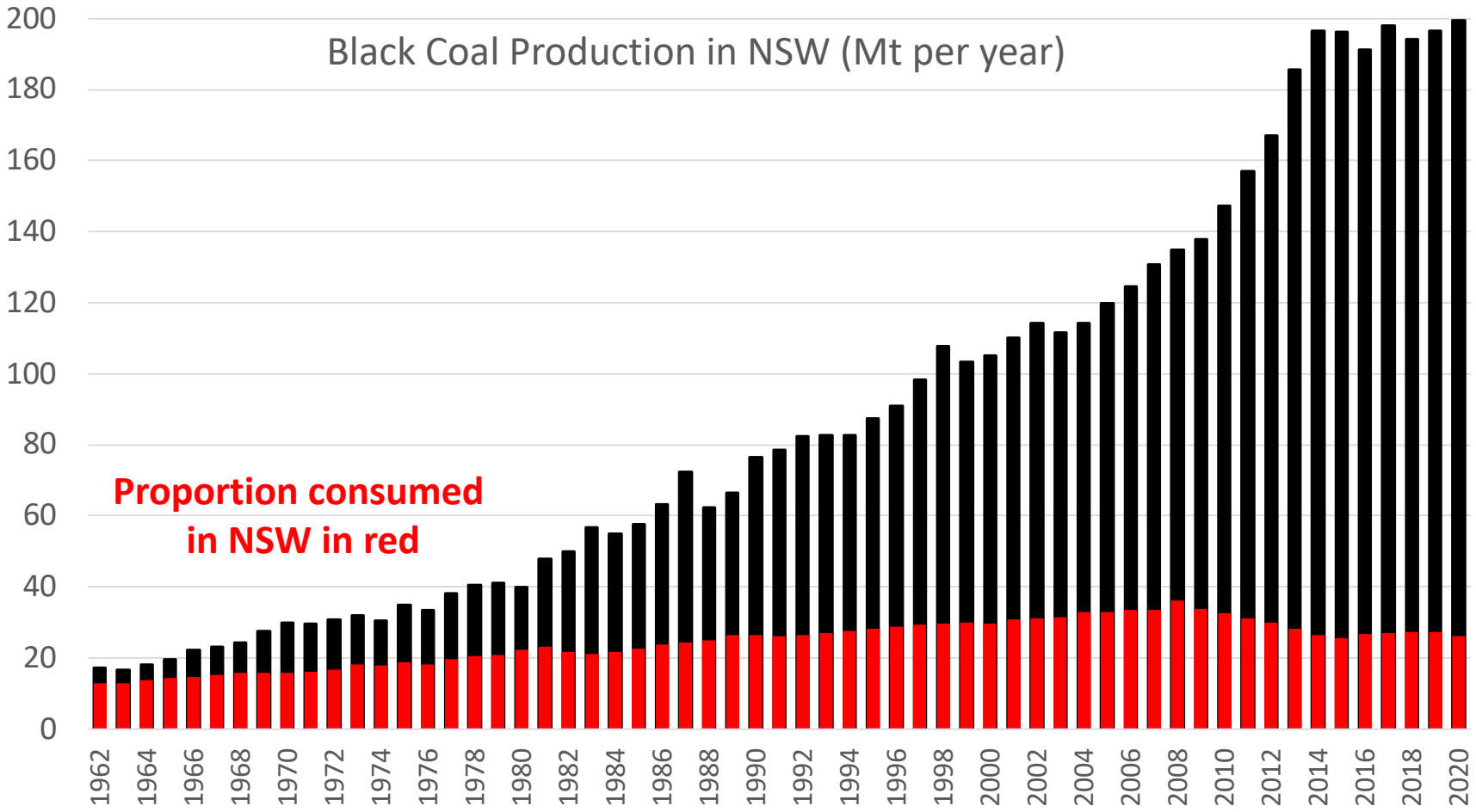
From SEI et al. 2021,
https://productiongap.org/2021report

50% Chance of Holding Global Warming to 1.5°C
66% Chance of Holding Global Warming to 2°C



Data from Australia Energy Statistics 2021

This trend must reverse starting now in order to be consistent with a future of 1.5°C to 2.0°C global warming

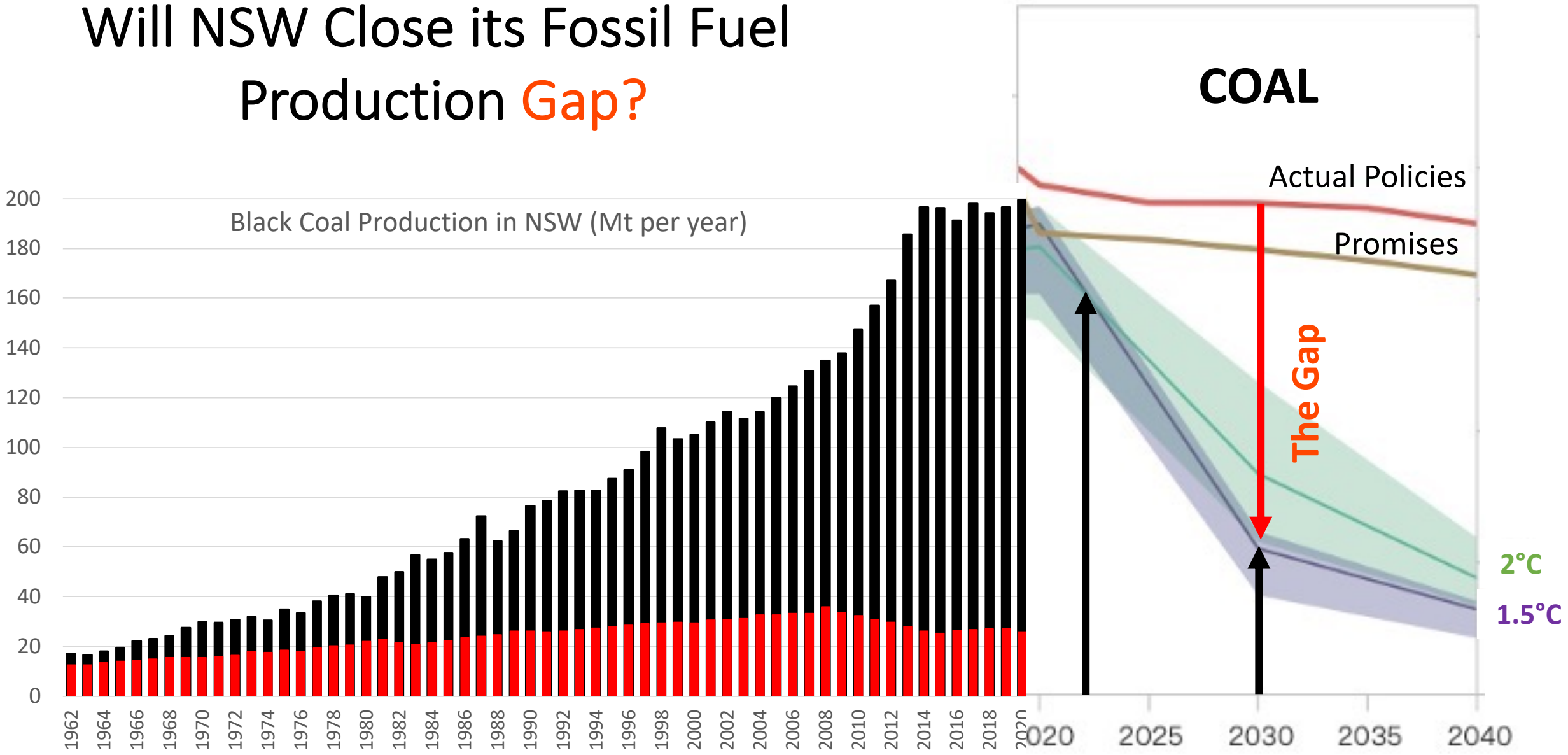


GHG emissions from the combustion of NSW coal (Scope 3)

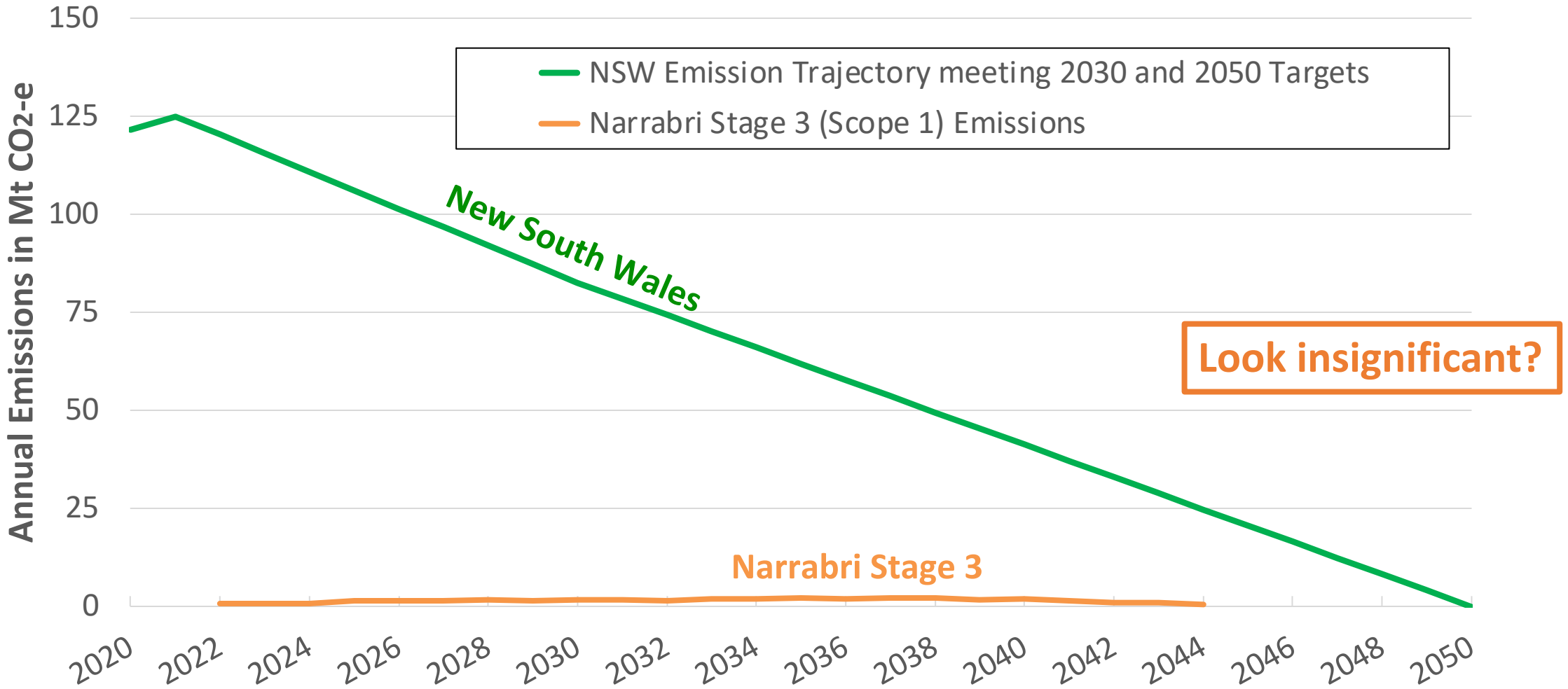
is 3 times more damaging to the NSW environment

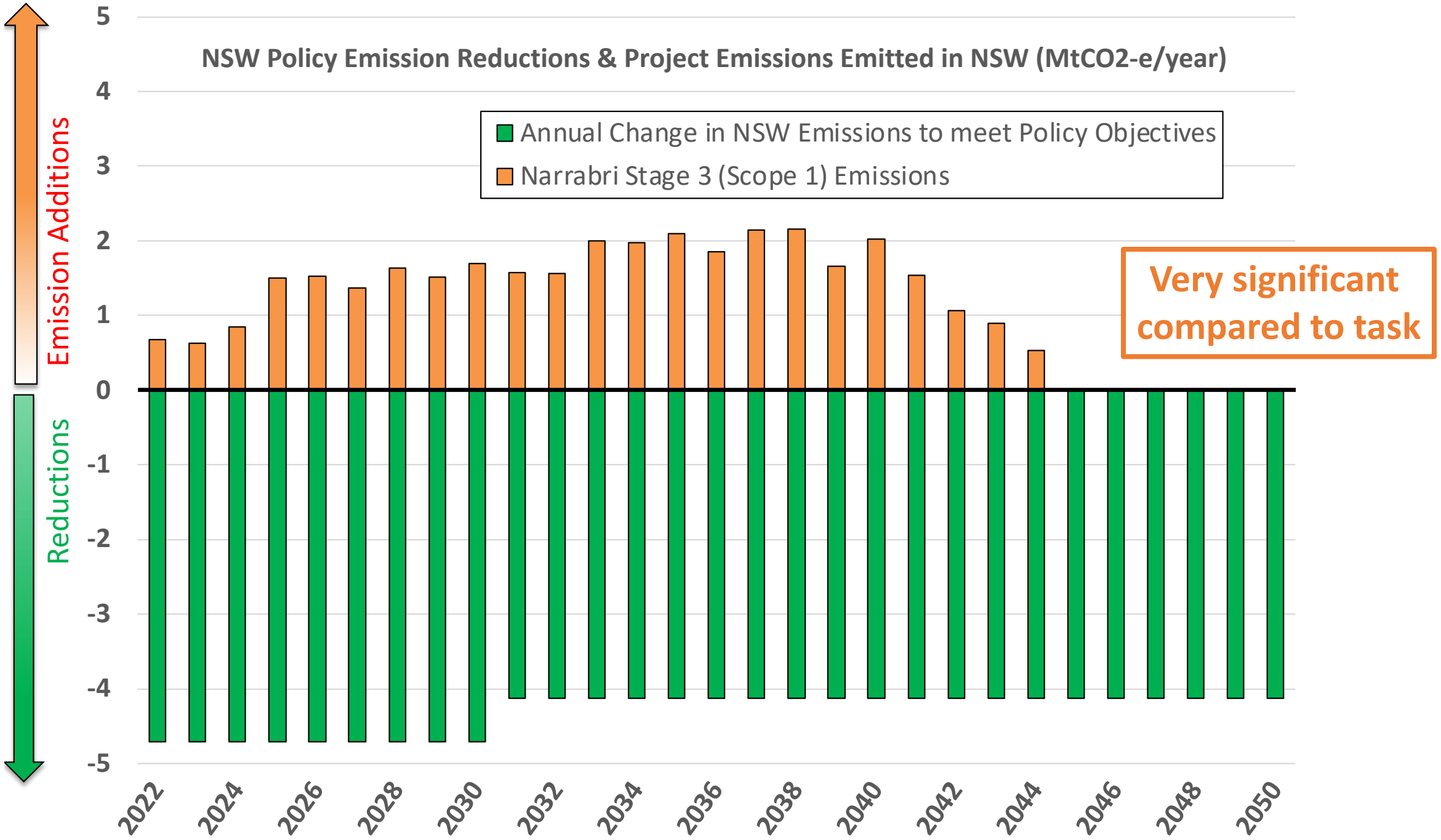
than all of the State's direct emissions (Scope 1) combined

Will NSW Close its Fossil Fuel Production Gap?



Narrabri Underground Stage 3 will make it much more difficult for NSW to meet 2030 and 2050 targets




NSW Policy Emission Reductions & Project Emissions Emitted in NSW (MtCO2-e/year)
Annual Change in NSW Emissions to meet Policy Objectives
Narrabri Stage 3 (Scope 1) Emissions
Emission Additions
Reductions
Very significant compared to task
5
4
3
2
1
0
-1
-2
-3
-4
-5
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
2048
2050

GHG Emissions from Narrabri Underground Stage 3

		Effect on NSW 2030 Target	Effect on NSW Environment
Category of Emissions (Mt CO_2-e)	**Annual Average over lifetime**	**Total in period 2022 – 2030 inclusive**	**Total in period 2022 – 2050 inclusive**
Scope 1	1.50	11.40	34.46
Scope 2	0.12	1.18	2.79
Scope 3	19.81	193.96	455.62

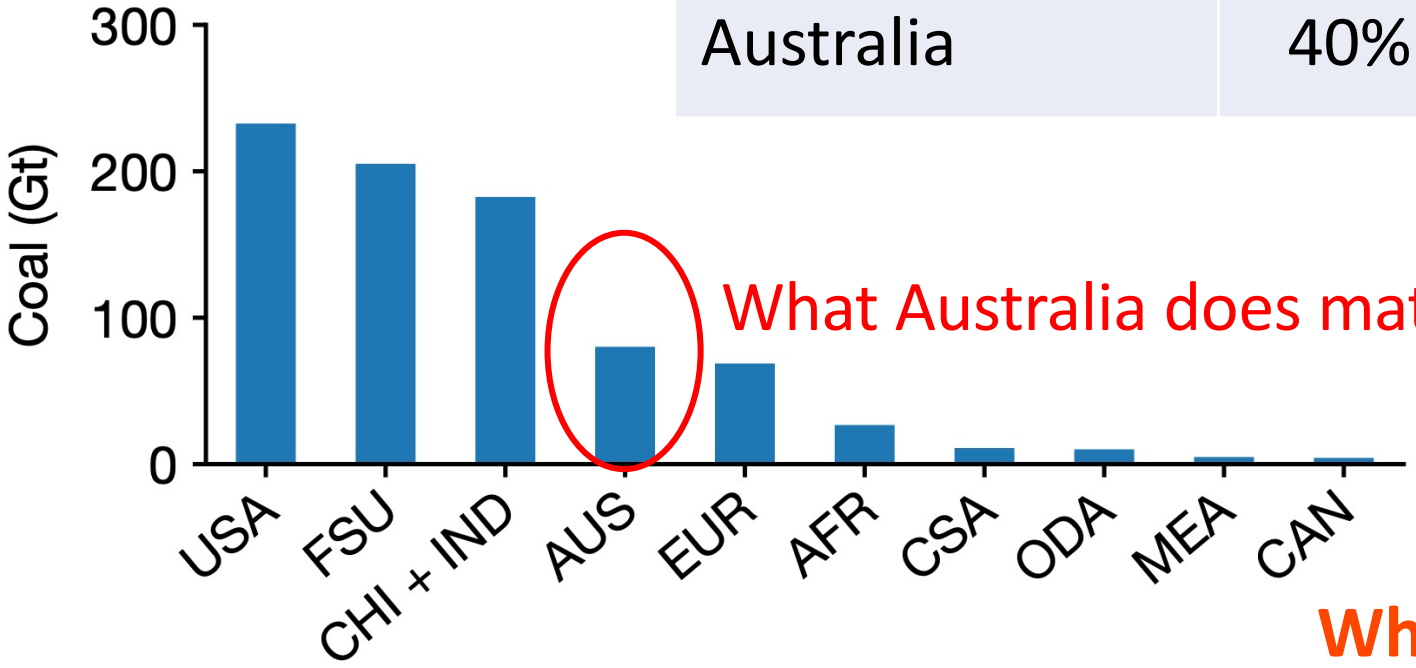
is more than 14x Scope 1 alone

NB: I have used current NGER values for methane

For at least a 50% chance of holding warming to 1.5°C

How much fossil fuel* must stay in the ground?

	Oil	Methane Gas	Coal
Globally	58%	59%	89%
Australia	40%	35%	95%



What Australia does matters!

What this Commission does matters.

*Reserves in 2018 proven to be economically & technologically mineable. Details in Welsby, Price & Ekins (2021) Nature, 597

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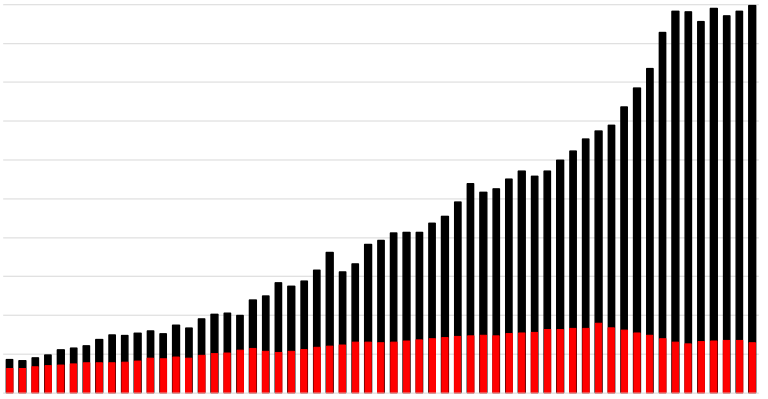
Thank You

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