RISC

decisions with confidence

Energy transition and emissions reductions

Some inconvenient truths

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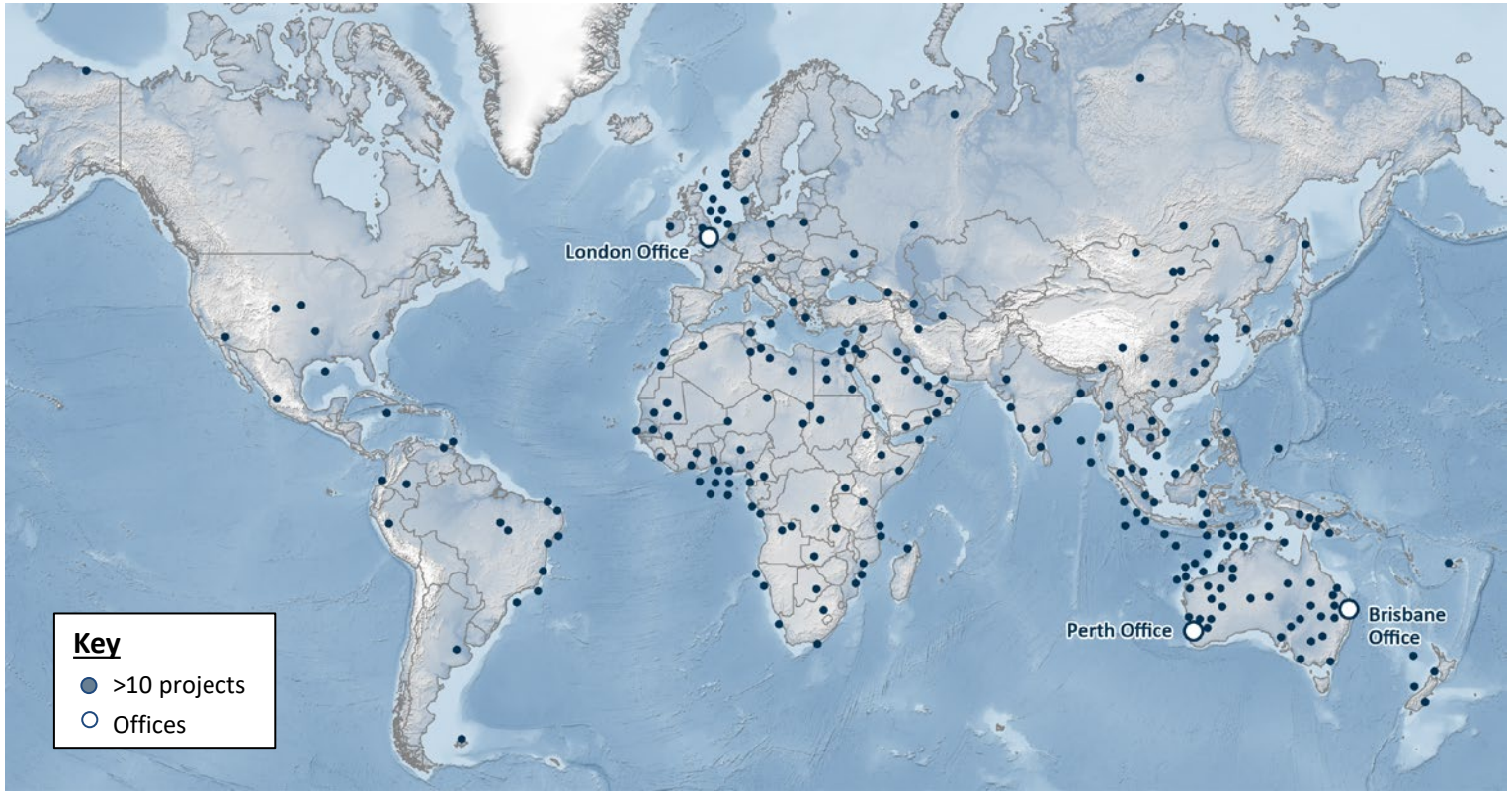
RISC is an independent advisory firm, providing insightful and impartial advice to a broad range of clients in the energy industries. We provide a more comprehensive, reliable and respected opinion faster than anyone else in the industry, enabling our clients to make their business decisions with confidence.



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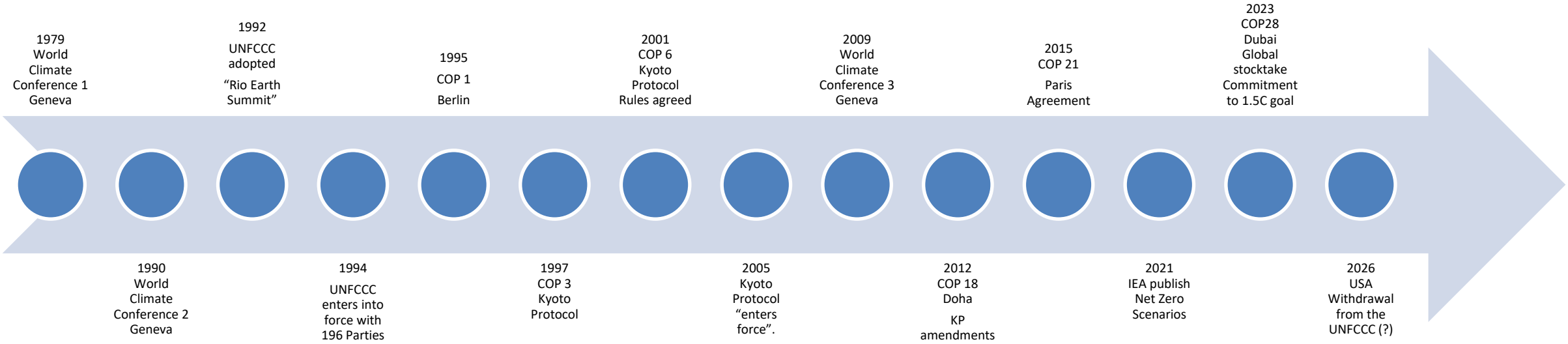
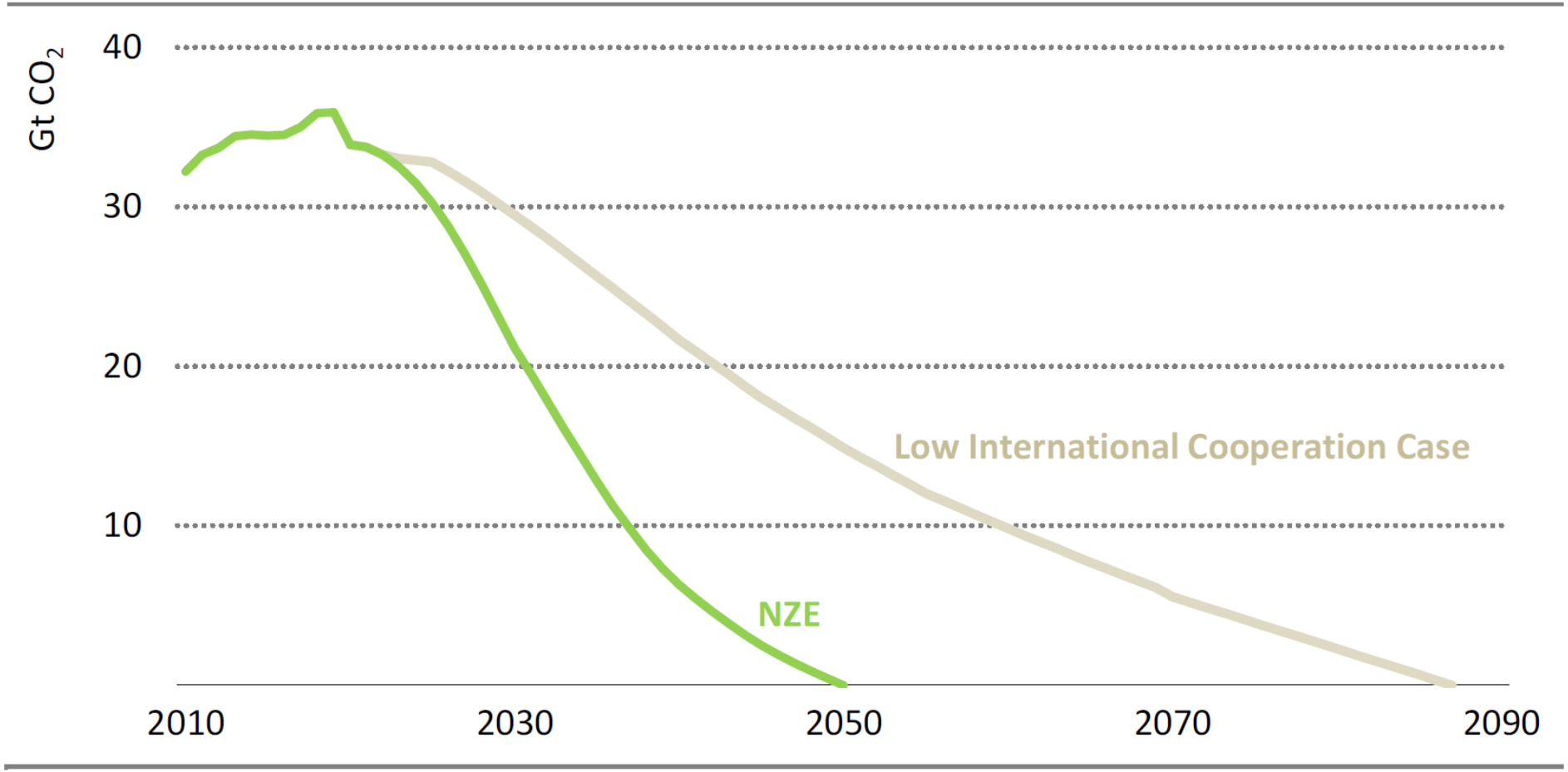
A historical Timeline



The Hope: We will get to Net Zero

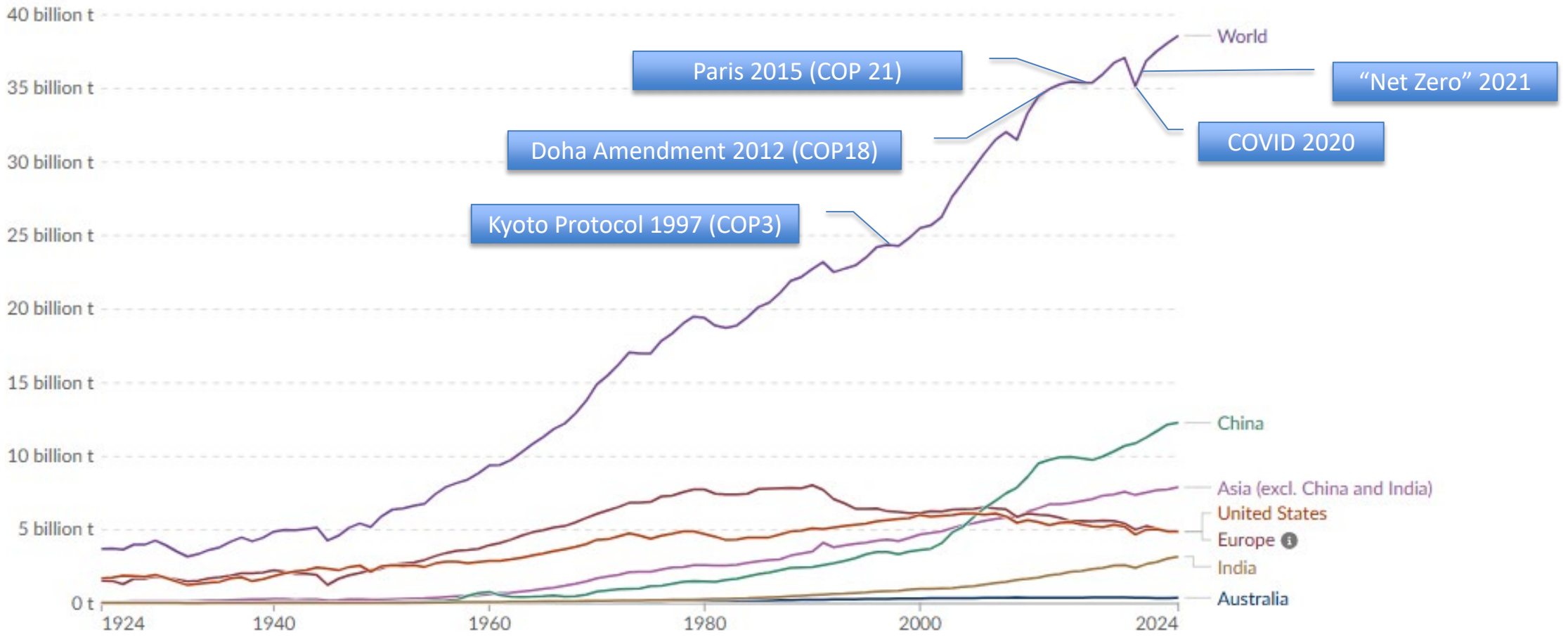
Global energy-related CO_2 emissions in the net zero pathway and Low International Co-operation Case



Source: IEA "Net Zero by 2050", 2021

The reality: Global emissions have continued to climb over several generations and it's unclear that we have yet peaked

- Annual CO_2 emissions (excl. land-use)



Global Carbon Budget (2025) – with major processing by Our World in Data

Why are emissions increasing?

In the last 20 years…Energy Consumption increased by 42% (and by 77% over the past 30 years)

The Good:

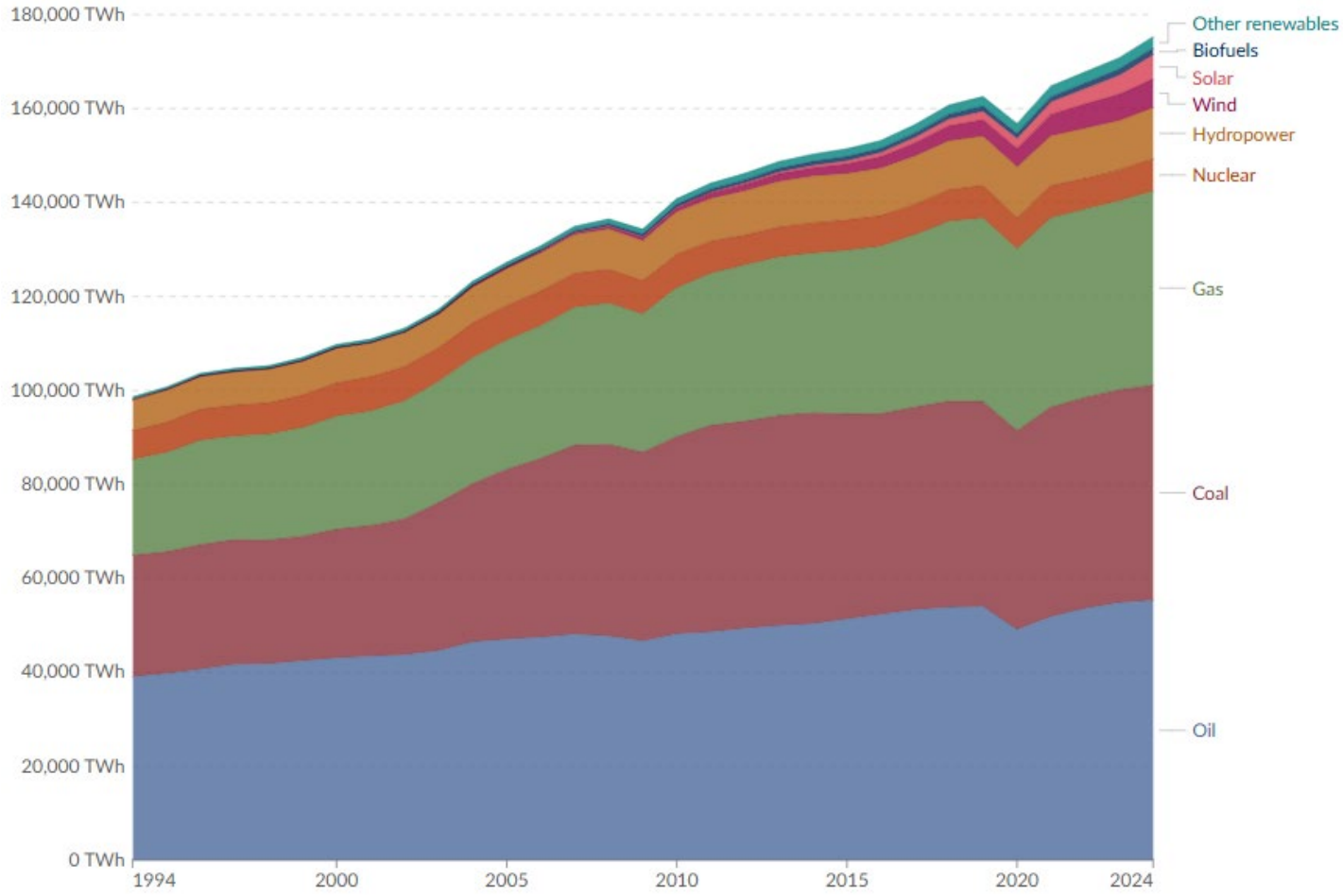
- Wind increased 26 times (2,600%)
  - 232 TWh to 6,124 TWh
- Solar increased 643 times (63,000%)
  - 8 TWh to 5,150 TWh
- Hydro increased by 42%
  - 7,630 TWh to 10,860 TWh
- Total = 14,260 TWh

The Bad:

- Gas increased by 54%
  - 26,780 TWh to 41,280 TWh 14,500 TWh
- Oil increased by 19%
  - 46,410 TWh to 55,290 TWh 8,900 TWh

The Ugly:

- Coal increased by 36%
  - 33,710 TWh to 45,850 TWh 12,150 TWh

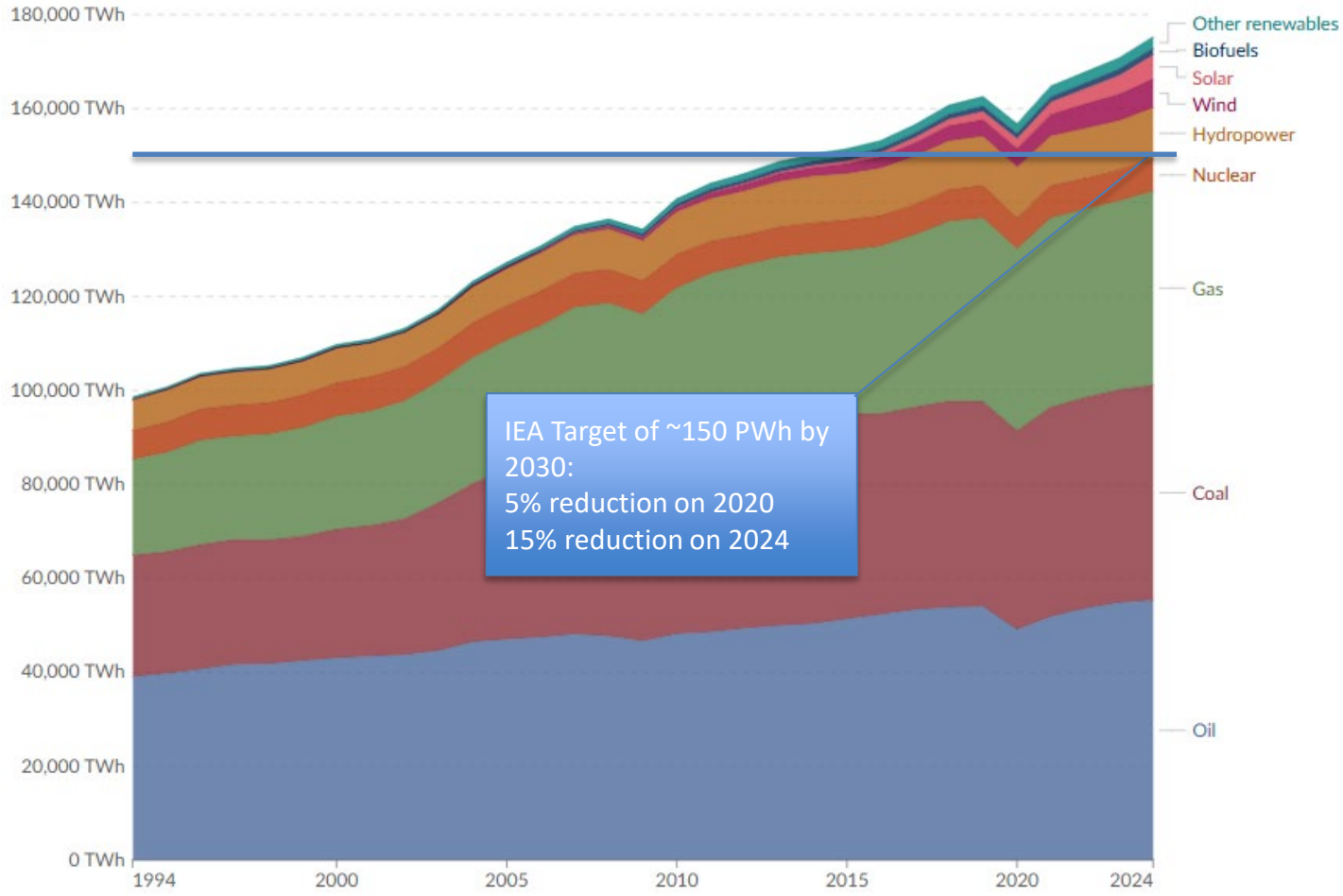


Source: Energy Institute - Statistical Review of World Energy (2025) – with major processing by Our World in Data

What Net Zero needs

Getting to Net Zero requires much more than most people realise

- Significant decrease in total energy use due to increases in energy efficiency



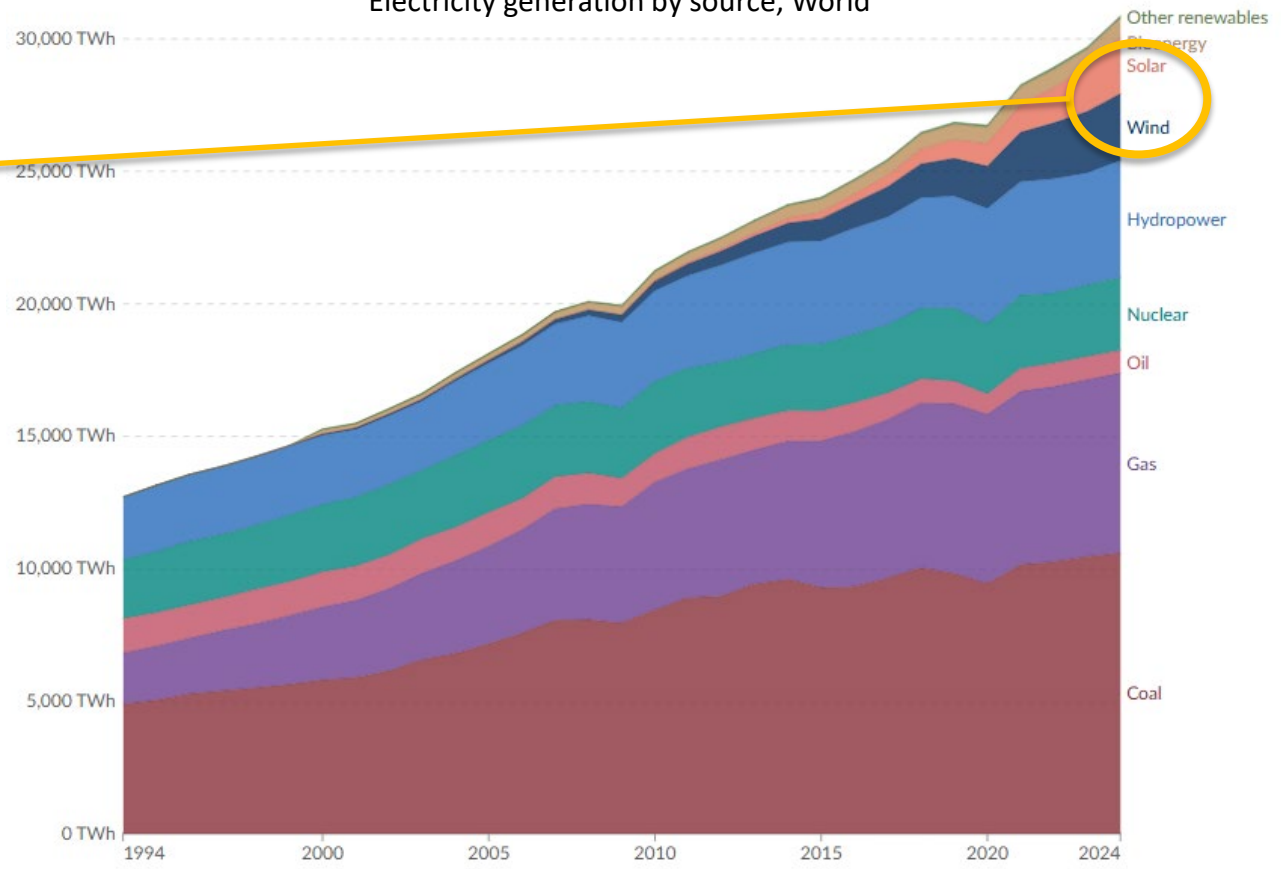
Source: Energy Institute - Statistical Review of World Energy (2025) – with major processing by Our World in Data

What Net Zero needs

Getting to Net Zero requires much more than most people realise

- Significant decrease in total energy use due to increases in energy efficiency
- Solar PV and wind are the leading sources of electricity generation (globally) before 2030.
- Universal access to sustainable energy achieved by 2030.
  - Cleaner cooking
  - Access to electricity

Electricity generation by source, World

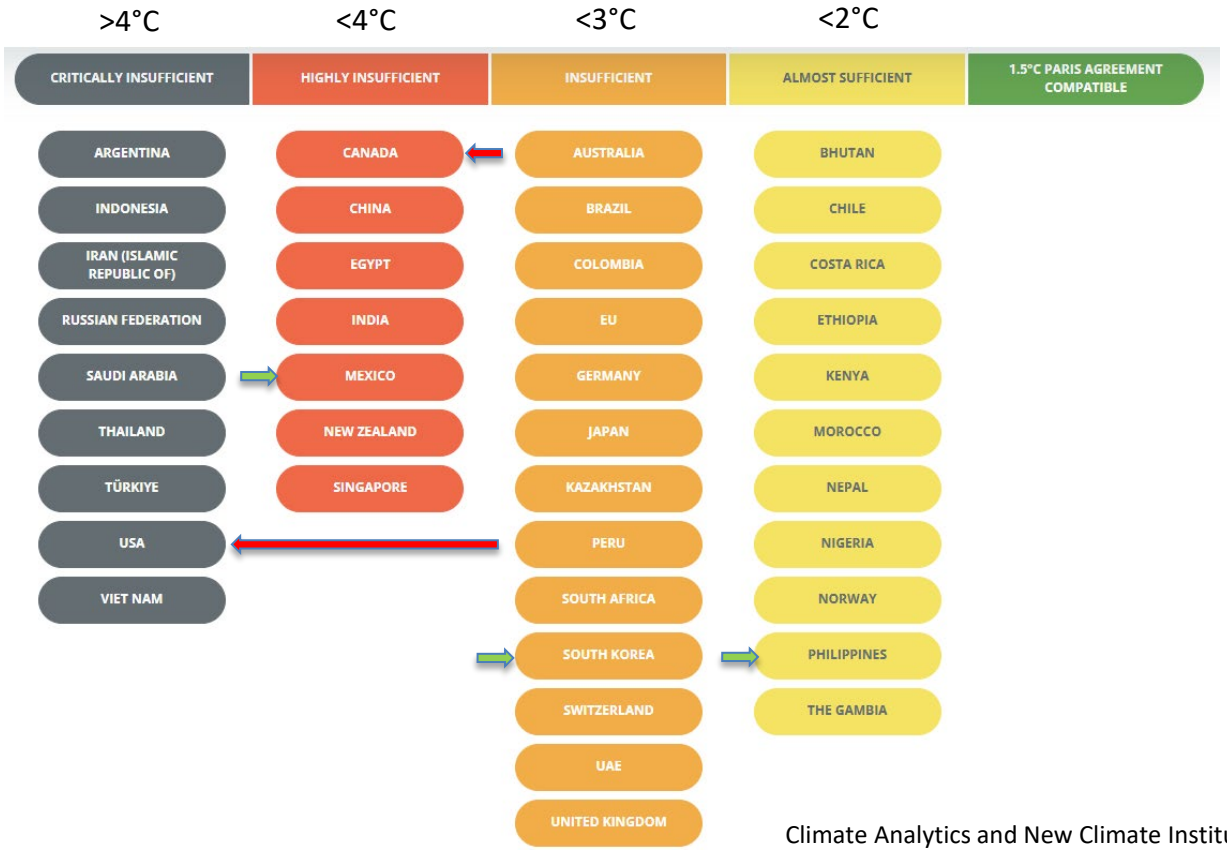


Source: Energy Institute - Statistical Review of World Energy (2025) – with major processing by Our World in Data

How are we tracking against the 2015 Paris Agreement…

The Climate Action Tracker (CAT) – not for profit project tracking measures and actions.

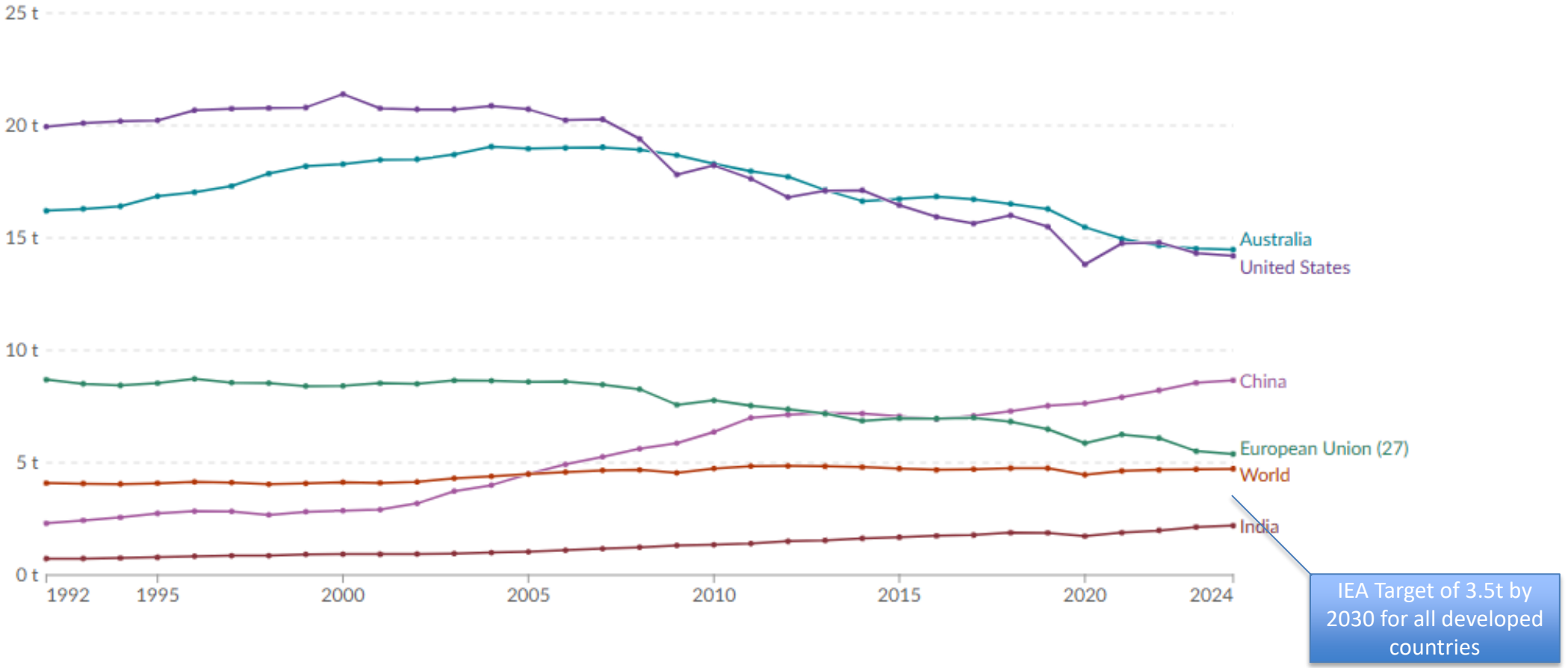
- No country compatible with Paris
- 11 small emitters “almost sufficient”
  - Philippines has moved up in last 12 months
- Most countries “insufficient”
  - USA has withdrawn from the Agreement



Climate Analytics and New Climate Institute
March 2026
Copyright: Climate Action Tracker

Who are the Energyholics

CO2e emissions per capita. Tonnes CO2e per person per year.



Sources: Global Carbon Budget (2024); IEA (2021)

What Net Zero needs

Getting to Net Zero requires much more than most people realise…all pathways require similar outcomes across a range of issues.

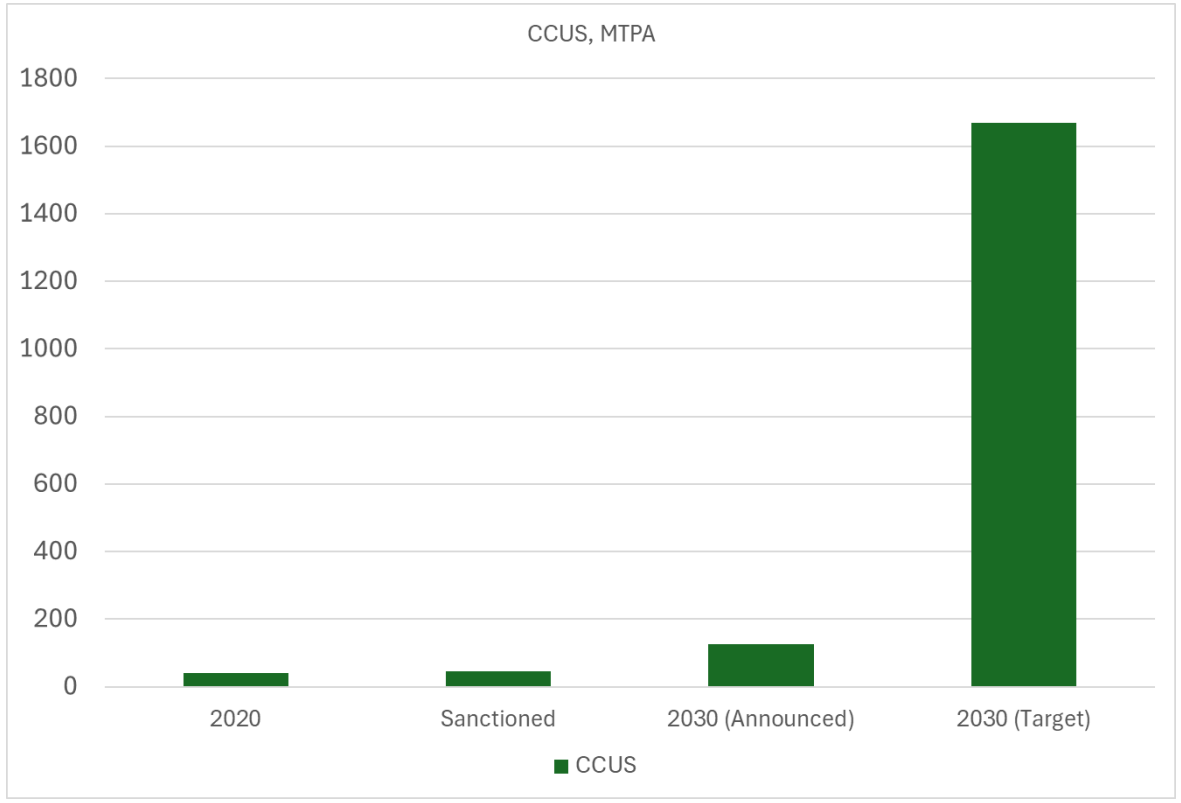
- Universal access to sustainable energy achieved by 2030.
- Solar PV and wind are the leading sources of electricity generation (globally) before 2030.
- Major reduction (75%) in coal-fired power generation by 2030.
- Commercialisation of new technologies has to happen faster than it has ever done before
  - Less than 10 years instead of the historical 10-30 years for the most rapidly developed new technologies.

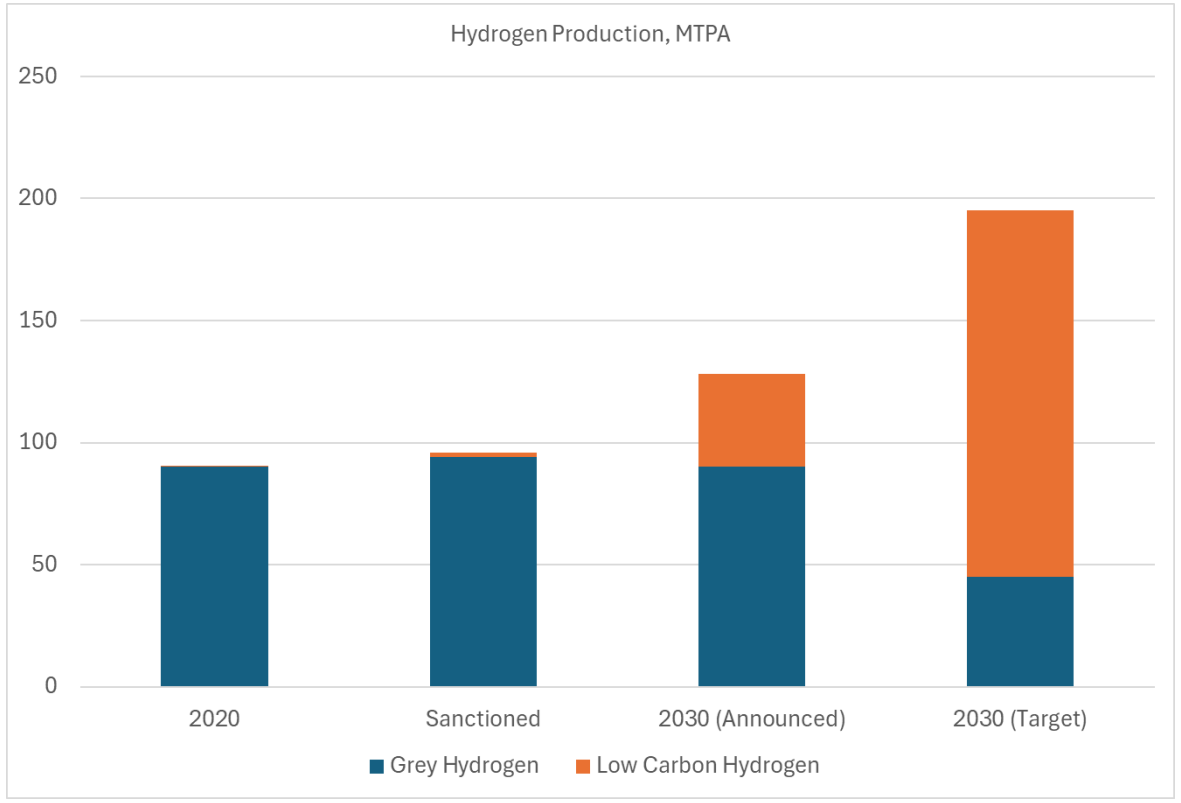
- Over 50% of passenger vehicles sold, and 30% of medium-heavy-duty trucks are electric or use hydrogen.

- There is significant behavioural change:
  - Avoid 75% of long-haul flights.
  - No flights of less than 1 hour.
  - Slower driving (7km/h)
  - No car trips that would take less than 10 minutes to cycle.
  - Public or shared transport for all urban trips
  - 3°C reduction in space heating temp (3°C increase in air-con setpoint)

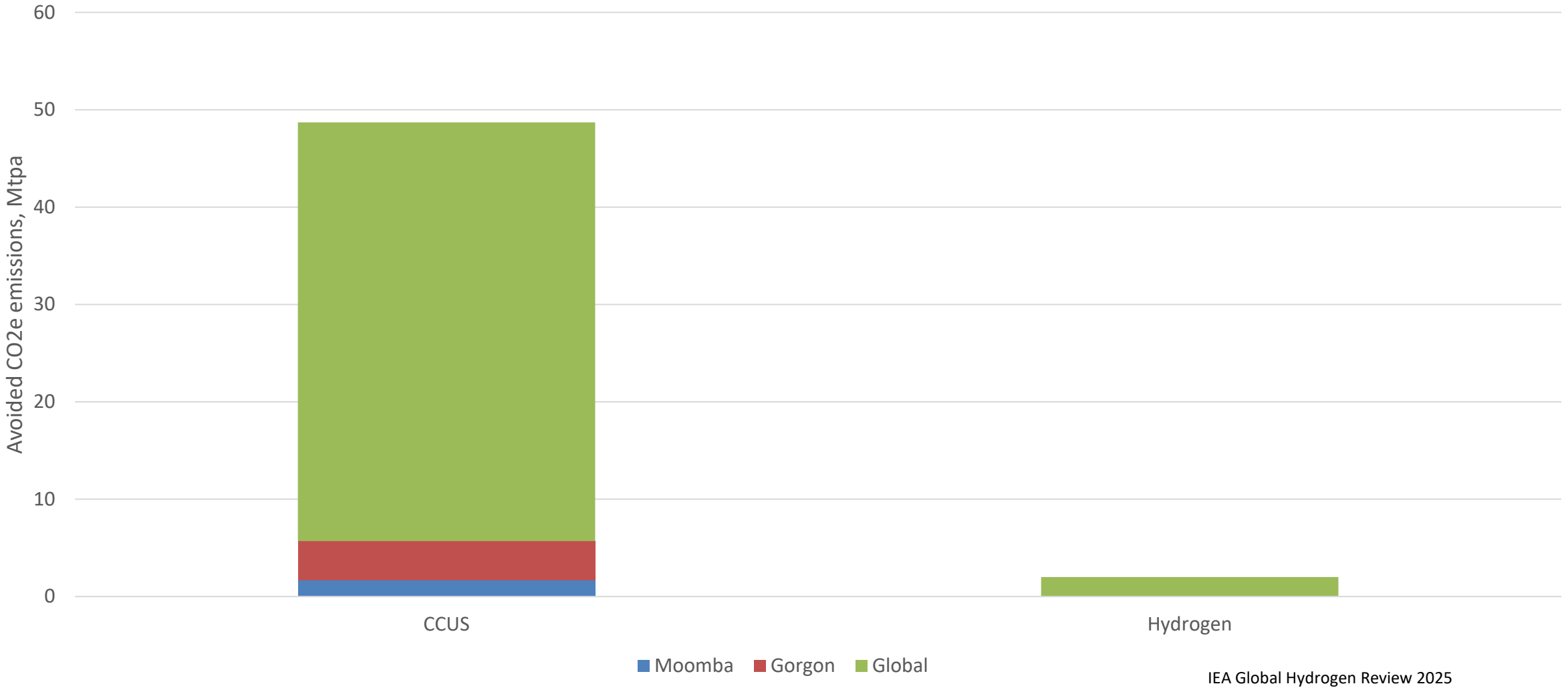
Commercialisation of new technologies – CCUS and Hydrogen

Neither CCUS or Hydrogen are on track to meet IEA projected requirements





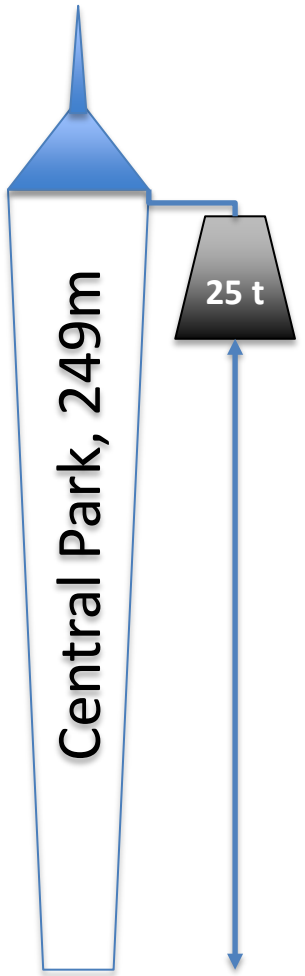
Relative impact on CO2e emissions



IEA Global Hydrogen Review 2025

Batteries vs Gravity

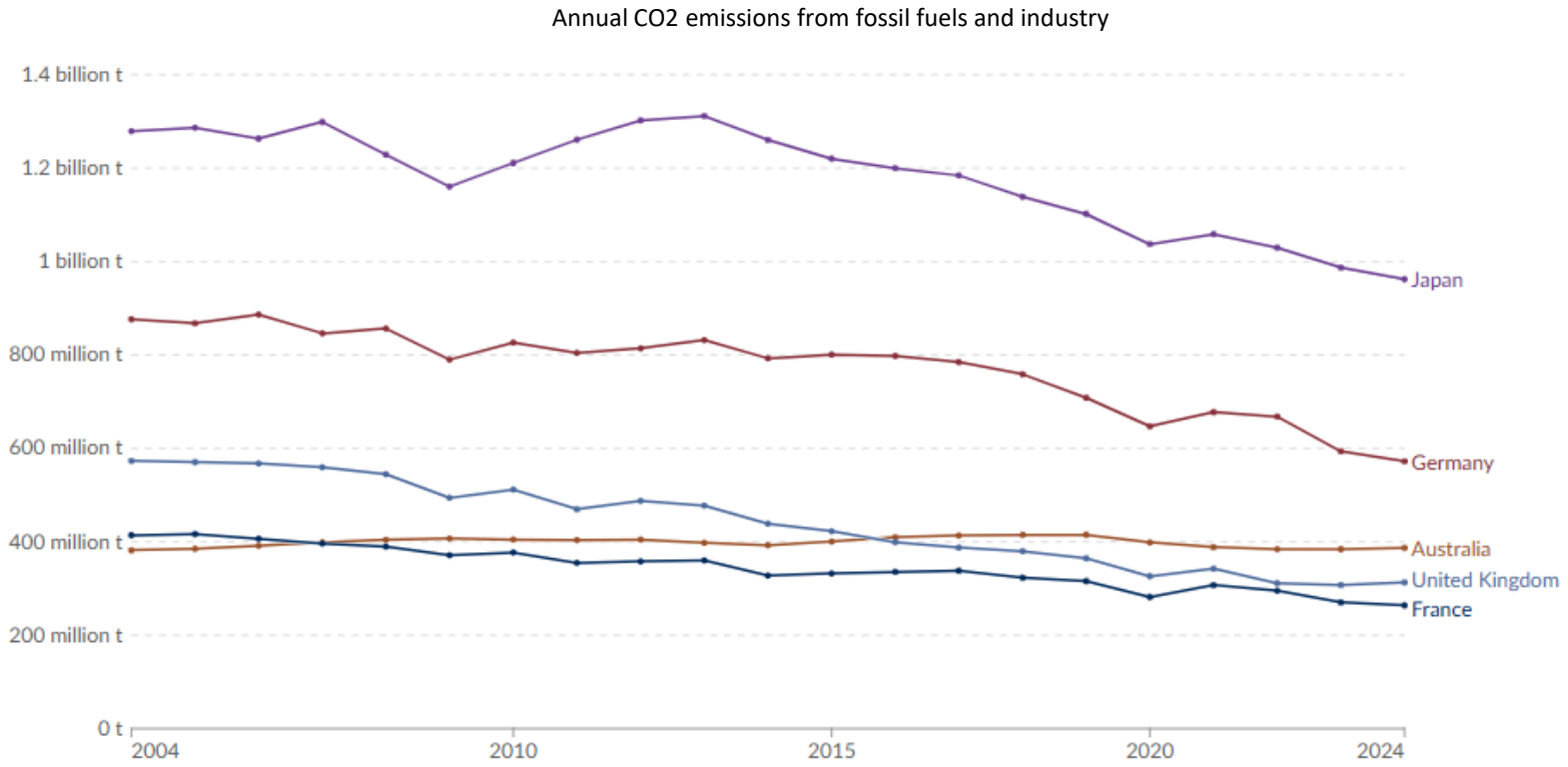
14 kWh = 50 MJ



What can we do?

Significant reductions can be achieved “relatively easily”

- February 2024: the UK government announced that it was the first major economy to halve its emissions (1990-2023)
- Between 2011-2020 the UK reduced its coal-fired power generation from coal from 40% to <2%.
  - Renewable energy rose from 7% to ~50%.
  - Gas use remained steady
- Australia relies on coal for over 50% of its power generation.
  - We could halve our emissions by getting coal out of the power generation mix.



Global Carbon Budget (2025) – with major processing by Our World in Data

What's the cost of replacing Coal

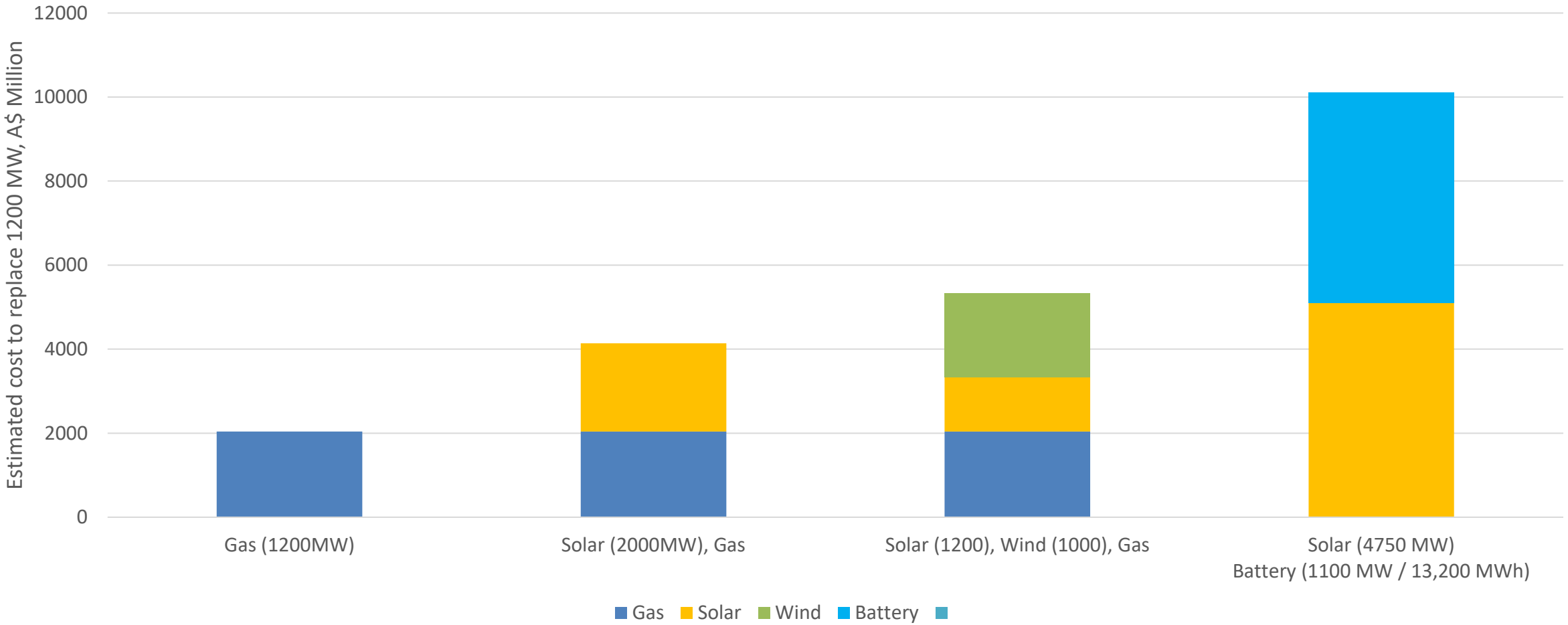
Liddell (1.2 GW) is being "replaced" by a 500MW, 1000 MWh BESS.

What would an equivalent replacement actually cost?

	Capacity MW / Cost A$ Million				Storage MWh	Total Cost, A$ million	Emissions, ktpa	%age reduction
	Gas	Solar	Wind	Battery	Battery			
Liddell (Coal)	1,200 MW Black Coal						**9,500**	
Gas Only (MW)	1,200							
Cost A$ million	2,040					**2,040**	**4,940**	**48%**
Solar & Gas (MW)	1,200	2,000						
Cost A$ million	2,040	2,150				**4,190**	**2,845**	**70%**
Solar, Wind & Gas (MW)	1,200	1,200	1,000					
Cost A$ million	2,040	1,290	2,000			**5,330**	**1,865**	**80%**
Solar & Battery (MW)		4,750		1,100	13,200			
Cost A$ million		5,105			~5,000	**10,105**	**0**	**100%**

Gas Costs based on Snowy Hunter Power project (2024), and GHD estimate for WA ERA (2022), $1.7 million/MW.
Solar costs based on announced cost of Blue Grass Solar, $215 million for 200 MW, $1.08 million/MW.
Wind costs based on announced cost of Herries Range, $2 billion for 1000 MW, $2 million/MW.
Battery based on announced costs of Stoney Creek BESS, $350 million for 125 MW, 1000 MWh, Liddell BESS, $750 million for 500 MW, 1000 MWh.

What's the cost of replacing Coal



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Conclusions

We are increasingly unlikely to find a path to Net Zero

- Whilst the need to reduce emissions has been discussed for 3 decades, global emissions are continuing to climb.
  - Population growth
  - Increasing urbanisation
  - Increasing standards of living
  - New ways of using energy

- We are not yet doing the easy things to reduce emissions – some easy changes can have significant impact
  - Gas is an enabler for increased renewable power generation.

- Significant reductions in emissions are only likely to be achieved with changes in consumer behaviour, and that appears unlikely in the near future.

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