



decisions with confidence

Decarbonisation - How are we tracking?

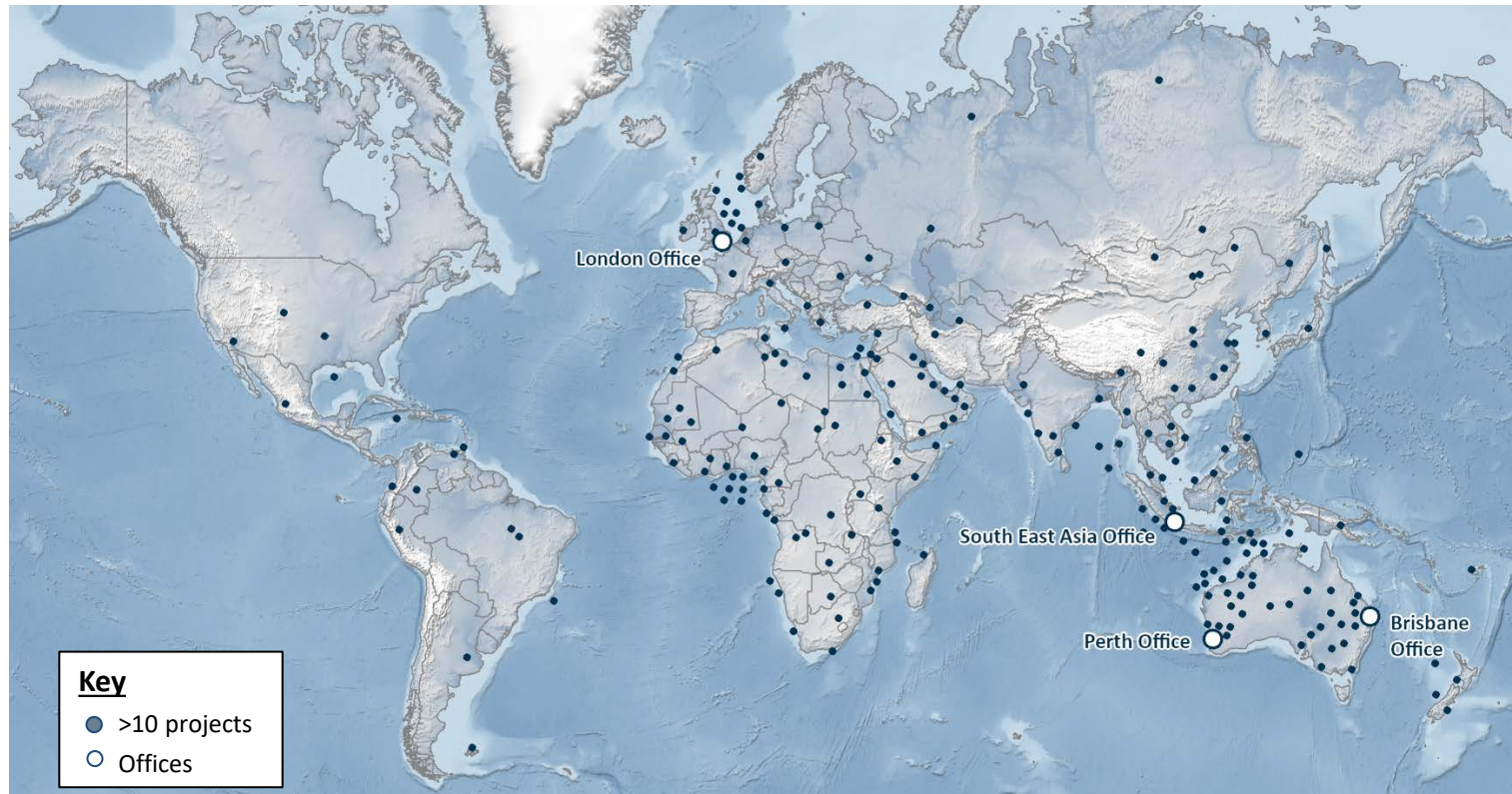
H₂opec, H₂ype, CH₄oices and CO₂nsequences



Who we are



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.



The statements and opinions attributable to the author and/or RISC in this presentation are given in good faith and in the belief that such statements are neither false nor misleading.

In preparing this presentation the author has considered and relied solely upon information in the public domain. This information has been considered in the light of RISC's knowledge and experience of the energy industries and, in some instances, our perspectives differ from some of our highly valued clients. In some cases the views and opinions of the author may differ from those held by others within RISC.

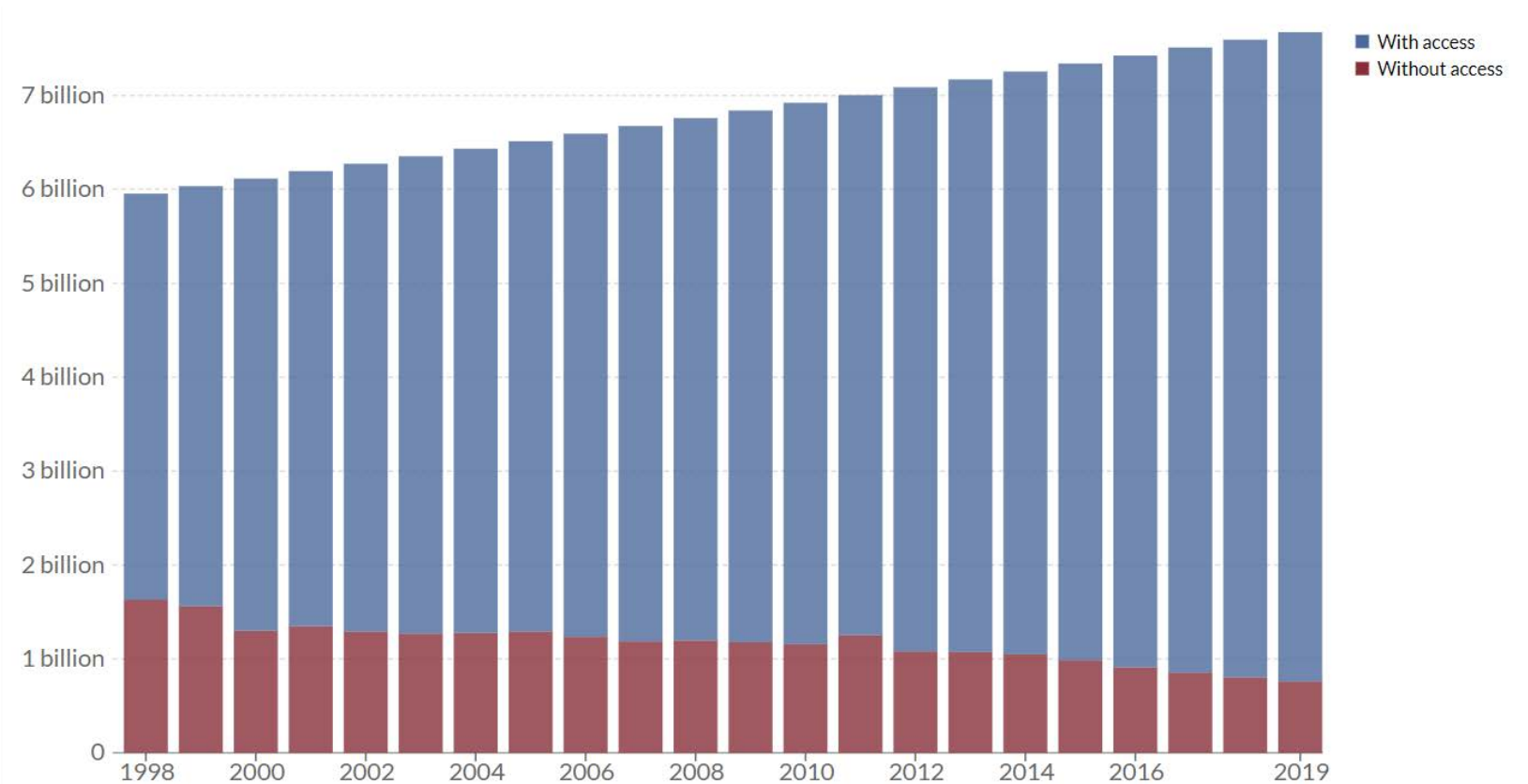
RISC has no pecuniary interest or professional fees receivable for the preparation of this presentation, or any other interest that could reasonably be regarded as affecting our ability to give an unbiased view.

This presentation is the copyright of RISC and may not be reproduced, electronically or in hard copy, without the written permission of RISC.

Energy Security – nearly a success?

In 2015 the number of people without electricity fell below 1 billion for the first time since the world population exceeded 1 billion (1805).

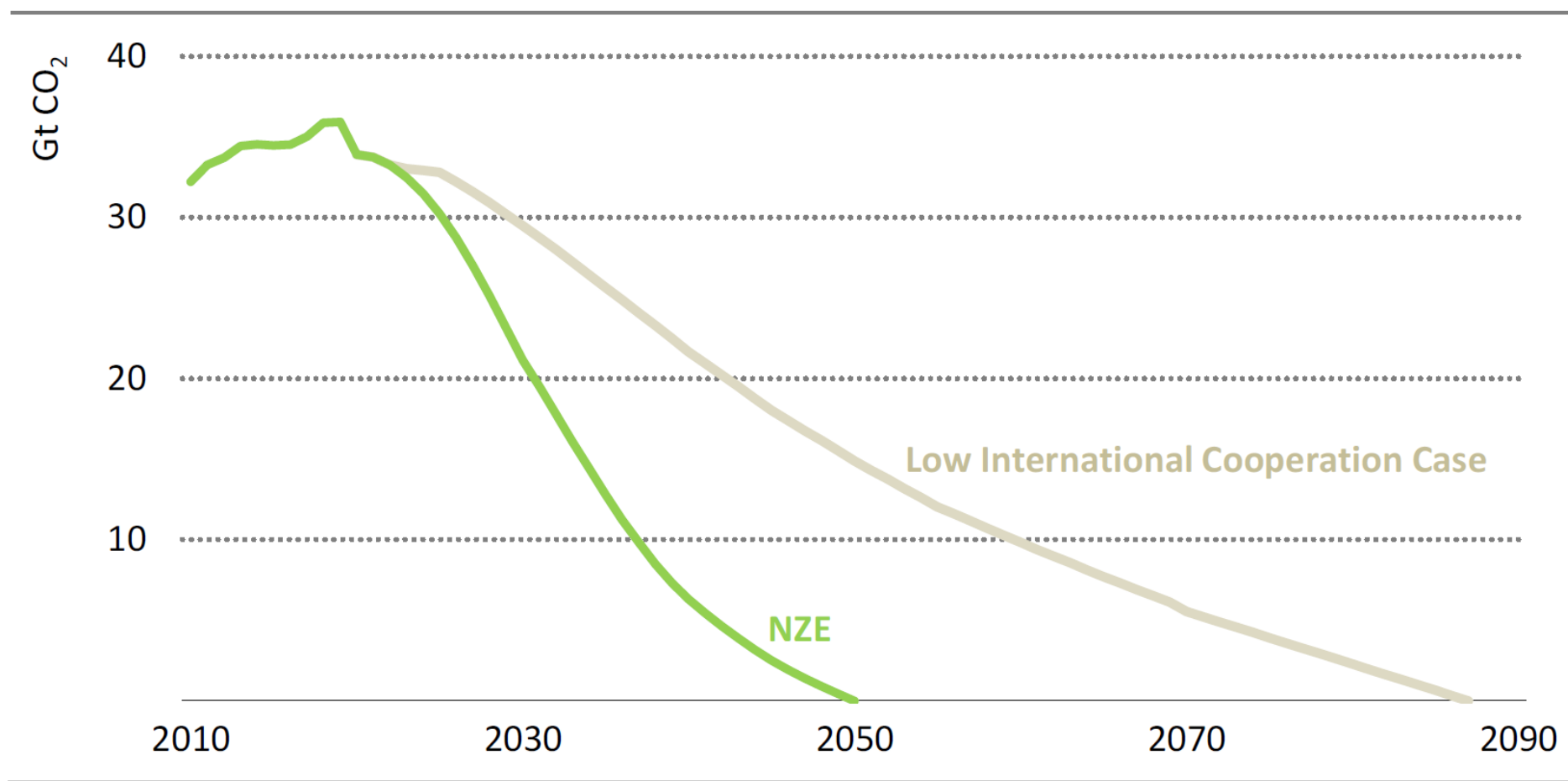
- For most of the 19th century 100% of the world's population lived without electricity.
- During the 20th century this figure fell steadily.
- At the turn of this century around 20% of the world's population did not have access to electricity.
- In 2019 that figure fell below 10%.



Source: Calculated by Our World in Data based on data published by the World Bank

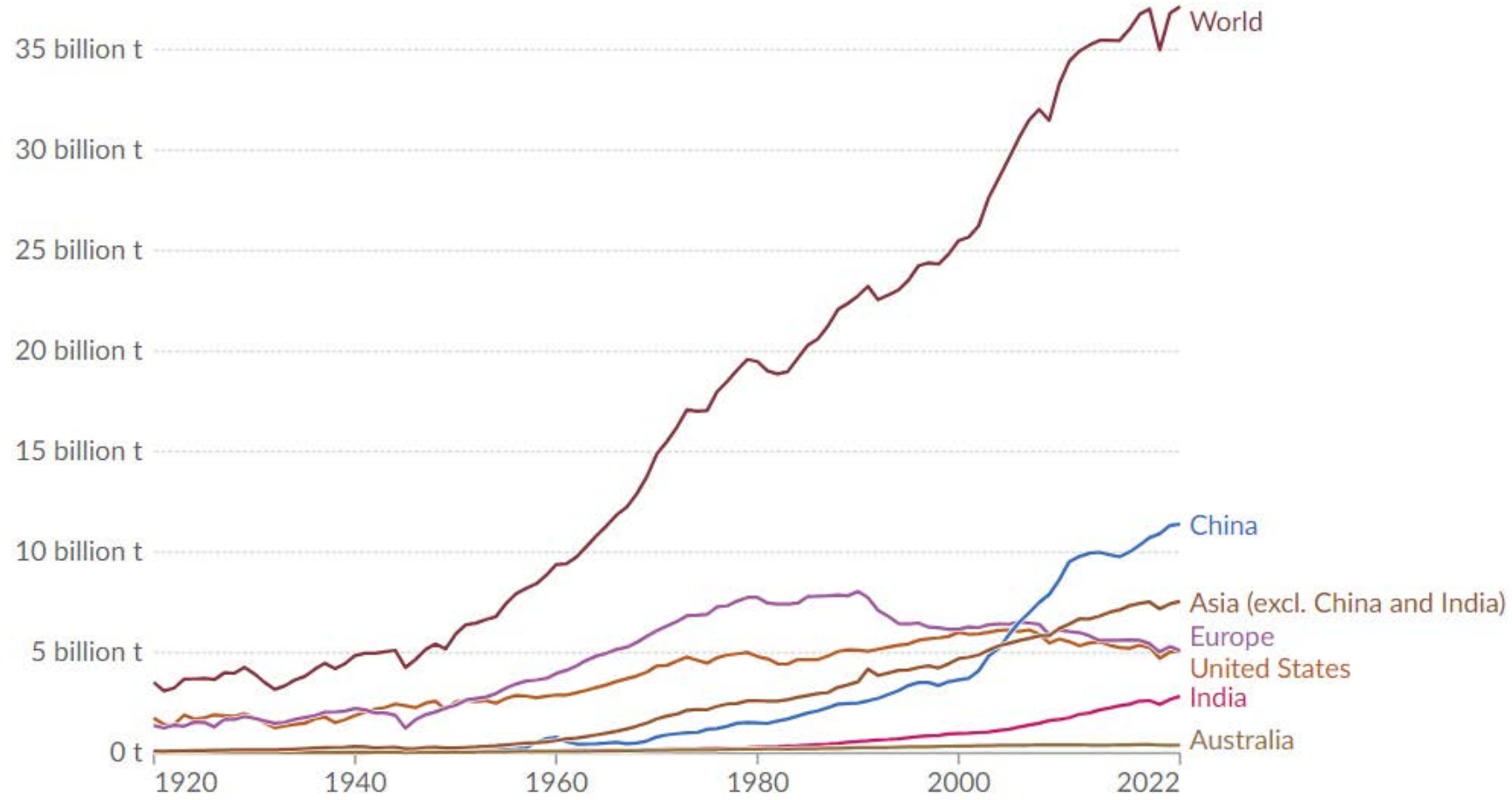
OurWorldInData.org/energy • CC BY

Global energy-related CO₂ emissions in the net zero pathway and Low International Co-operation Case



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

- Annual CO₂ emissions (excl. land-use)

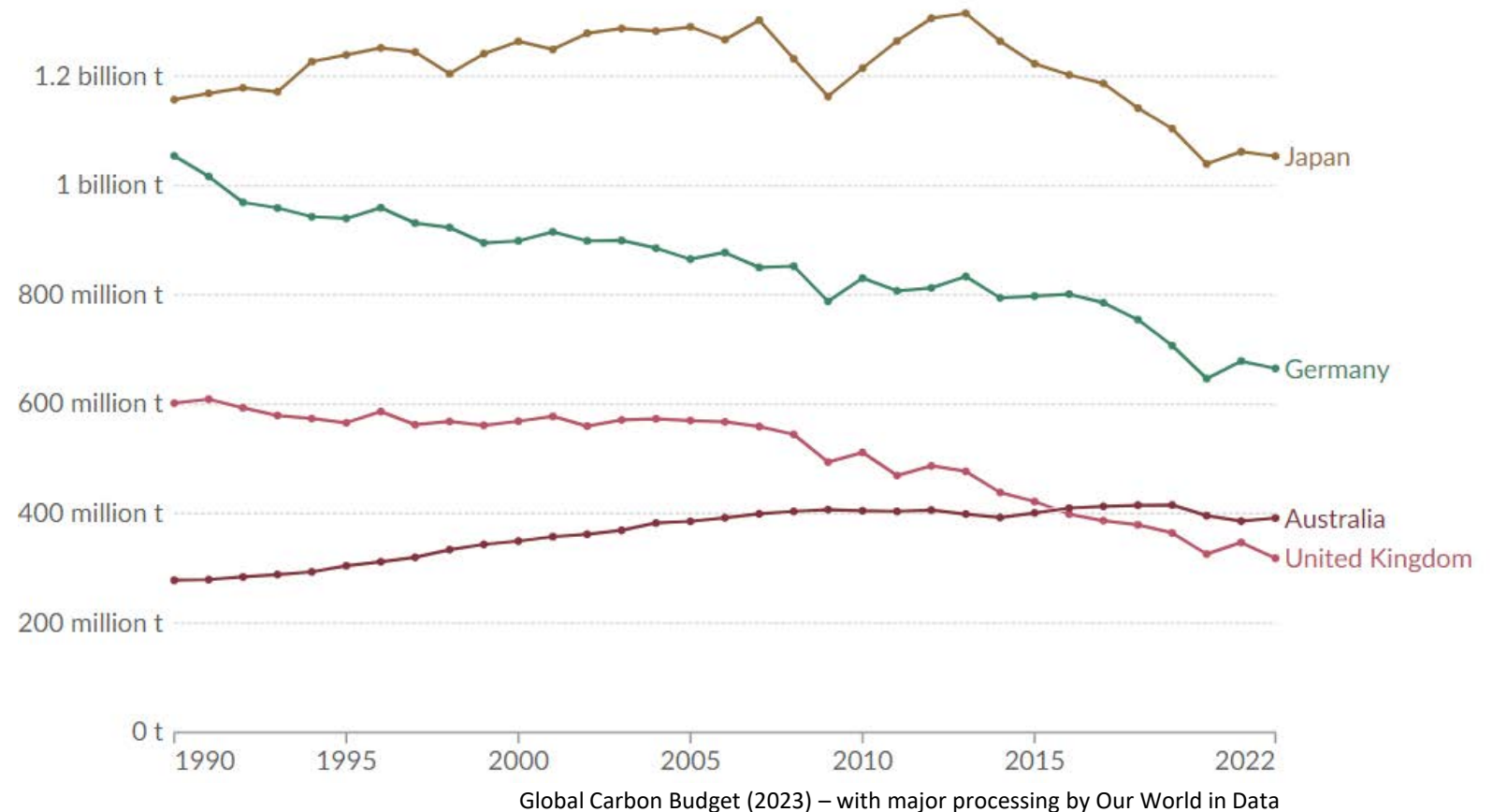


Global Carbon Budget (2023) – with major processing by Our World in Data

The developed world is lowering emissions.

Australia has lowered emissions but hasn't lowered its emissions as much as some..

- Australia is starting to reduce emissions but it lags most of the rest of the developed world
- The UK has reduced its reliance on coal from 40% to less than 2% in the last decade.
 - Gas steady (~40%)
 - The UK has also reduced demand by 15% (energy efficiency measures)
- Australia now emits more than the UK but has only 40% of the population.



How are we tracking against the 2016 Paris Agreement...

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

- No country compatible with Paris
- 9 small emitters “almost sufficient”
- Most countries “insufficient”

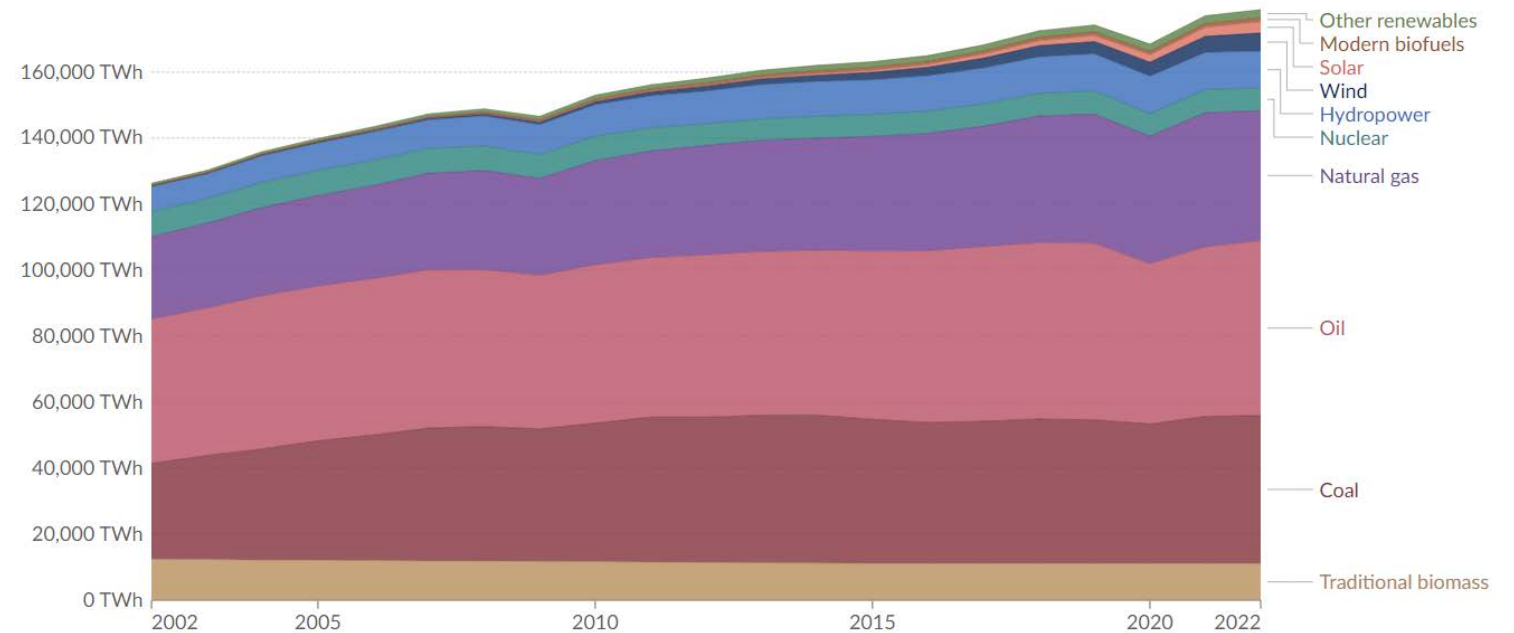


Climate Analytics and NewClimate Institute
Copyright: Climate Action Tracker

What is happening with energy consumption

In the last 20 years....

- Energy consumption increased by 42%
- Wind increased 36 times (3,500%)
 - 153 TWh to 5,500 TWh
- Solar increased by 690 times (68,000%)
 - 5 TWh to 3,500 TWh
- Hydro increased by 47%
 - 7,600 TWh to 11,300 TWh
- Gas increased by 57%
 - 25,700 TWh to 40,000 TWh
- Oil increased by 20%
 - 43,700 TWh to 53,000 TWh
- Coal increased by 55%
 - 29,000 TWh to 44,900 TWh



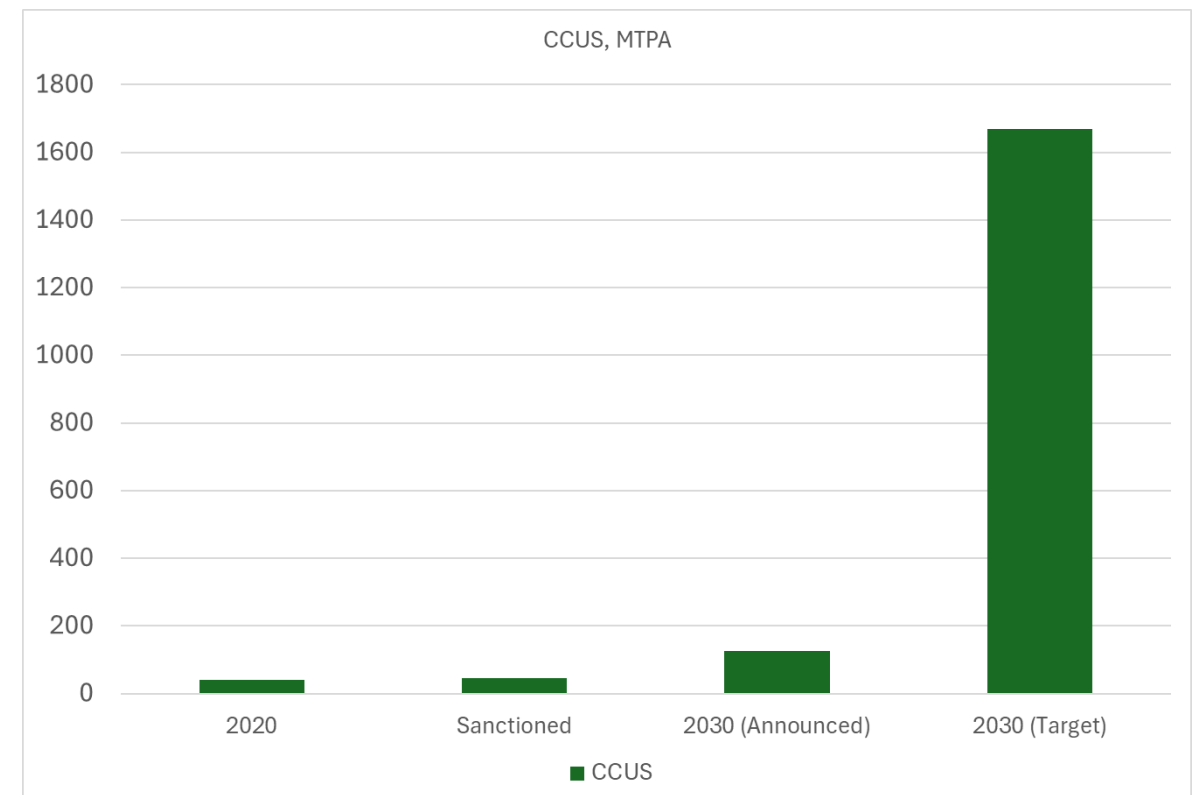
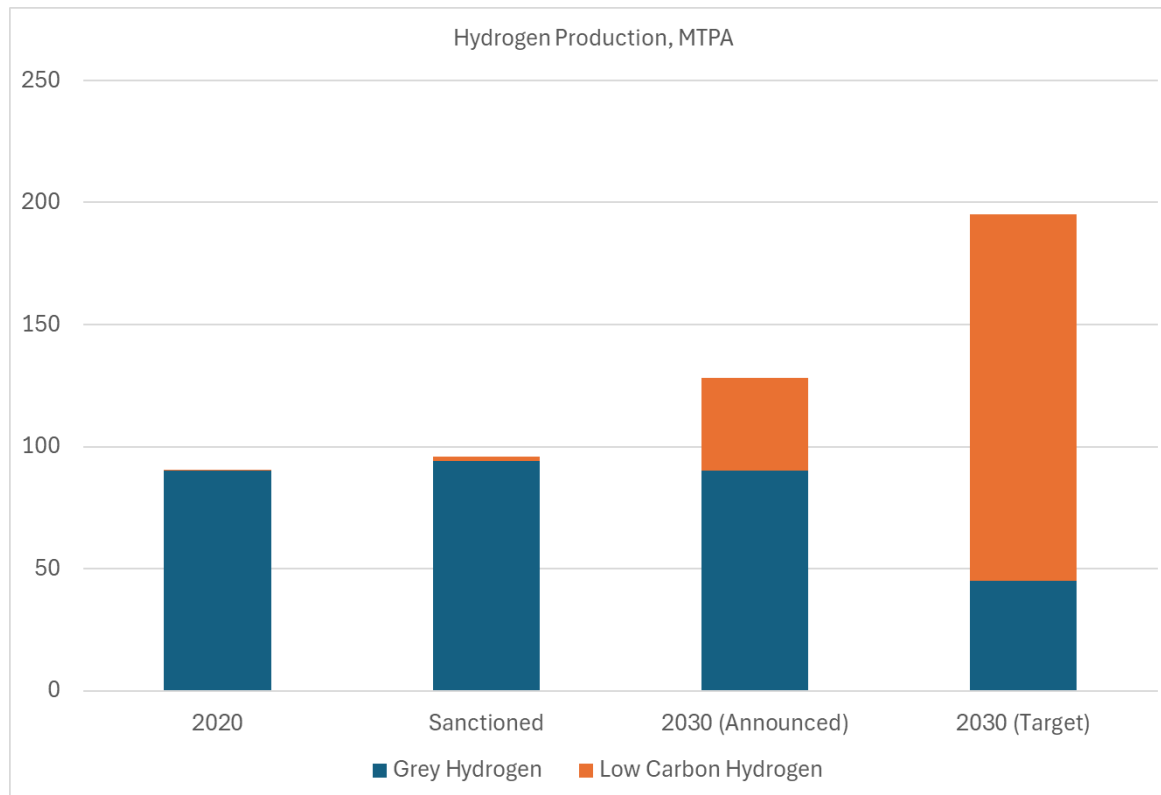
Energy Institute - Statistical Review of World Energy (2023), Smil (2017) - with major processing by Our World in Data

Getting to Net Zero requires much more than most people realise

- 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.
 - Reduce space heating temp (3C)
 - Increase A-C temp (3C)
 - Slower driving (7km/h)
 - Share all urban car trips (or use public transport more)
 - Do not take any car trips that would take less than 10 minutes to cycle.

Commercialisation of new technologies – Hydrogen and CCUS

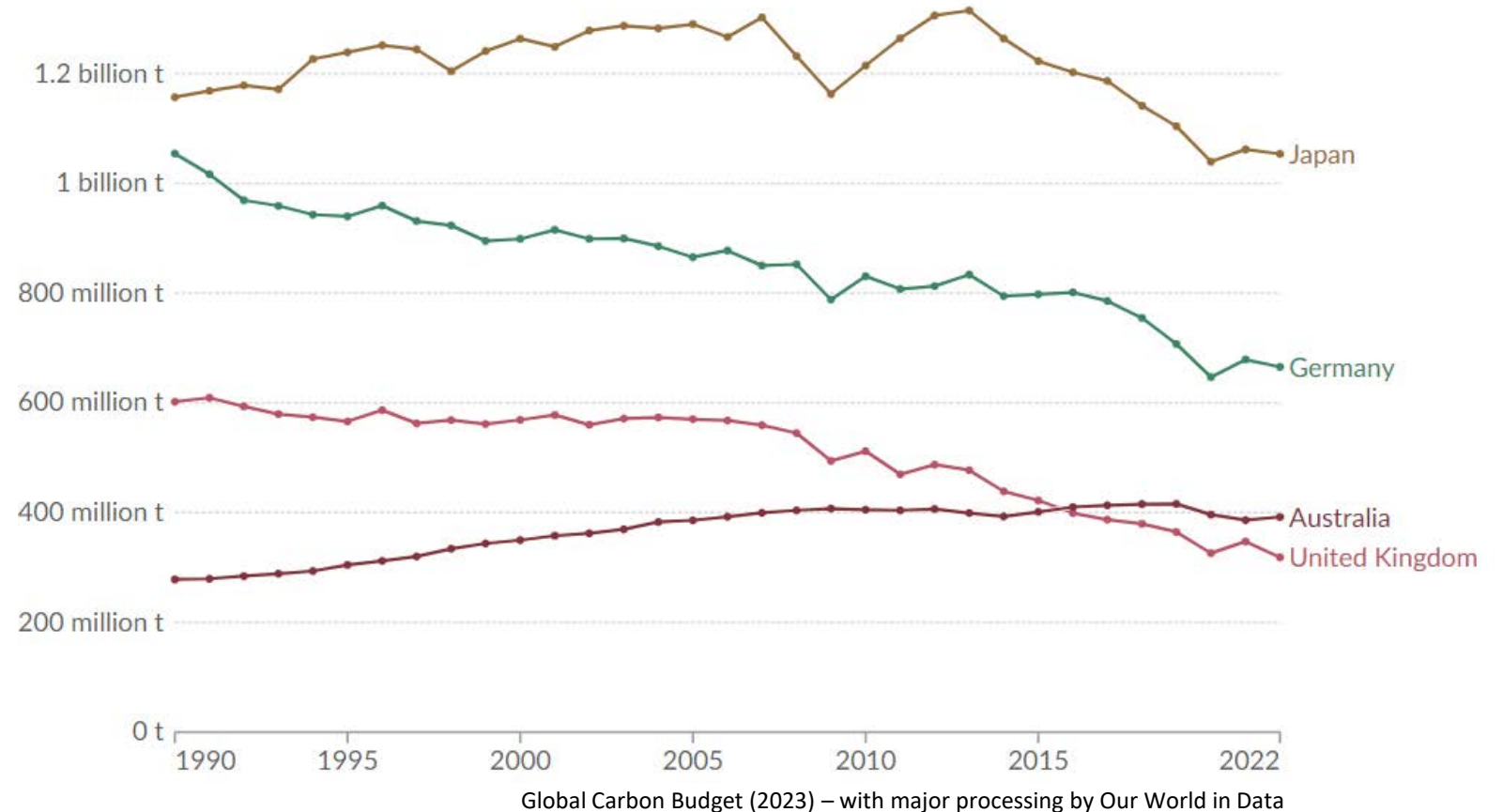
Neither Hydrogen nor CCUS are on track to meet IEA projected requirements



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)
 - Renewable energy rose from 7% to ~50%.
 - Gas use remained steady
- 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.



Is our message finally being heard?

- This slide was repeated 5 times in the AEMO “Draft 2024 Integrated System plan” presentation in December 2023.



Conclusions

- This is the conclusion from a presentation entitled “Repositioning Gas in the Energy Mix” that RISC presented at APPEA in 2018

- Gas generation produces approximately half the emissions of coal generation, so simply switching from coal to gas generation has a material impact on emissions (as seen in the USA)
- Gas generation is a natural companion to renewables as it can be turned on and off and ramped up and down as the renewables generation changes.
- Gas generation is, and should be recognised as, an enabler for the integration of renewables into the grid
- Gas needs to be positively promoted as a partner for renewables
 - Maintains stability of system (intermittency of VRES)
 - Minimises emissions (Coal emits twice as much CO₂ as gas fired generation, and is not as flexible)

Promotion of a future energy mix based on renewables and gas is likely to lead to the lowest cost and least disruptive way of maximising emission reductions



www.riscadvisory.com

Perth

Level 2
1138 Hay Street
WEST PERTH WA 6005
P. +61 8 9420 6660
E. admin@riscadvisory.com

Brisbane

Level 10
95 North Quay
BRISBANE QLD 4000
P. +61 7 3025 3397
E. admin@riscadvisory.com

London

20 St Dunstan's Hill
LONDON EC3R 8HL
United Kingdom
P. +44 203 795 2900
E. admin@riscadvisory.com

South East Asia

Jakarta
Indonesia
P. +61 8 9420 6660
E. admin@riscadvisory.com