Global, National and Sectoral Mitigation required by 2035 to align with 1.5°C

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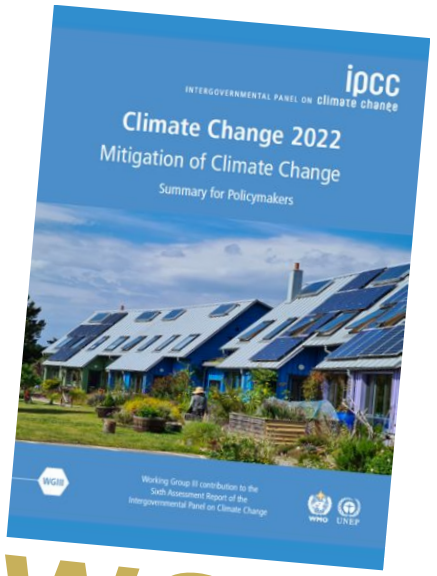
30 November 2022

IPCC confirms that 1.5°C is still within reach

1.5°C is still in reach – but will be lost without stronger mitigation ambition

IPCC AR6 Working Group III is also clear that:

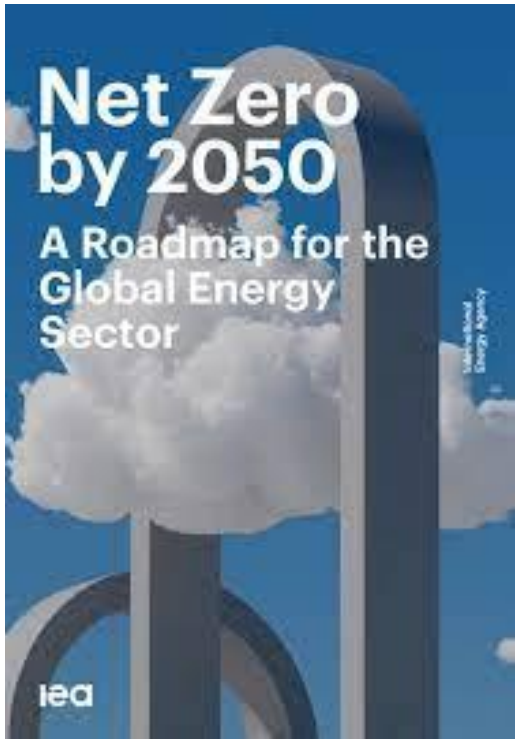
- Global emissions have to **peak immediately** and **halve by 2030** to limit warming to 1.5°C.
- We must reach **net zero CO_2 by mid-century**, and **net zero greenhouse gas emissions** shortly thereafter *IPCC WGIII SPM Table SPM.2*
- There are options available in every sector that can **close the 2030 emissions gap**, with mitigation **options costing USD100 or less** *IPCC WGIII SPM C.12*
- The **finance is there** to close mitigation investment gaps *IPCC WGIII SPM E.5.2*



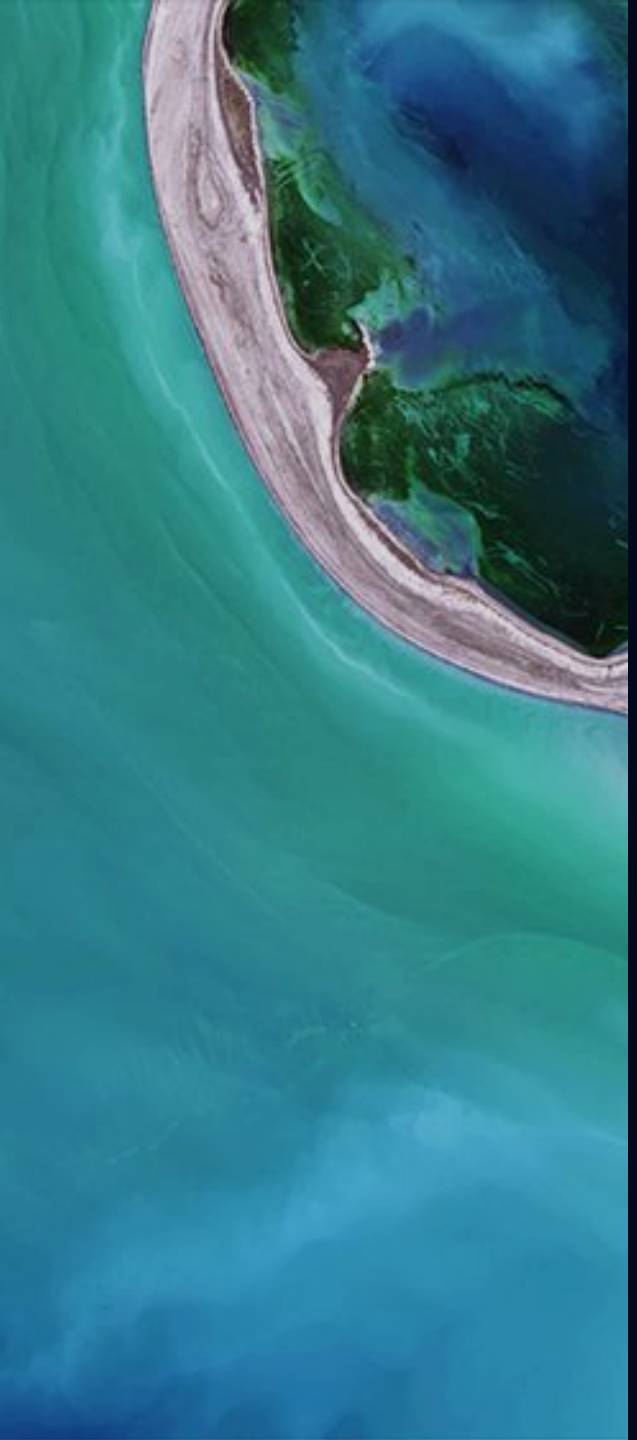
WGIII

IEA Net Zero by 2050 Roadmap confirms picture from IPCC 1.5C pathways

- **Key messages from IEA Net Zero by 2050 Report**
  - Expansion or establishment of new fossil fuel supply infrastructure is not needed under a net zero pathway.
  - No final investment decisions for unabated coal plants
  - Unprecedented clean technology push to 2030
  - No sales of fossil fuel combustion cars by 2035
  - Net zero GHGs for the global electricity sector by 2040



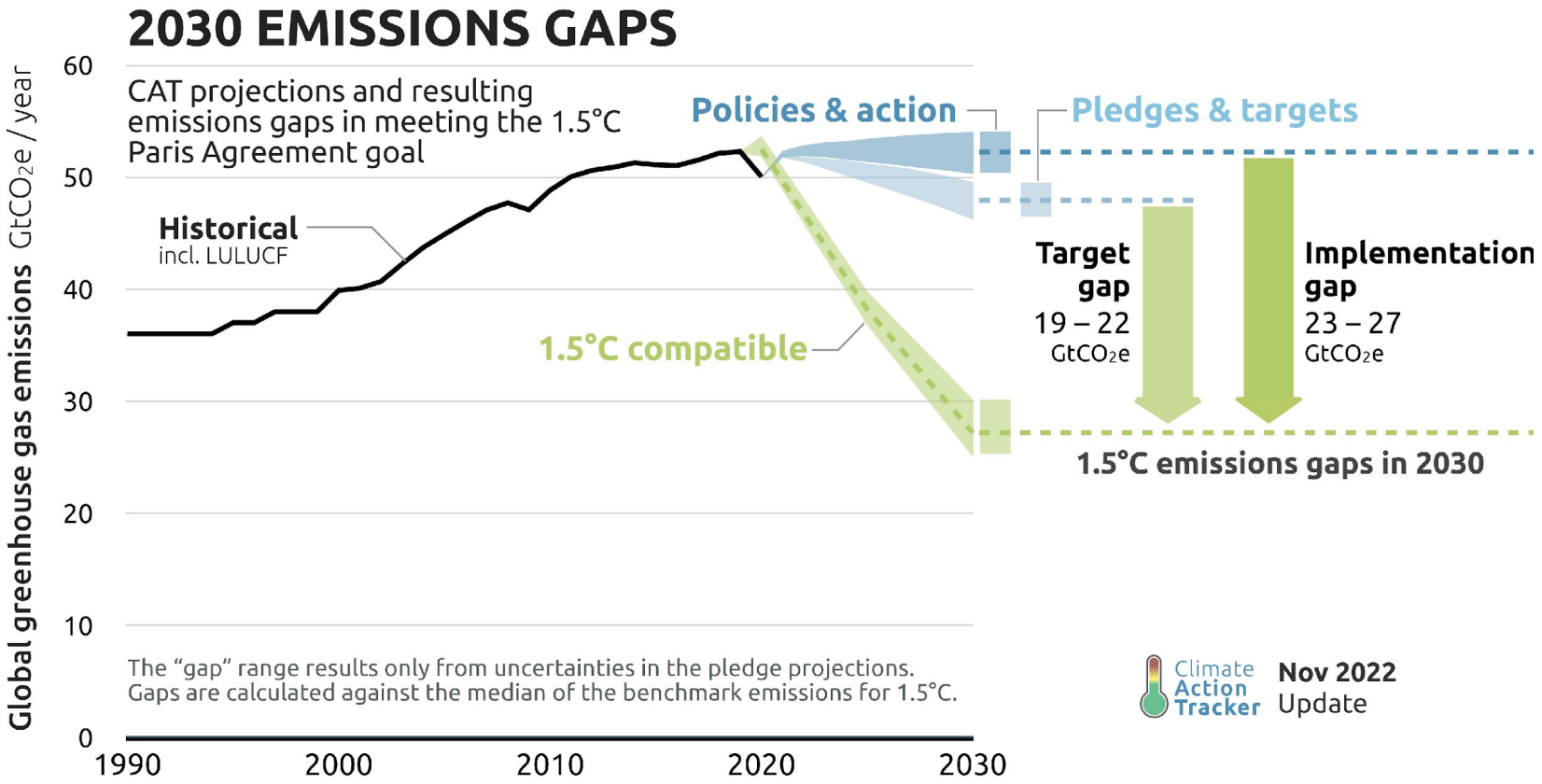
https://www.iea.org/reports/net-zero-by-2050



CLIMATE ANALYTICS

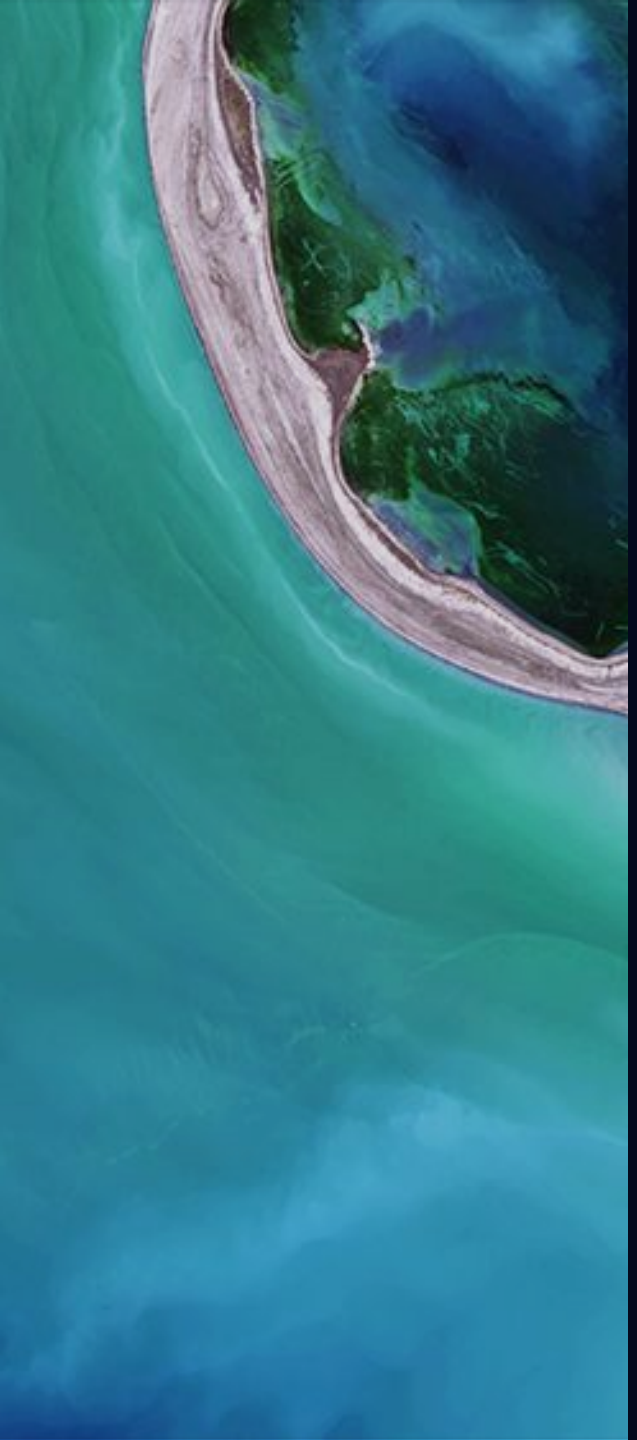
State of climate action

We have begun to narrow the 2030 emissions gap…
but nowhere near enough



Even if all targets are fully implemented, emissions in 2030 would be 19-22 $GtCO_2e$ above a 1.5°C pathway

Climate Action Tracker



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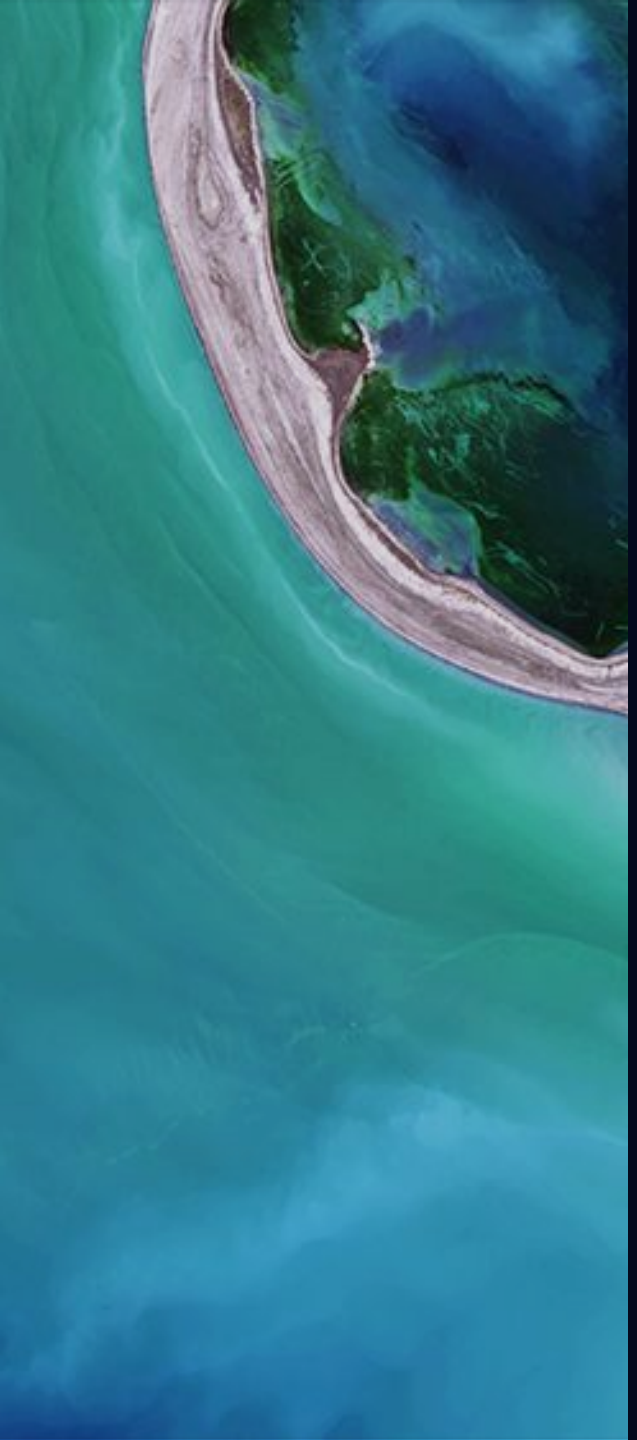
Identifying feasible 1.5°C compatible pathways from the IPCC AR6

Identifying feasible 1.5°C compatible pathways from the IPCC AR6 report

Criterion	Feasibility Threshold
CO_2 removal via bioenergy w/ CCS (BECCS)	<5 $GtCO_2/y$
CO_2 removal via afforestation / reforestation	<3.6 $GtCO_2/y$
CO_2 capture by fossil CCS	<3.8 $GtCO_2/yr$

- We apply these filters, which reduces the number of pathways considered from 97 to 42.
- In addition, we filter to ensure that all pathways are compatible with reaching net-zero GHGs by 2100 (in line with Article 4.1 of the Paris Agreement). This reduces the number of pathways considered to 39.



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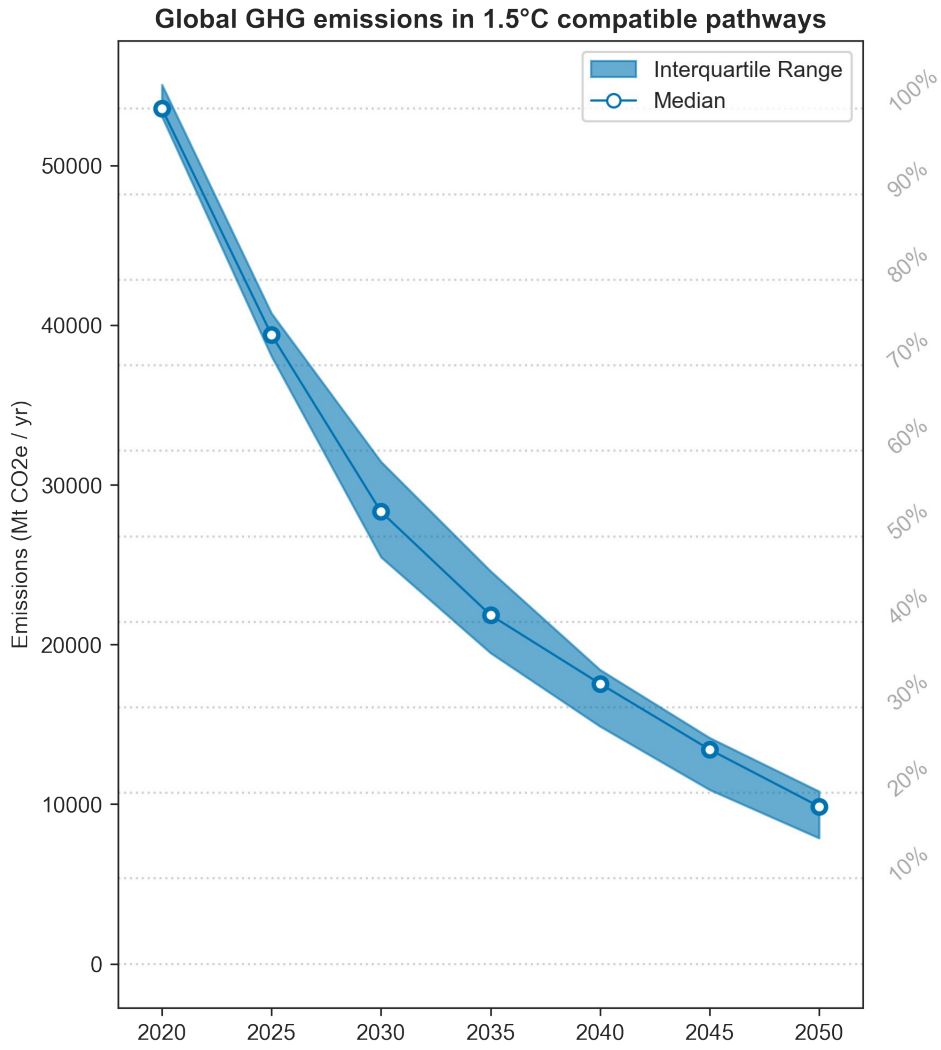
Whole-economy emission reduction pathways

Global emission reductions required by 2035

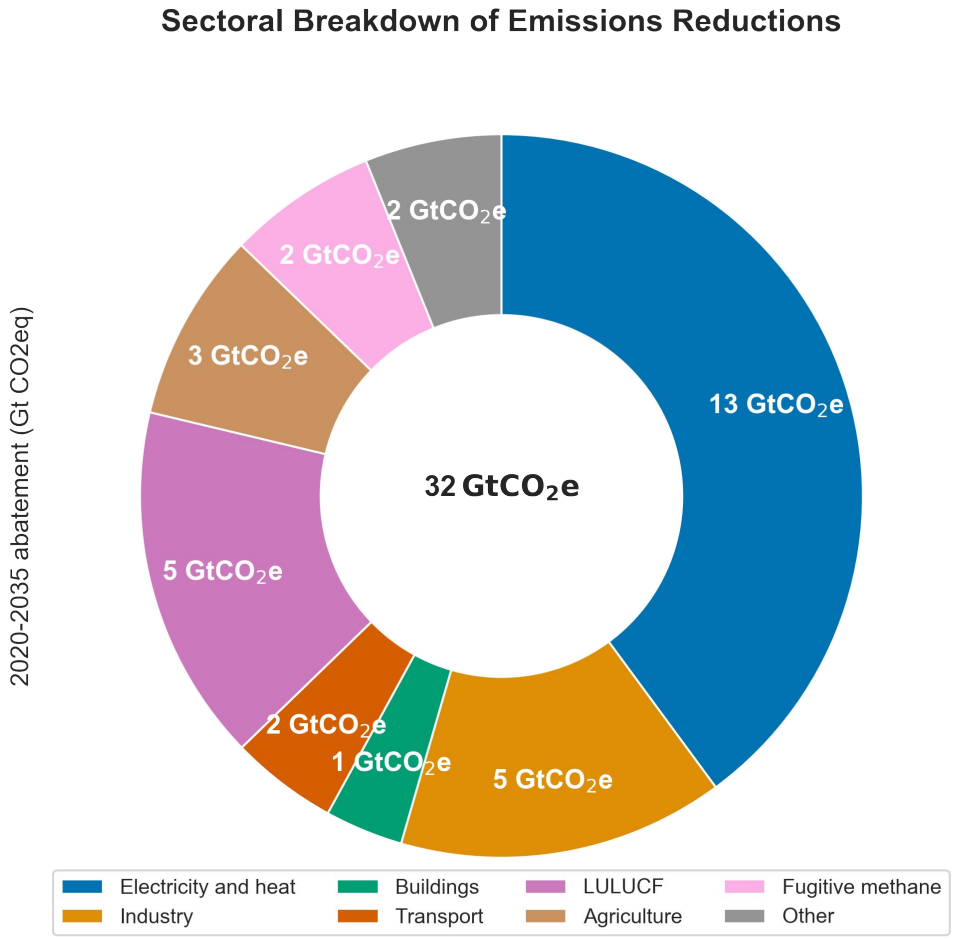
- 2030 GHG emissions need to be about halved (49%) from 2020 levels

- 2035 GHG emissions need to be 60% below 2020 levels
  - Down approximately 32GtCO_2eq



Sectoral breakdown of mitigation: 2020 to 2035

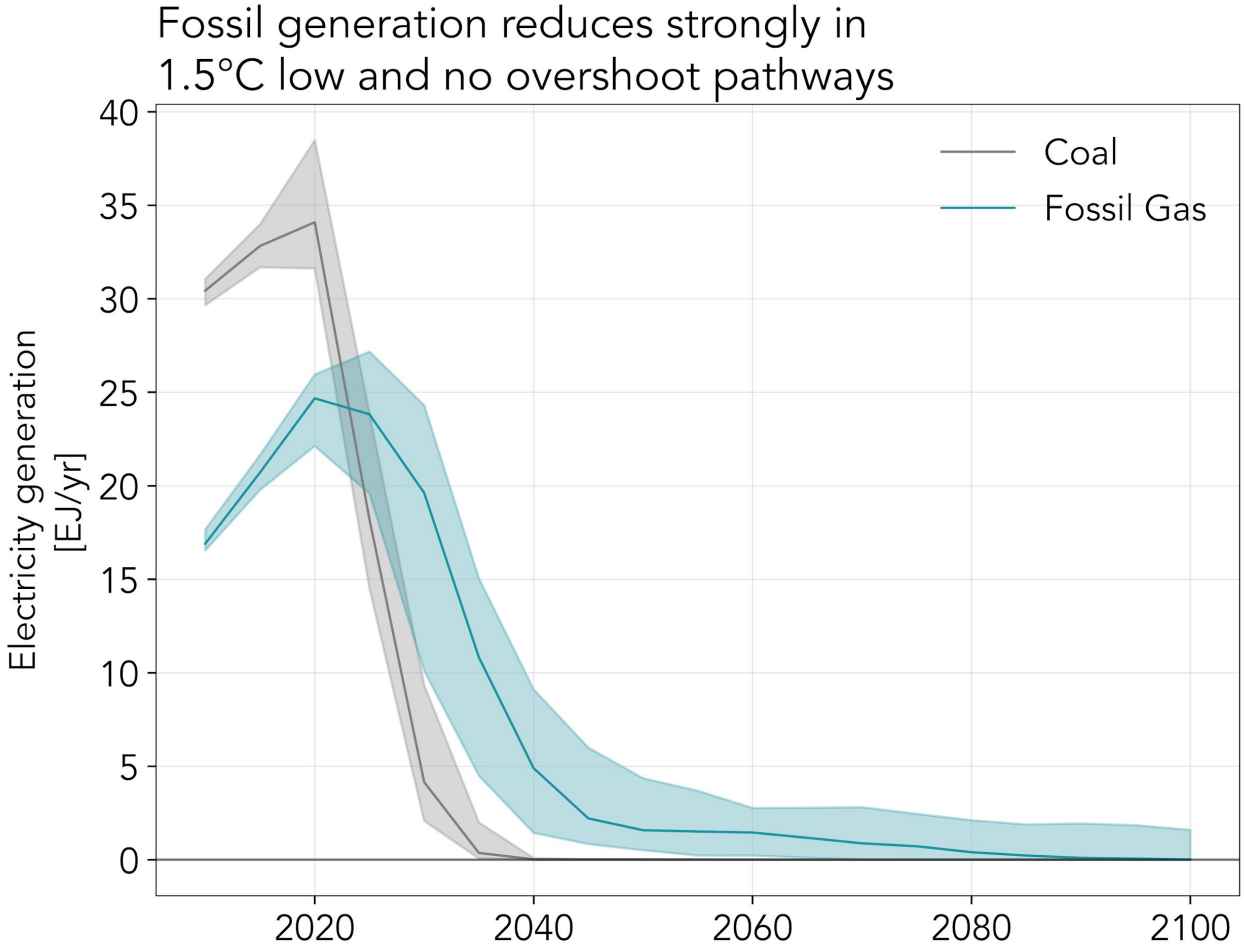
- Global emissions need to fall 32GtCO_2eq by 2035
- Over 50% of this mitigation comes from the power sector and industry
- Direct emissions reductions in buildings/transport are smaller
  - Indirect emissions reductions from clean electricity are noticeable in the buildings sector
- Reducing LULUCF emissions is also key

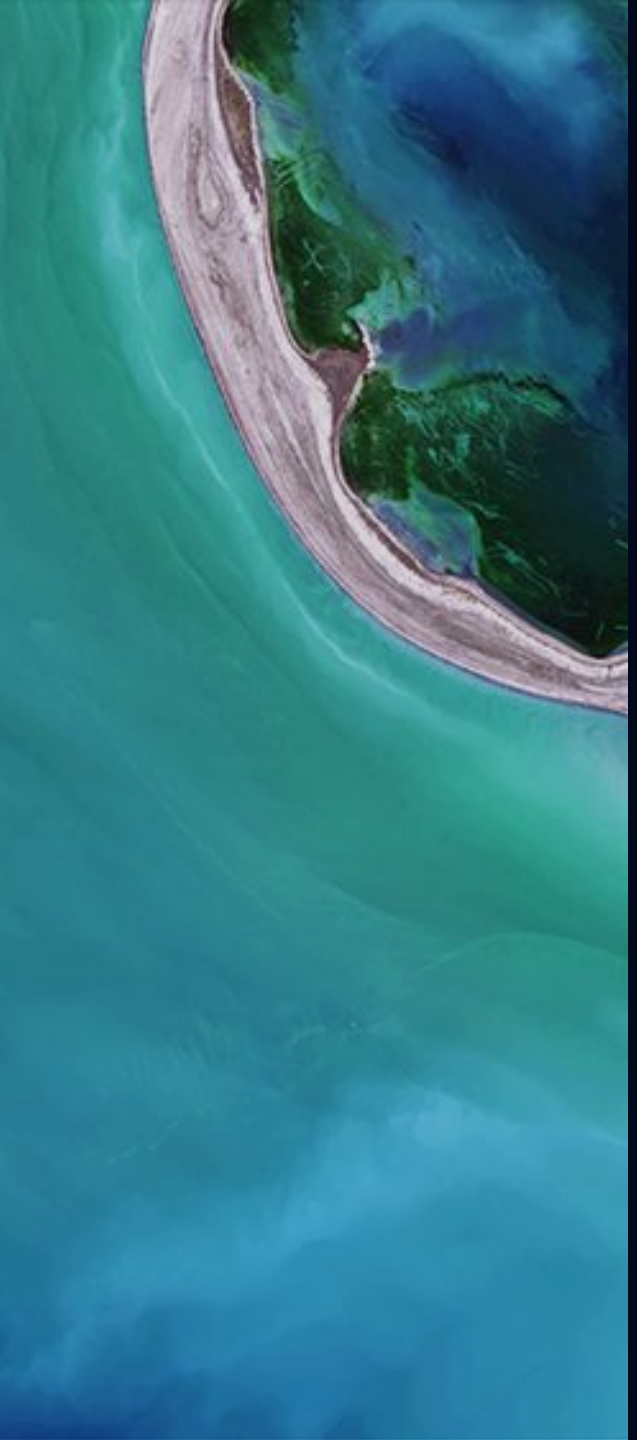


The IPCC's latest AR6 scenarios show an even faster gas phase out

- Pathways from the IPCC's 6th assessment report, selected using the same sustainability constraints, show an even earlier phase-out date, by **around 2040**.

- A rapid phase-out of fossil gas from the power sector is becoming both **more urgent**, due to rising emissions, and **more feasible**, due to the falling costs of renewables and storage.





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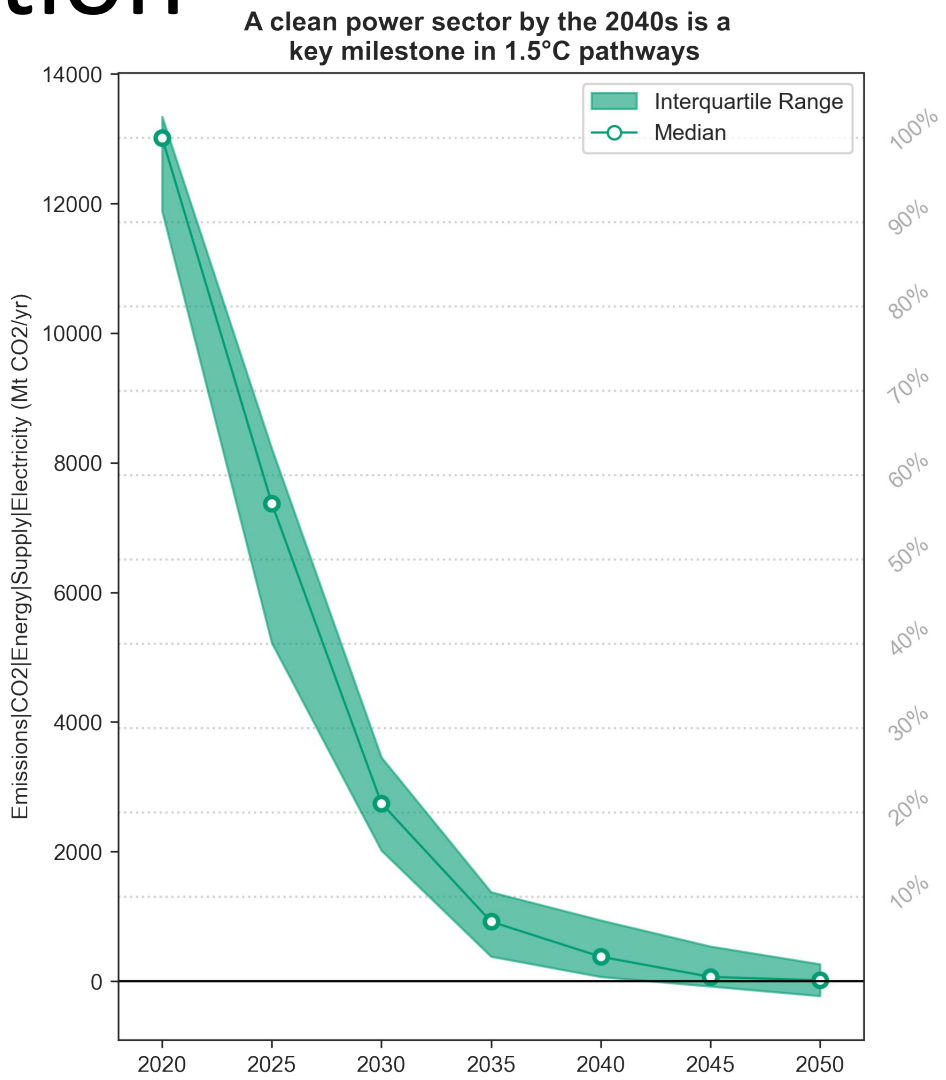
Sectoral emission reduction pathways

Power sector decarbonisation

- CO2 emissions from electricity production fall over 90% by 2035
- A global clean electricity system is achieved in the 2040s
- Developed economies should move faster → target clean power by 2035 in advanced economies



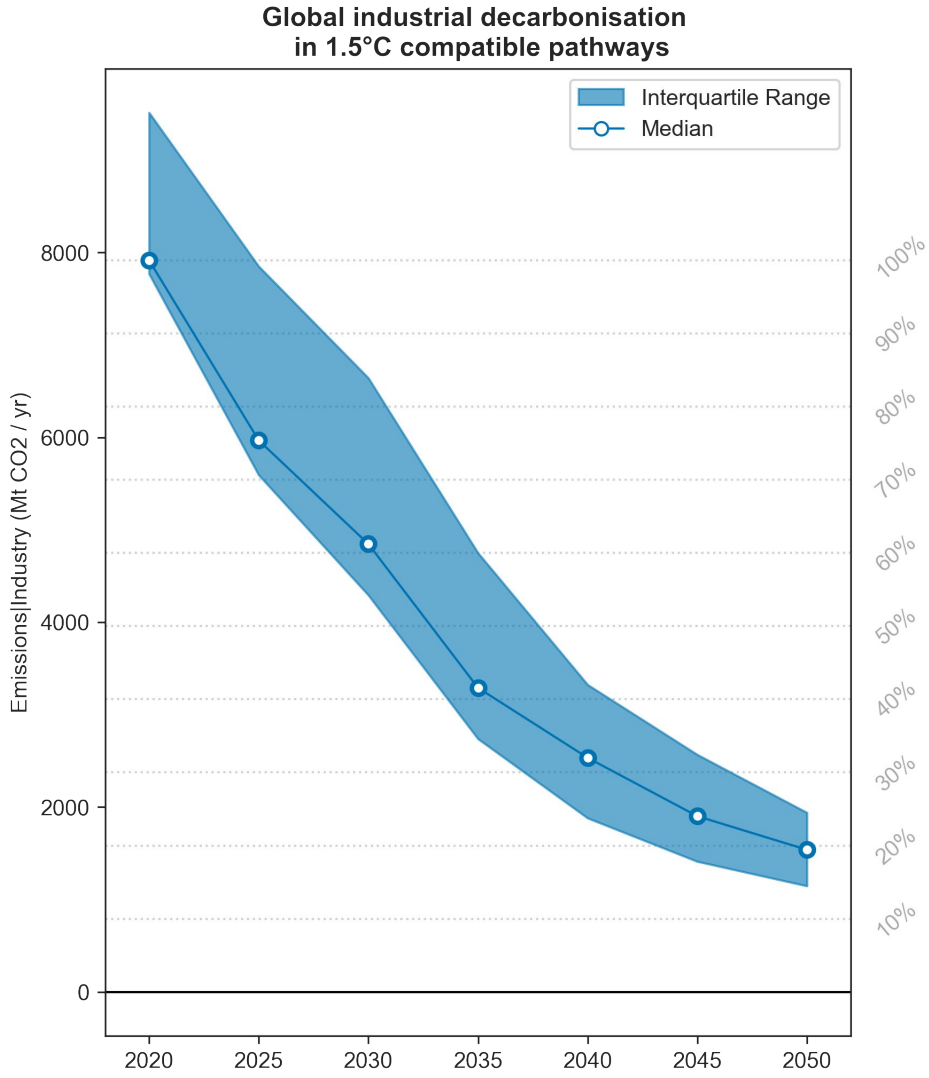
Industrial decarbonisation

- Industrial emissions fall by ~5GtCO2 by 2035
- 60% reduction over the 2020-2035 period

Key milestones (from IEA NZE2022 scenario)

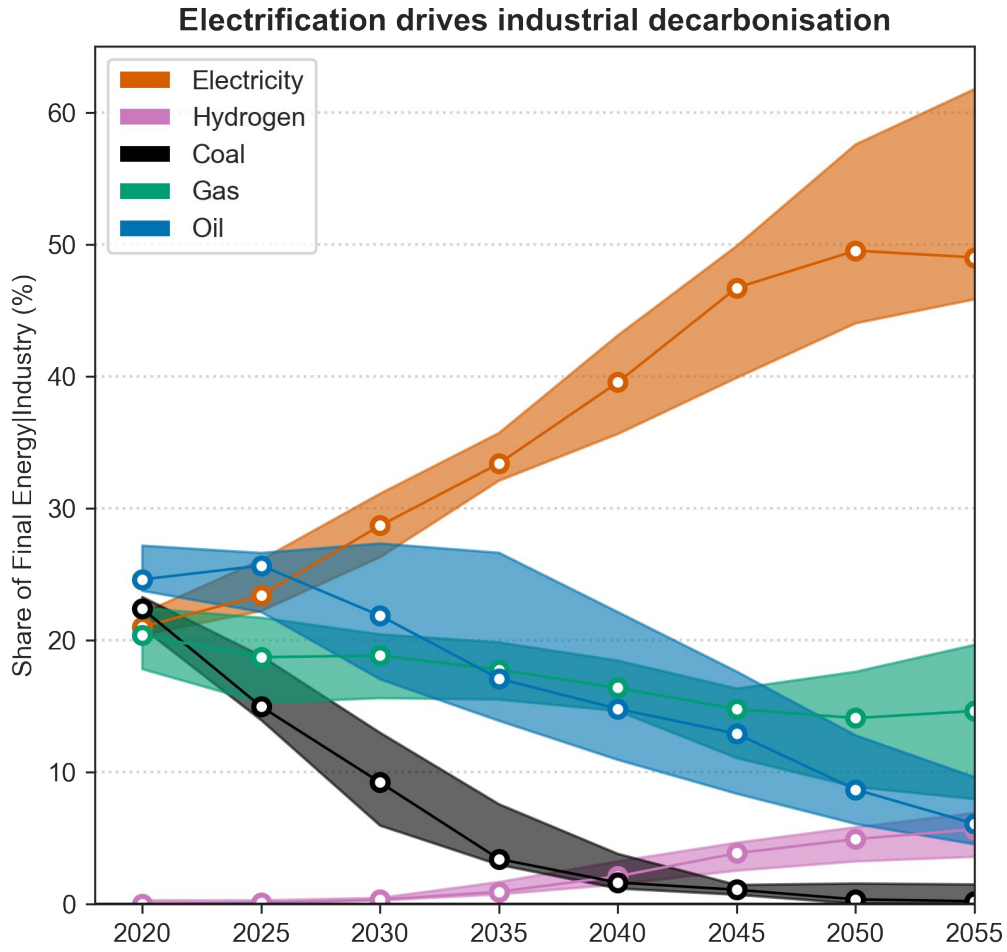
1. **% of primary steel production that is zero-carbon:**
   53% by 2040, 96% by 2050

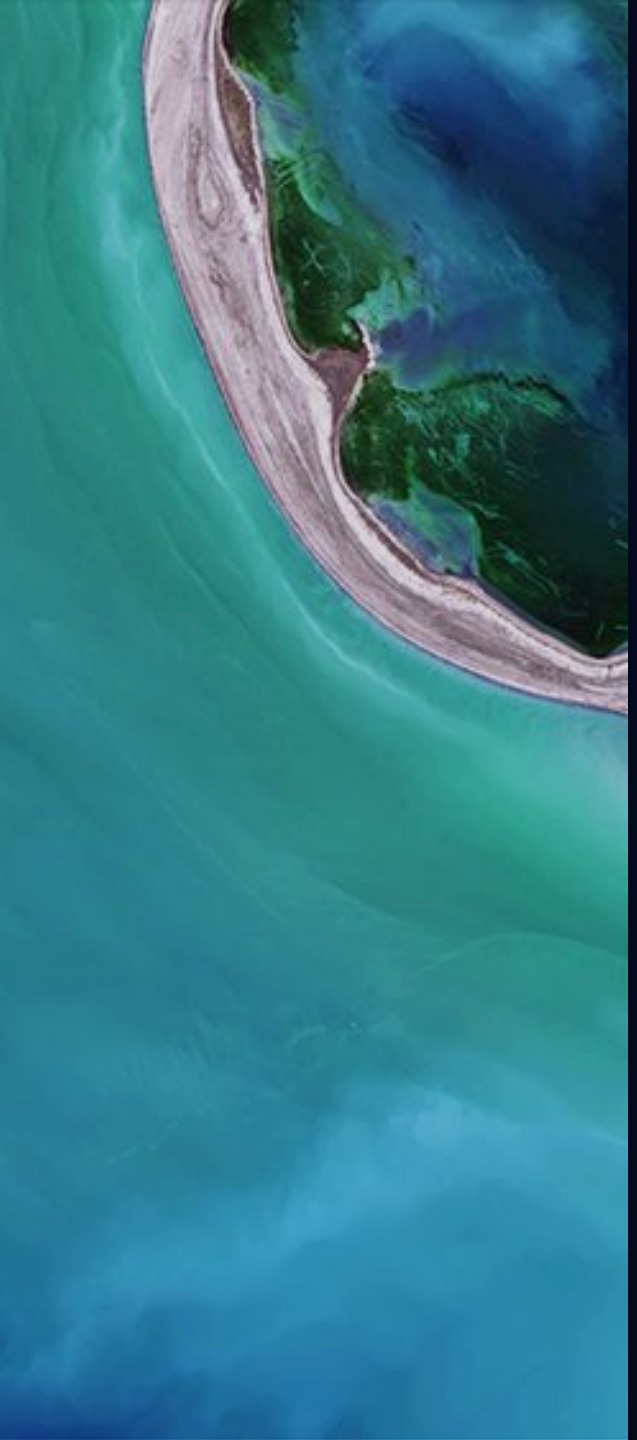
2. **Energy intensity of industry (MJ/$$_{GVA}$$):**
   -25% by 2030, -45% by 2040, -55% by 2050



Electrification is key to industrial decarbonisation

- Electricity provides around 50% of final energy by 2050
- In modelled pathways, hydrogen remains a minor player – providing around 5% of final energy in 2050
- Rapid reductions in coal and oil demand (bio-based feedstocks replacing oil in non-energy use)
- Any remaining fossil fuels will have to be fitted with CCS to achieve low-carbon industry





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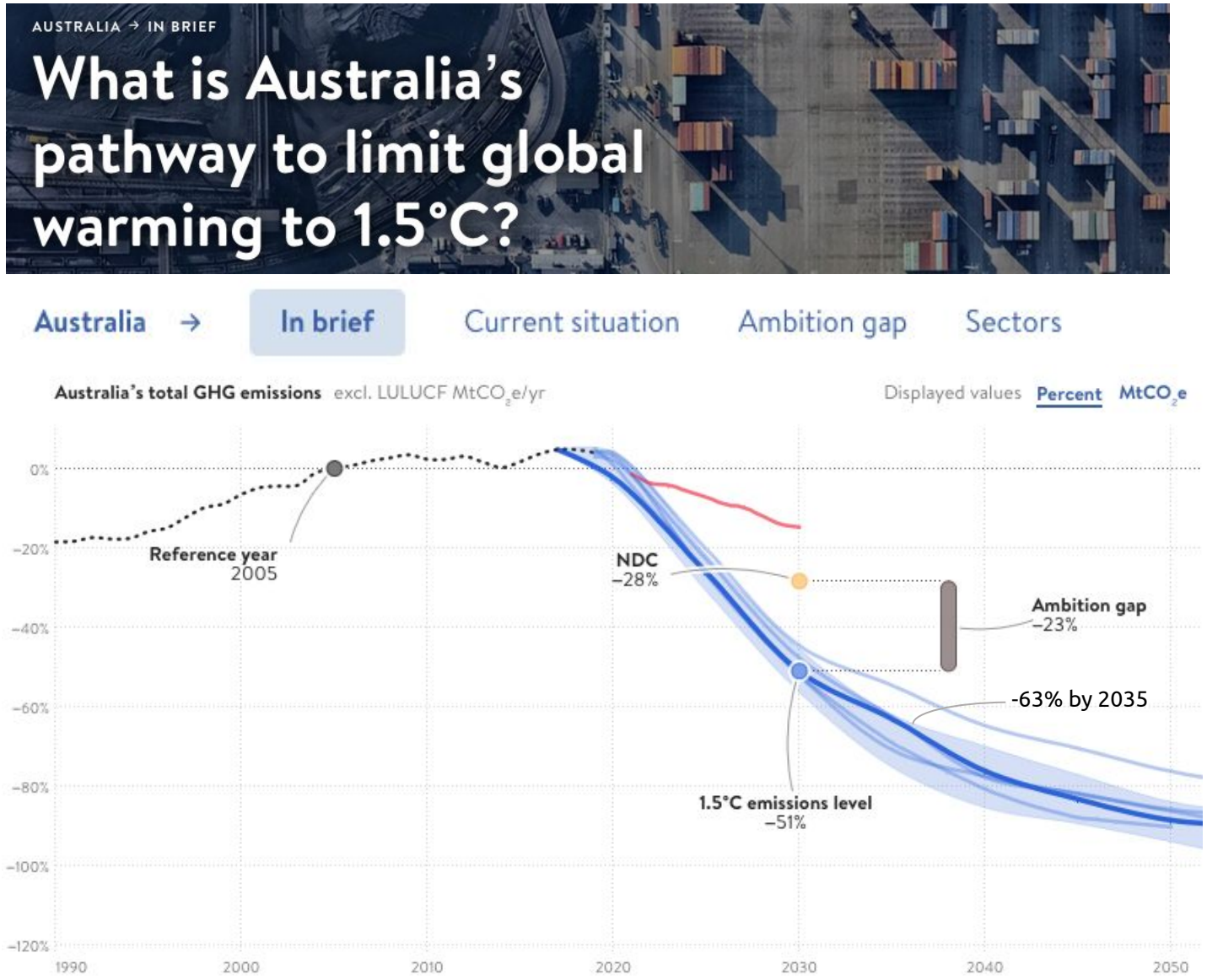
Select national 1.5°C compatible emissions pathways

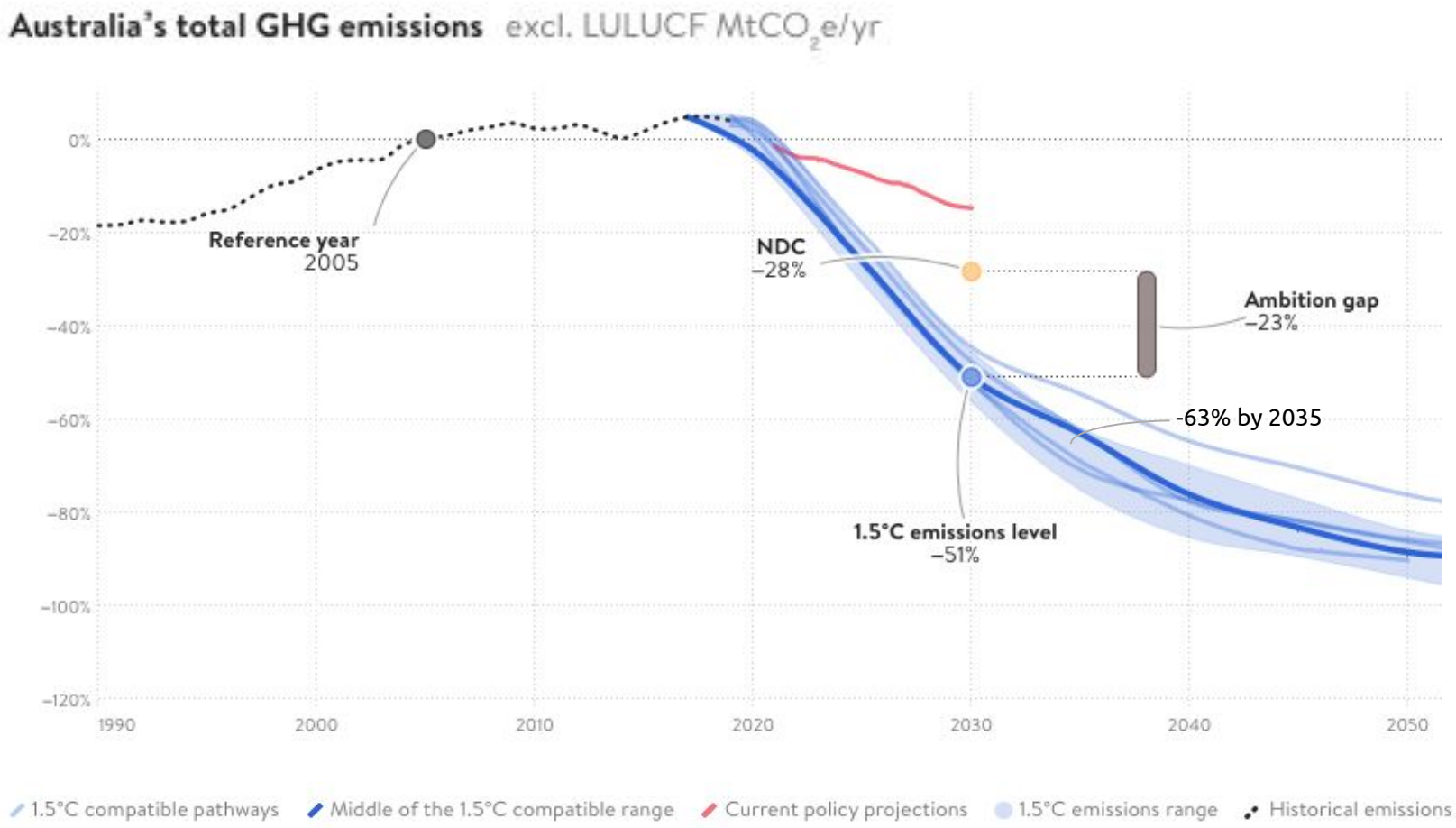
1.5°C National Pathway Explorer



- Compares historical and projected GHG emissions (economy wide and sectoral) against 1.5°C pathways and national emissions reduction targets
- Shows 2030 ambition gap between target and 1.5°C level of ambition
- Outlines 1.5°C compatible sectoral and primary energy mixes for each country (power, buildings, industry, transport)

Australia – economy wide GHG emissions

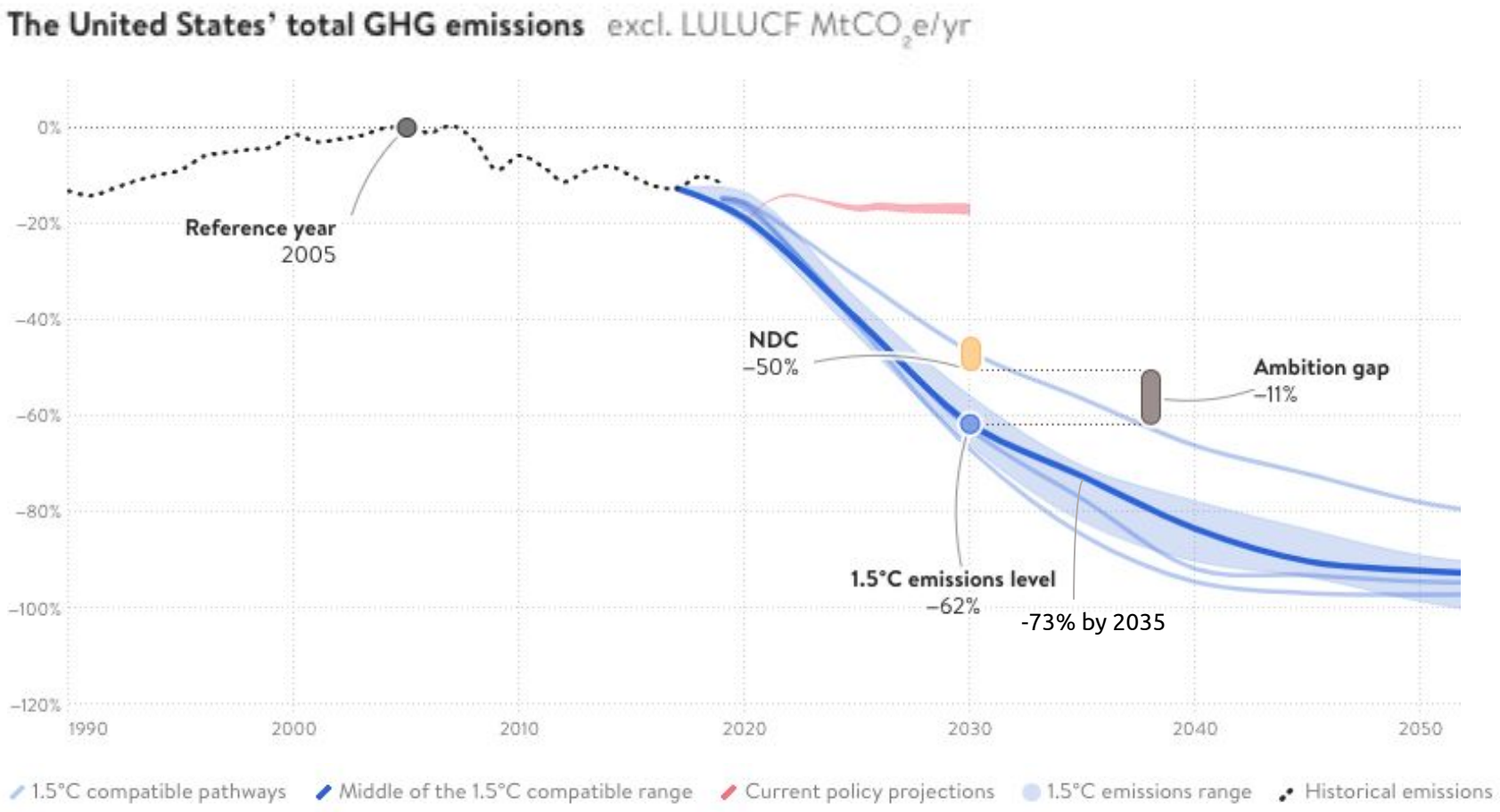
- 2030 NDC
  - 43% below 2005 incl. LULUCF
  - ~28% below 2005 excl. LULUCF
- 1.5°C aligned GHG emissions reductions
  - 2030
    - 60-67% below 2005 incl. LULUCF
    - ~50% below 2005 excl. LULUCF
  - 2035
    - 72-82% below 2005 incl. LULUCF
    - ~63% below 2005 excl. LULUCF



Source: 1.5°C National Pathway Explorer, Climate Analytics (2022)

United States – economy wide GHG emissions

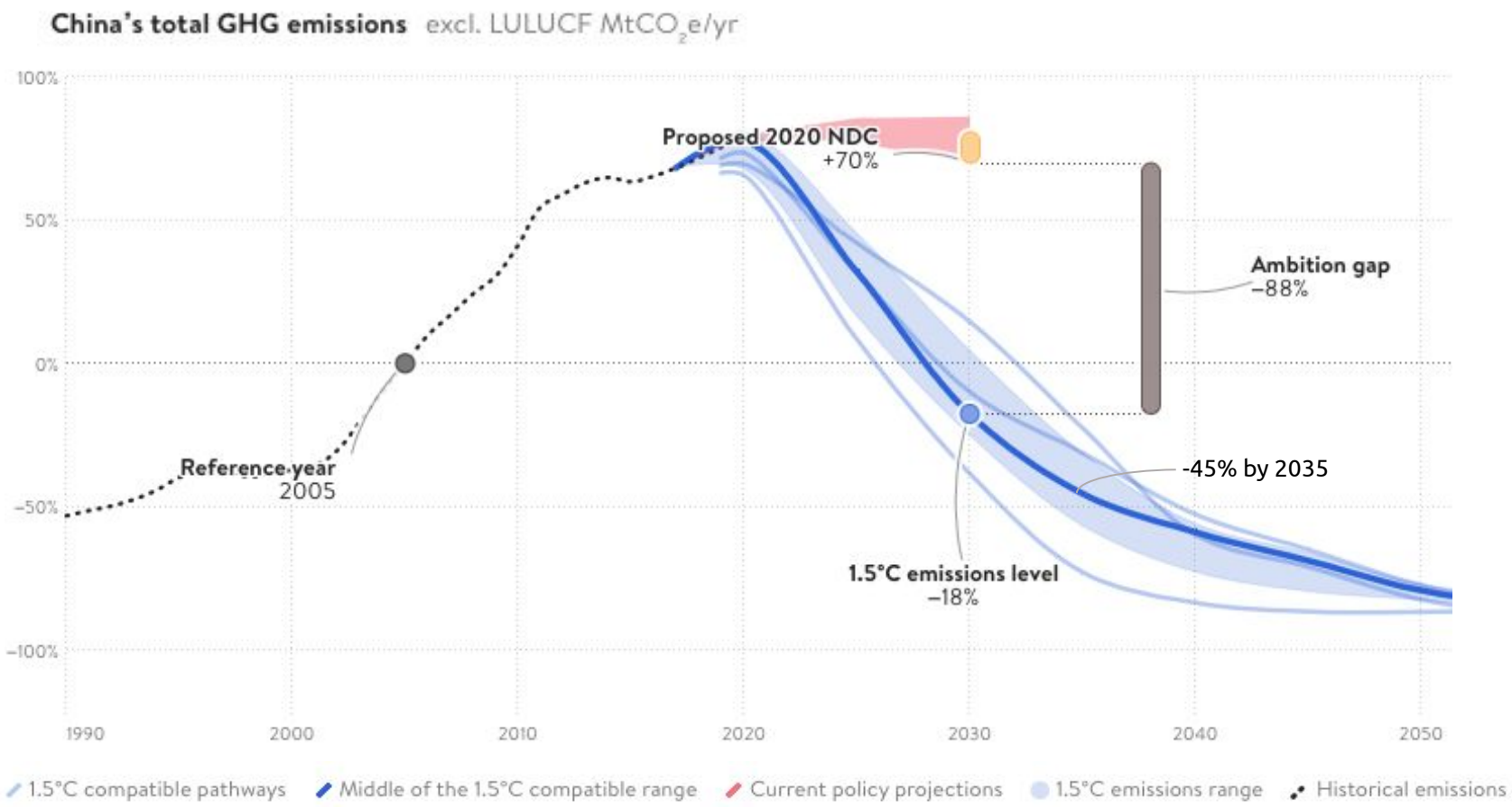
- Total US GHG emissions dipped below 1990 levels for the first time in 2020
- Recently passed climate legislation has placed Biden's strengthened 2030 target within reach
- By 2035, US GHG emissions would need to fall by almost 3/4 below their 2005 peak (excl. LULUCF)



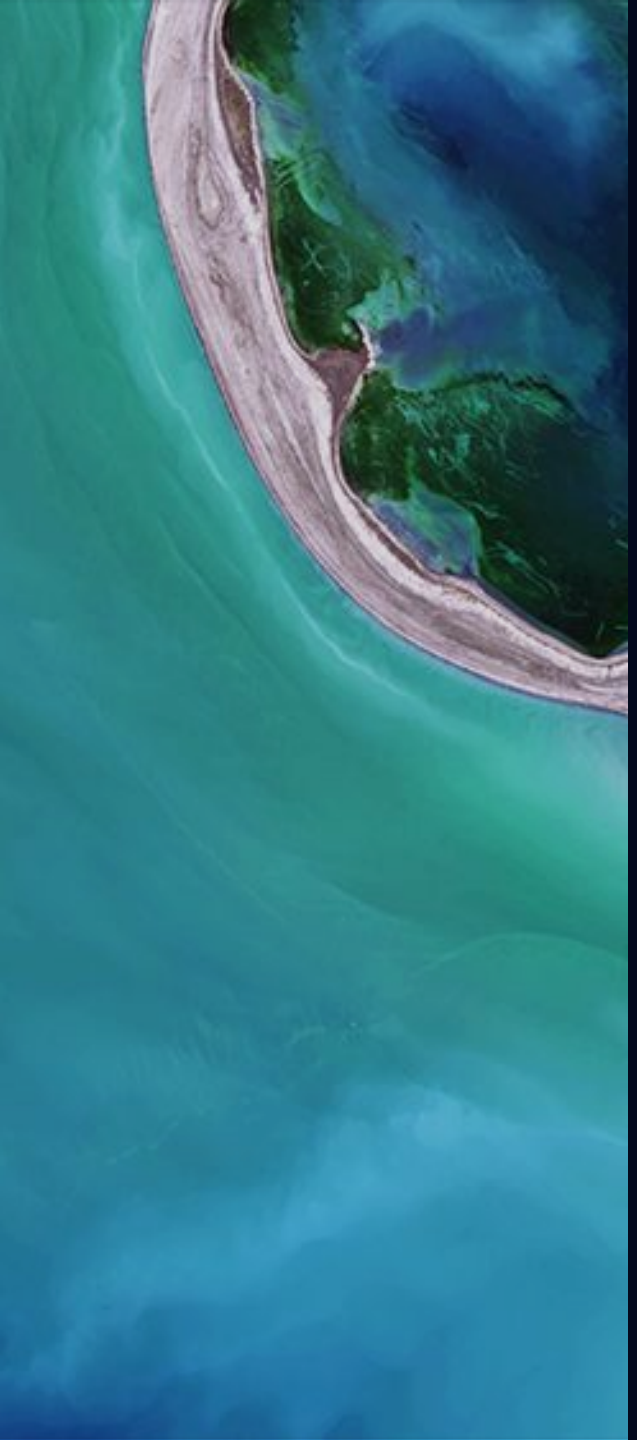
Source: 1.5°C National Pathway Explorer, Climate Analytics (2022)

China – economy wide GHG emissions

- NDC and emissions under current policies show emissions in 2030 roughly at current levels
- Recent five year plan did not outline an increase in ambition, with coal outlined as a necessary "backstop for energy security"
- By 2035, China's GHG emissions (excl. LULUCF) would need to return roughly to early 1990s levels to be 1.5°C compatible



Source: 1.5°C National Pathway Explorer, Climate Analytics (2022)



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What’s needed to reach 1.5°C

The State of Climate Action 2022

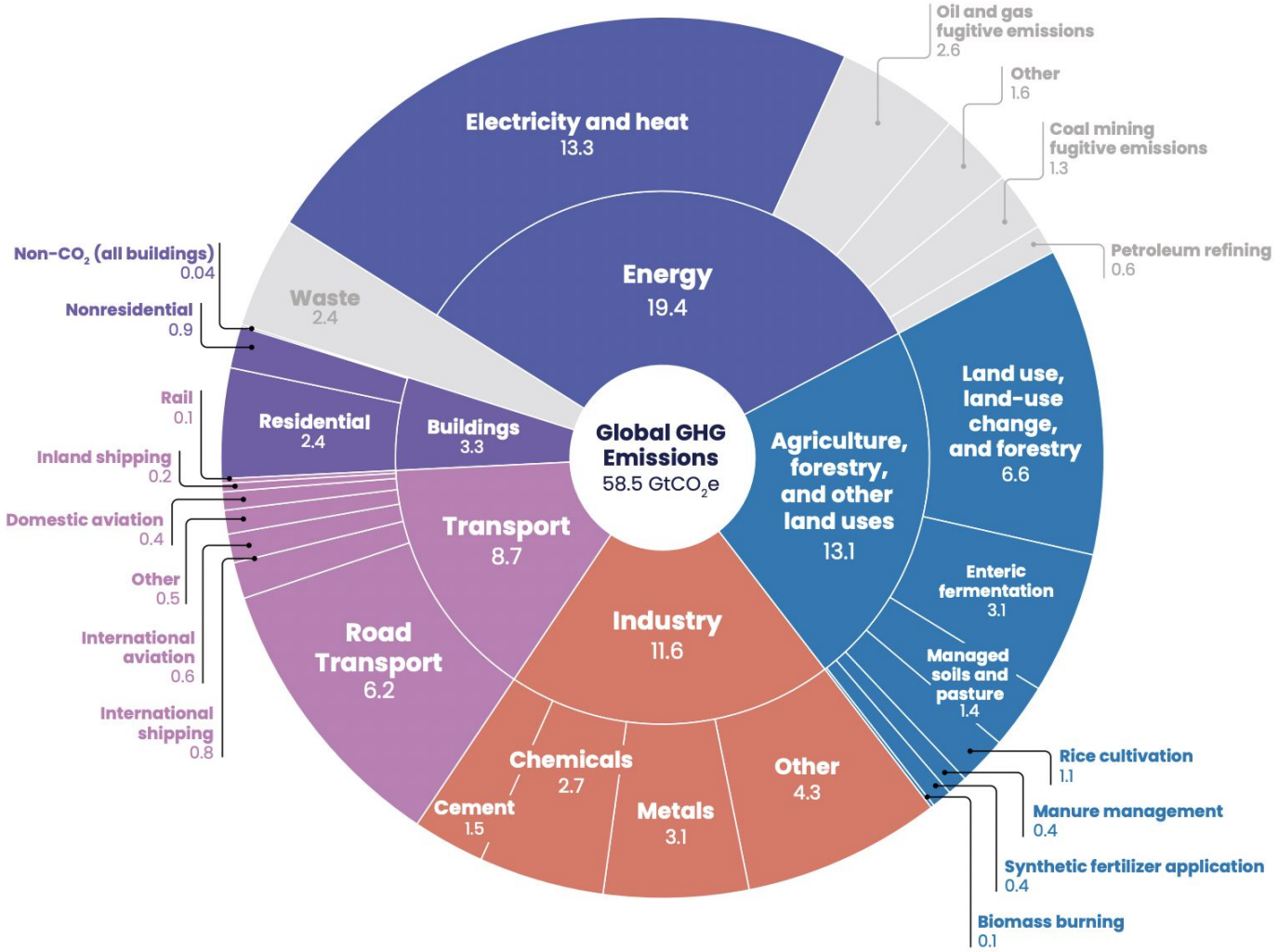
BEZOS EARTH FUND

CLIMATE ANALYTICS

NEW CLIMATE INSTITUTE

WORLD RESOURCES INSTITUTE

Sectors Emitting ~85% of GHGs Globally



Source: Boehm et al. 2022

None of the 40 indicators we've assessed are on track

ON TRACK: Change is occurring at or above the pace required to achieve the 2030 targets

No indicators assessed exhibit a recent historical rate of change that is at or above the pace required to achieve their 2030 targets.

OFF TRACK: Change is heading in the right direction at a promising, but insufficient pace

For **6 indicators**, this rate of change is heading in the right direction at a promising but insufficient pace to be on track for their 2030 targets.

WELL OFF TRACK: Change is heading in the right direction, but well below the required pace

For **21 indicators**, the rate of change is heading in the right direction at a rate well below the required pace to achieve their 2030 targets.

WRONG DIRECTION: Change is heading in the wrong direction, and a U-turn is needed

For **5 indicators**, the rate of change is heading in the wrong direction entirely.

Insufficient Data: Data are insufficient to assess the gap in action required for 2030

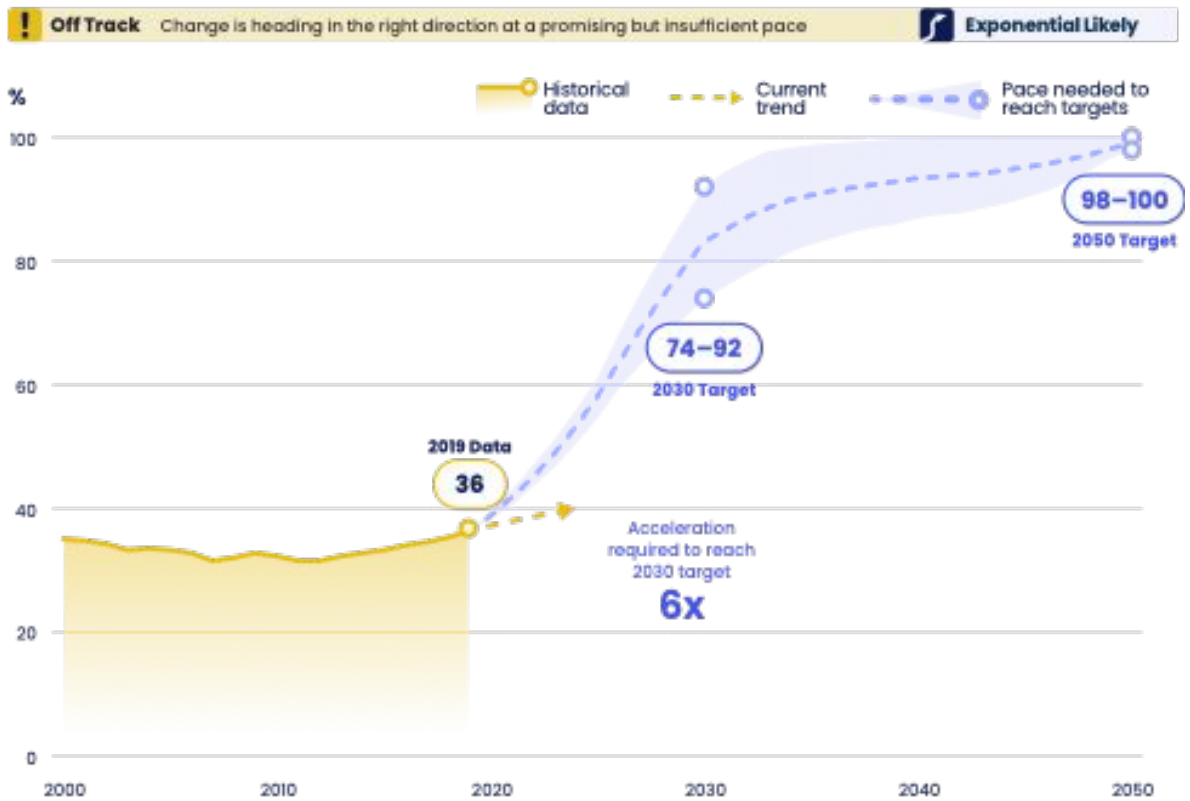
For **8 indicators**, data are insufficient to assess the rate of change relative to the required action.

POWER

Photo Source: Hans Ott/Unsplash

Zero carbon power transition needs to go faster

Zero carbon share of electricity generation



Coal electricity generation phase-out

Source: State of Climate Action, 2022

INDUSTRY

Photo Source: Ant Rozetsky/Unsplash

Progress in Industry

OFF TRACK:

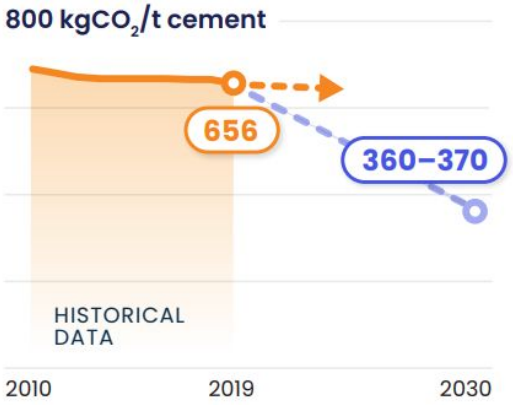
INDUSTRY 1.7x

Increase the share of electricity in the industry sector's final energy demand to 35%

WELL OFF TRACK:

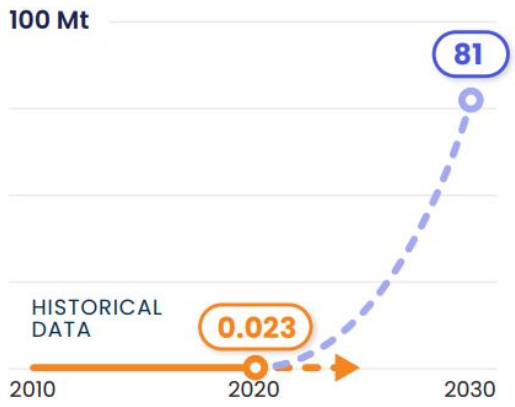
INDUSTRY >10x

Reduce the carbon intensity of global cement production to 360–370 $kgCO_2$/t of cement



INDUSTRY >10x

Increase green hydrogen capacity to 84 Mt



WRONG DIRECTION:

INDUSTRY N/A

Reduce the carbon intensity of global steel production to 1,335–1,350 kgCO2/t of steel

Source: Boehm et al. 2022

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