

NET ZERO: 2025 Perspective

Trends and challenges in the
global energy transition



Agenda

Introduction

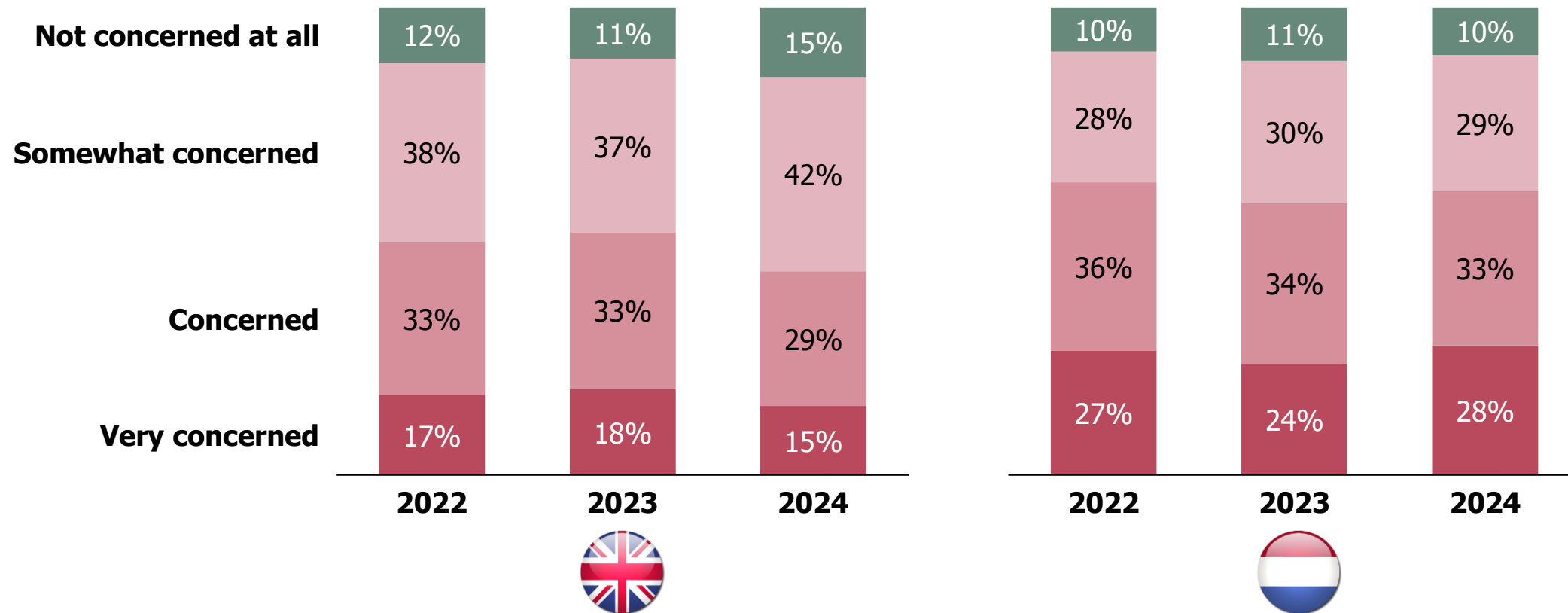
Net Zero: 2025 Perspective

Q&A



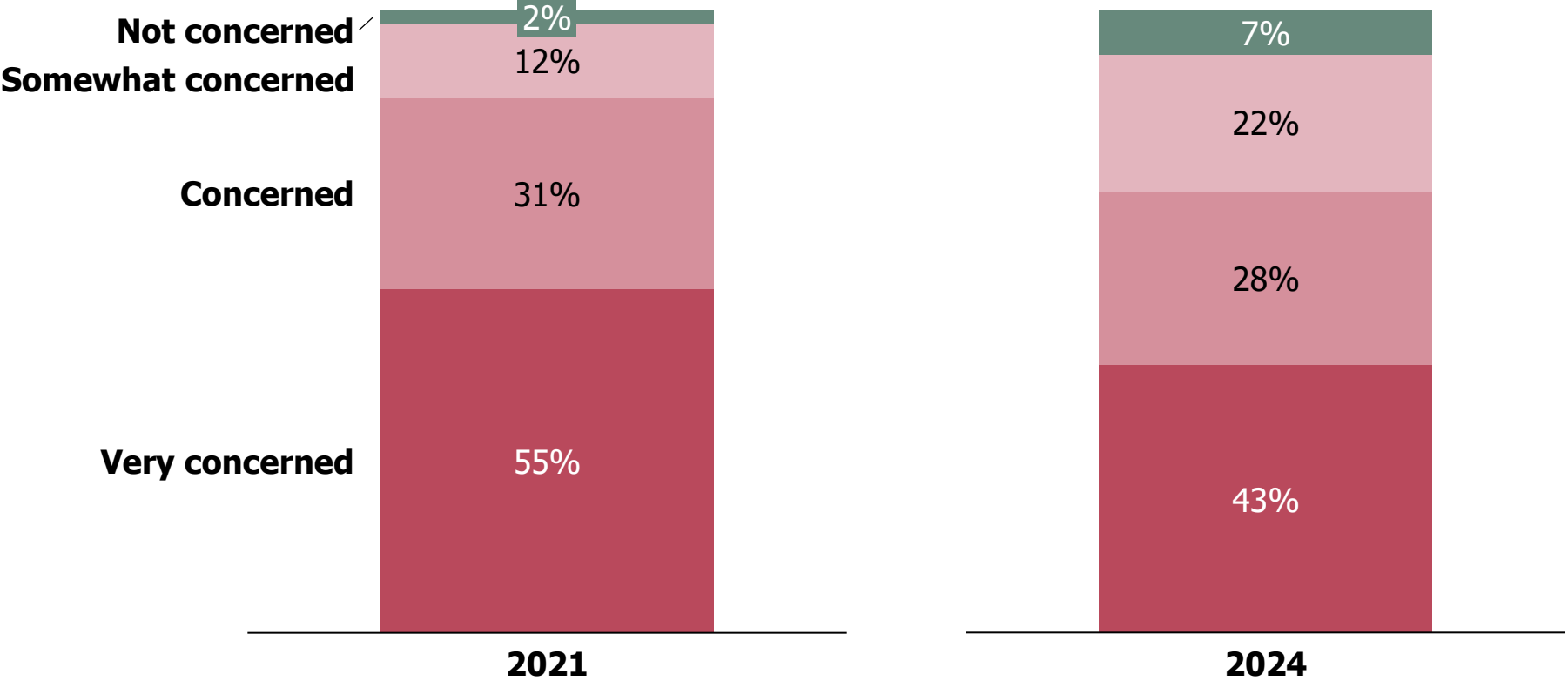
How concerned are you about the environment / sustainability?

CONSUMER SENTIMENT SURVEYS



How concerned are you personally about environmental sustainability?

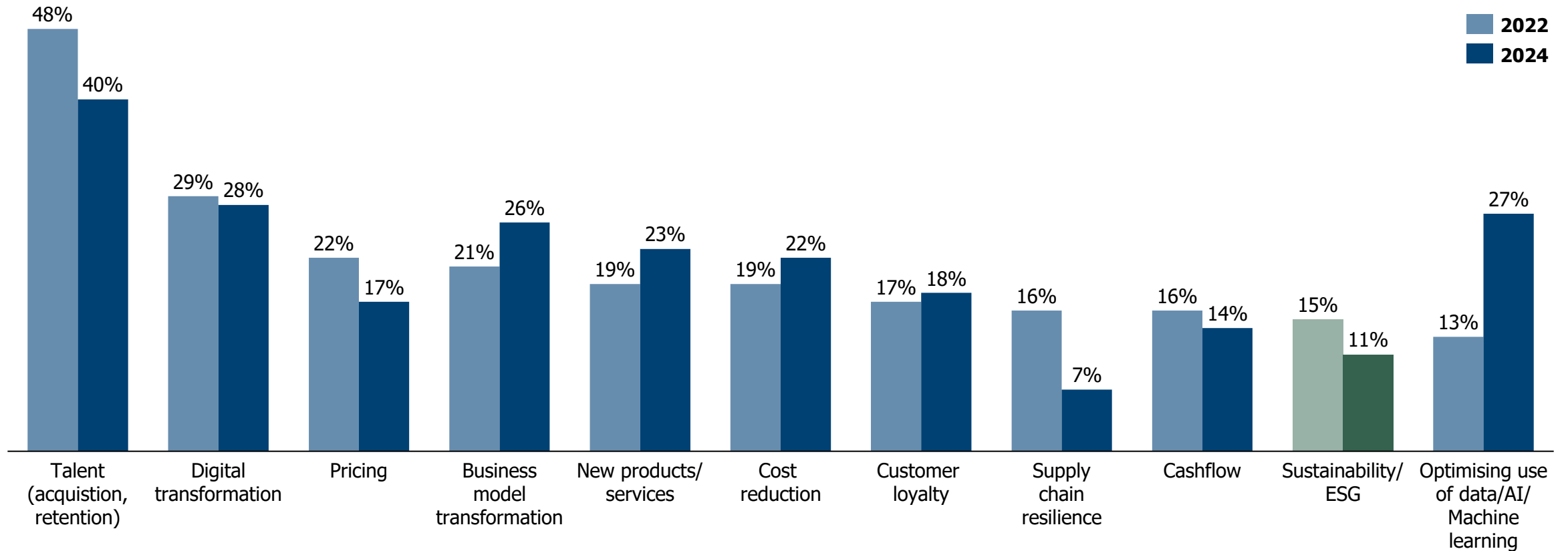
BUSINESS LEADER SURVEYS



Source: Eden McCallum Business Outlook Surveys

What are the most important internal issues for your company over the next 1-2 years?

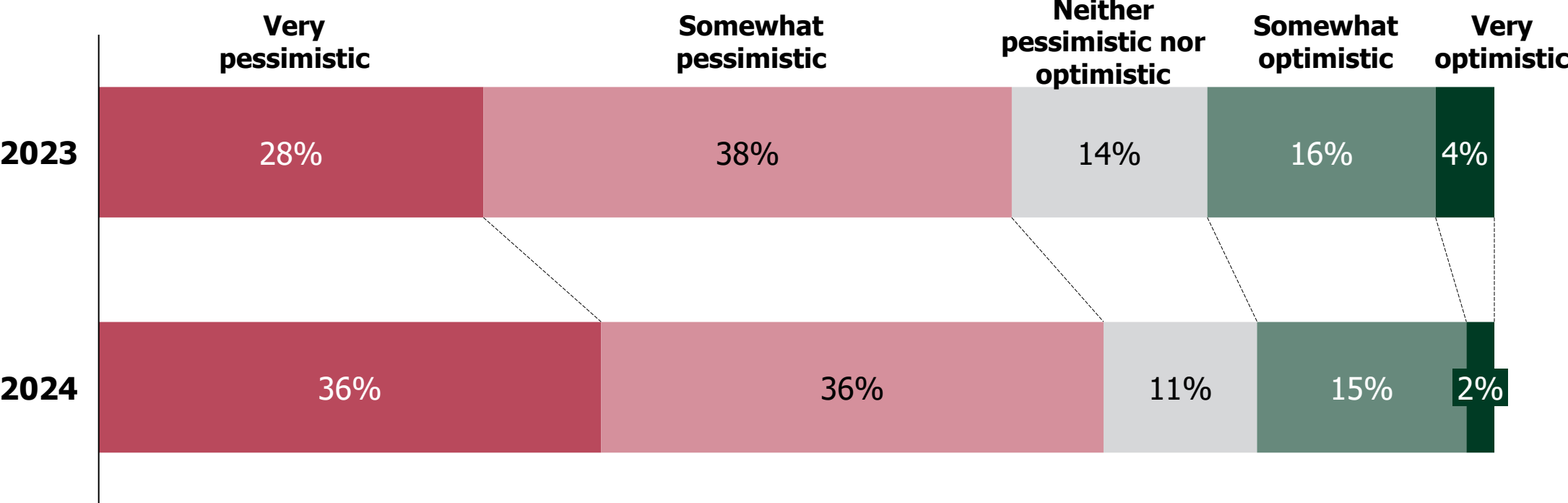
BUSINESS LEADER SURVEYS



Source: Eden McCallum Business Outlook Surveys

How pessimistic or optimistic are you about your country achieving the target of net zero greenhouse gas emissions by 2050?

BUSINESS LEADER SURVEYS



Source: Eden McCallum Business Outlook Surveys

Lord Adair Turner

Currently

- **Chair, The Energy Transitions Commission**
- Chair, Chubb Europe
- Member of the board, AESC
- Advisor to Watershed Technologies Inc.
- Chairman, Oaknorth Bank plc

Previous public policy roles

- Chair, Financial Services Authority
- Chair, Climate Change Committee
- Chair, Pensions Commission
- Chair, UK Low Pay Commission

Previous business roles

- Vice-Chair, Merrill Lynch Europe
- NED, Standard Chartered plc
- Director-General, CBI
- Director, McKinsey



Energy
Transitions
Commission

eden
mccallum



Energy
Transitions
Commission

Avoiding catastrophic climate change: technologic possibilities and political barriers

Adair Turner

Chair, Energy Transitions Commission

Eden McCallum

28th February 2025

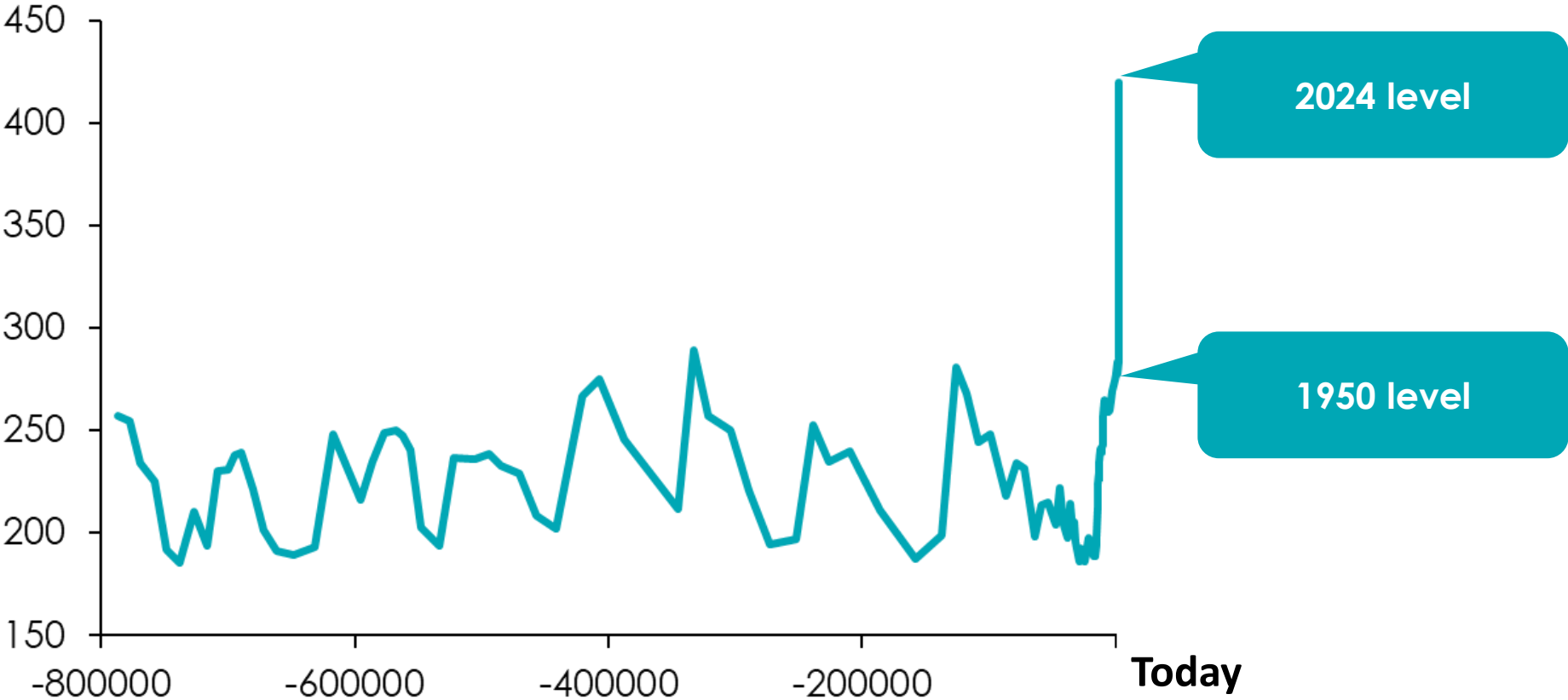
- **Emissions, concentrations and temperature:** very, very bad
- **Technologies and cost reductions:** far better than I dared hope
- **Politics:** very, very bad

... 5 priorities for action



Atmospheric CO2 concentration

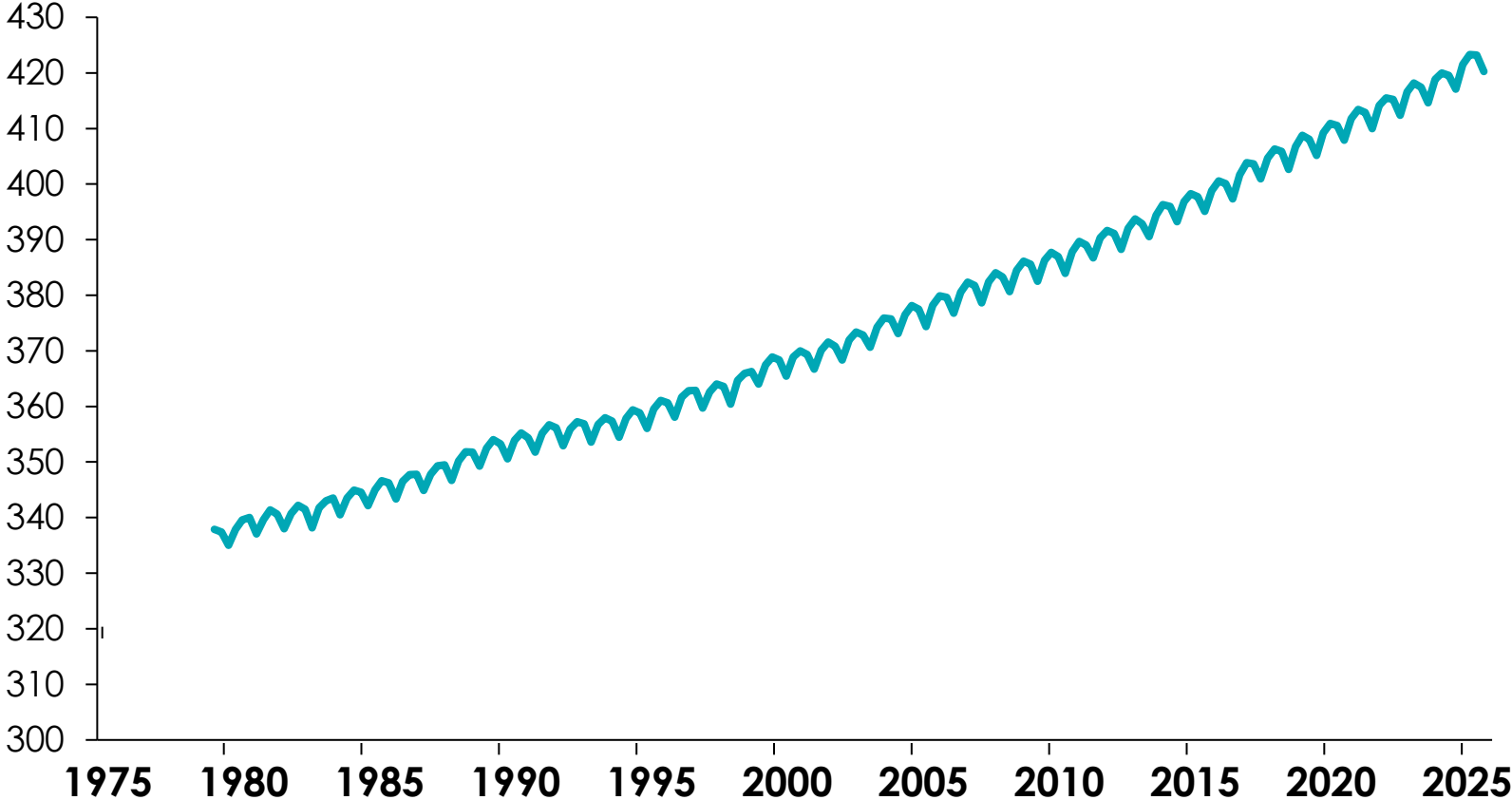
Parts per million, years before today



Source: Our World in data (Accessed Jan 2025); Carbon dioxide concentrations in the atmosphere

Atmospheric CO2 concentration

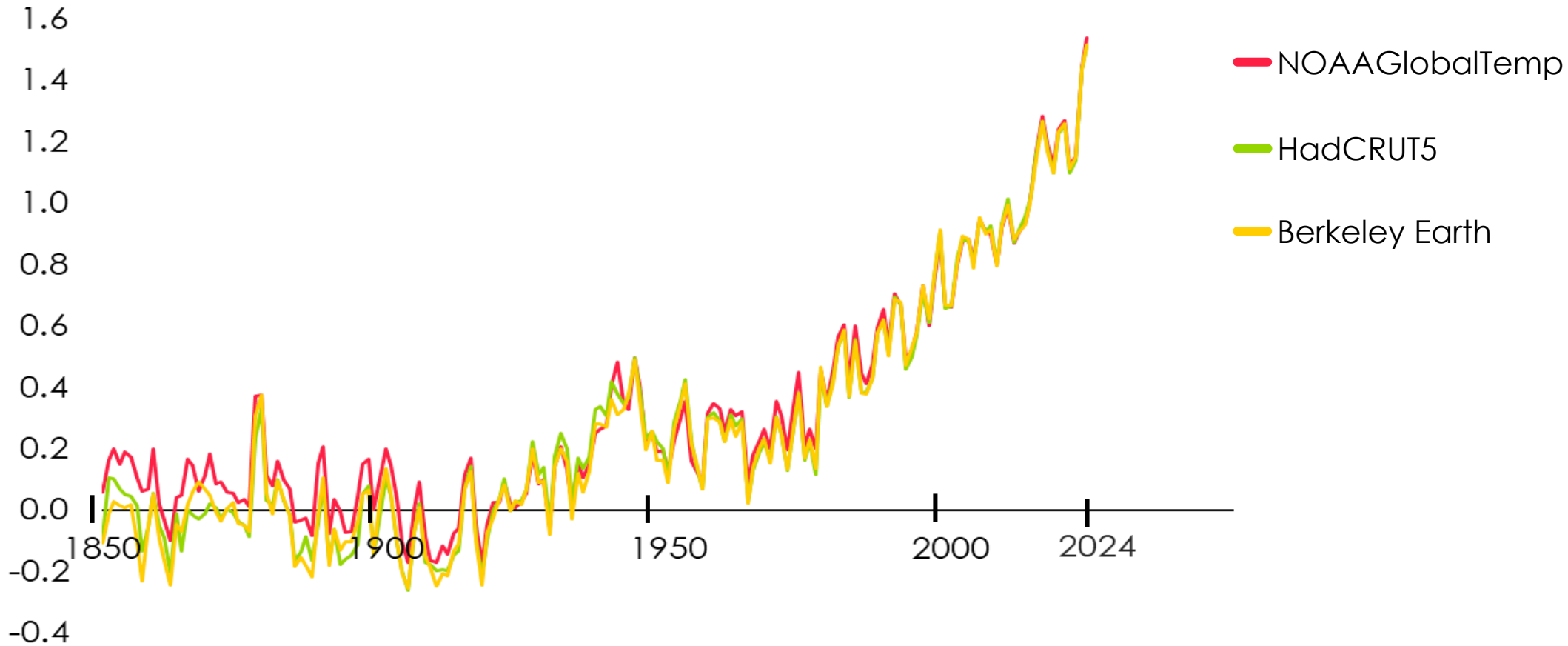
Parts per million, 1975 – 2025



Source: Our World in data (Accessed Jan 2025); Carbon dioxide concentrations in the atmosphere

Global temperature versus pre-industrial average level

Degrees Celsius, 1850 – 2024



Source: Our World in data (Accessed Jan 2025); Carbon dioxide concentrations in the atmosphere

Extreme weather summer 2023



California



China



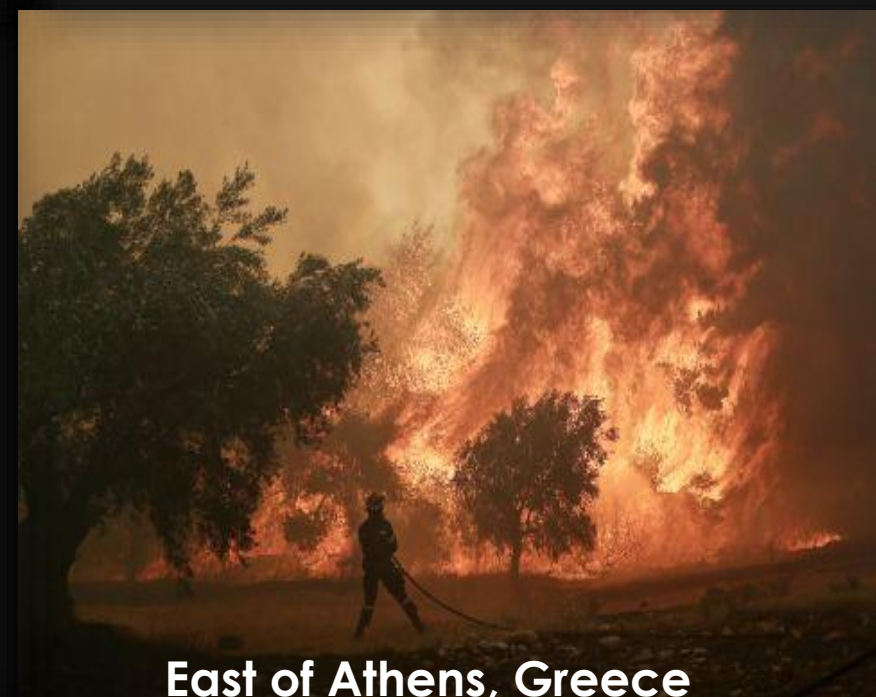
China



Pakistan



River Po at Castel San Giovanni



East of Athens, Greece

Extreme weather summer 2024



Extreme weather last six months

Valencia
(Spain)

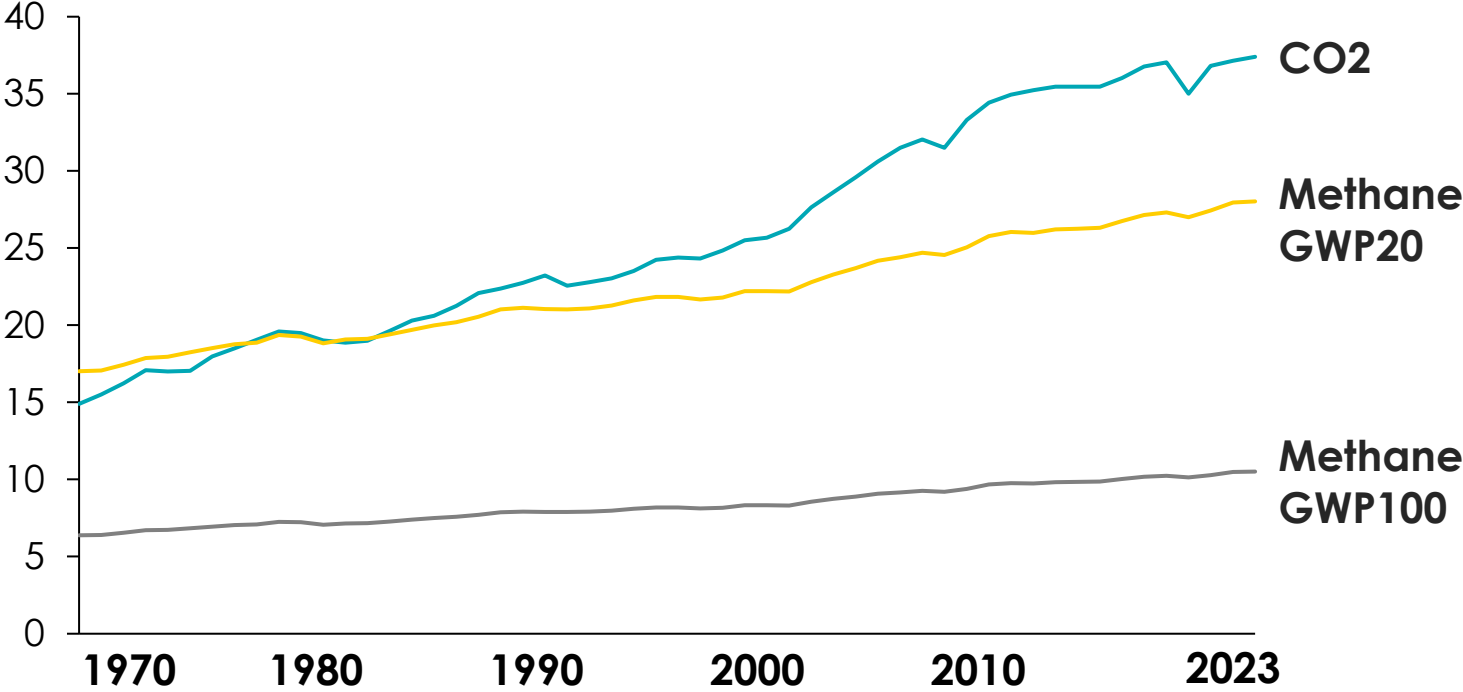


Los Angeles
(USA)



CO2 and methane emissions in last 50 years

Billion tons



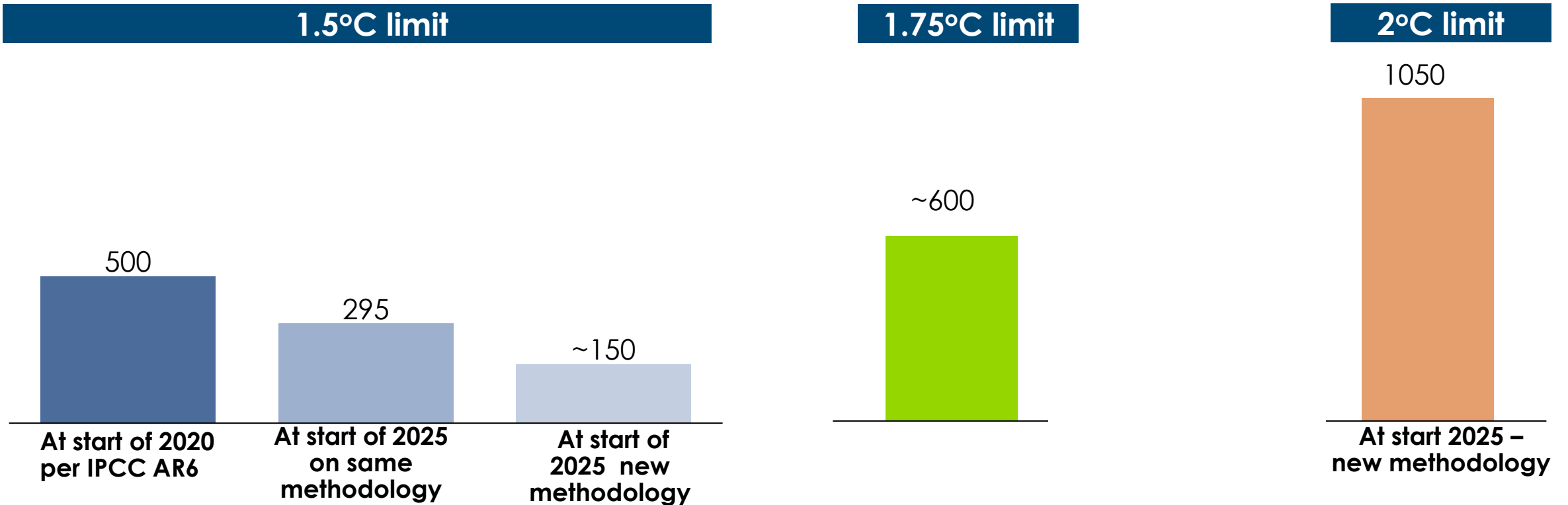
- Carbon Dioxide
- Methane GWP100 (actual methane emissions multiplied by 30 to reflect their higher warming potential over 100 years against CO2)
- Methane GWP20 (actual methane emissions multiplied by 80 to reflect their higher warming potential over 100 years against CO2)



Source: Our World in data (Accessed Jan 2025); Carbon dioxide concentrations in the atmosphere

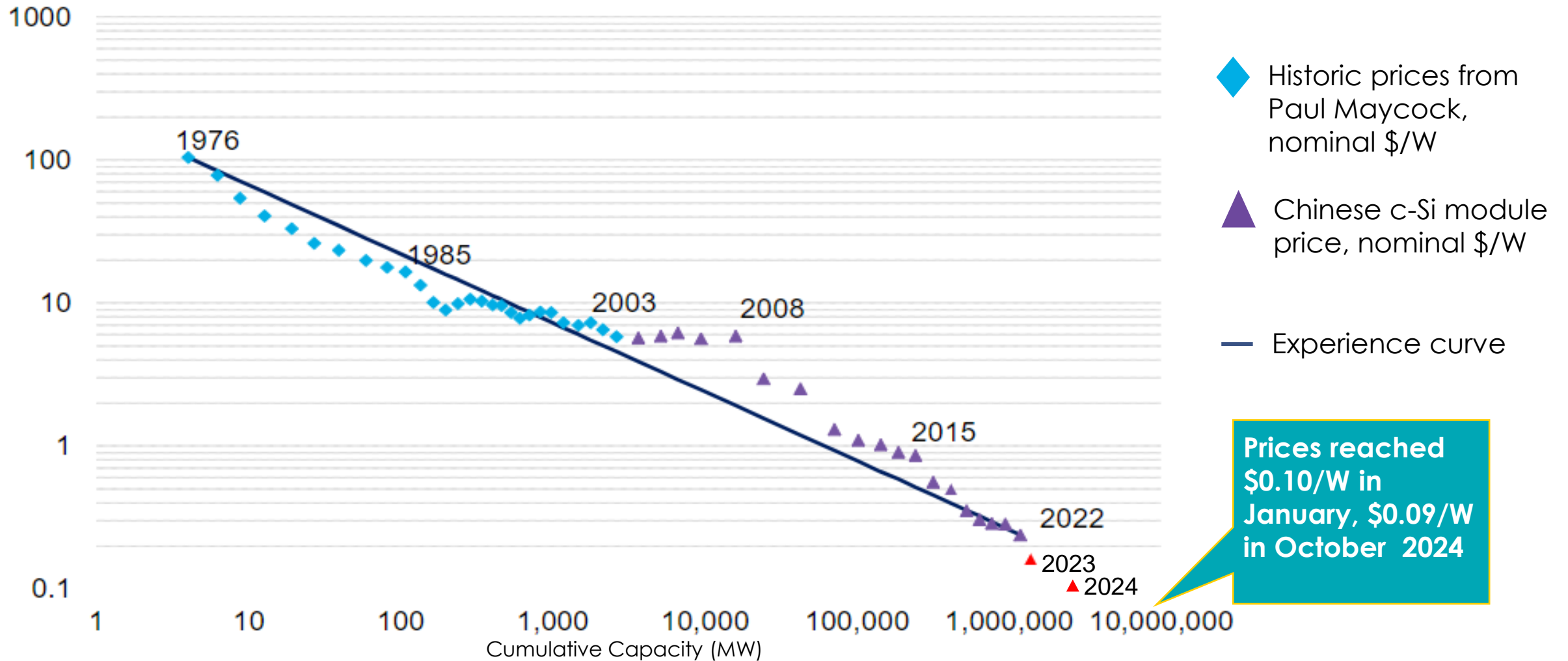
Remaining carbon budgets for 50% chance of 1.5°C and 2°C limits

GtCO₂



Price of solar PV panels

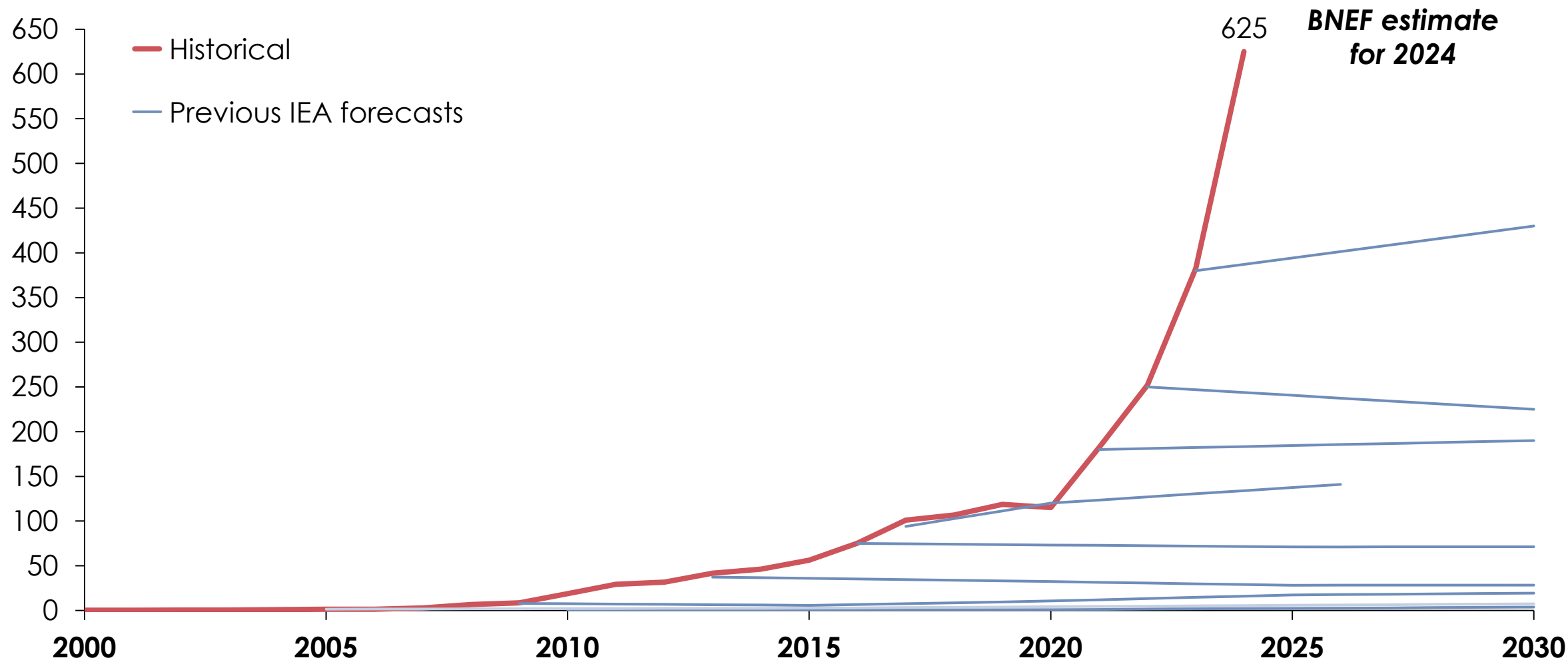
\$ per peak watt; real 2023 \$



Source: BNEF

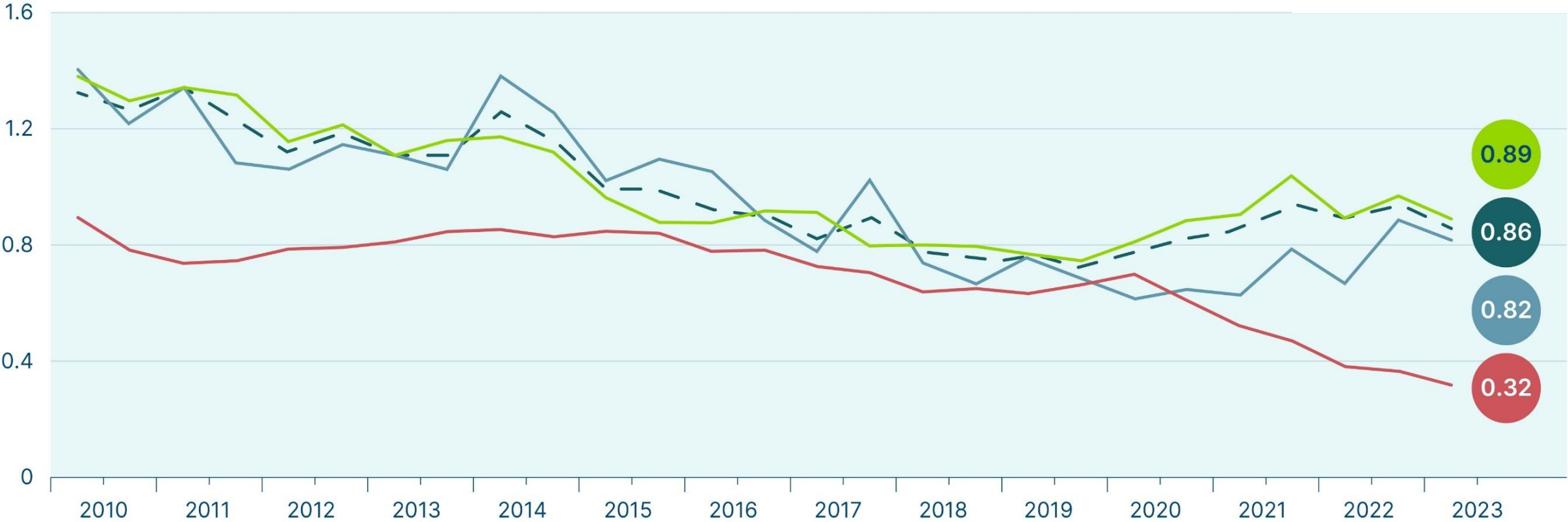
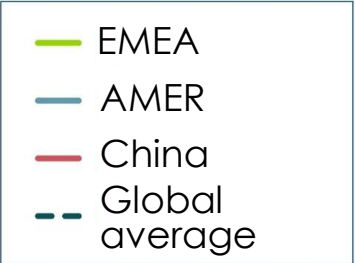
Annual solar PV installations compared to IEA forecasts

GW



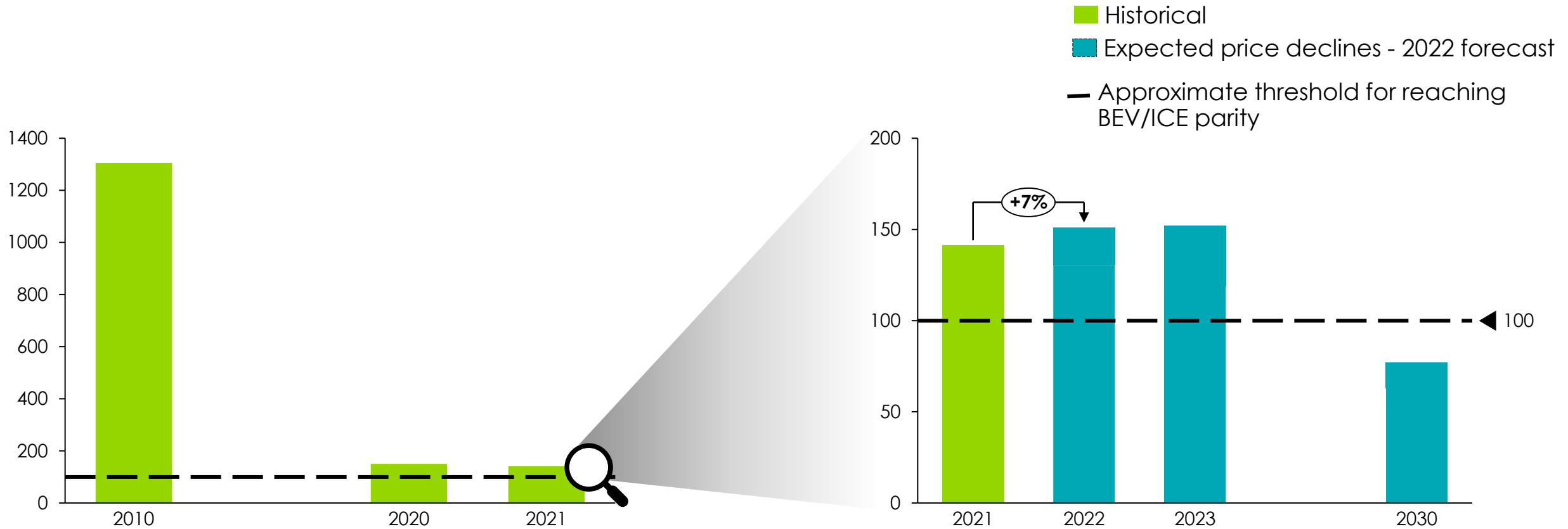
Wind turbine prices by region, 2010-23

\$ million/MW, nominal



EV Battery costs – past and projected

USD/kWh; 2022 nominal



BYD Seagull



Range: 190-250 miles

**Price in China: ~ \$9800
Fully competitive with
ICE vehicles**

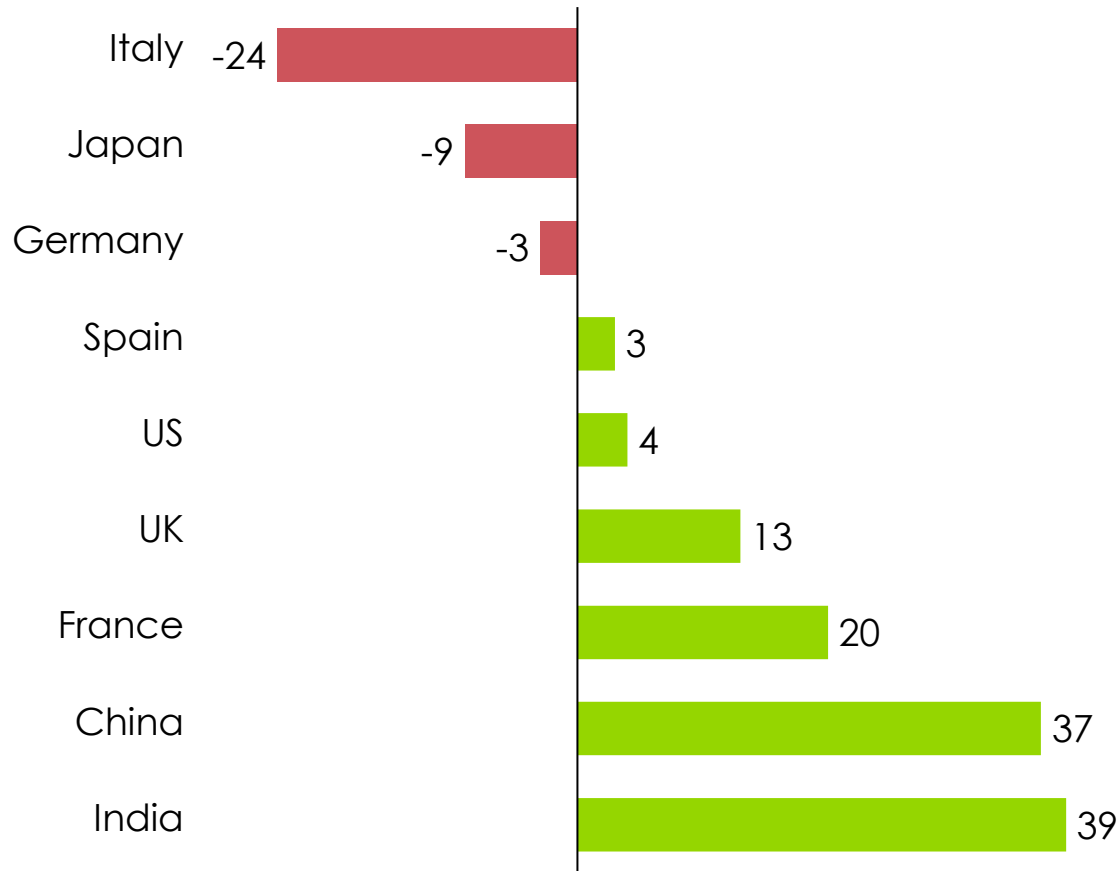
**Launching in UK 2025
Price around £10000?**

**On average, EVs in China
now 10% cheaper than
equivalent ICEVs**

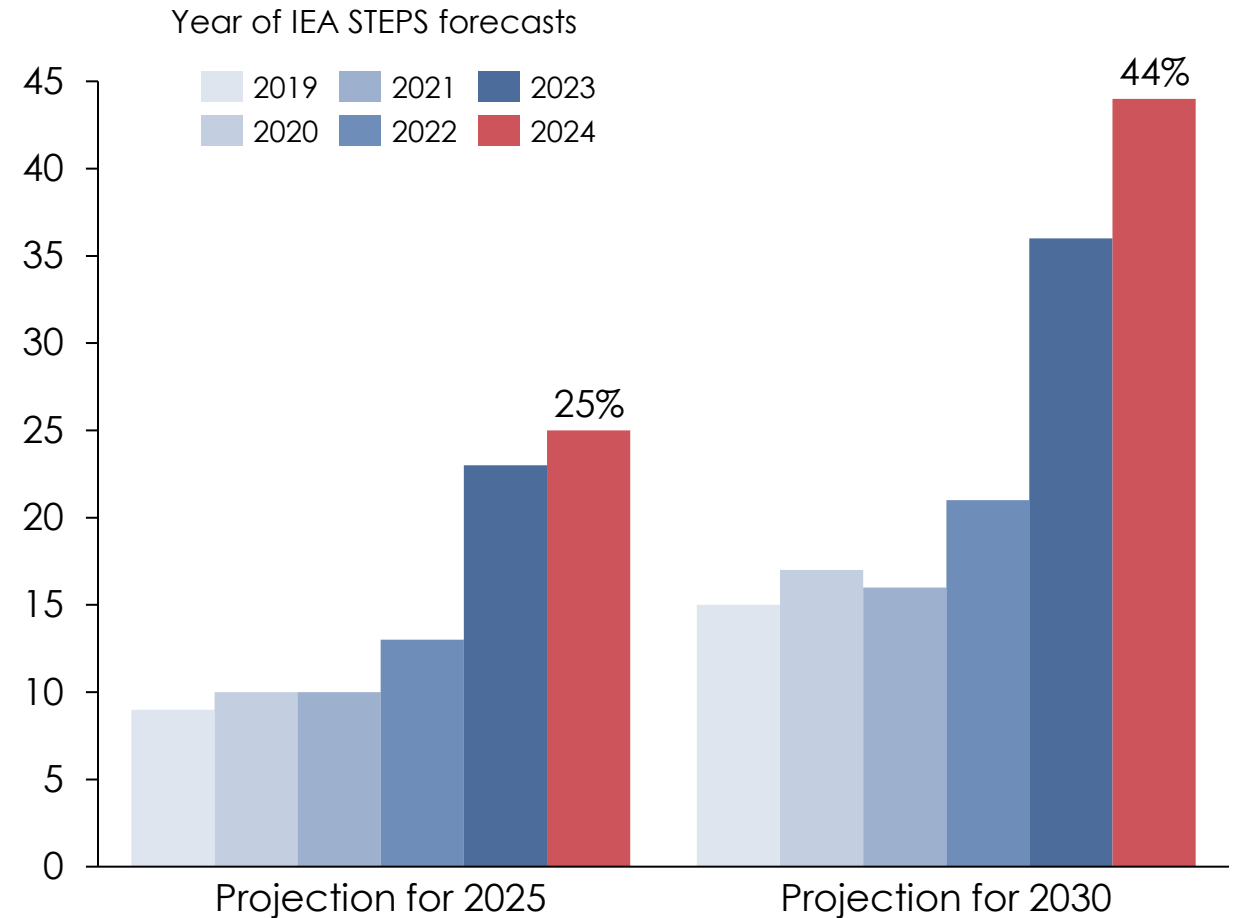


The EV revolution: temporary slowdown – longer term acceleration

Passenger EV sale year-on-year change
1Q 2024, %

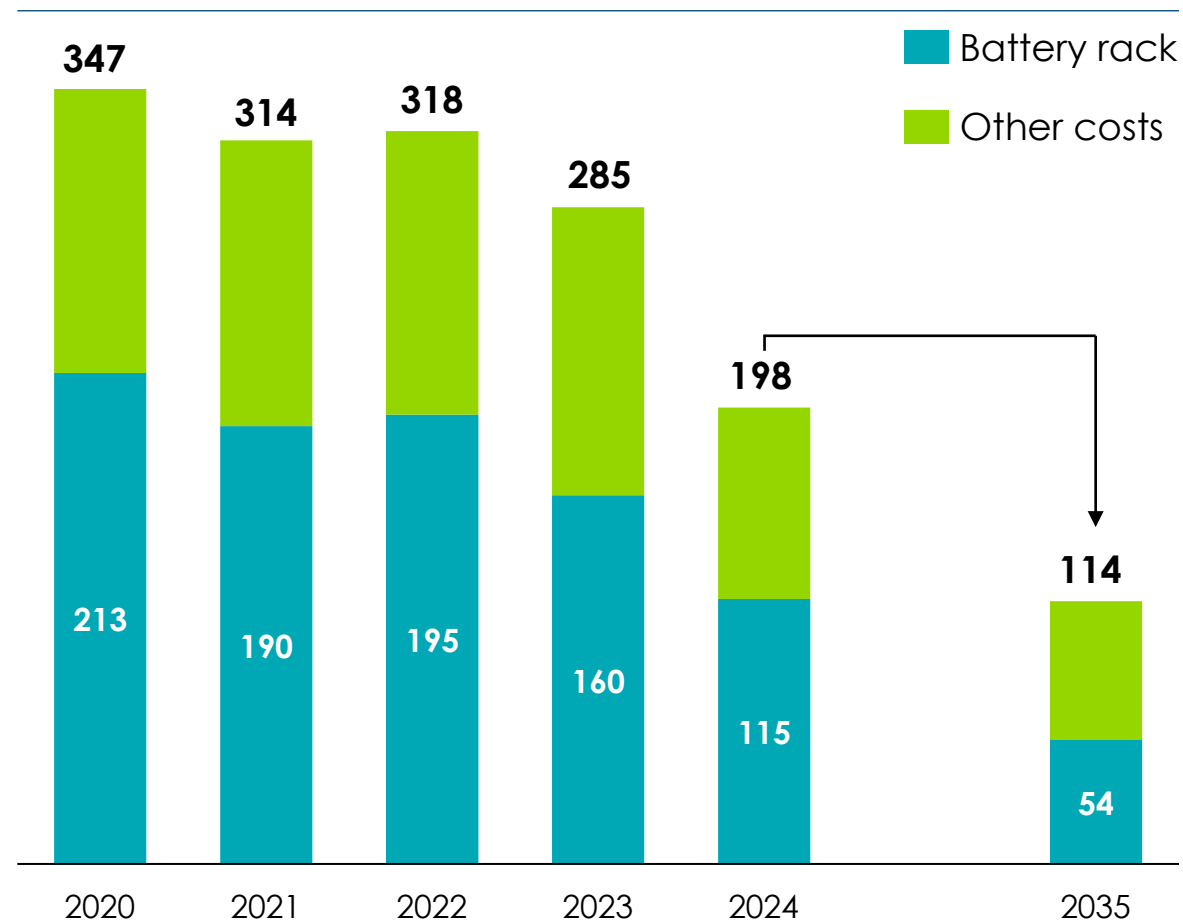


Forecasts of EV share of passenger vehicle sales
%

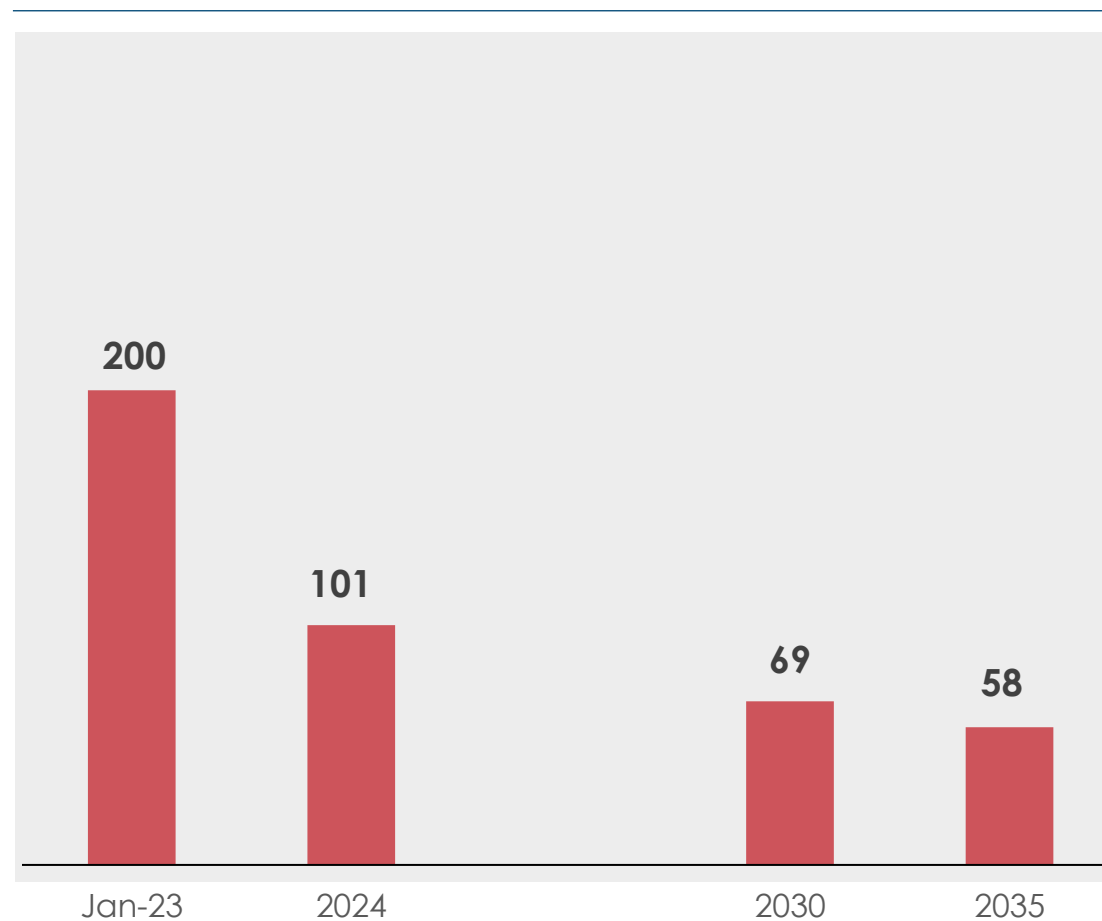


Battery energy stationary storage (BESS) costs for 2-hour total system \$ per kwh: 2020 – 2024 and projected

Global average



China total costs



Source: BNEF Energy Storage System Cost Survey, 2024

Falling solar costs

+

Falling battery costs



The Economist

AI and war

A report card on Milei's reforms

China in the Arctic

The champagne boom

JUNE 22ND-28TH 2024

DAWN OF THE SOLAR AGE

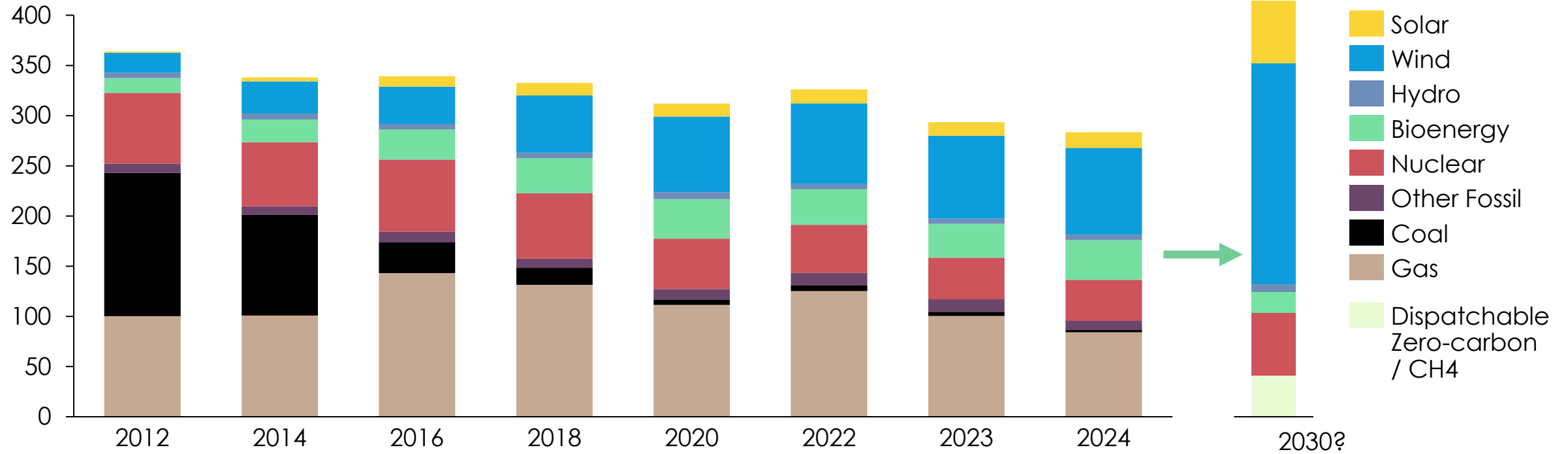
A SPECIAL ISSUE



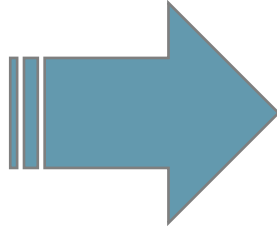
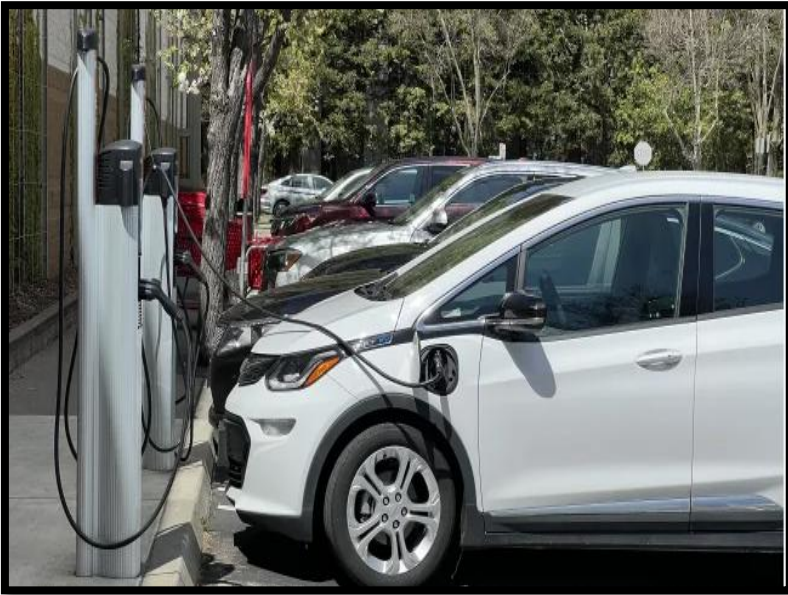
UK Electricity generation mix and carbon intensity, 2012-2024

TWh and g CO₂ per kWh

2030s zero-carbon electricity system, % possible mix

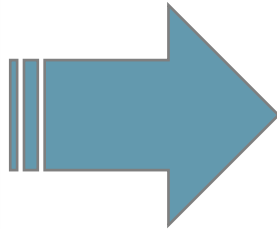


Source: BNEF (2024), Global Installed Capacity (2012-2023); Ember (2024), Electricity data explorer (2024)



3 to 4 times more efficient than ICEs in converting energy in the battery/ fuel tank into kinetic energy in the wheels

... because of hugely reduced heat energy losses



3 to 4 times more efficient than gas boilers in converting input energy heat within the home

- Gas boiler 70-90% efficiency
- Heat pump 300-400% COP, since extracts heat from the air

...and heat pump efficiencies will increase



The green cost premium at business and consumer level

		Impact on intermediate product cost % price increase		Impact on final product cost US\$ / % price increase	
Industry	Cement	Tonne of cement Tonne of concrete	+100% (+30%)	Building	+3%
	Steel	Tonne of steel	+25%	Passenger car	~ +1%
	Plastics	Tonne of ethylene	+50%	Bottle of soda	< +1%
Transport	Shipping	Container/bulk shipping freight rate	+100%	Pair of jeans or kg of sugar	<+1%
	Aviation	Litre of jet fuel	+50- 100%	Economy class flight	+10- 20%



Cost to consumers living standards GDP per capita once transition to net zero complete

Buildings
Road Transport
Non-heavy industry

Electrification >
greater energy
efficiency
+
Power
decarbonisation at
low cost

Zero or negative cost impact on
consumers (i.e., consumers gain)

Heavy industry
(steel, chemicals, cement)
Aviation and shipping

Green cost premia – for
long time or in
perpetuity

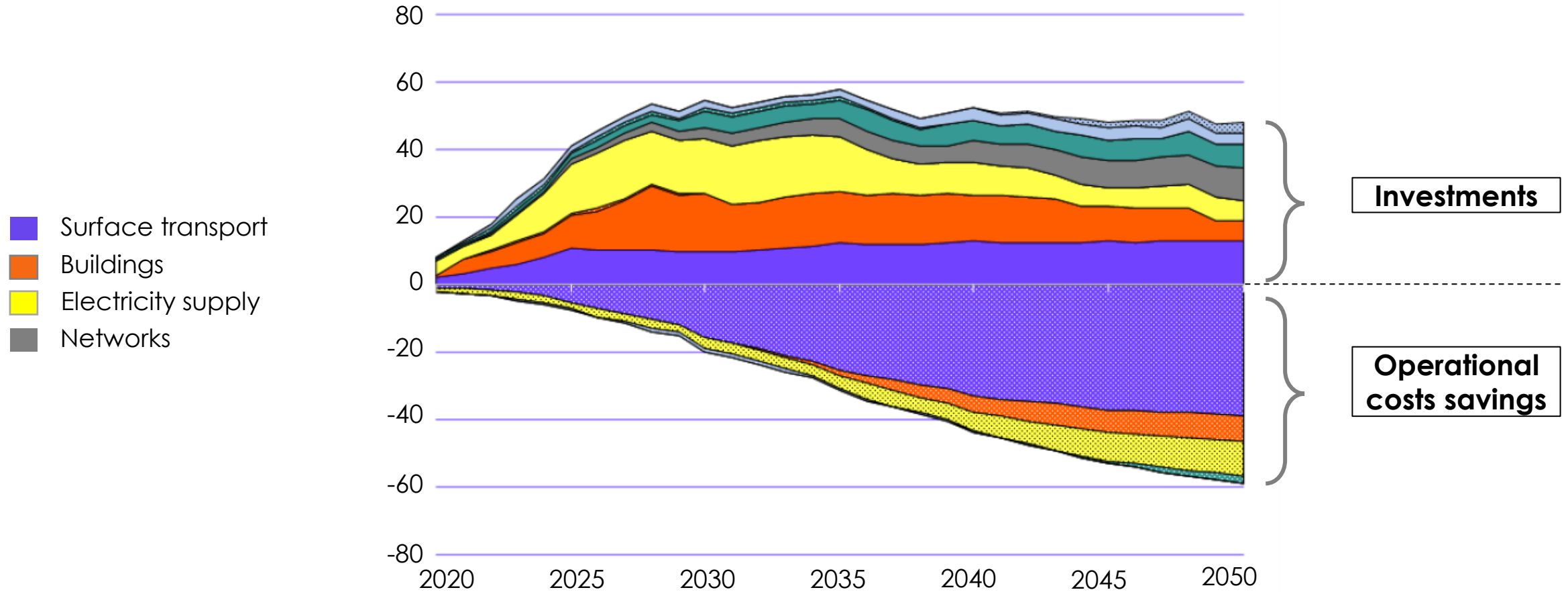
But small at consumer
level (except in
aviation)

Small cost to consumers
... ETC 2021 estimate ~ 0.5% of GDP



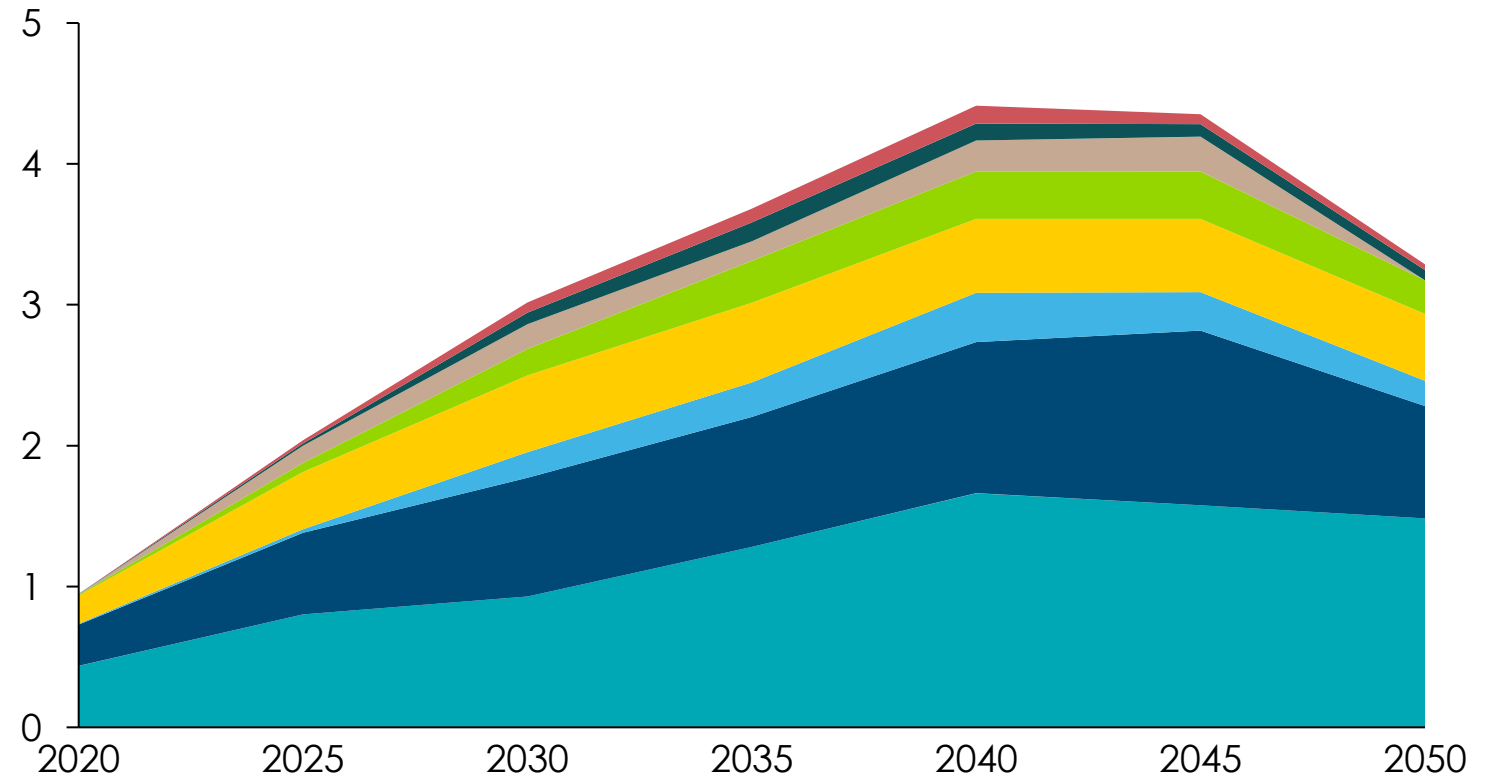
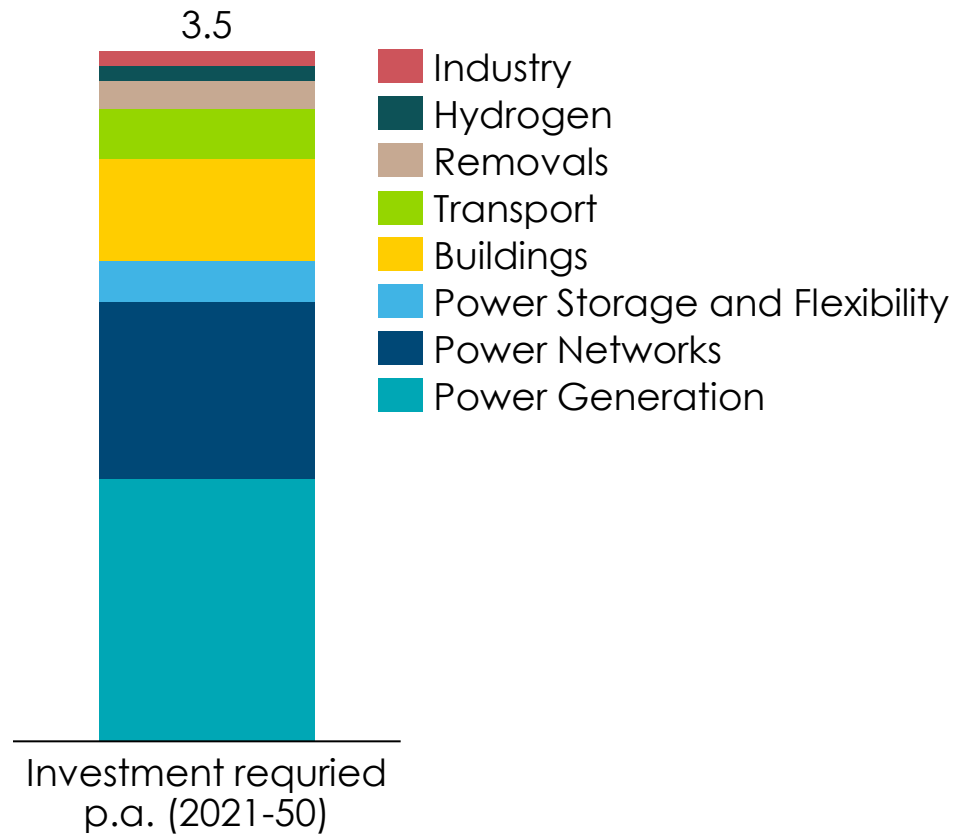
Capital and investment costs and savings in net zero pathway

Billion GBP per year



Annual capital expenditure in the energy system

Trillion USD



Non-Traditional Gatekeepers

Key sources of climate mis- information:

- The Manosphere
- Anti-vaxx groups
- Wellness influencers
- The 'Intellectual Dark Web'
- Far-right pundits
- Conspiracy movements
- Extremist groups



Elon Musk    @elonmusk · Feb 1

Replying to @EvaVlaar

I'm pro-environment, but I support the farmers!

Farming has no material effect on **climate change**.

959 replies 3.6K retweets 16K likes 695K views



Dr Jordan B Peterson  @jordanbpeterson

clintel.org/wp-content/upl...

Just a reminder
Scientists agree
That there is no
Climate Emergency

2:12 AM · Aug 6, 2024 · 374.1K Views

402 replies 2.7K retweets 13K likes 901 views

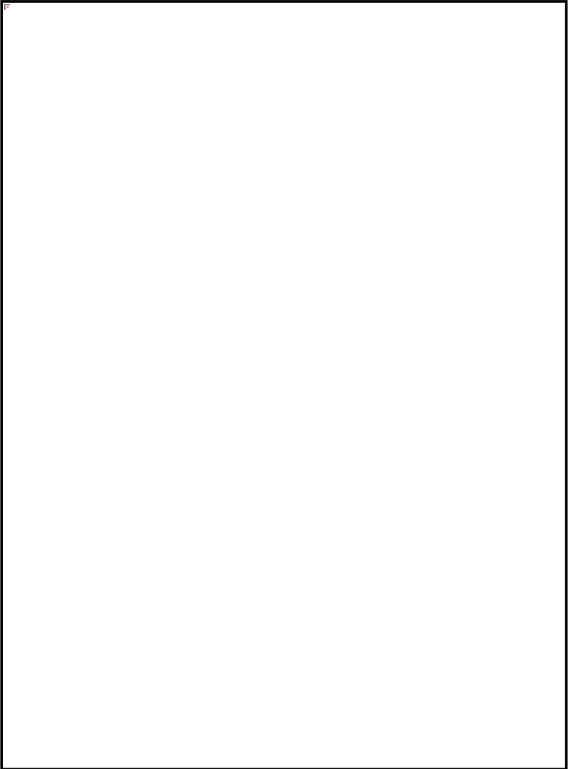
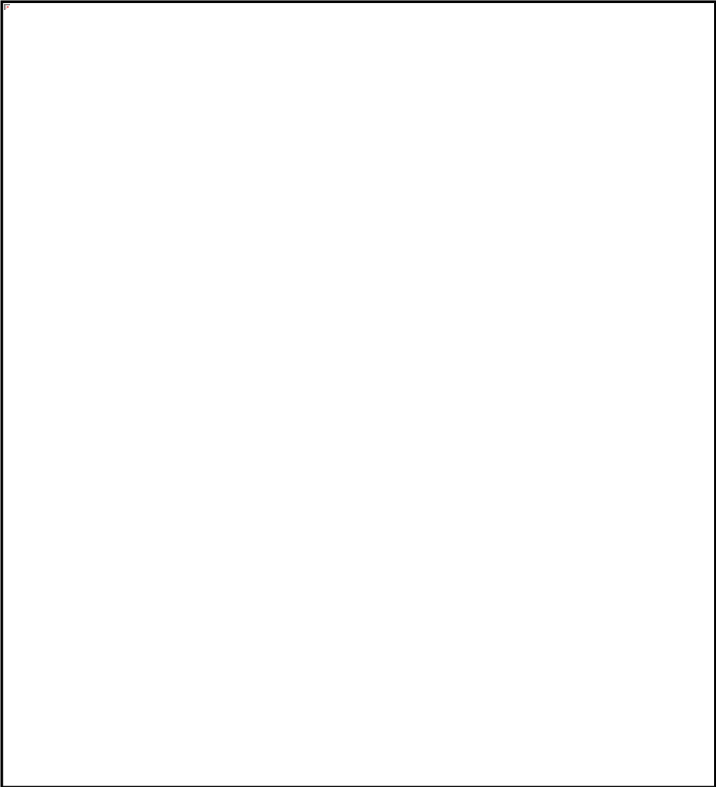
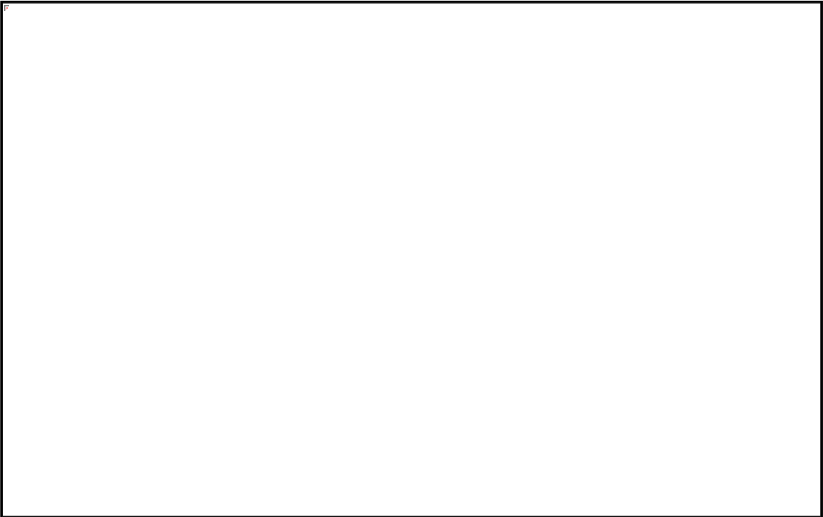


Andrew Tate   @Cobratate

#ClimateScam

11:02 AM · Apr 18, 2023 · 1.9M Views

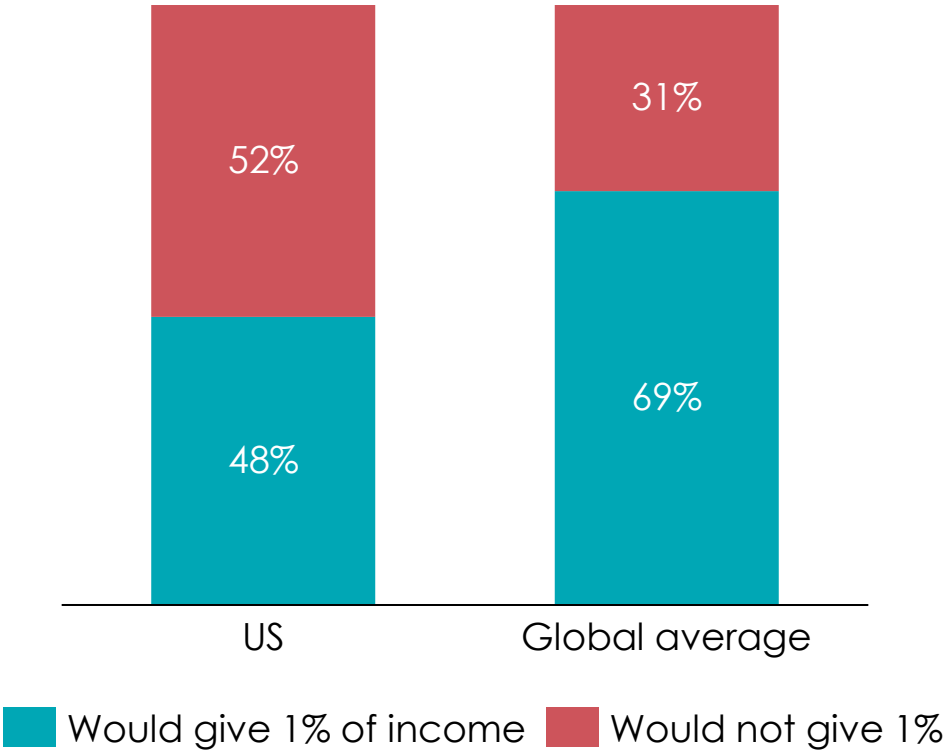
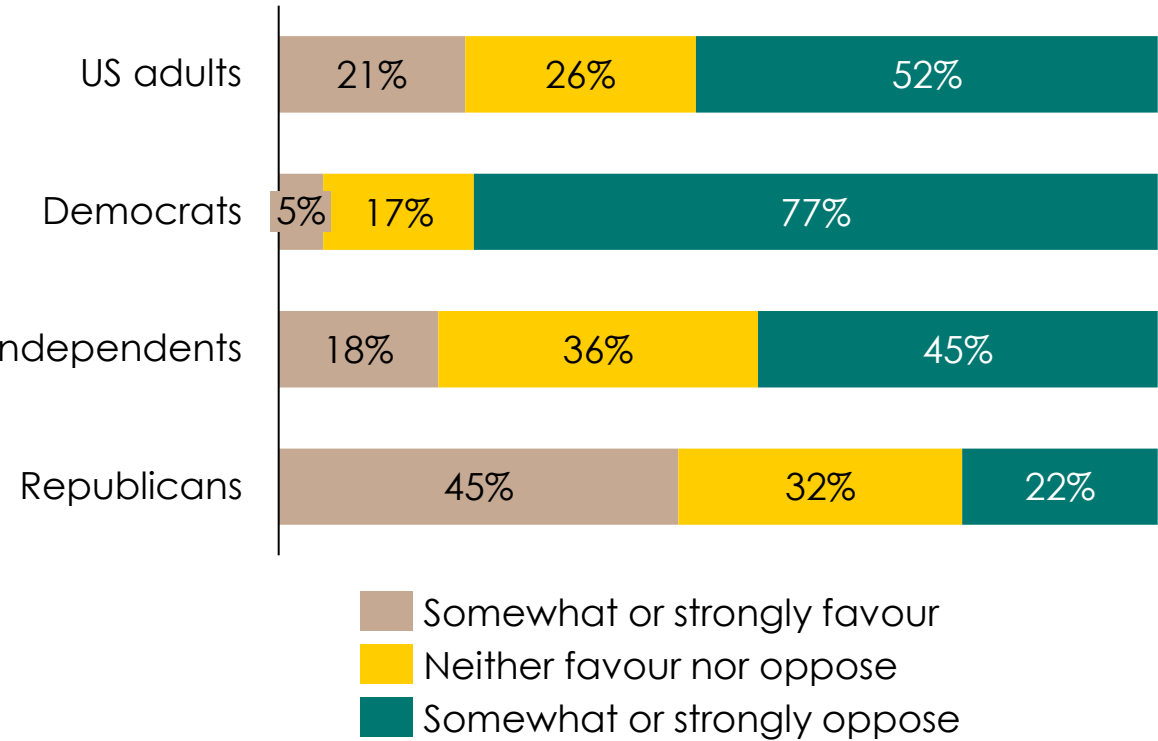
387 replies 1.1K retweets 24K likes 22 views



Attitudes to climate action – survey results

US attitudes to withdrawing from Paris Agreement, Jan 2025

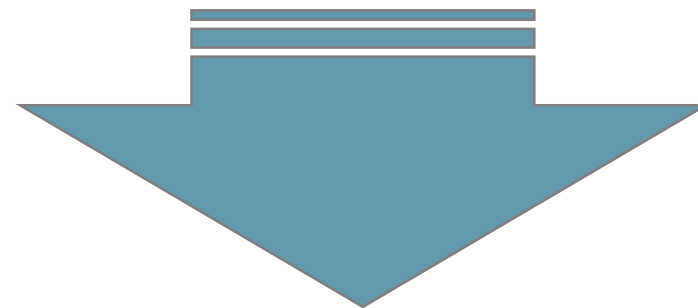
People who would give 1% of income to tackle climate change, 2024



Notes: US results based on interviews with 1,150 US adults conducted Jan 9-13 2025. Margin of error is +/- 3.9 percentage points for full sample. Global survey data across 130,000 participants from 125 countries. Source: The Associated Press-NORC Center for Public Affairs Research; Andre et al. (2024), *Globally representative evidence on the actual and perceived support for climate action*



- ❖ No reinforcement of IRA – US will not achieve committed target of 48-52% reduction (from 2005 level) by 2030
- ❖ US will not become major driver of clean tech development and cost reduction alongside China
- ❖ US will not provide significant support to capital flows to developing countries
- ❖ US exit from Paris process may encourage other countries to do same and/or dilute emission reduction targets



+0.2°C to reasonable estimate of global warming by 2100?



Five priorities for action

- Win the argument that climate change is huge threat to human welfare and that we should accept some cost to mitigate it
- Anticipate and manage distributional effects
- Seize the opportunity to decarbonise not so “hard to abate” sectors
- Mobilise reasonable cost of capital finance flows to developing countries
- Develop collaborative, constructive and robust relationship with China

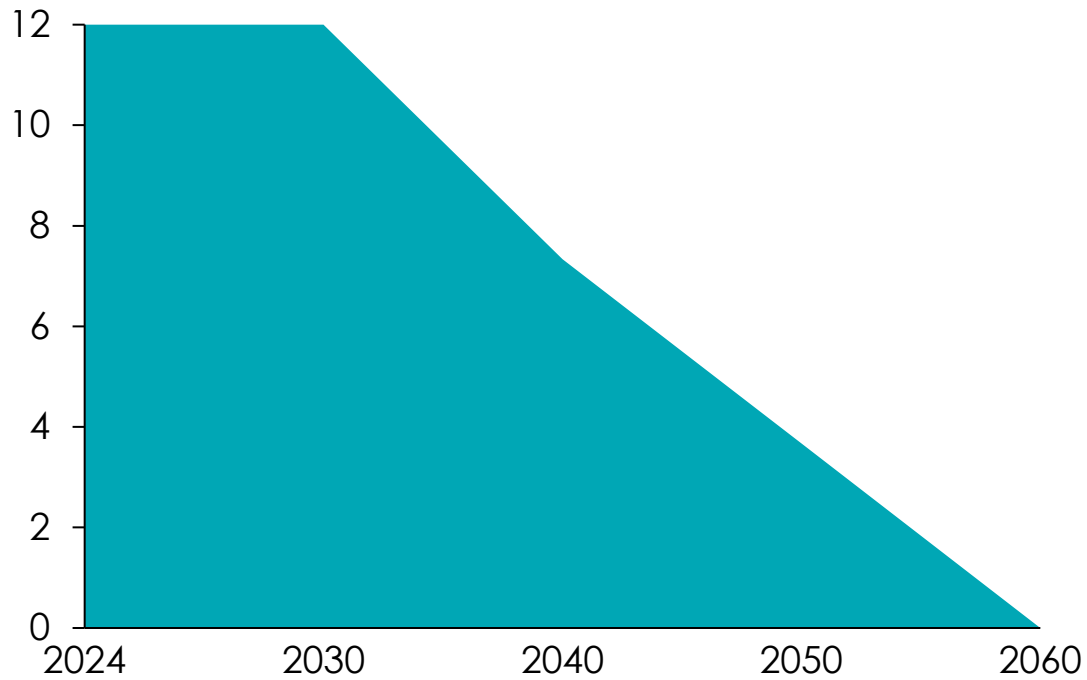


Extreme weather summer 2024



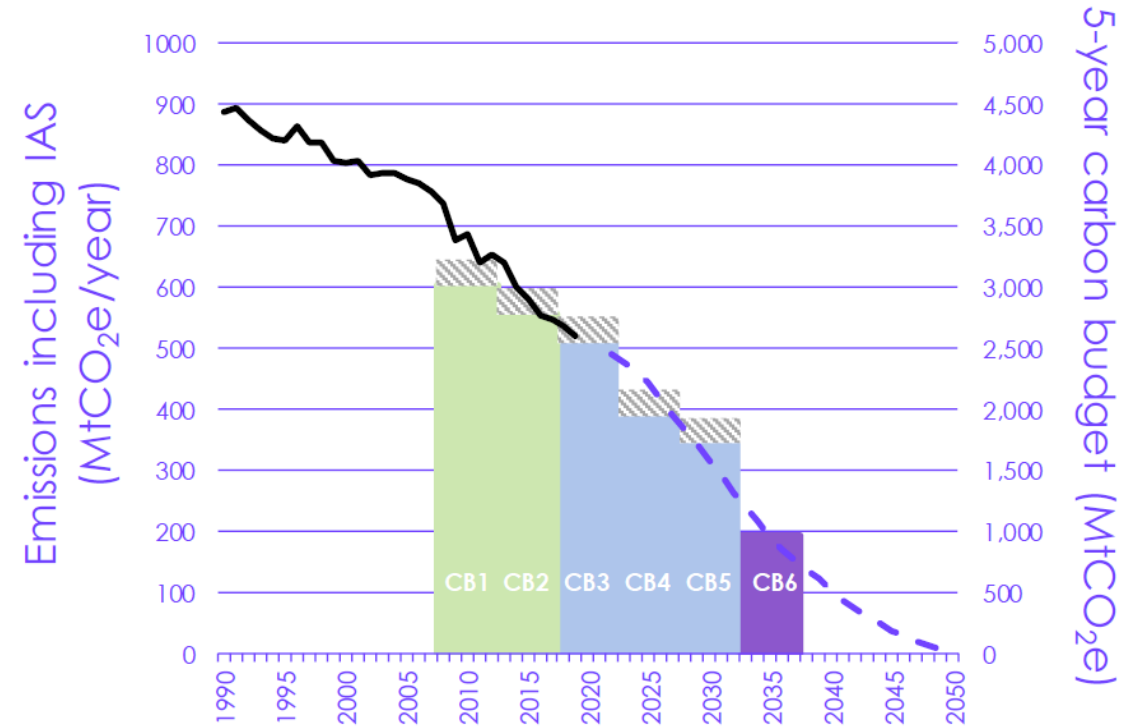
Cumulative remaining emissions under formal commitments

China cumulative CO2 emissions 2025 – 2060?
GtCO₂



Cumulative remaining emissions ~ 240 GtCO₂e

UK cumulative CO2 emissions until 2050
GtCO₂



Cumulative remaining emissions ~ 4.9 GtCO₂e

= ~ 100GT on population equivalent basis

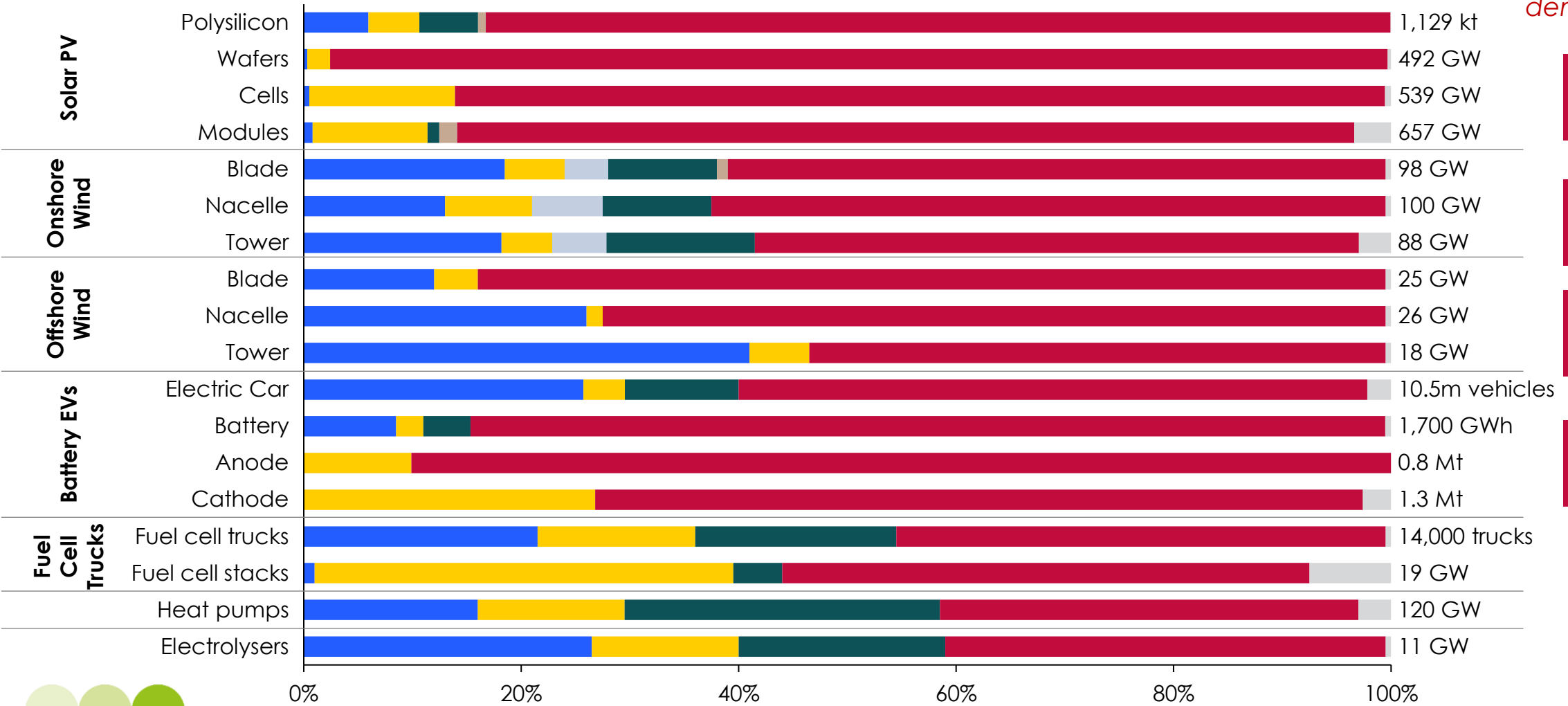


Share of global manufacturing capacity for clean energy technologies, 2021/22

%

Europe APAC C. & S. America N. America Eurasia China RoW

China domestic demand in 2022



~105 GW

~44 GW

~5 GW

~6m vehicles



Drivers of Chinese clean tech advantage

Common beliefs

Lower environmental standards

Low labour costs

Declining importance with:

- Rising environmental standards
- Highly automated production

Key factors

Strategic vision: 5 year plan targets for clean tech deployment and development

Huge local demand for solar PV, wind turbines, batteries, EVs

Low cost of capital given high domestic savings

Excellent science and technology skills and culture

Entrepreneurship and vision



Economies of scale and learning curve effects

Eco system of scale suppliers across whole supply chains

Technological leadership



A win-win approach in relations between China and EU/UK

China



- Tighten emissions reduction targets
- Accept EU/UK CBAM as a stimulus to decarbonisation of Chinese industry, with effective Chinese emissions trading scheme

➤ ➤ **Work together to increase capital flows supporting clean electrification in developing countries**

EU/UK



- Welcome the benefit of Chinese clean tech development and cost reduction
- Welcome Chinese company clean tech investment in EU/ UK
- Set tariffs in line with WTO rules





Energy Transitions Commission

www.energy-transitions.org

Briefing Note
JANUARY 2025

Demand side flexibility – unleashing untapped potential for clean power

In February 2025, countries must submit new "nationally determined contributions" or NDCs, setting new, more ambitious emissions reduction targets for 2035. In our recent publication, *Credible Contributions: Bolder Plans for Higher Climate Ambition at the Next Round of NDCs*, the ETC highlights that current NDCs for 2035 put the world on track for 3.2-3.4°C of warming by 2100 – far from the Paris agreement's goal of well below 2°C, or the higher ambition of 1.5°C. More ambitious targets are urgently needed, with stronger links to national policies.

As countries gear up to update NDCs in February, the spotlight is firmly on how to accelerate the transition to clean electricity. Under net-zero scenarios, the global economy must decarbonise. As COP29, a Global Energy Storage and Grids Package was signed by 58 countries, including Brazil, the United States and United Kingdom¹. That package builds on COP28's pledge to triple renewables by 2035, adding practical commitment to accelerate system level enablers required for rapid renewable deployment. It commits to increasing global energy storage capacity to three times 2022 levels, reaching 1,000 GWh by 2030 and to add or refurbish 25 million km of grids as set out by the International Energy Agency (IEA)².

While action on storage and grids (including long-distance transmission) is vital, another pillar of action – demand side flexibility – will also be critical to deliver clean, expanded power systems. Traditionally, power systems operated on building generation to meet demand. In future power systems – based on variable generation from wind and solar, and with a more dispersed network of electricity end-uses – demand is now positioned to play a much bigger role in actively responding to system needs.

Demand side flexibility means being able to shift the consumption of electricity at peak times – such as through "smart charging" of electric vehicles (EVs), time-shifting usage of other electric devices, or using distributed storage. Critically, this flexibility can help to offset new grid and generation capacity needed across the system, reducing costs and speeding up the transition. Overall, demand side flexibility can play a significant role in buildings, industry, and the transport sectors. ETC analysis at the global level suggests that a third of total electricity demand in 2050 could be flexible – roughly equivalent to today's entire electricity consumption.

A third of total electricity demand in 2050 could be flexible – roughly equivalent to today's entire electricity consumption.

1. ETC (2024), *Credible Contributions: Bolder Plans for Higher Climate Ambition at the Next Round of NDCs*, Paris.
2. Global Renewable Market 2025, COP28 Global Energy Storage and Grids Package, available at <https://www.energy-transitions.org/publications/global-renewable-energy-market-2025> and <https://www.energy-transitions.org/publications/global-renewable-energy-market-2025>.
3. See IETP (2024), *Building Grids Faster: The Backbone of the Energy Transition*, Paris.
4. In 2024, the Energy Storage and Grids Package was signed by 58 countries.

Achieving Zero-Carbon Buildings: Electric, Efficient and Flexible
February 2025 | Version 1.0

Energy Transitions Commission

EU Policy Whitepaper
December 2024

Solidifying the EU's leadership in the global energy transition

Introduction

The Energy Transitions Commission (ETC) is a global coalition of leaders from across the energy landscape, committed to achieving net-zero emissions by mid-century, the primary practical guidance and recommendations to policymakers, businesses, and stakeholders to support the transition to a low-carbon economy, which we believe can unlock new economic opportunities and drive sustainable growth. With far-reaching implications, we laid the progress of energy transitions worldwide, giving us a unique perspective on the challenges and opportunities in different regions.

As the European Commission prepares for a new five-year term, we present this white paper as a showcase of current progress, identifying further opportunities to solidify the European Union (EU)'s climate leadership through implementation of our monthly energy policy packages. While the EU has made considerable strides in reducing emissions – notably through renewable energy and efficiency – there is still more to be done, with other key geographies such as China and the United States accelerating deployment of fast, well-timed cases more comprehensively, through green industrial policy.

The coming months will be crucial in shaping the EU's next phase of climate action, and we hope to engage the Commission to consider the following focus areas and enacting these recommendations to ensure the EU remains a leader in the global energy transition:

This EU Policy Whitepaper therefore covers two areas:

1. A look-back at state of the energy transition and implications for Europe, covering in turn:
 1. EU accomplishments within its energy transition to date.
 2. Looking forward, the path to further EU progress on emissions reductions by sector.
 3. The state of the global transition and how Europe compares.
2. Key focus areas and recommendations for the next five-year agenda of the EU Commission:
 1. Hold the ground: Avoid renegeing previous policies to send clear market signals that will encourage investment and maintain momentum around the energy transition.
 2. Complete the picture: Expand policy focus to areas beyond the power sector to ensure emissions reductions in all relevant sectors of the economy.
 3. Realise competitive advantage: Align industrial policy with environmental goals to ensure European companies can compete in the global marketplace.

Briefing Note

A CRITICAL RAW MATERIAL SUPPLY-SIDE INNOVATION ROADMAP FOR THE EU ENERGY TRANSITION
December 2024

Briefing Note

NDCs, NCQG, and Financing the Transition: Unlocking Flows for a Net-Zero Future
October 2024 | Version 1.0

Energy Transitions Commission

Briefing Note

Building grids faster: the backbone of the energy transition
September 2024 | Version 1.0

Energy Transitions Commission

Credible Contributions: Bolder Plans for Higher Climate Ambition in the Next Round of NDCs
June 2024

Energy Transitions Commission

Insights Briefing

Overcoming Turbulence in the Offshore Wind Sector
Version 1 | May 2024

Energy Transitions Commission

Insights Briefing



Q&A

