NET ZERO: 2025 Perspective

Trends and challenges in the global energy transition

eden mccallum

Agenda

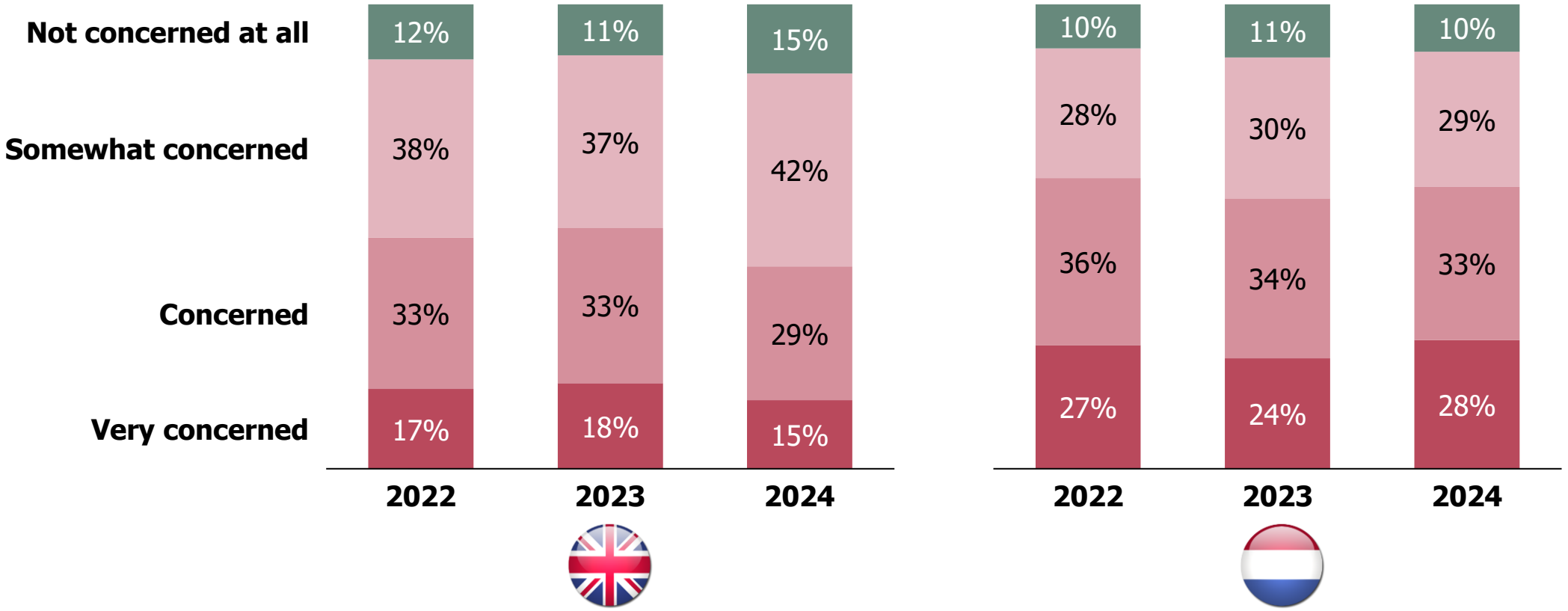
Introduction

Net Zero: 2025 Perspective

Q&A

How concerned are you about the environment / sustainability?

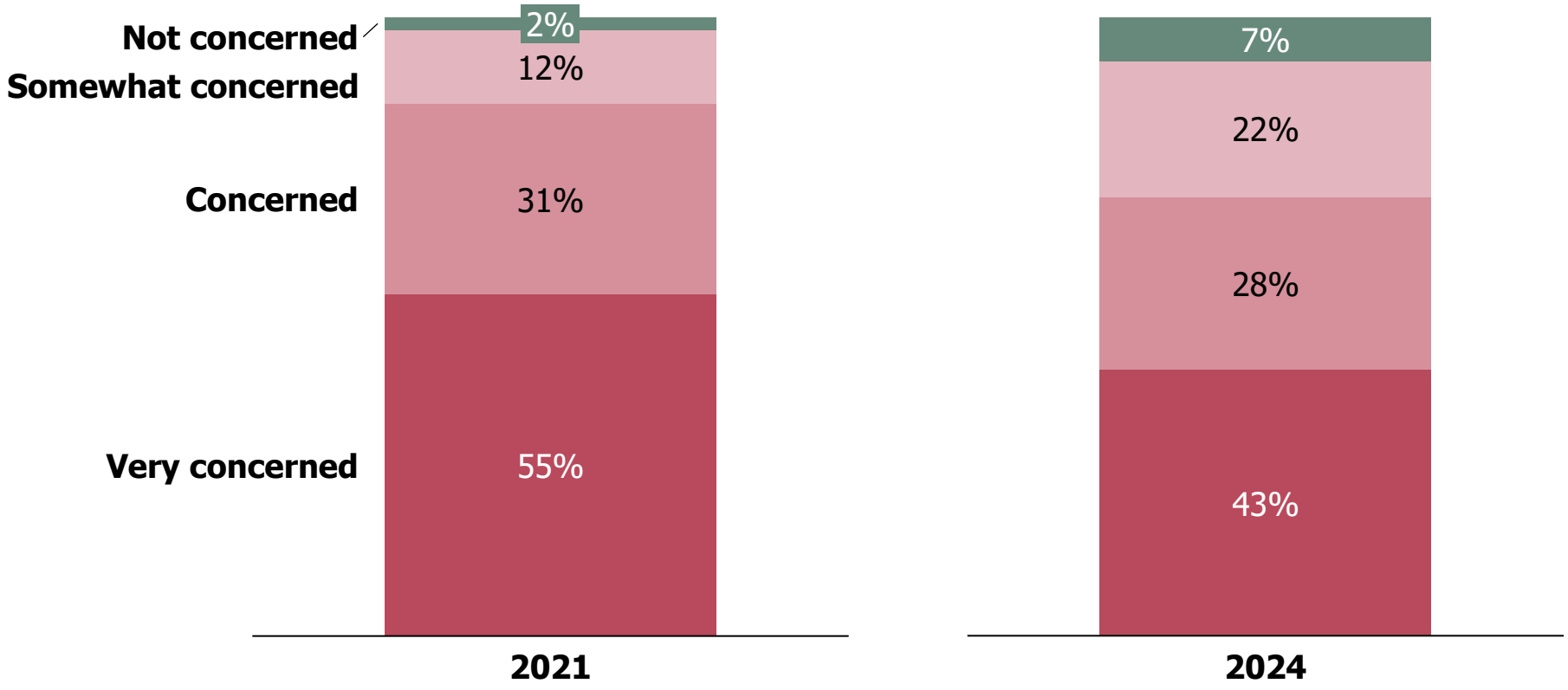
CONSUMER SENTIMENT SURVEYS



Source: Eden McCallum and Dynata Consumer Research Surveys

How concerned are you personally about environmental sustainability?

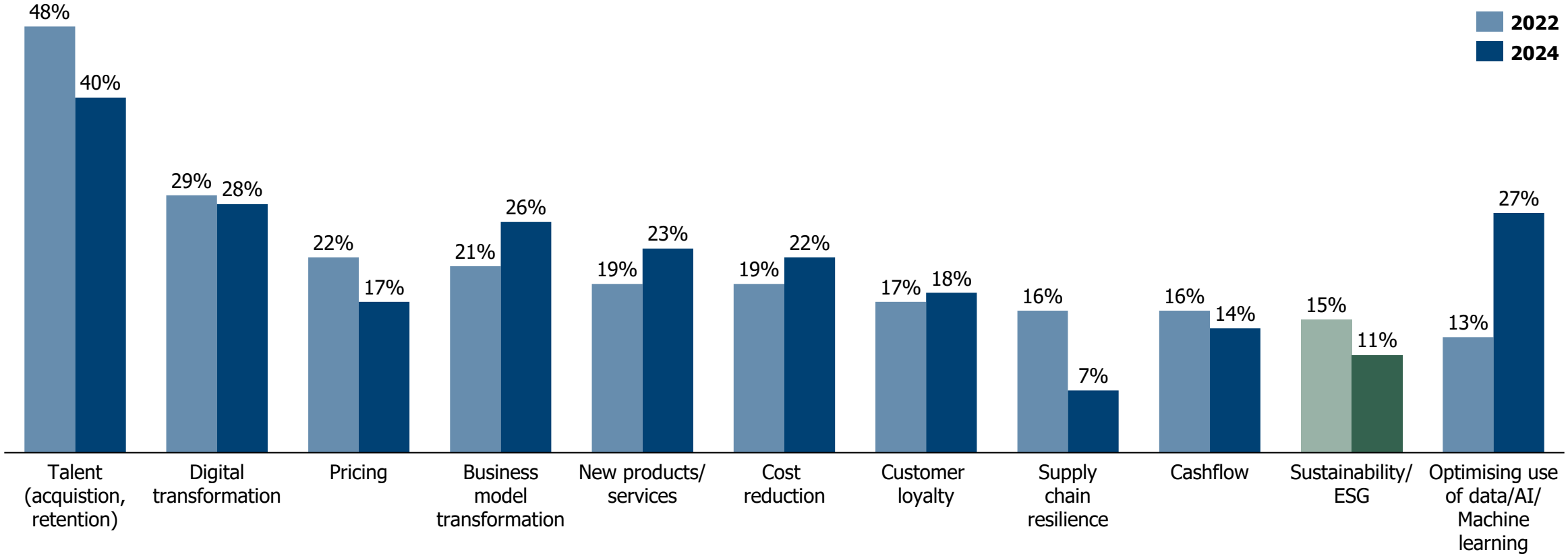
BUSINESS LEADER SURVEYS



Source: Eden McCallum Business Outlook Surveys

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

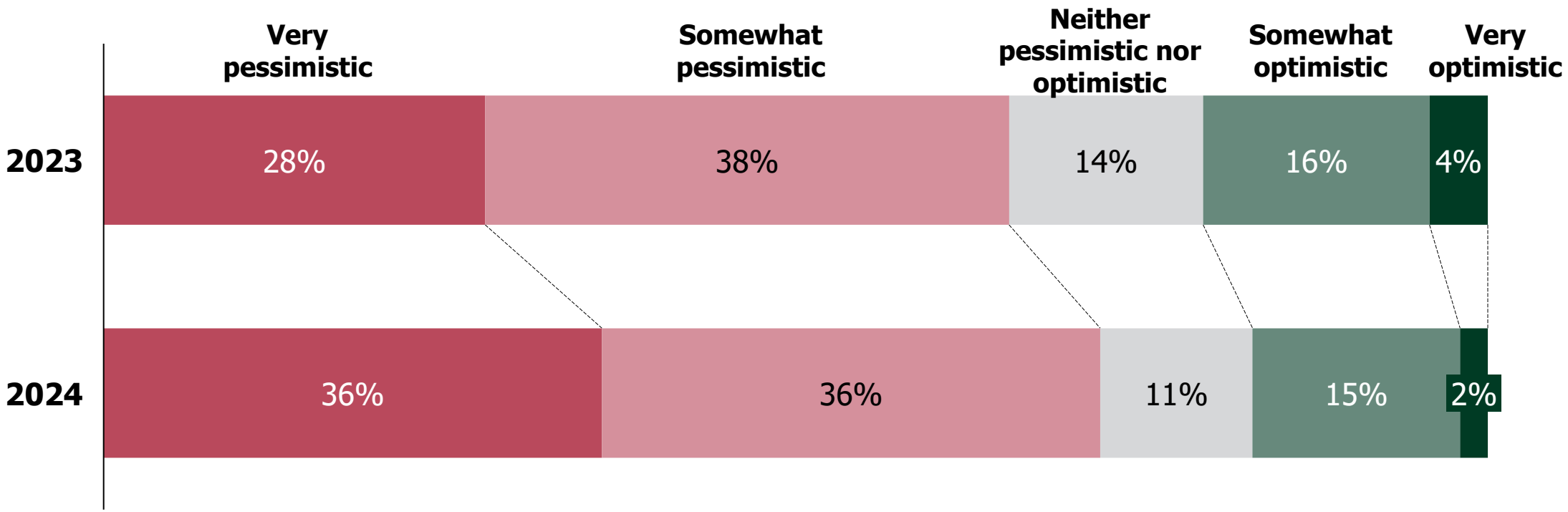
BUSINESS LEADER SURVEYS



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

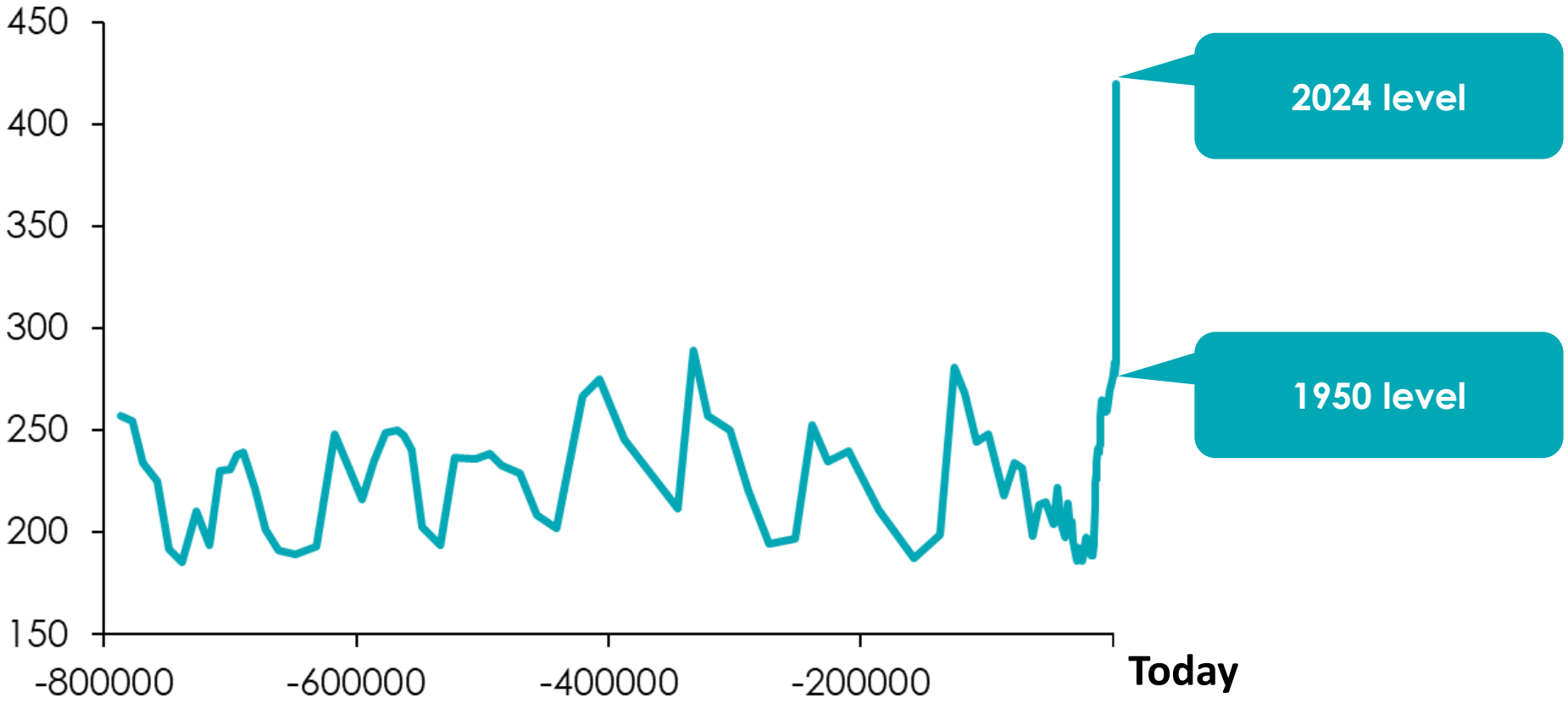
28th February 2025

- **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

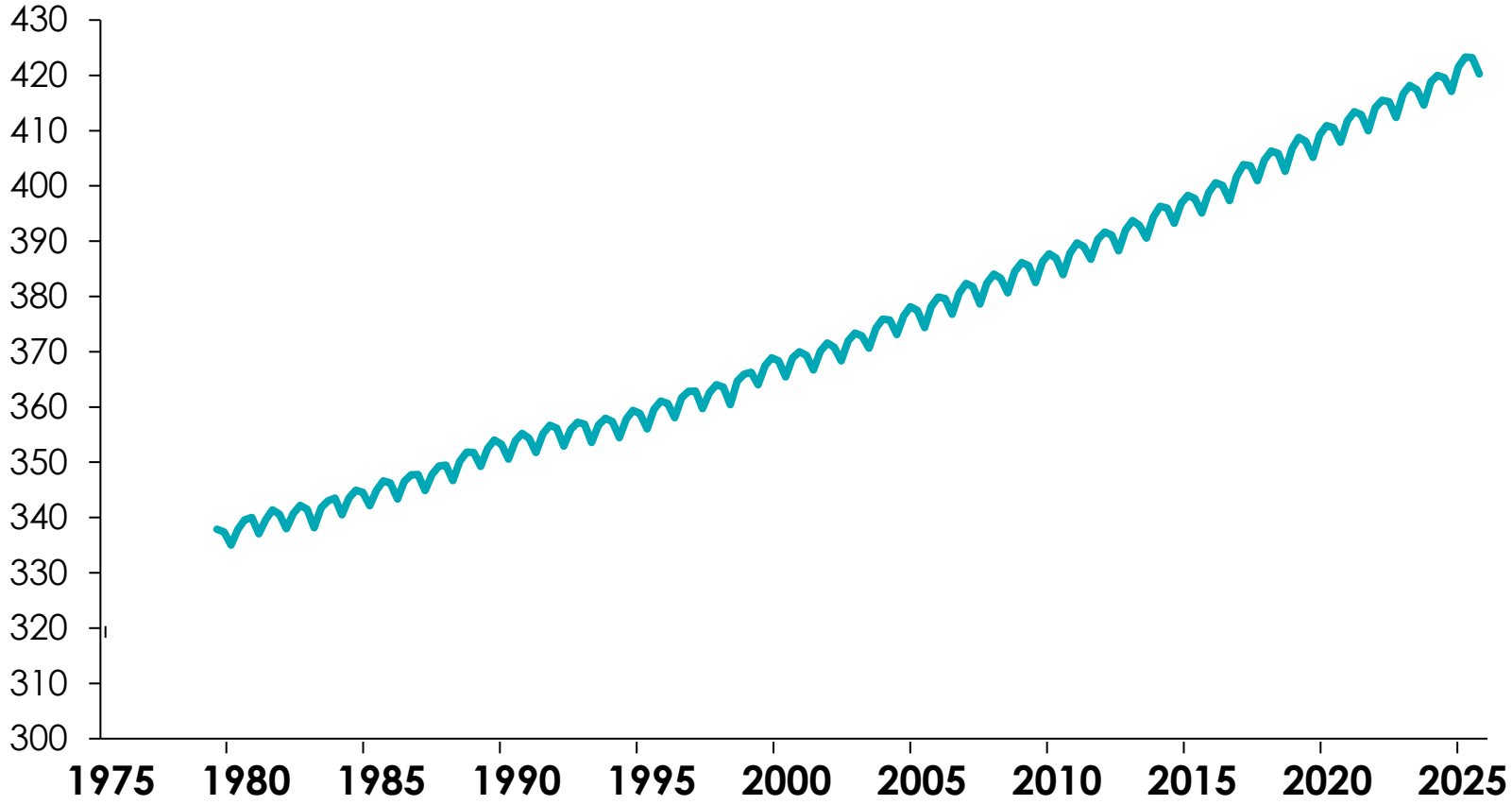
Parts per million, years before today



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

Atmospheric CO2 concentration

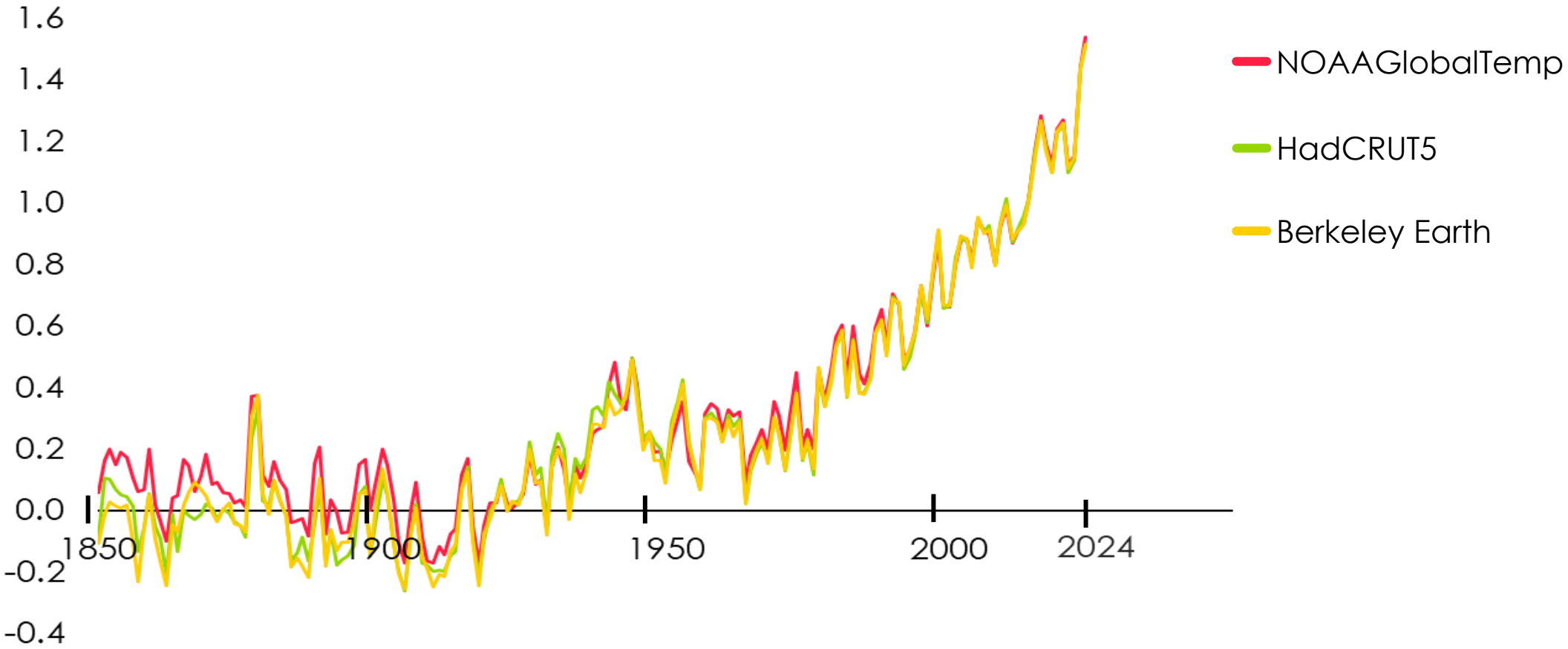
Parts per million, 1975 – 2025



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)

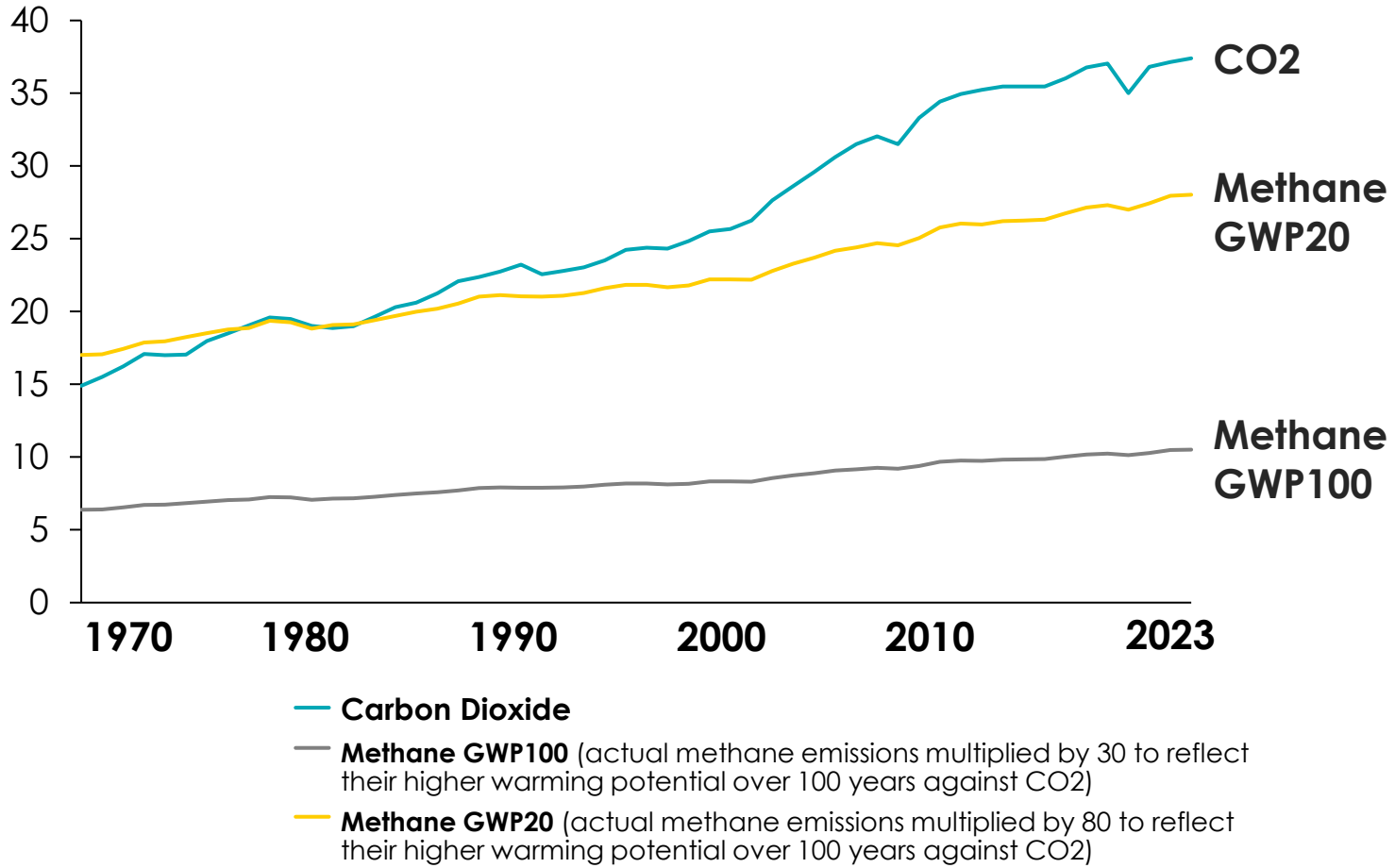
Oct 2024

Los Angeles (USA)

Jan 2025

CO2 and methane emissions in last 50 years

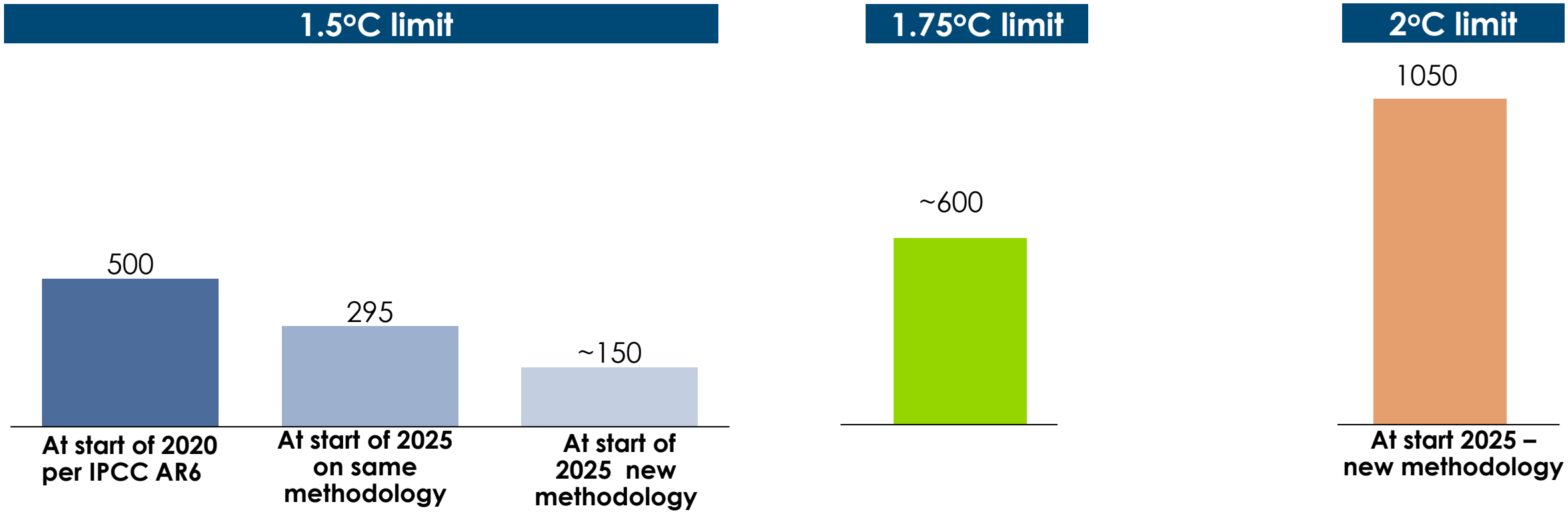
Billion tons



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

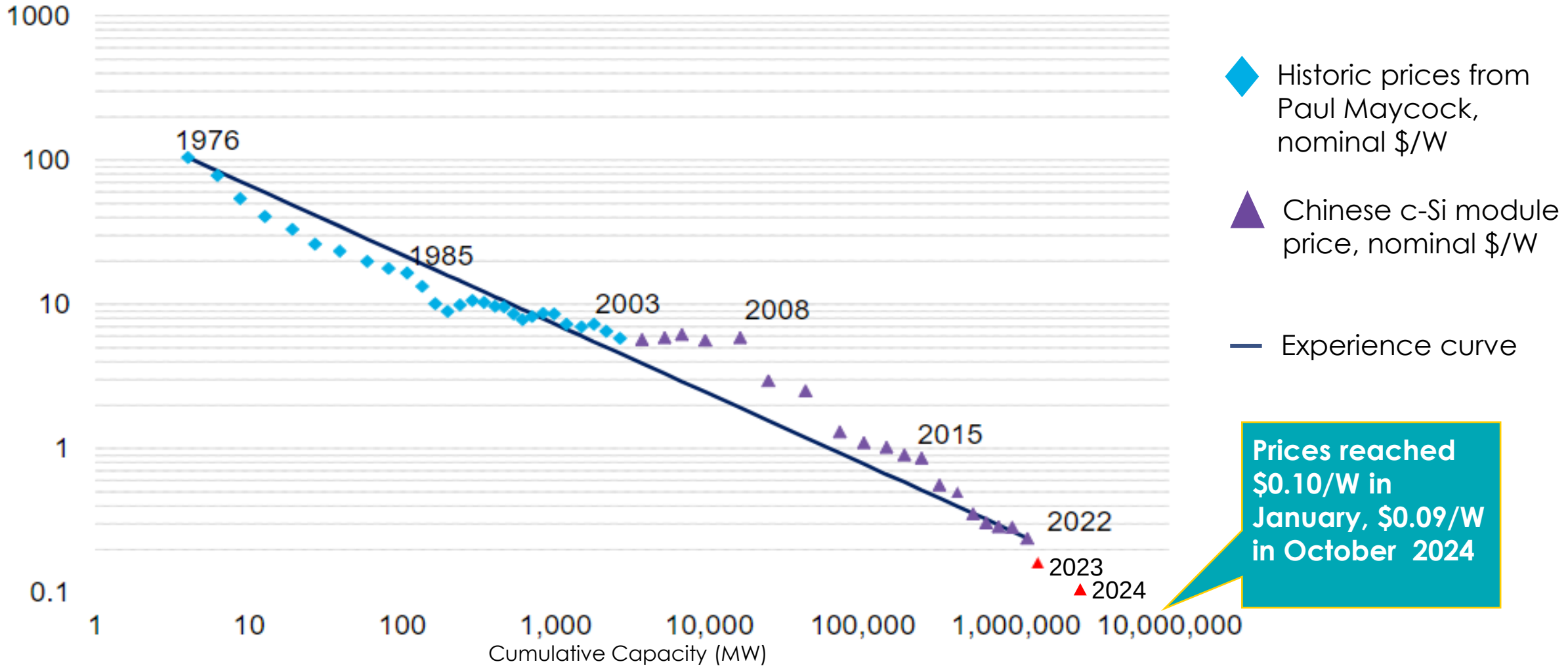
Remaining carbon budgets for 50% chance of 1.5°C and 2°C limits

$GtCO_2$



Price of solar PV panels

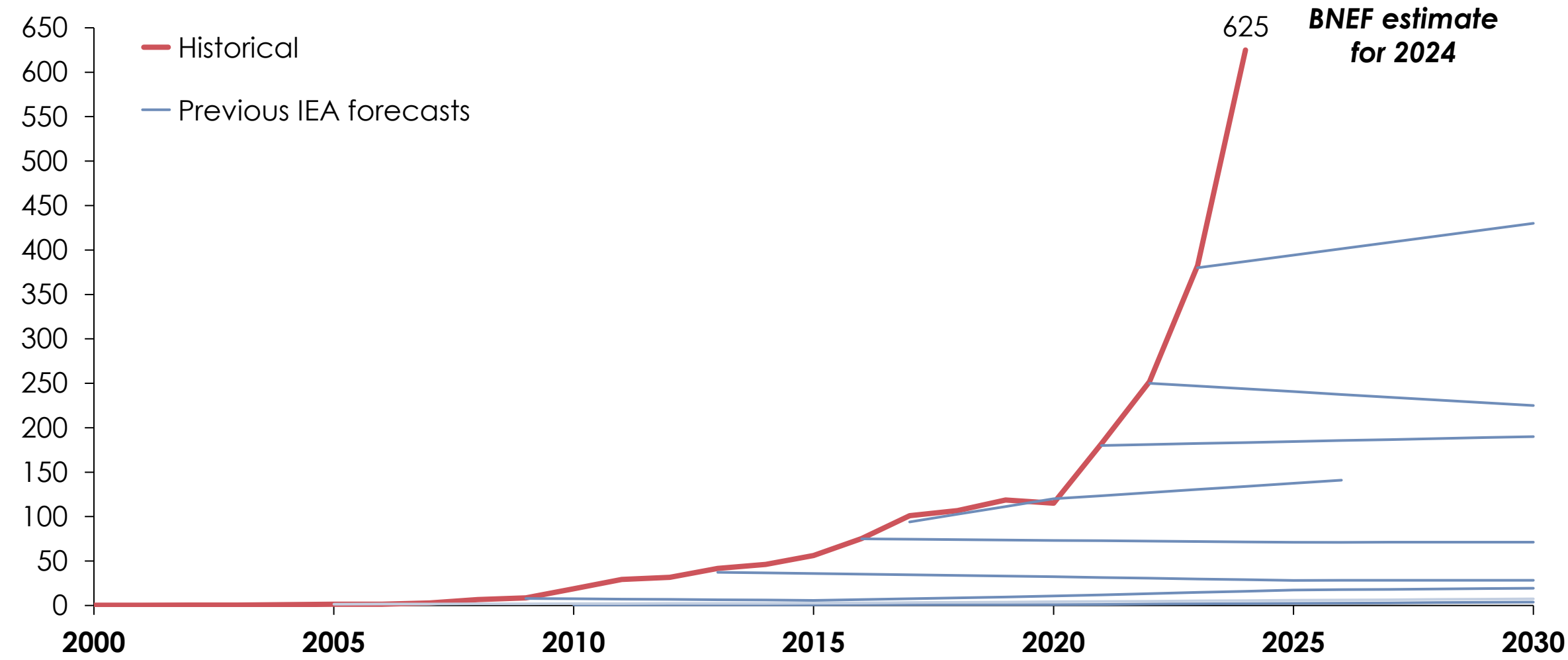
$ per peak watt; real 2023 $



Source: BNEF

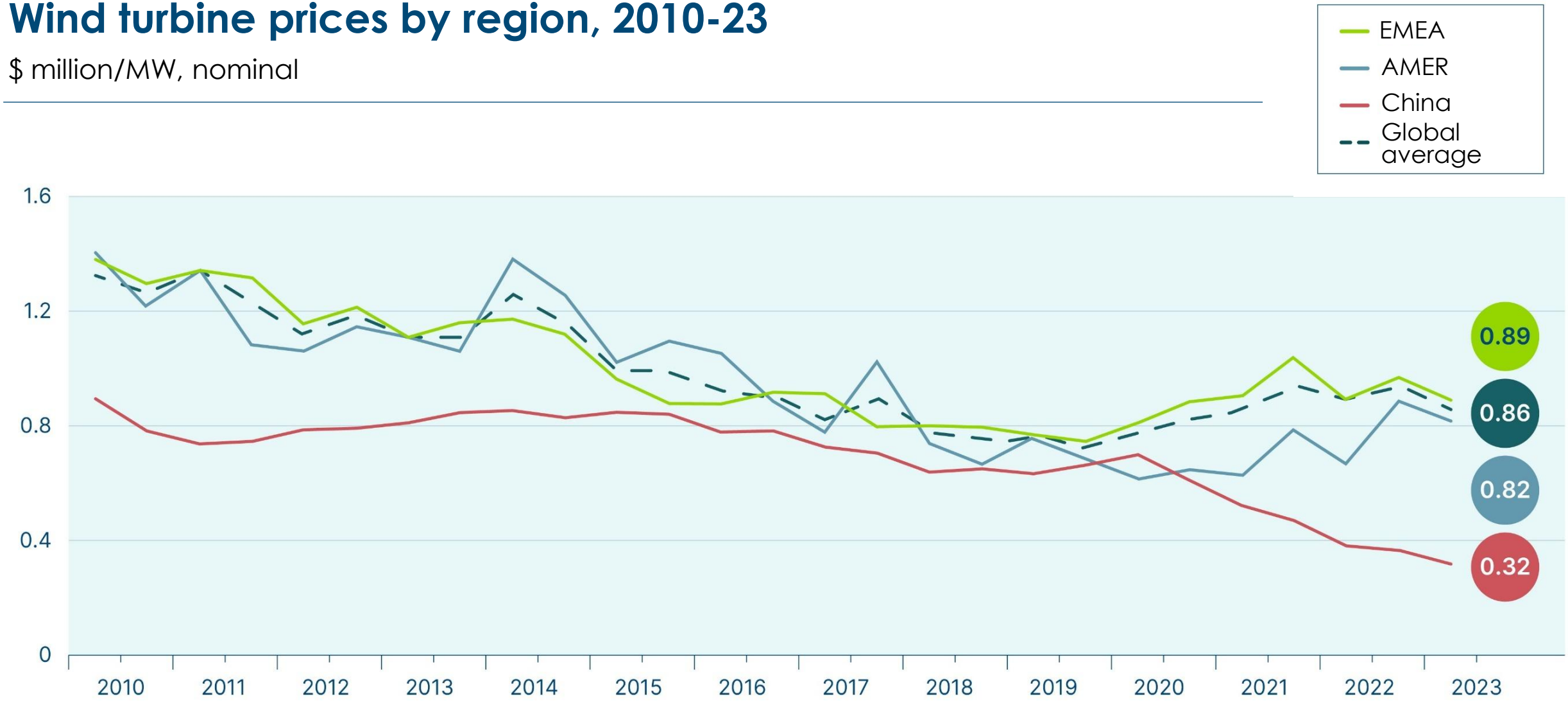
Annual solar PV installations compared to IEA forecasts

GW



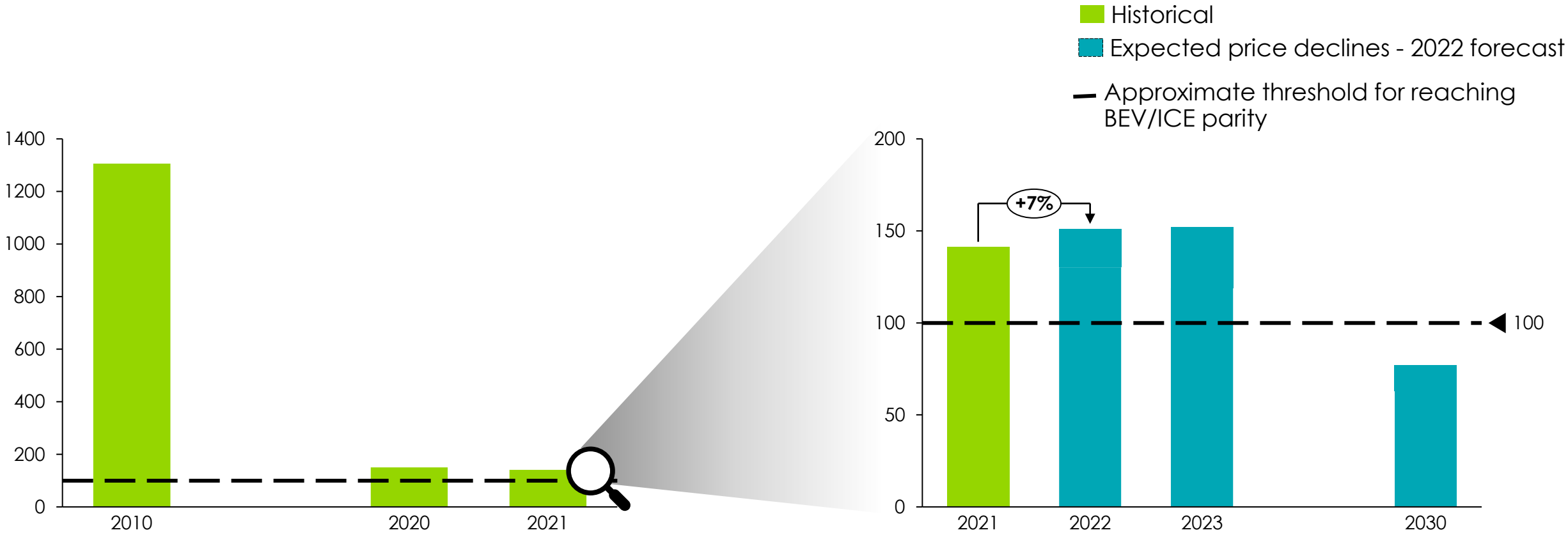
Wind turbine prices by region, 2010-23

$ 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

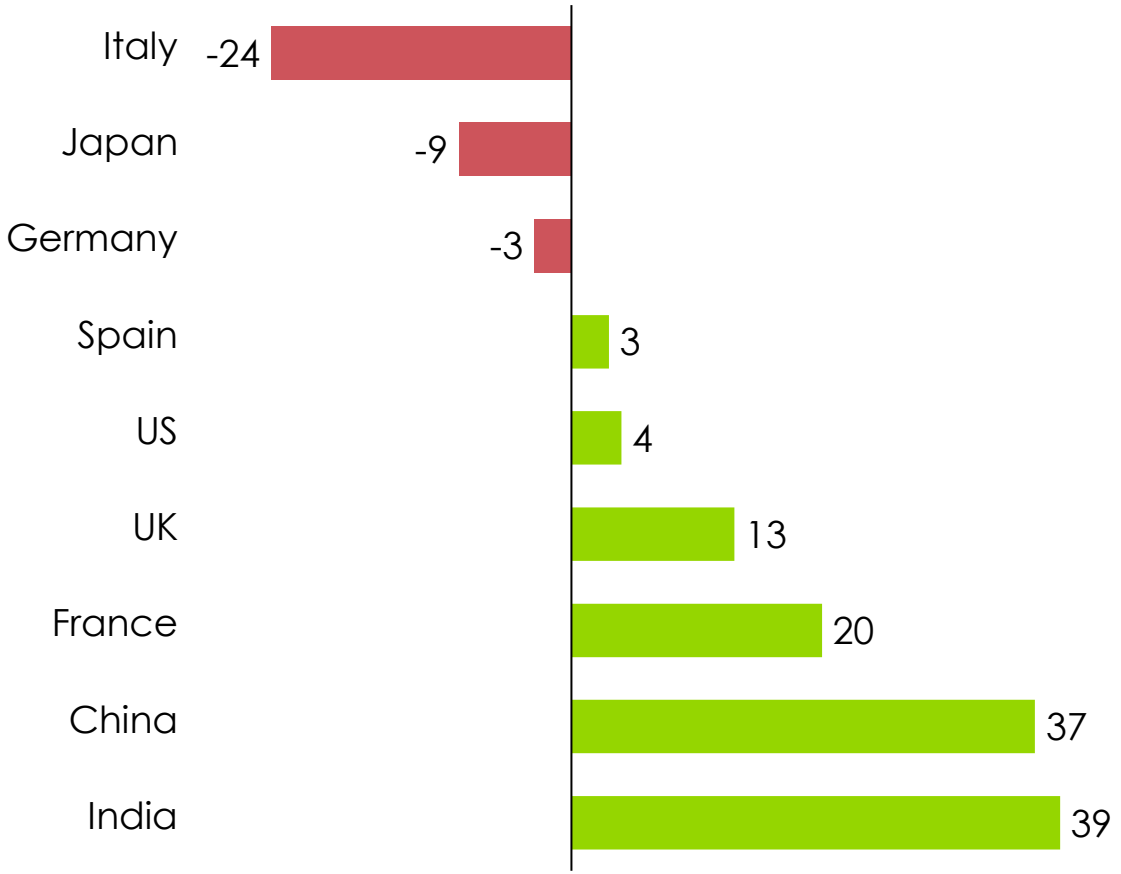
Launching in UK 2025
Price around £10000?

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

The EV revolution: temporary slowdown – longer term acceleration

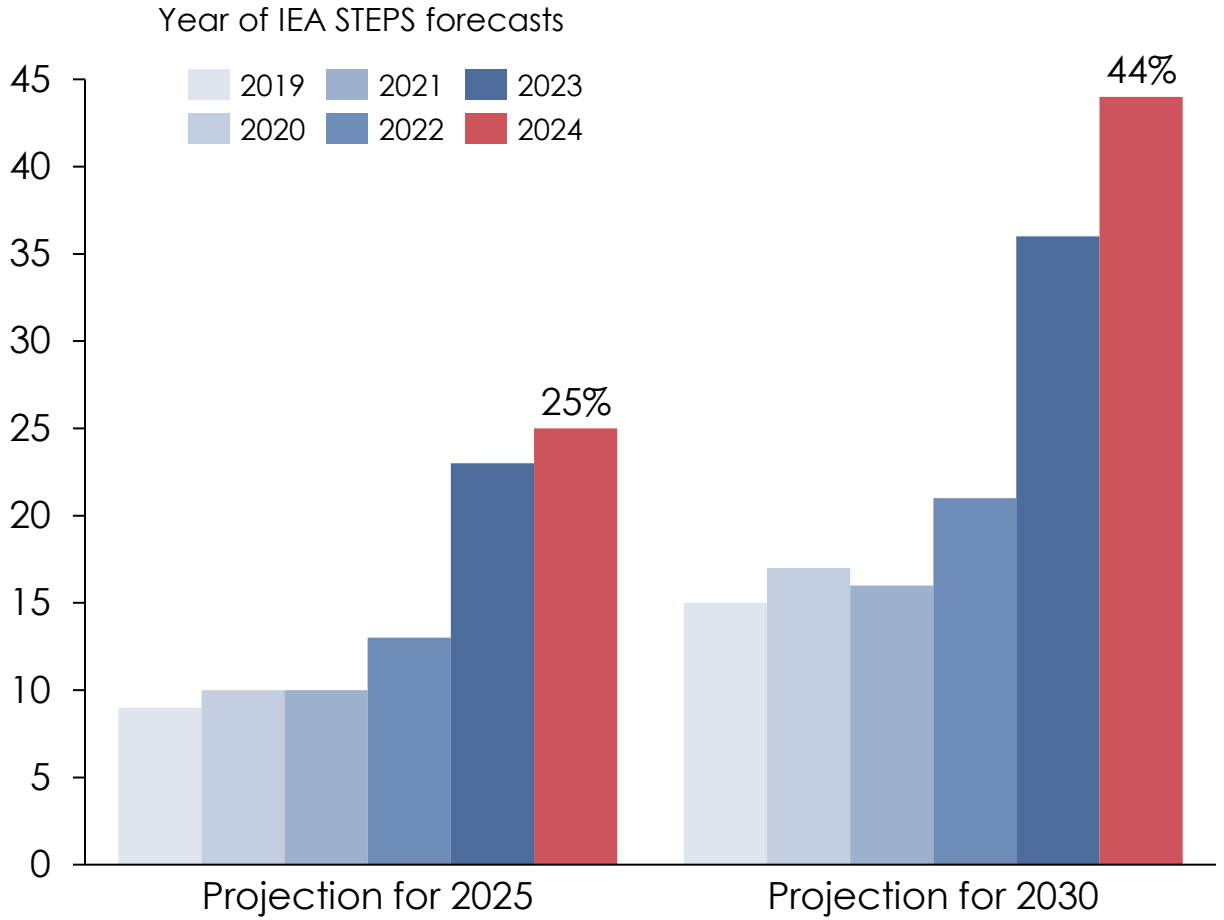
Passenger EV sale year-on-year change

1Q 2024, %



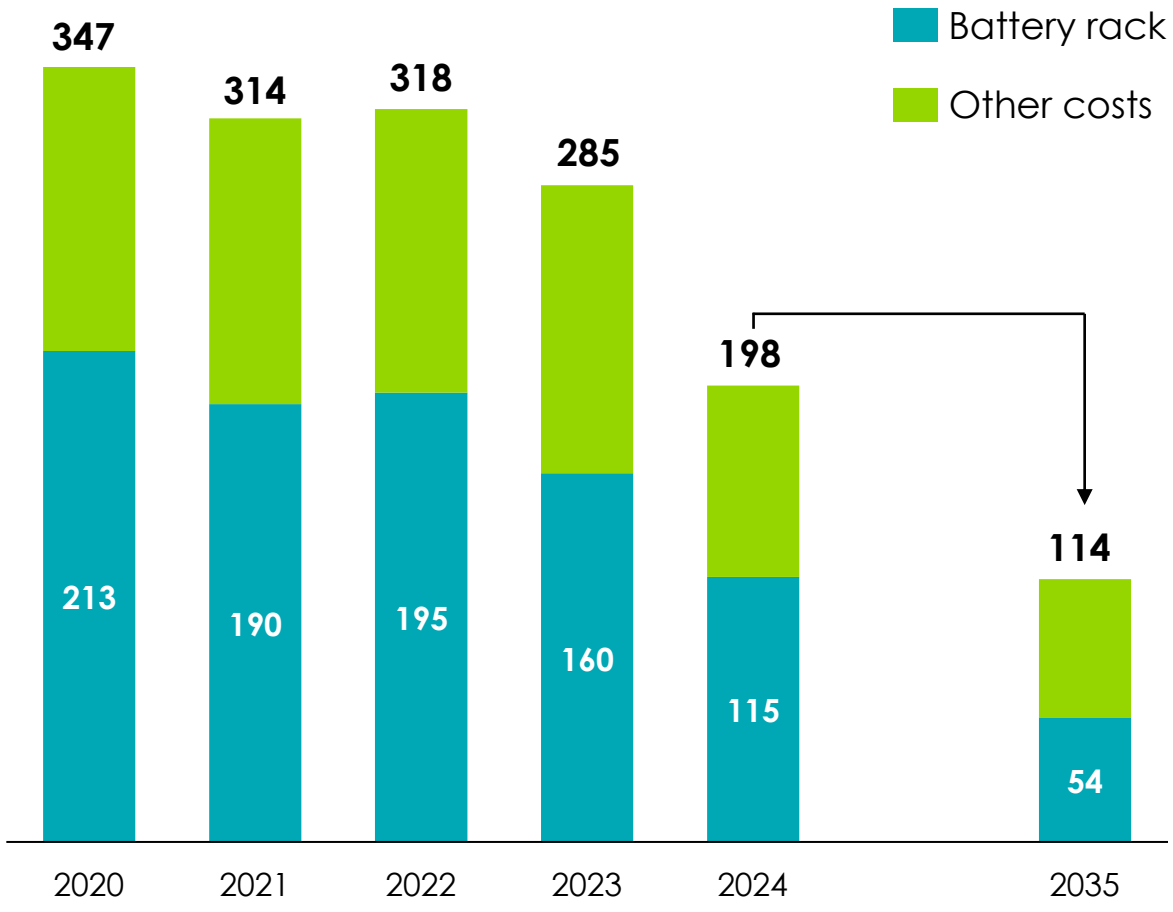
Forecasts of EV share of passenger vehicle sales

%

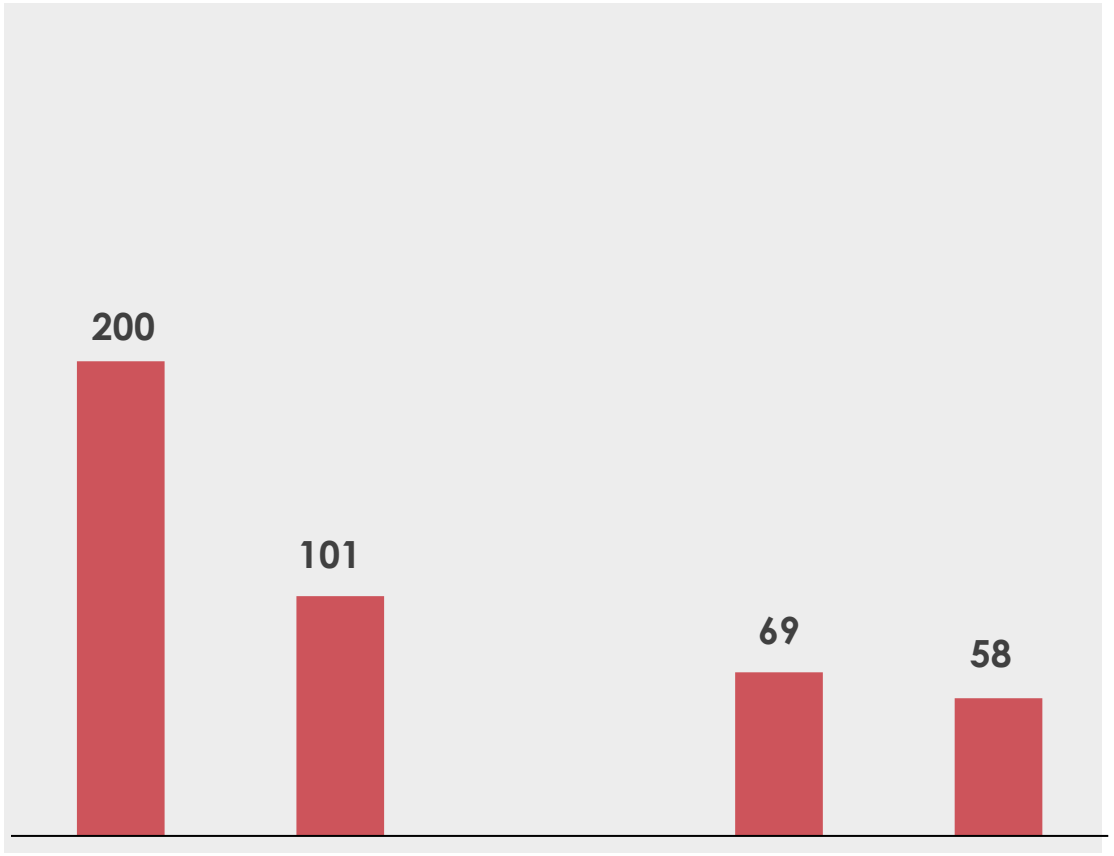


Battery energy stationary storage (BESS) costs for 2-hour total system $ per kwh: 2020 – 2024 and projected

Global average



China total costs



2023 outlook estimate was 124

Source: BNEF Energy Storage System Cost Survey, 2024

Falling solar costs

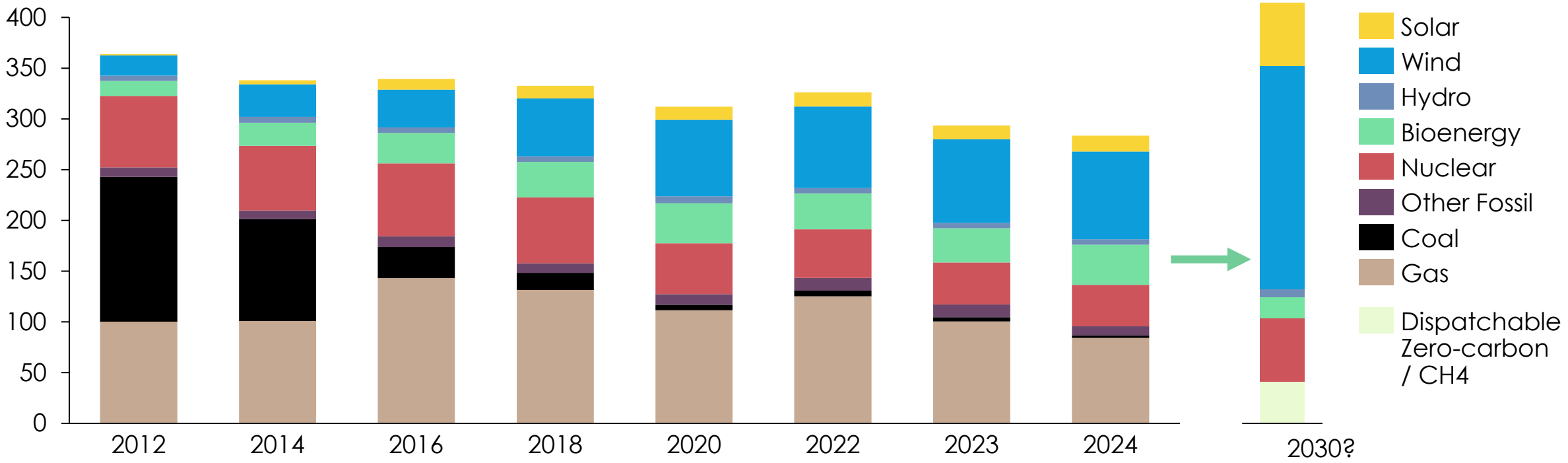
+

Falling battery costs

UK Electricity generation mix and carbon intensity, 2012-2024

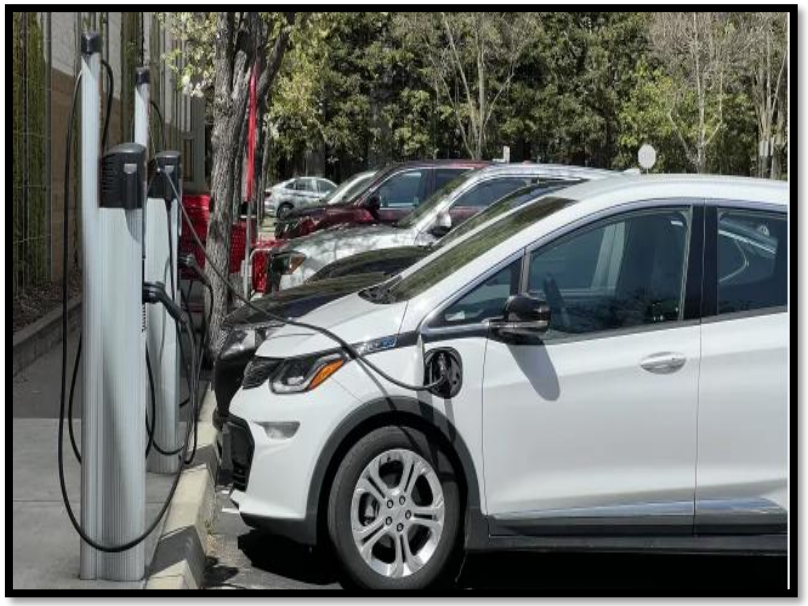
TWh and g CO2 per kwh

2030s zero-carbon electricity system, % possible mix



Annual gCO_2/ kWh	500	420	270	210	170	180	150	125	→	<20

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

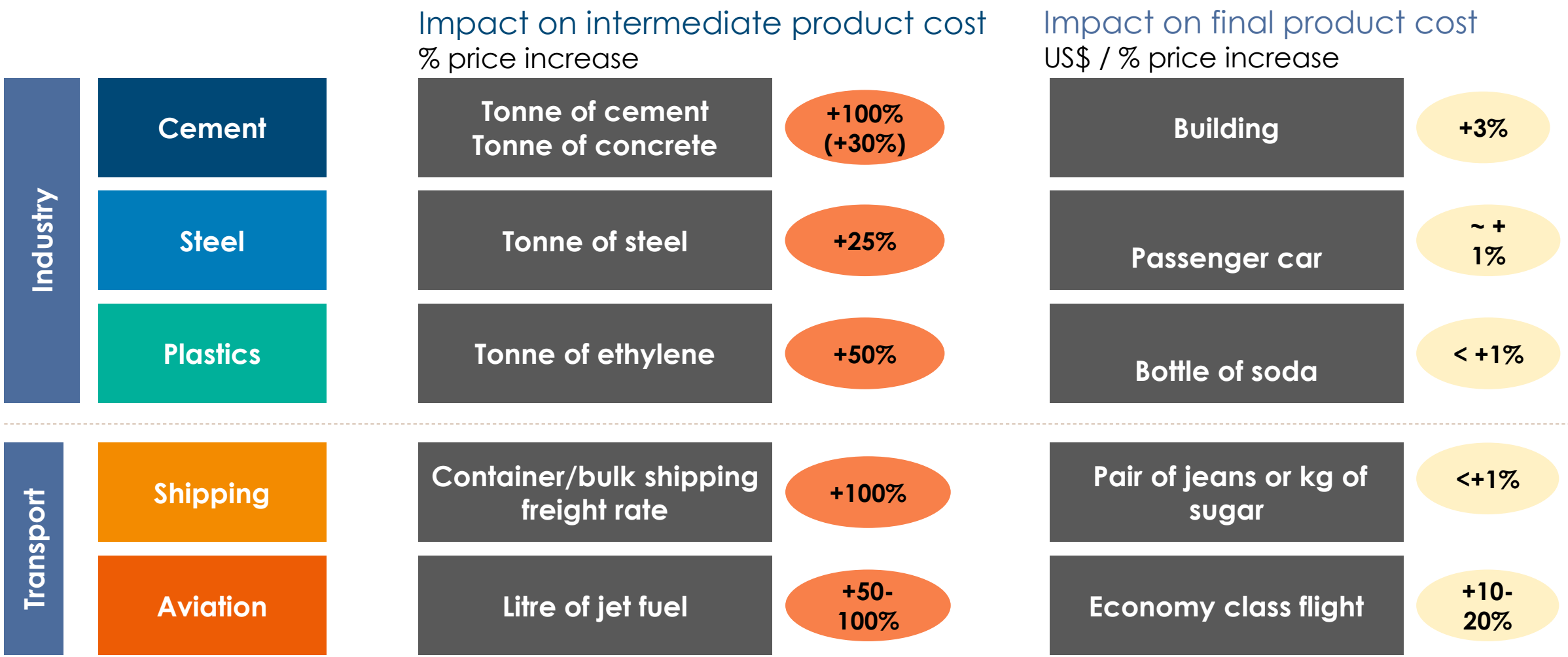
… because of hugely reduced heat energy losses

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



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

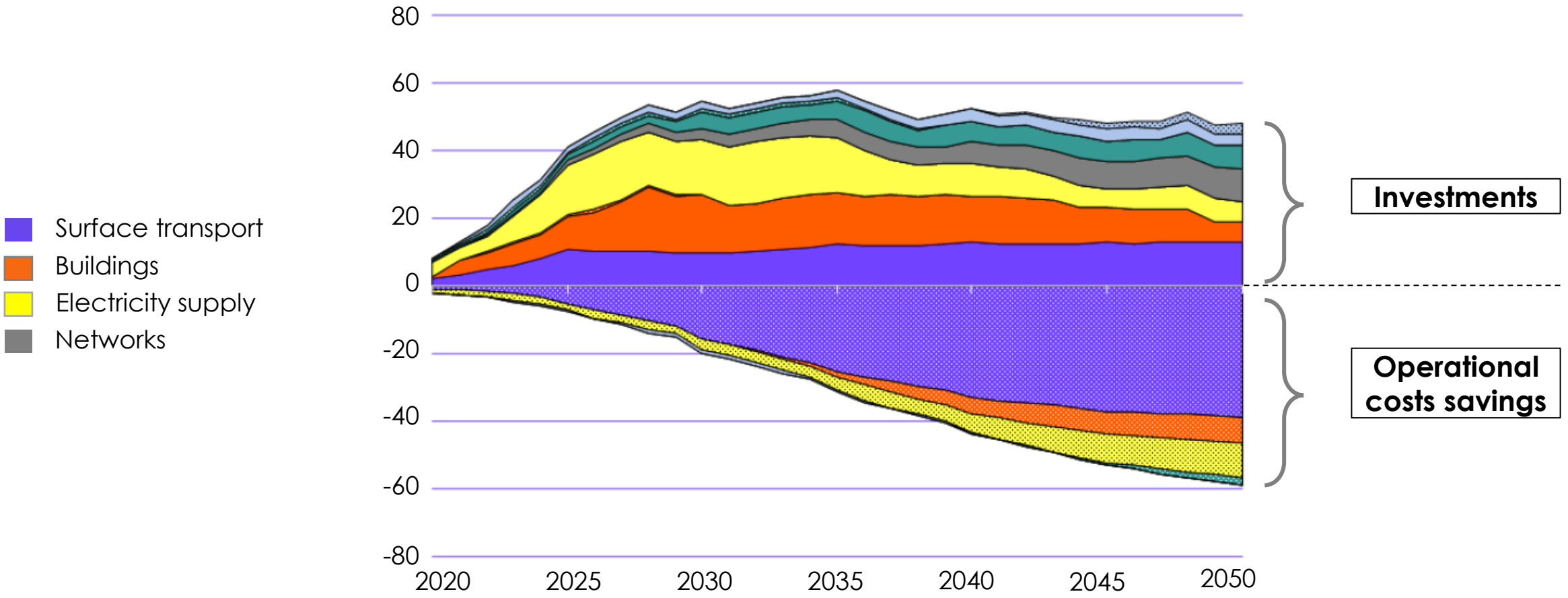
Green cost premia – for long time or in perpetuity

But small at consumer level (except in aviation)

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

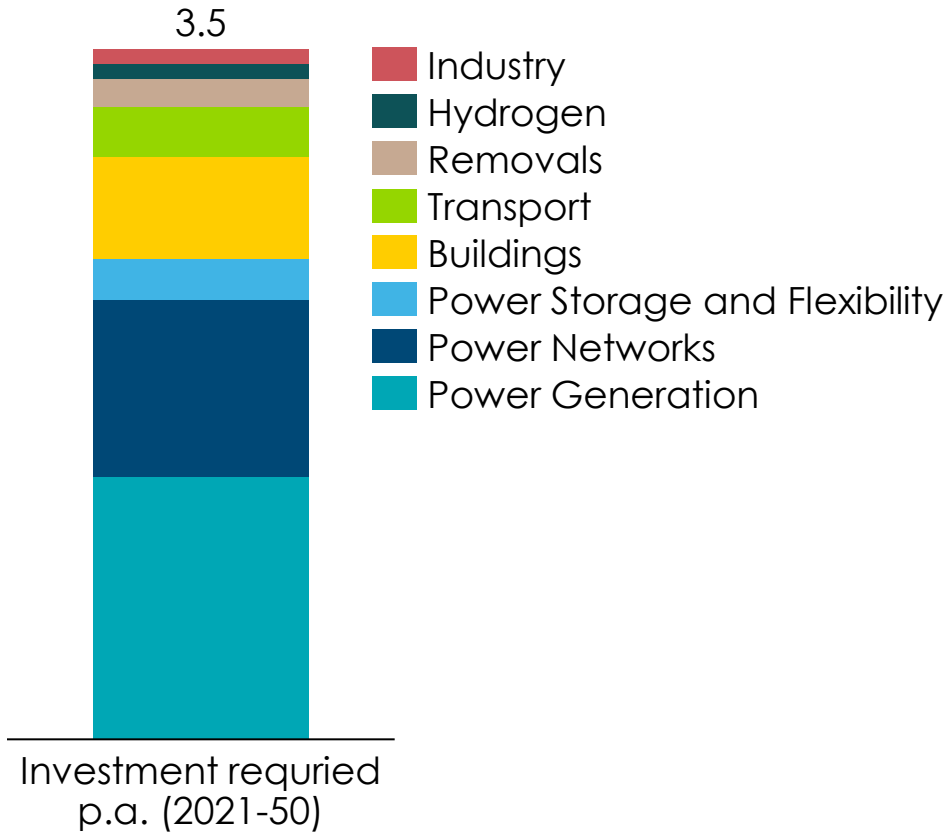
Capital and investment costs and savings in net zero pathway

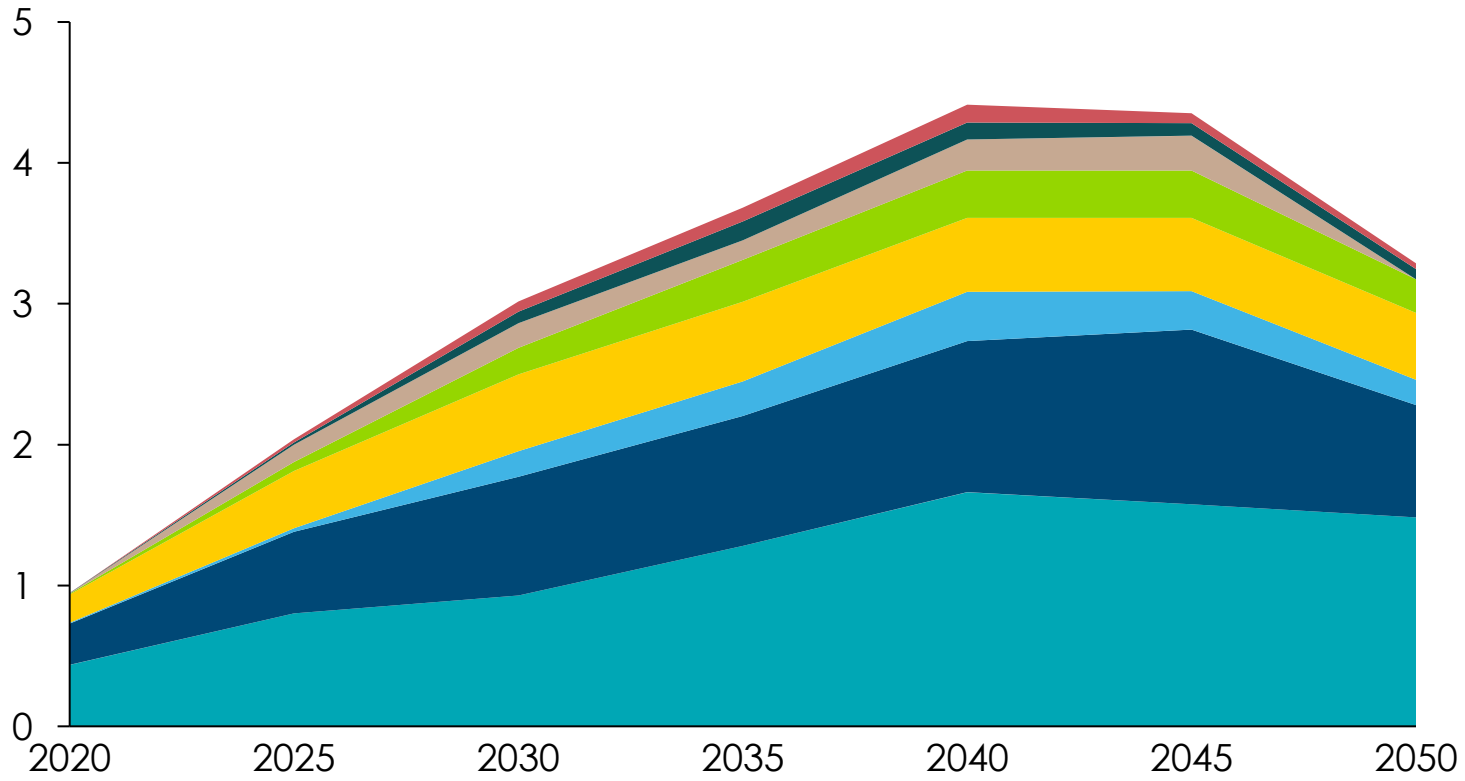
Billion GBP per year



Annual capital expenditure in the energy system

Trillion USD

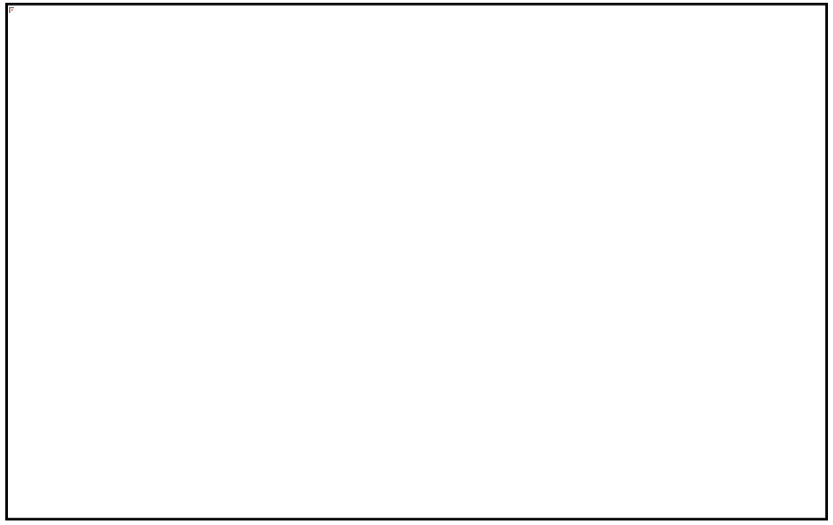


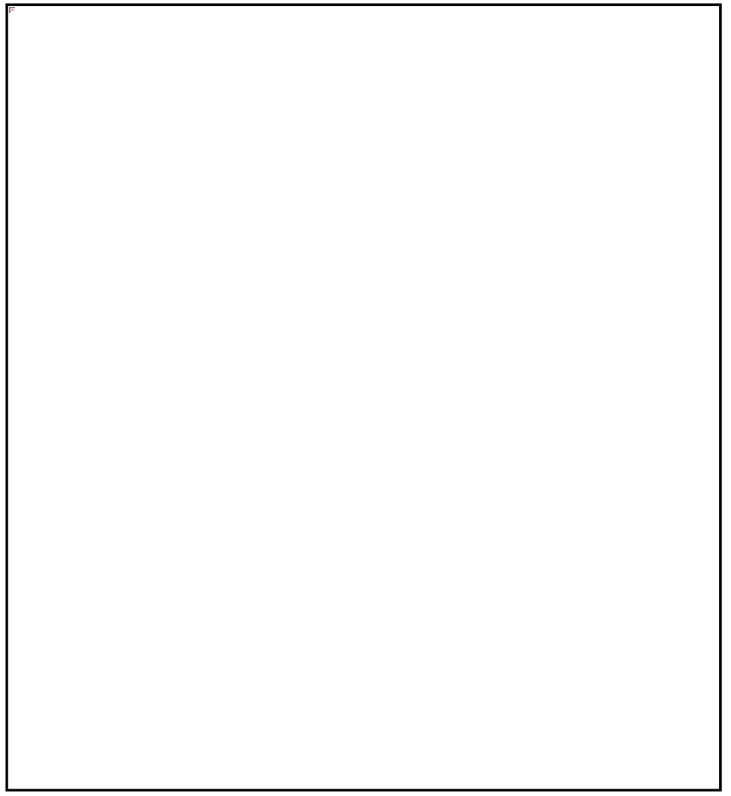


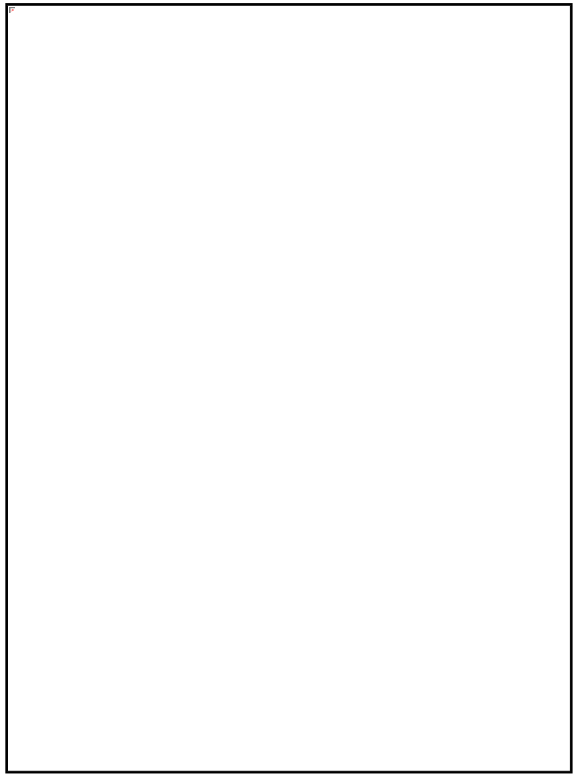
Non-Traditional Gatekeepers

Key sources of climate mis- information:

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

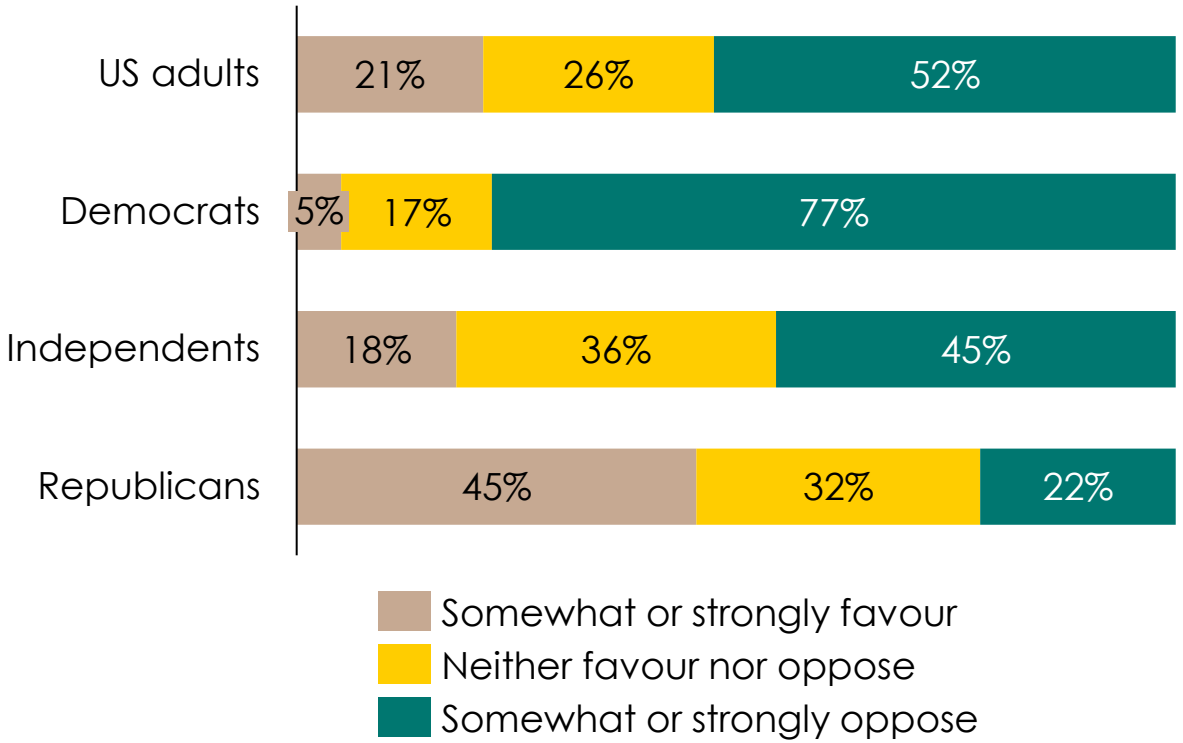




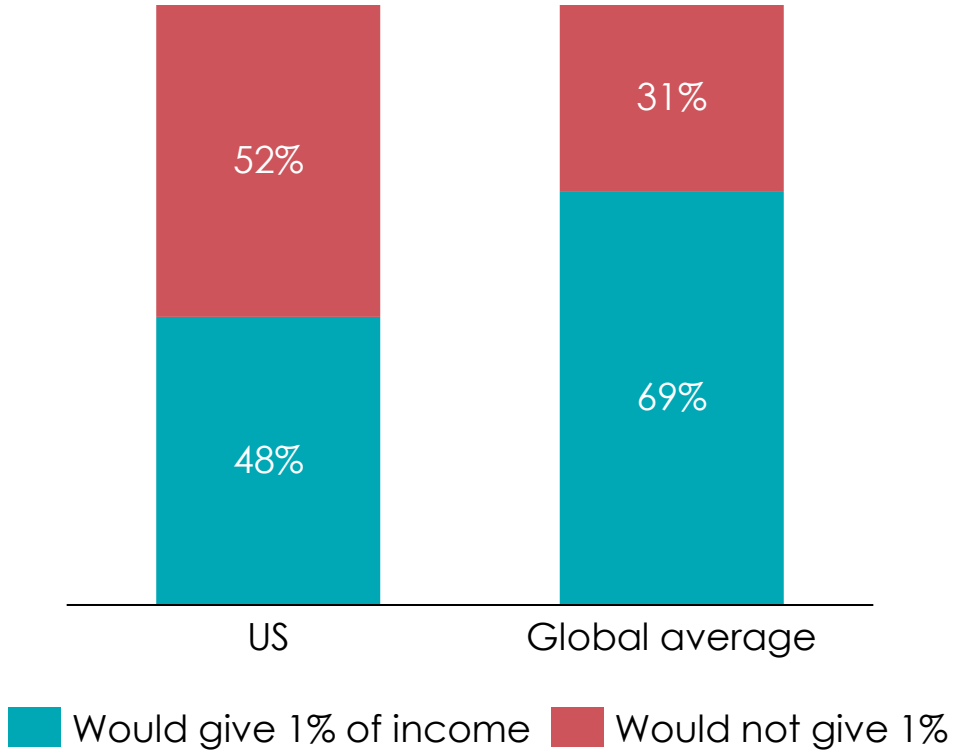


Attitudes to climate action – survey results

US attitudes to withdrawing from Paris Agreement, Jan 2025

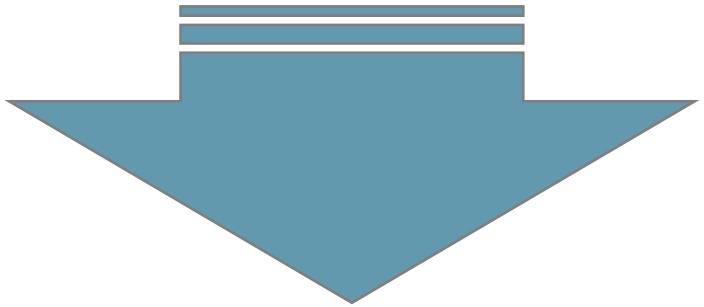


People who would give 1% of income to tackle climate change, 2024



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

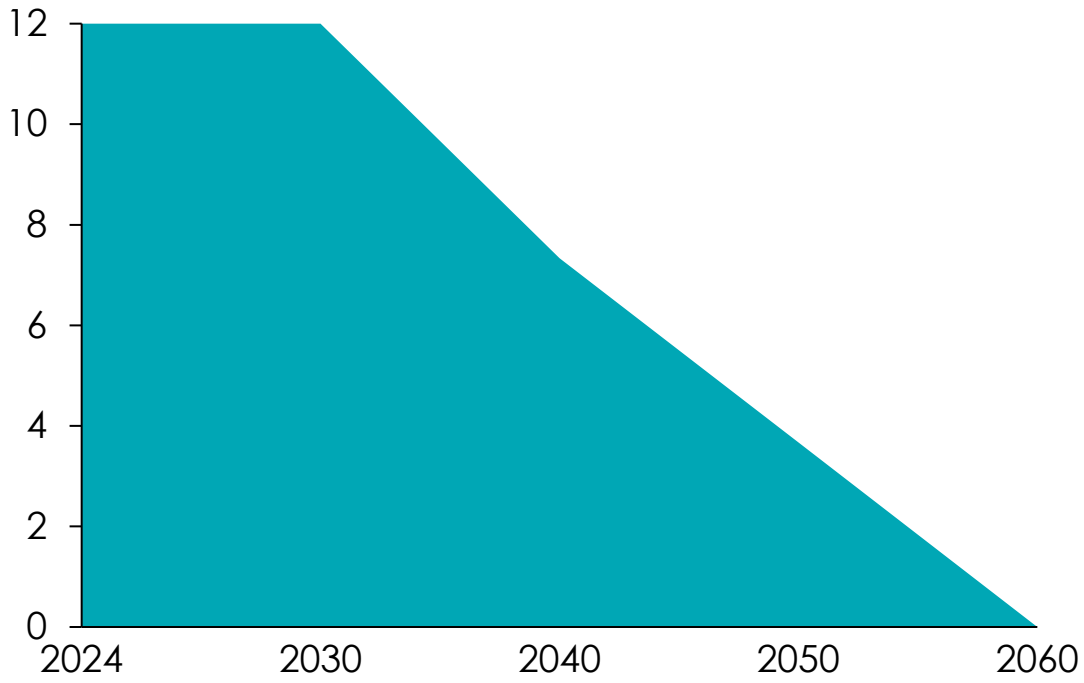
- Win the argument that climate change is huge threat to human welfare and that we should accept some cost to mitigate it
- Anticipate and manage distributional effects
- Seize the opportunity to decarbonise not so “hard to abate” sectors
- Mobilise reasonable cost of capital finance flows to developing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

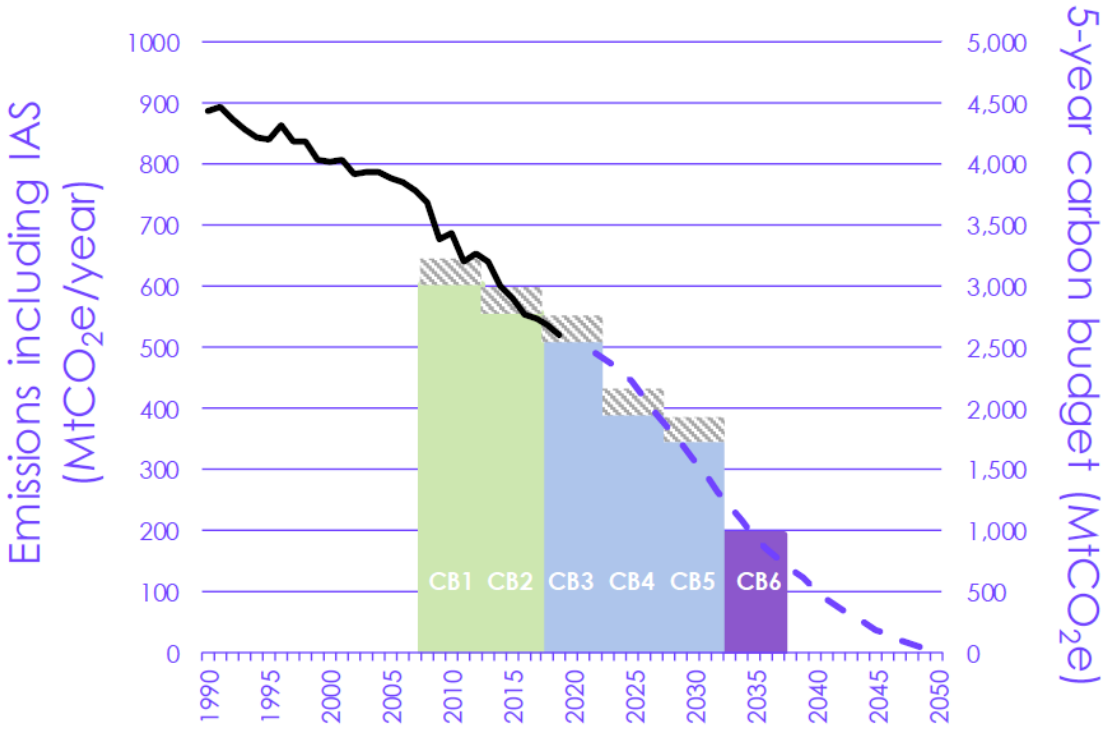
$GtCO_2$



Cumulative remaining emissions ~ 240 $GtCO_2e$

UK cumulative CO2 emissions until 2050

$GtCO_2$

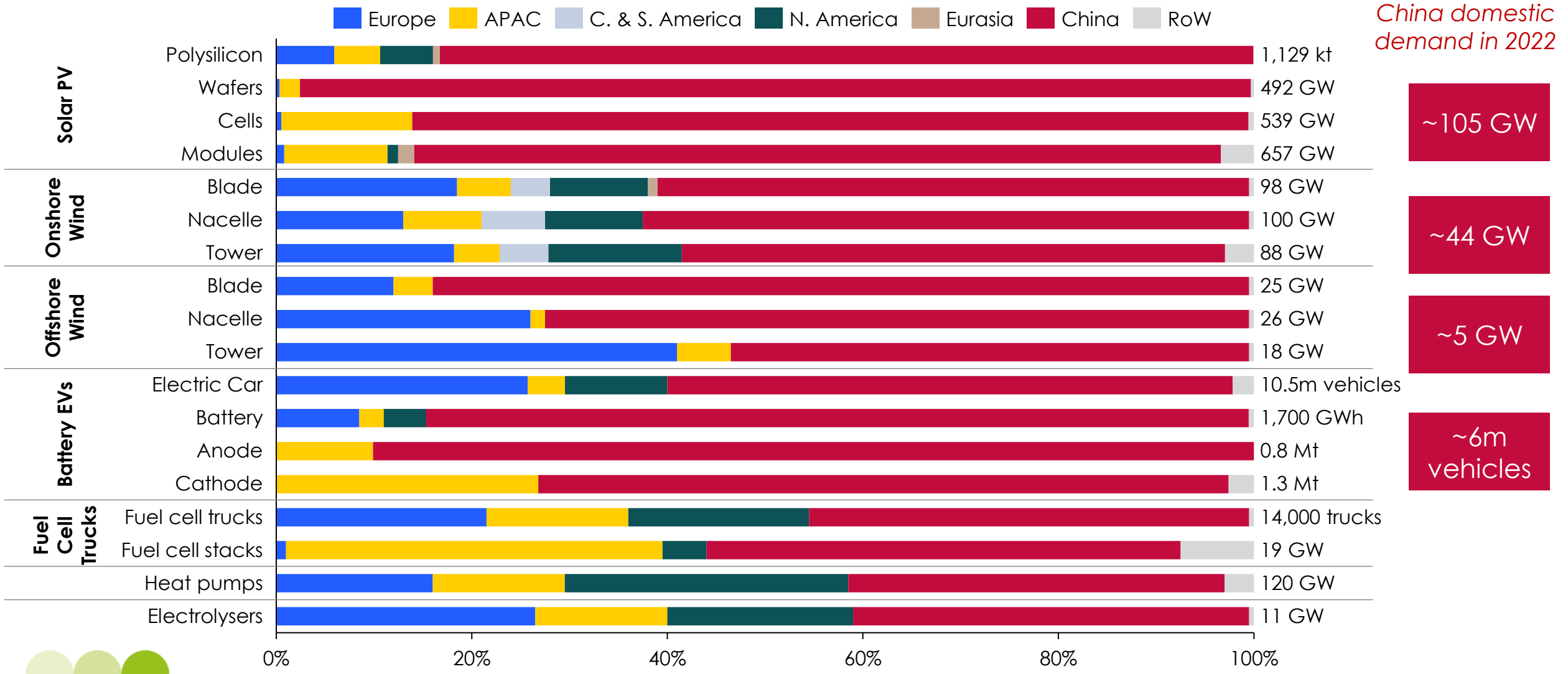


Cumulative remaining emissions ~ 4.9 $GtCO_2e$

= ~ 100GT on population equivalent basis

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

%



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

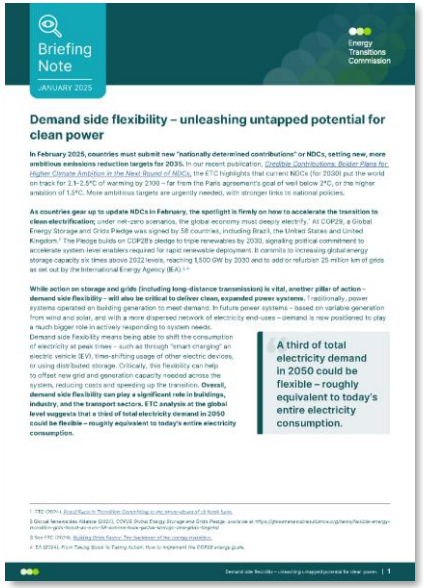
- **Work together to increase capital flows supporting clean electrification in developing countries**

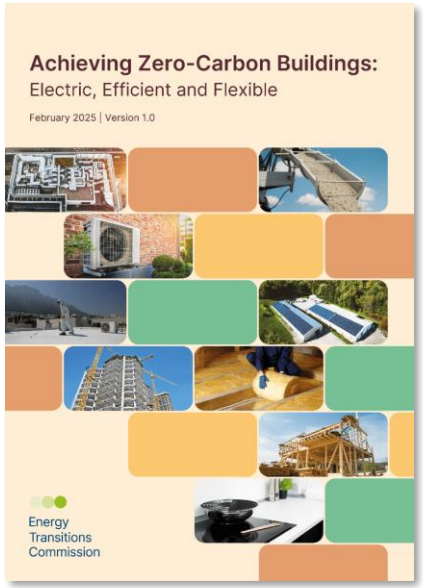
EU/UK

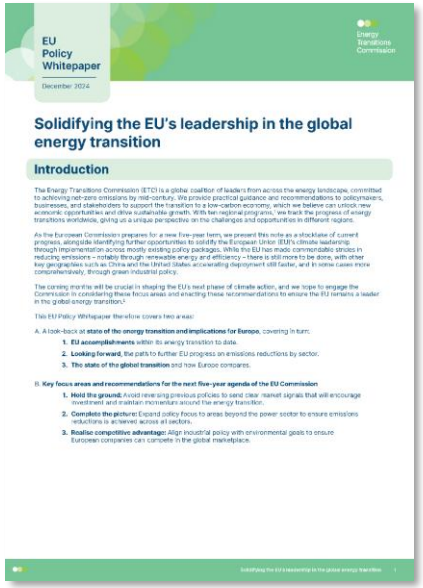
- Welcome the benefit of Chinese clean tech development and cost reduction
- Welcome Chinese company clean tech investment in EU/ UK
- Set tariffs in line with WTO rules

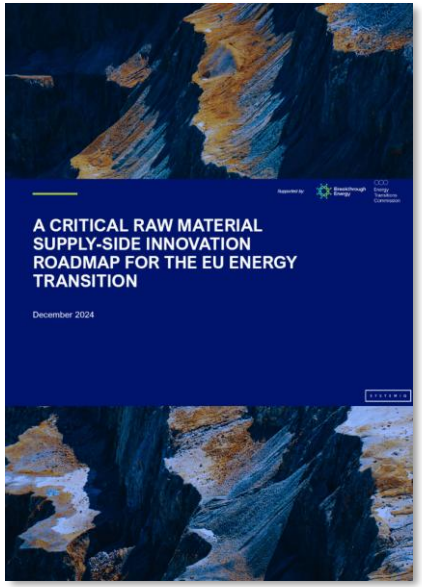
Energy Transitions Commission

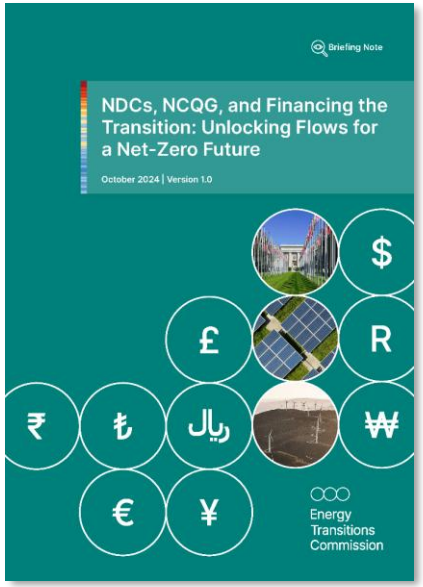
www.energy-transitions.org

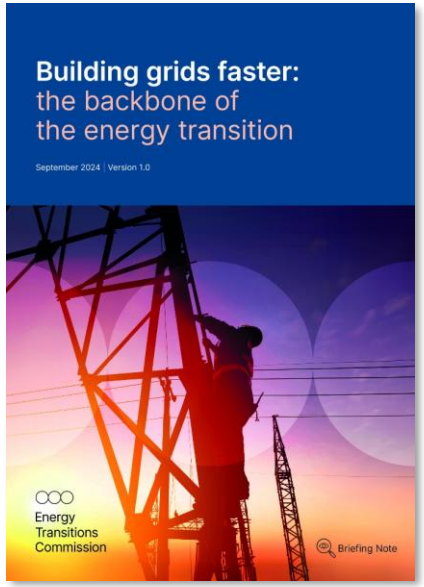


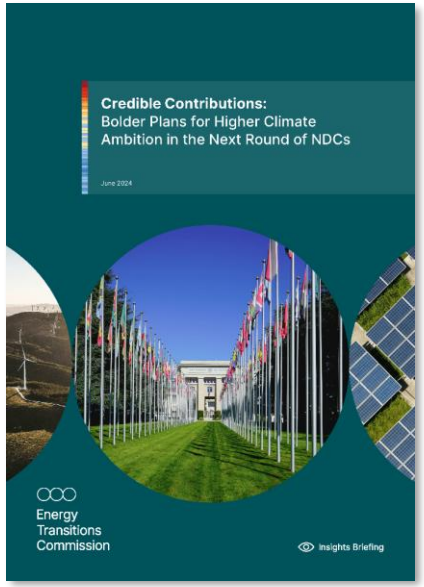


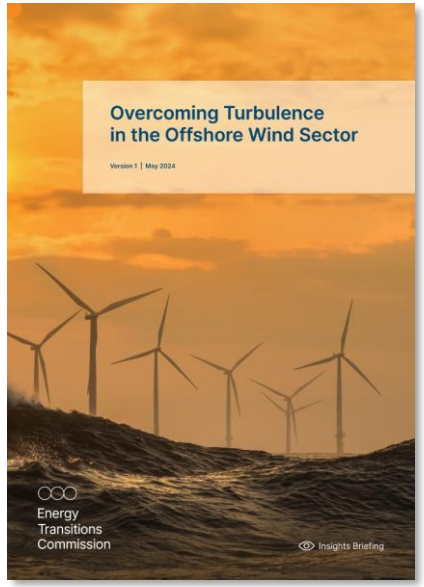












Q&A