Energy
Transitions
Commission

Energy Transition Monitor 2026

The transition is a speed and delivery challenge, not a technology challenge

- **The energy transition is moving faster than ever.** Clean technologies are now scaling because they increasingly make economic sense over fossil alternatives. Solar, batteries and electric vehicles continue to outperform expectations and are beginning to reshape energy systems globally - removing barriers (tariffs, grid, business models) can extend this further still.
- **Paradox of progress: current trajectories put the world on track for a ~2.5°C of warming which would have severe impacts on human lives.** Emissions appear to be plateauing, but the world remains significantly off-track towards climate goals; climate damage costs are already at ~1% of global GDP and sectors such as industry and transportation are making progress but still heavily depend on fossil fuels.
- **Early investments in heavy industry are moving forward but the pace must increase.** The foundations for decarbonisation are largely in place – driven by European-led carbon pricing that is increasingly mirrored by key geographies such as China and India. Multinational schemes in aviation and shipping can provide similar foundations. Project investments are strongest in China. Accelerating the pipeline will require additional policy support, via carbon pricing and additional de-risking, to reach delivery.
- **The challenge is shifting from technology deployment to system transformation.** In many regions, most new infrastructure is already predominately clean, so challenge shifts to phasing out legacy assets – especially coal generation in Asia.
  - China continues to deploy as much renewable energy as the rest of the world combined – India's rate of deployment is 1/10th of this.
  - Chinese clean technology leadership doesn't risk the same trade dependencies as fossil fuels and can present an opportunity to accelerate global transitions.
  - Federal action in the US stops the transition accelerating but doesn't stop it entirely.
  - The EU continues to build on strong foundations of ambitious and cross-cutting climate policy – but must remove barriers to deployment and defend policy from political pressures.
- **Multilateralism in geopolitics will play a crucial role.** The transition increasingly depends on public support, international supply chains, carbon markets and clean technology trade. The Strait of Hormuz crisis highlighted choices between clean energy and fossil fuels. China's leadership accelerates clean deployment globally but also raises key questions outside its borders around industrial strategy, resilience and dependence.

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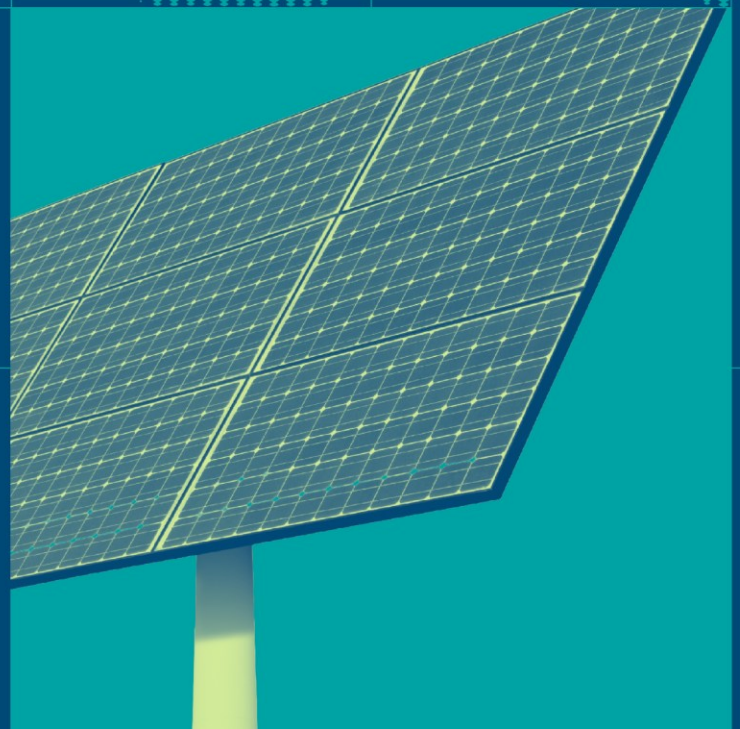


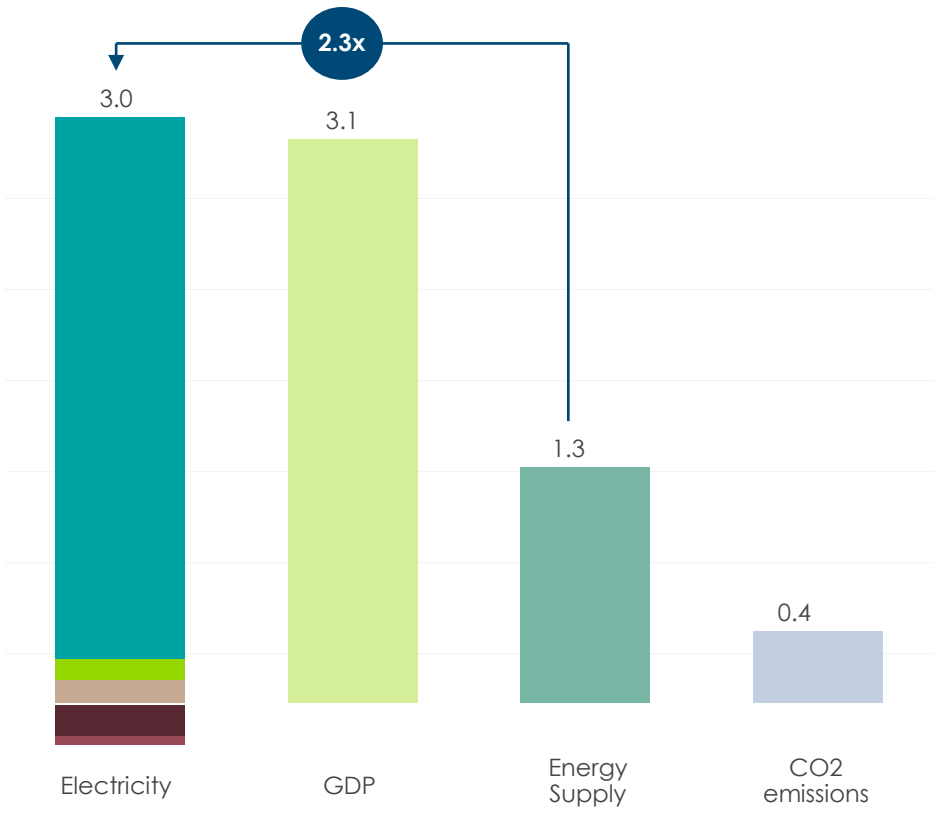
What is progressing: renewables, batteries, vehicles

Key messages | Renewables, batteries, EVs are scaling, but we remain off-track towards global renewable, efficiency and electrification targets

- **There is clear evidence of global energy transition progress, but sectors that progress at pace are limited to where favourable economics are already within reach.**
- **Clean electricity is growing far faster than overall energy demand, but by starting at a lower proportion, there is still opportunity to accelerate.** In 2025, electricity demand grew by 3%, mostly by powered by clean sources, while energy supply grew ~1%. Despite impressive growth rates, clean electricity only met ~40% of the overall new energy demand.
- **Solar, batteries and electric vehicles continue to outperform deployment expectations.**
  - Passenger EVs are expected to meet +25% of new car sales in 2026, with growth markets sales outperforming some developed economies.
  - Annual solar installations have again far exceeded previous forecasts while module costs falling at 20% per year since 2010.
  - Battery prices continue to decline, while battery densities are also improving, allowing new applications such as electric trucking to take off in key markets (e.g., China).
- **Progress towards COP28 goals of tripling renewable capacity and doubling the rate of energy efficiency is encouraging but not yet on track.**
  - Global renewable capacity has almost doubled since 2022 and current trajectories approach 10 TW by 2030, yet this remains around 900 GW short of the 11 TW required to meet the global tripling target.
  - Energy productivity improvements (measuring the amount of energy required to generate a unit of GDP) have recovered to a rate of around 3% per year after several years of weak progress, but this remains short of the 4% annual improvement required to deliver the commitment to double the global rate of energy efficiency improvement.

Clean electricity growth rate was 2.3x faster than overall energy supply in 2025; but still met just ~40% of overall demand growth

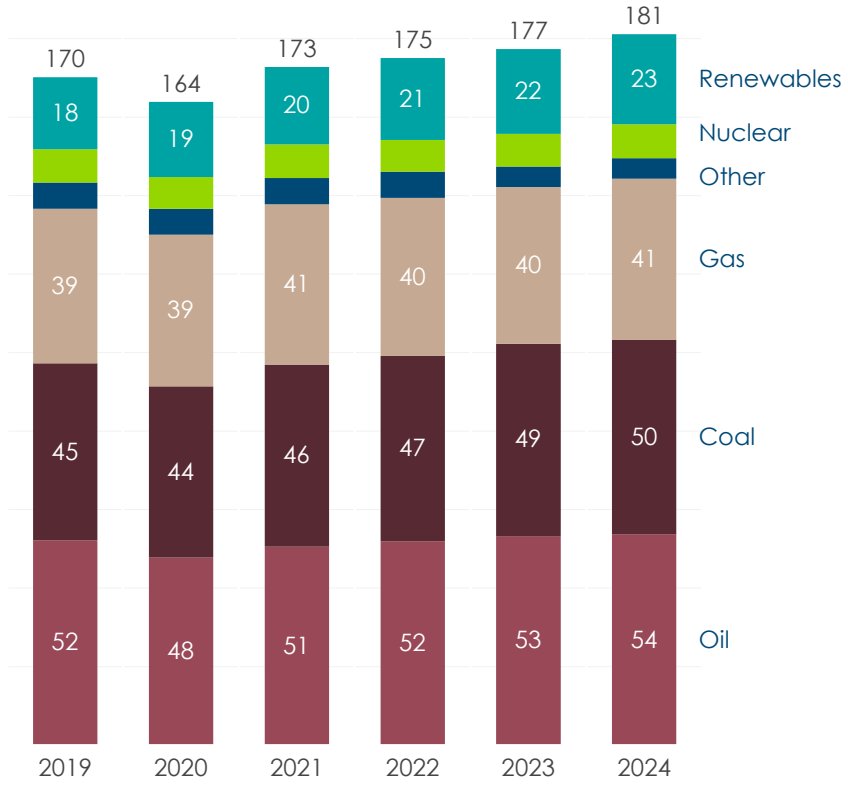
Key global growth rates 2025
%



Electricity growth source

Renewables	99%
Nuclear	4%
Natural Gas	5%
Coal	-6%
Oil	-2%

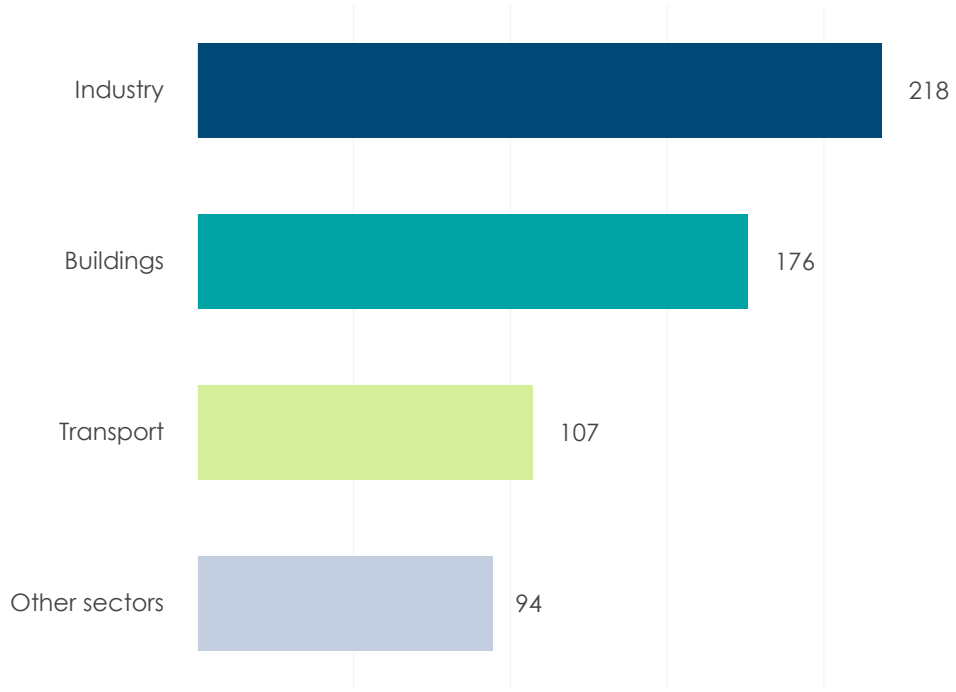
Global energy supply, IEA
'000 TWh



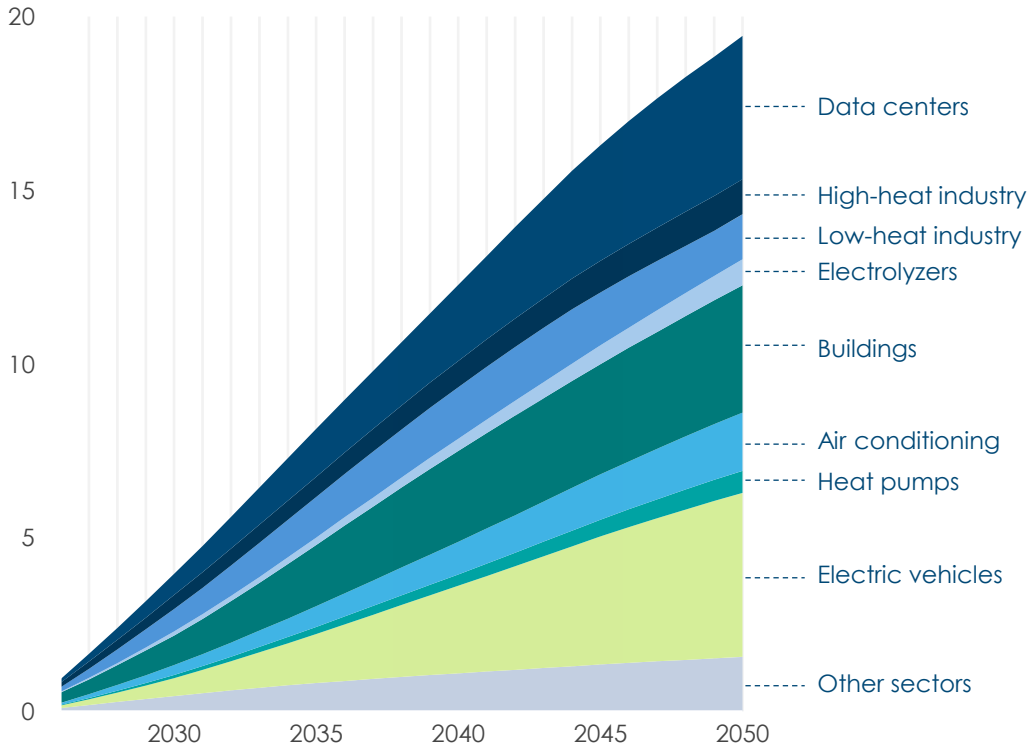
Notes: "Other" includes heat, hydrogen and biomass. Energy supply = Primary energy supply.
Source: IEA (2026) World Energy Review 2026; IEA (2025) World Energy Outlook 2025; IEA (2023) World Energy Outlook 2023; IEA (2022) World Energy Outlook 2022; IEA (2021) World Energy Outlook 2021.

Buildings accounted for 40% of power demand growth last year; electric vehicles likely to be main driver of demand growth, alongside data centres

Net change from 2024 to 2025 in electricity demand, global (BloombergNEF ETS[1])
TWh



Global drivers of future electricity demand, net change from 2025 (BloombergNEF ETS),'000 TWh

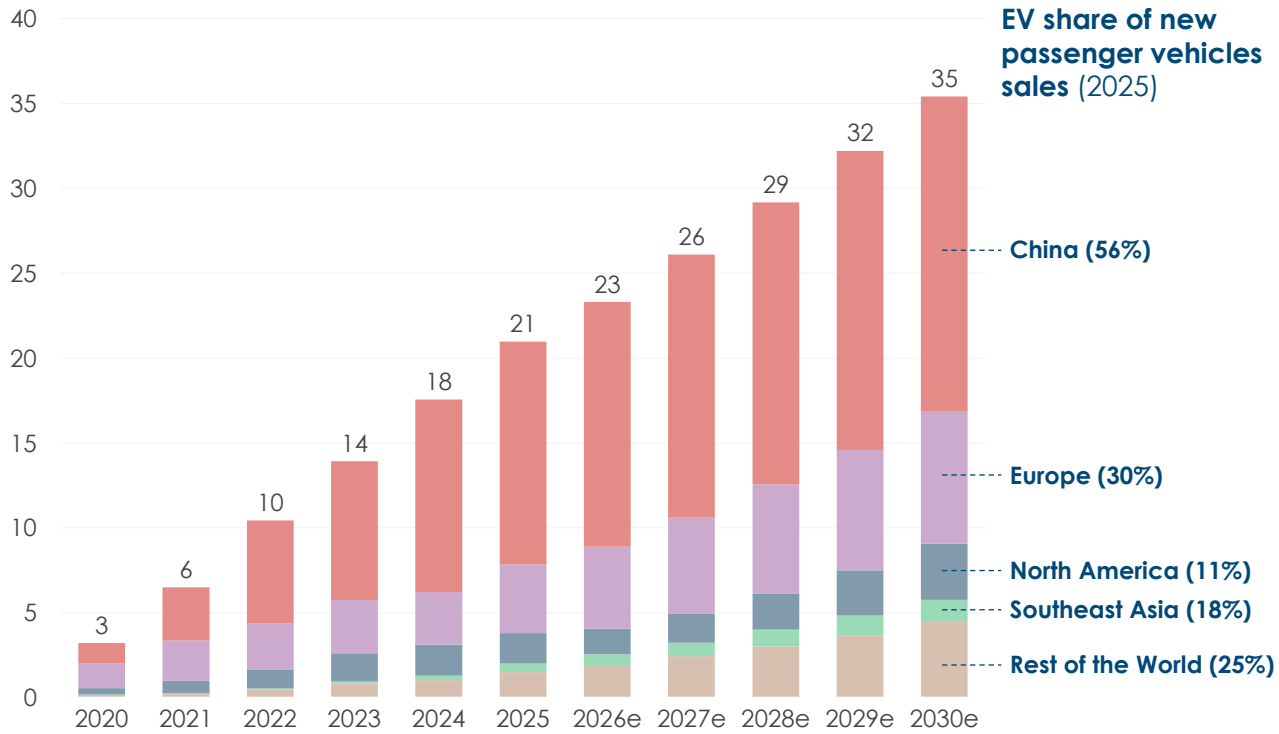


Notes: 1. ETS: Economic Transition Scenario
Source: BloombergNEF (2026), New Energy Outlook 2026

Electric cars expected to make up 27% of global vehicle sales this year, China leads with over 55% market share

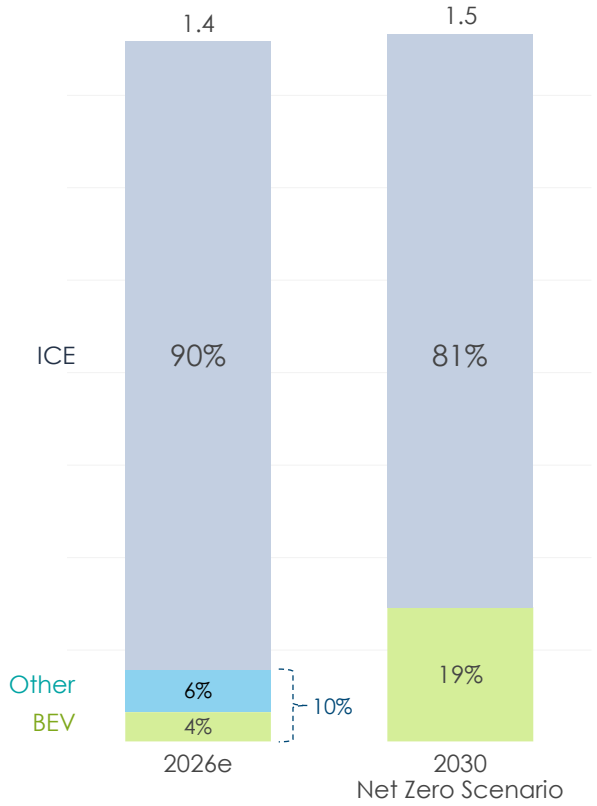
Passenger annual electric vehicle sales, 2024-2030 (BloombergNEF)

Million units sold per year



Passenger vehicle stock breakdown (BloombergNEF)

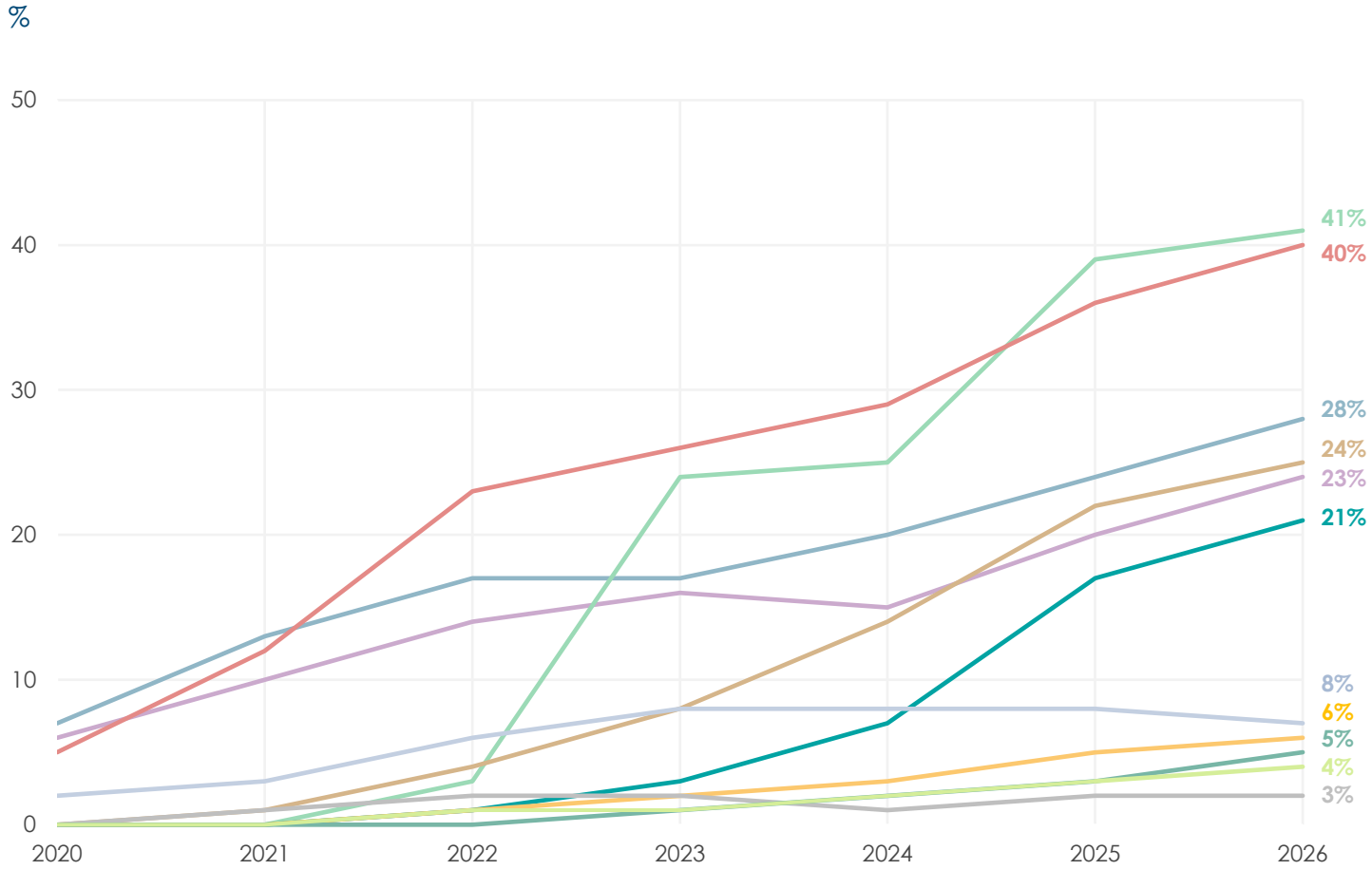
Billion vehicles



Notes: BEV = battery electric vehicle; ICE = internal combustion engine. 2026-2030e values are estimated sales. North America includes the US and Canada. "Other" includes PHEV (plug-in hybrid electric vehicles), e-REV (range-extender electric vehicles), and HEV (hybrid vehicles). Source: BloombergNEF (2026), Long-Term Electric Vehicle Outlook 2026; BloombergNEF (2026), Electric Vehicle Market Outlook 1Q 2026: Sales Decelerate; BloombergNEF (2025), Electric Vehicle Outlook; BloombergNEF (2026), New Energy Outlook 2026

Electric vehicle adoption is picking up outside of China: EVs surpassed diesel sales in the EU and growth markets are leapfrogging to high shares

EV share of new passenger car sales



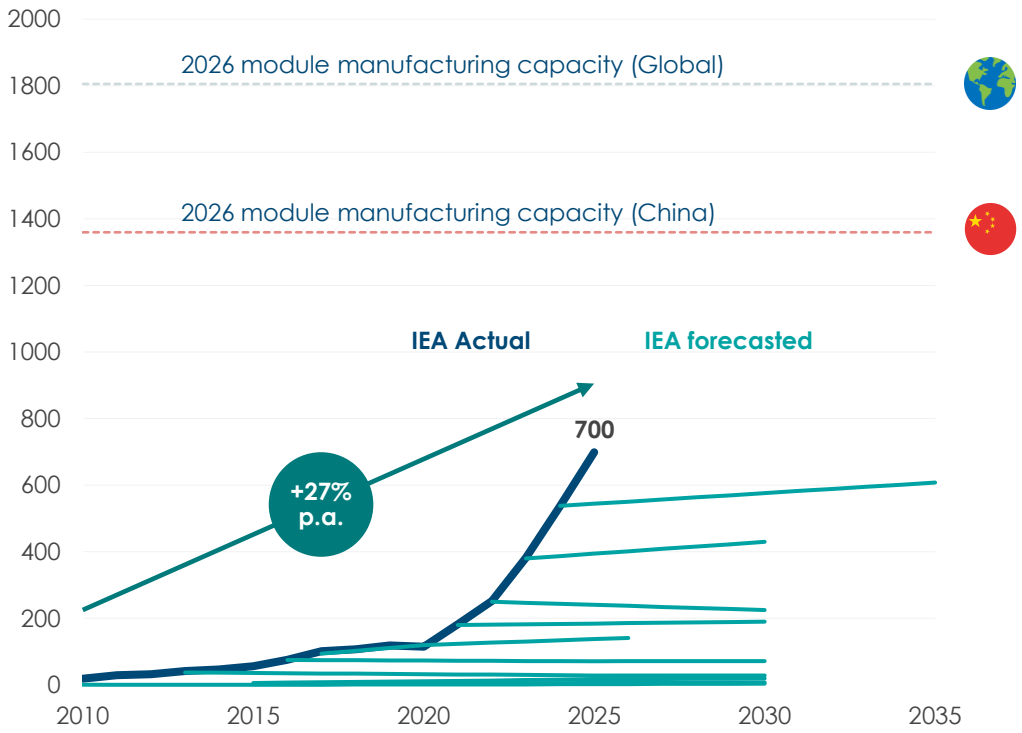
	EV share of new commercial vehicles (2025)		EV share of new two-wheelers (2025)
	Light-duty	Heavy-duty	
Global		9%	14%
Vietnam			22%
China	14%	28%	56%
UK			
Thailand			
EU	10%*	3%*	6%*
Indonesia			1%
US			
India	1%		6%
Brazil			
Mexico			
Japan			

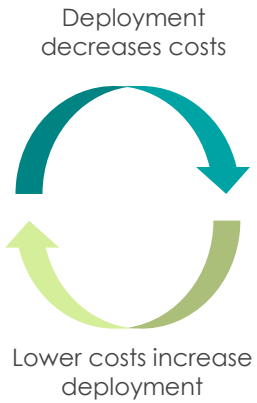
* Including sales in the UK

Source: Ember (2025), The EV leapfrog – how emerging markets are driving a global EV boom; IEA (2026) Global EV Outlook 2026

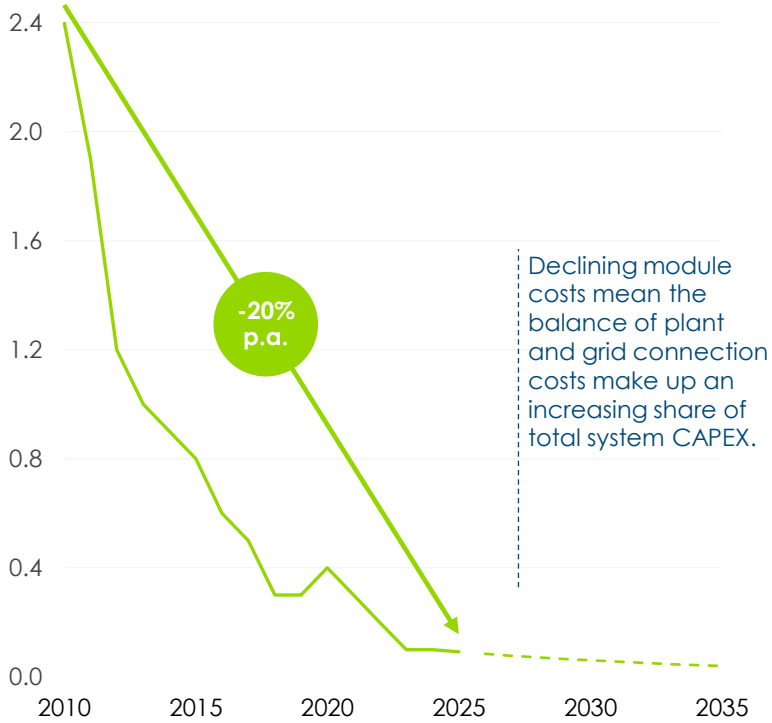
Solar deployment continues to rise as costs fall – a self-reinforcing cycle; manufacturing capacity presents opportunity to go faster

Annual solar PV installations compared to forecasts
GW (direct current)





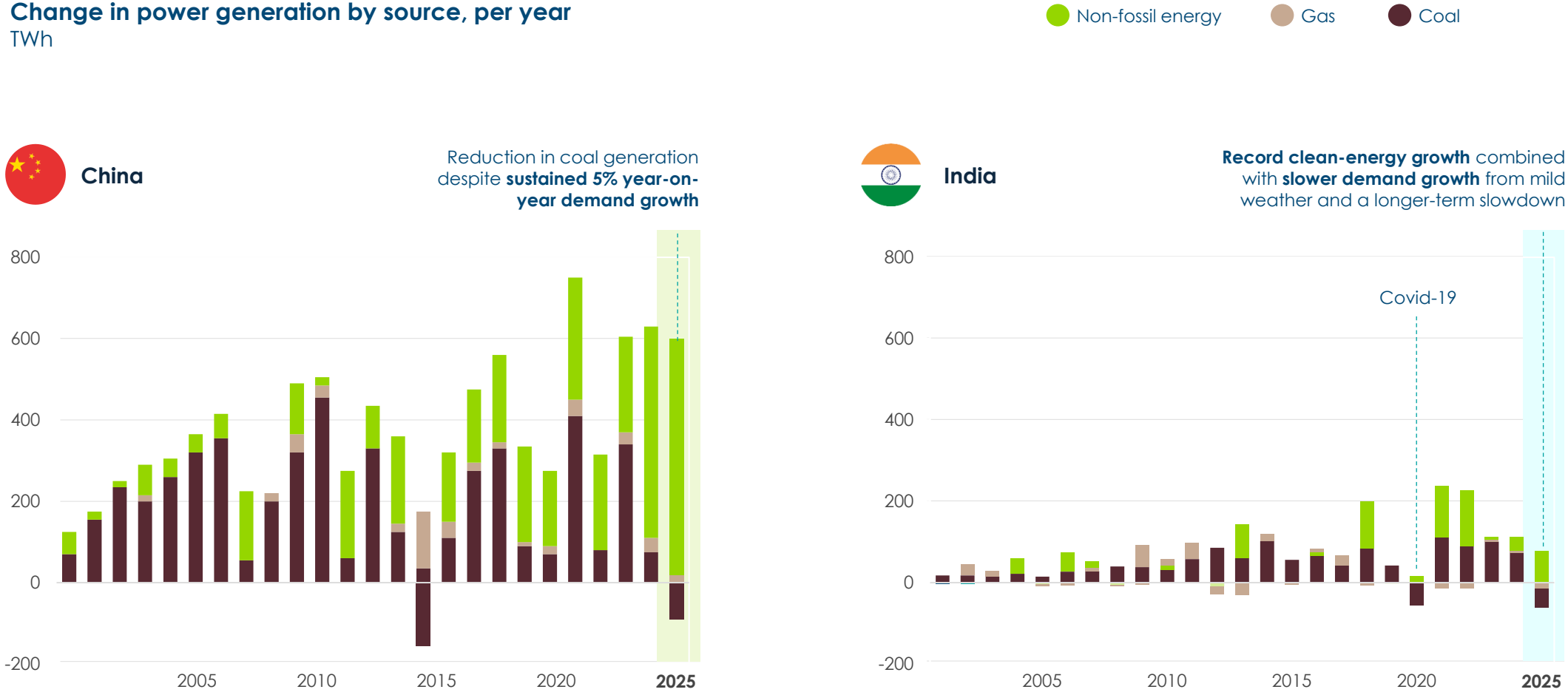
Solar PV module global benchmark costs (BloombergNEF)
$/W (real 2024)



Note: Manufacturing capacity refers to solar crystalline silicon module manufacturing capacity, split between China and global (including China). Costs are module element of benchmark capex for a typical fixed-axis utility-scale PV project. CAPEX = capital expenditure. Source: IEA (Various), IEA World Energy Outlook; BloombergNEF (2025), Global Installed Capacity; BloombergNEF (March 2025), Solar Modules Are Cheap and Will Become Even Cheaper; BloombergNEF (2026), Solar Manufacturing Assets

Renewables growth in 2025 displaced coal power generation in both China and India for the first time

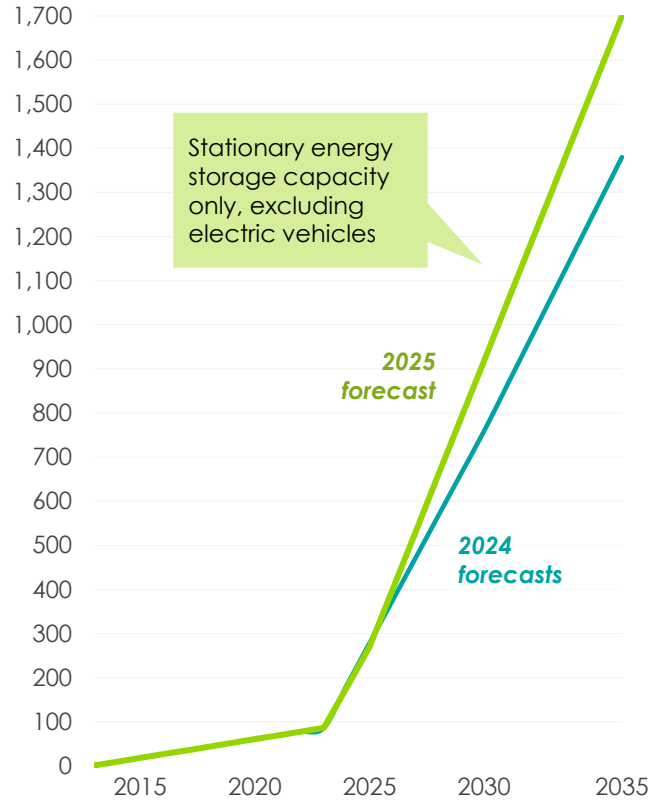
Change in power generation by source, per year
TWh



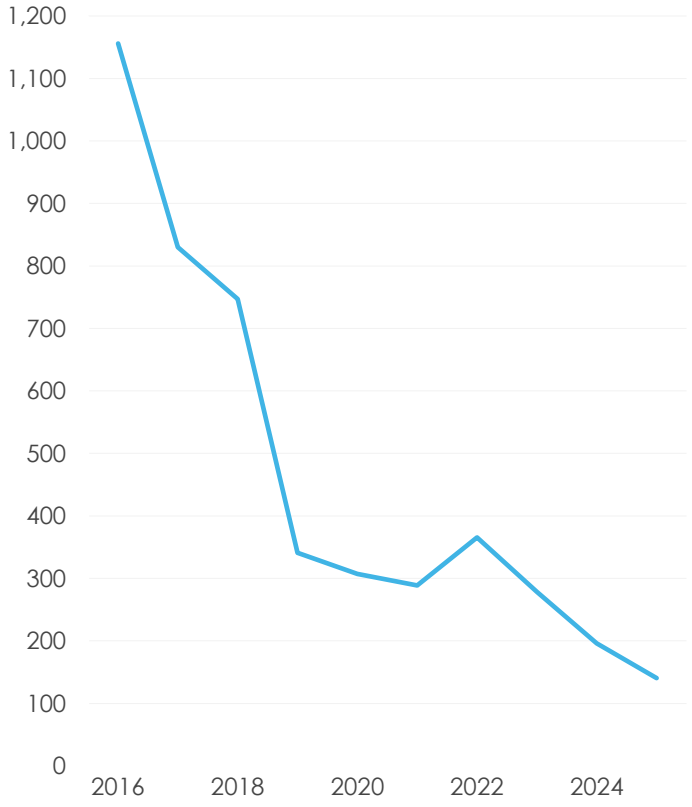
Source: Carbon Brief (2026) Coal power drops in China and India for first time in 52 years after clean-energy records

Where solar goes batteries follow: deployment increases, prices drop, and energy density gains enable new applications

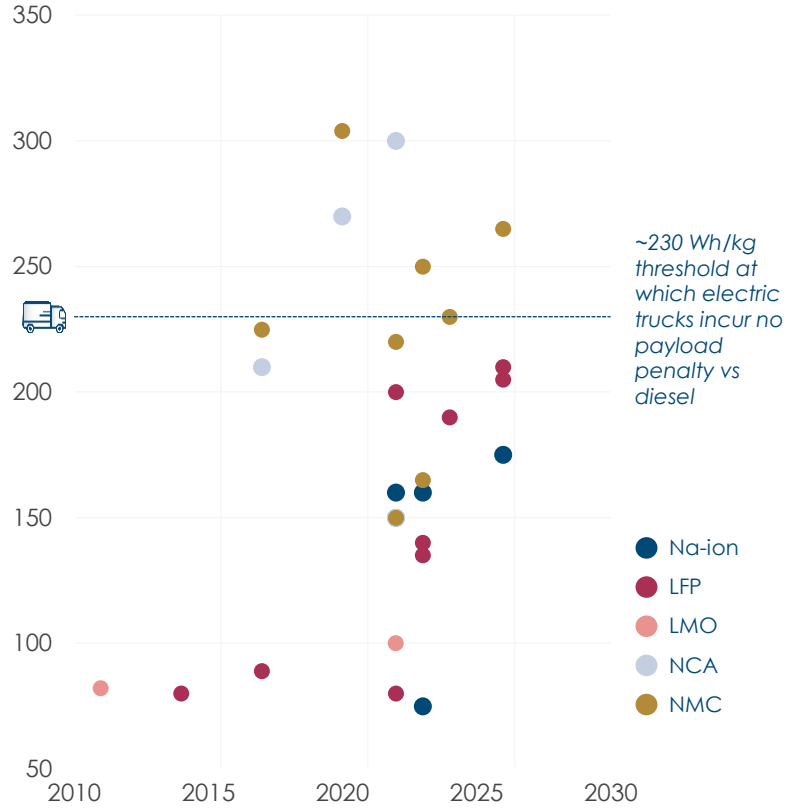
Global installed battery storage capacity forecasts in IEA STEPS, GW



Total installed costs for battery storage projects 2016-2025, $/kWh, usable



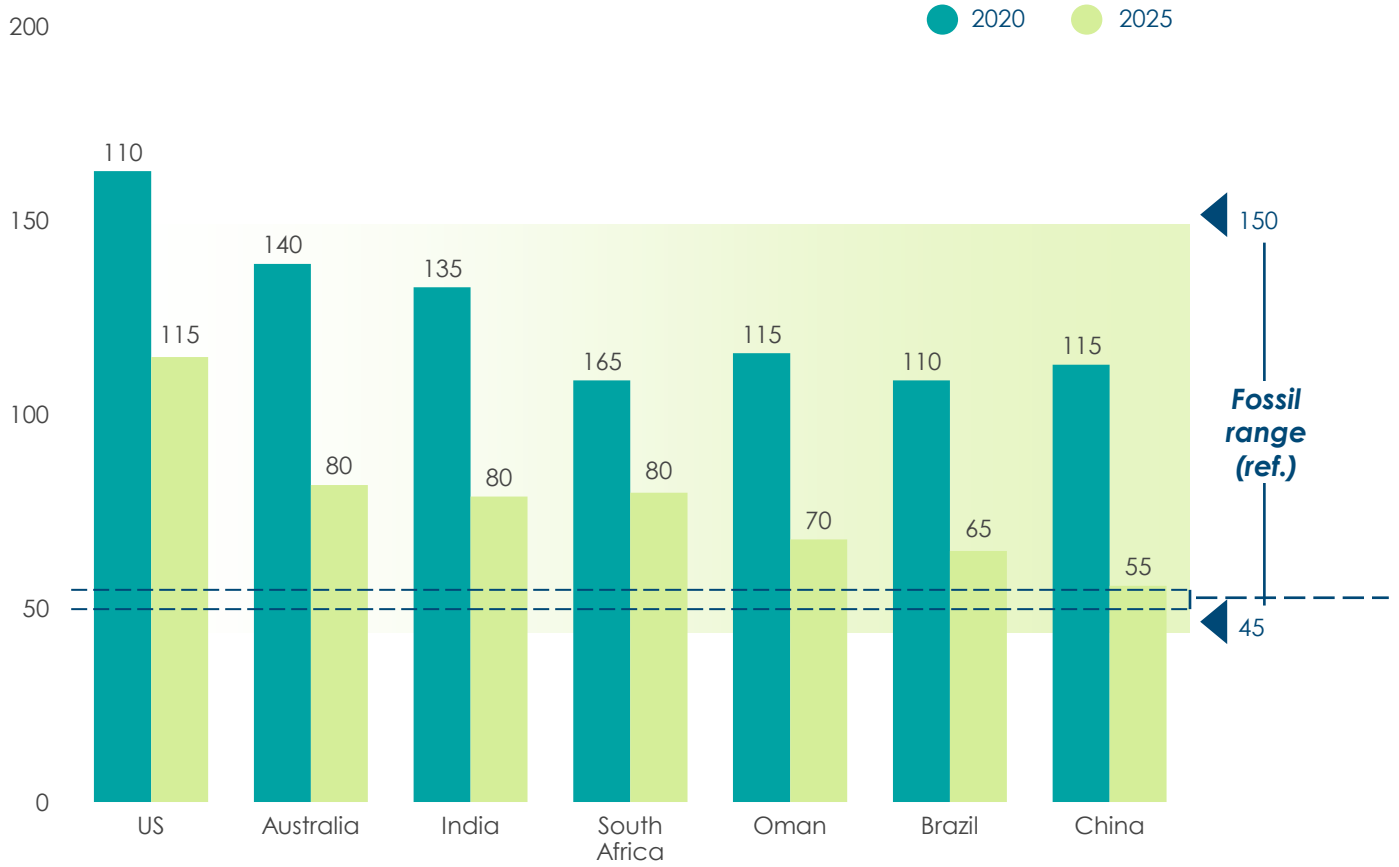
Energy density by battery chemistry 2010-2030, Wh/kg



Note: NMC refers to nickel manganese cobalt oxide; NMCA is nickel manganese cobalt aluminum oxide; NCA is nickel cobalt aluminum oxide; LMFP is lithium manganese iron phosphate; LFP is lithium iron phosphate; LMO is lithium manganese oxide; Na-ion is sodium ion. Source: IEA (2026) Energy Technology Perspectives 2026; IEA (2024) Batteries and Secure Energy Transitions; IRENA (2026) Renewable power generation costs in 2025; IEA (2023-2026) Global EV Outlook; Argonne National Laboratory (2026) "Argonne's manganese-rich battery legacy and the next generation of electric vehicle batteries"; IEA 4E (2022) Emerging Battery Technologies; McKinsey (2024) "The battery chemistries powering the future of electric vehicles"; The Faraday Institution (2020) High-energy battery technologies; The Faraday Institution (2023) Developments in Lithium-Ion Battery Cathodes; U.S. DOE (2014) "Advanced Vehicle Testing – Beginning-of-Test Battery Testing Results"; Barkholtz et al. (2017) "Comparative Electrochemical Performance of Commercial 18650-Format Lithium-ion Cells"; ICCT (2022), Long-haul battery-electric trucks in Europe

Solar and batteries in the global sunbelt means electricity can be produced night and day at the same cost as fossil fuels

Modelled costs for solar and battery setups with 95% availability, 2020-2025 (IRENA, 2026), $/MWh, levelised costs (real 2025)



Data points for projects in the sunbelt align with modelled trajectories:

India REMCL round the clock auction (November 2025):

- 1GW awarded ₹4.33 per kWh (~$49/MWh)
- Fixed nominal price at 75-85% availability

Abu Dhabi Masdar / EWEC project:

- 5.2 GW solar PV + 19 GWh battery delivering 1 GW baseload, 24/7 at ~$55/MWh
- Set to come online ~2027

Notes: Nominal auction prices are not directly comparable with real LCOE estimates. India's REMCC round the clock auction project timelines are yet to be announced. Abu Dhabi LCOE is an illustrative estimate based on published capex of ~$6bn (AED 22bn), 30-year project life, 5% WACC, 1.5% annual O&M, and one battery replacement. Source: IRENA (2026), 24/7 Renewables: the economics of firm solar and wind; Mercom India (2025), REMCL Issues RfS for Supply of 1 GW Round-the-Clock Renewable Power; PV Magazine (2025), Masdar, EWEC announce 5 GW/19 GWh solar-plus-storage project in Abu Dhabi; BloombergNEF (2025), LCOE Data Viewer

COP28 focused on two headline targets: tripling renewables and doubling energy efficiency; and COP31 proposes a new target of 35% electrification by 2035

3x

Renewable Power

Target 11,000 GW+ by 2030, growing:

- **Solar ×5 *(from 2022 levels)***
- **Wind onshore ×4**
- **Wind offshore ×8**
- **Geothermal ×7**

Renewables to reach 62% of installed capacity by 2030

2x

Energy Efficiency

Doubling the global rate of energy efficiency improvement to 4% per year

Key to limiting energy demand growth and keeping 1.5°C within reach

35%

Electrification

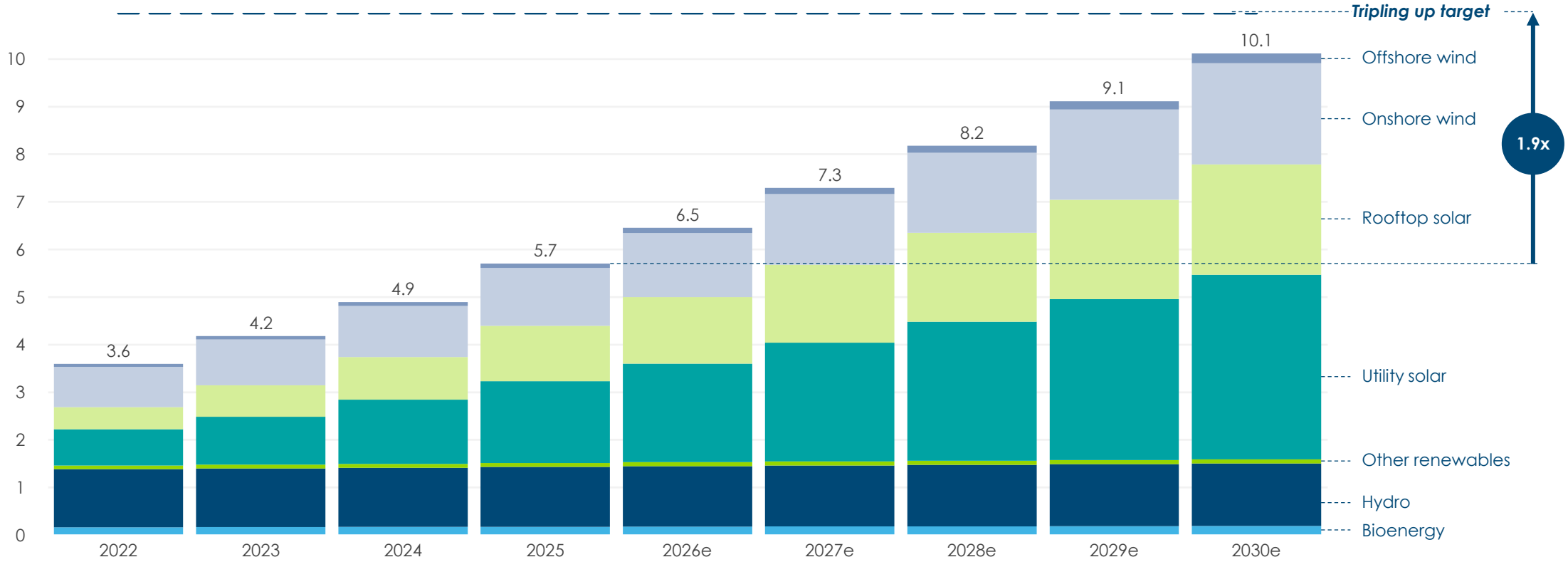
35% of global final energy demand coming from power by 2035

Notes: targets compared to capacity and efficiency rates as of 2022; COP 31 electrification target not yet agreed in text

Renewables need to double between 2025 and 2030 to meet the 2030 tripling up target; the current trajectory falls short by ~900 GW

Global renewables capacity change in BloombergNEF Economic Transition Scenario

TW

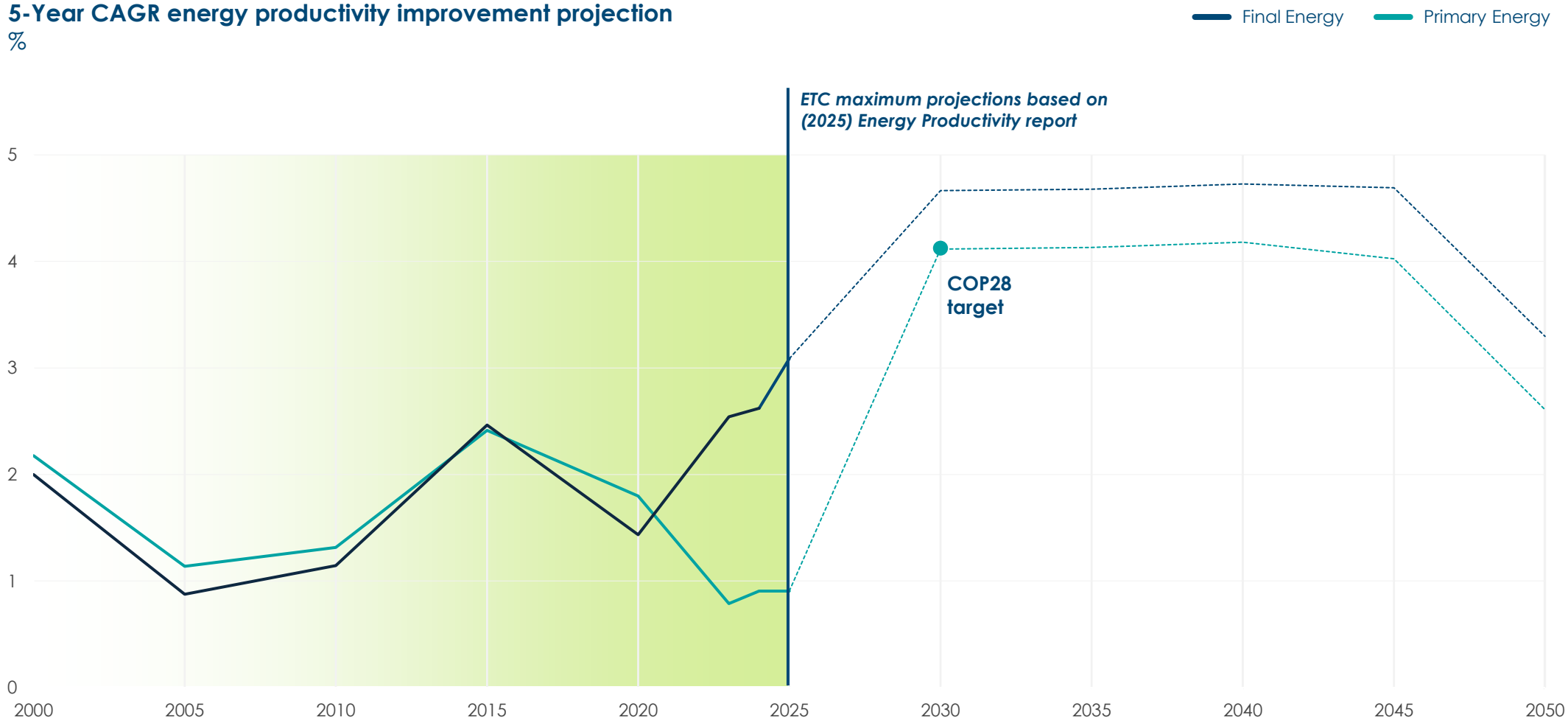


Notes: 2026-2030 are BloombergNEF estimates based on the Economic Transition Scenario Source: BloombergNEF (2026), New Energy Outlook 2026

And the world is not on track for doubling improvements in energy efficiency by 2030: latest improvements = 3% in primary, and >1% in final energy

5-Year CAGR energy productivity improvement projection

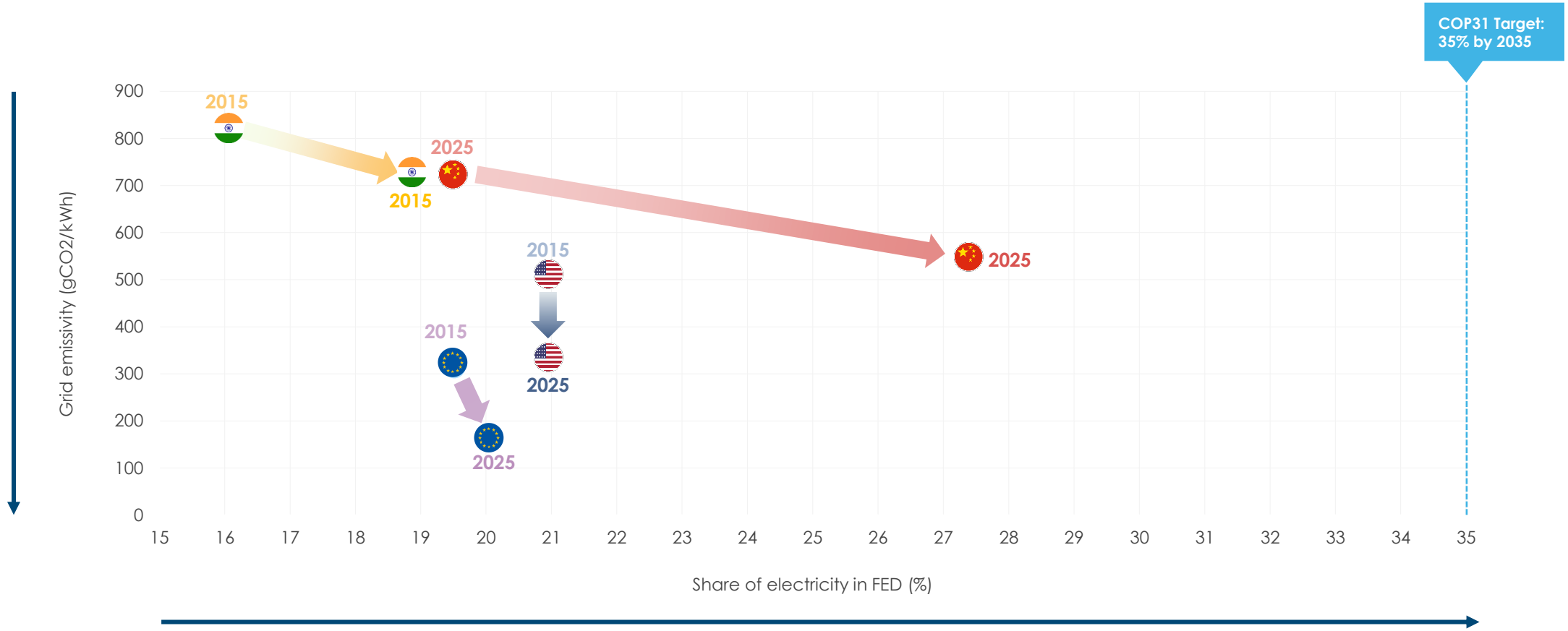
%



Notes: Energy productivity is the measure of economic output (GDP) generated per unit of energy, it is related to energy efficiency which is the ratio between the input of energy to the output of service or goods; annual improvements of energy productivity and energy efficiency are therefore the same. CAGR = Compound annual growth rate; Energy productivity is the inverse of energy intensity (energy input per unit of GDP), intensity is used for instance in many IEA reports.
Source: ETC (2025) Energy productivity: Increasing efficiency in an expanded, electrified energy system

Electrification is the essential companion to grid decarbonisation; the priority varies by region, but the world is still far form 35% electrification target

Grid emissivity vs electrification share in final energy demand (FED) by region, 2015-2025 (BloombergNEF)
gCO_2/kWh & %, respectively



Source: BloombergNEF (2026), New Energy Outlook 2026

Where do current efforts leave us:

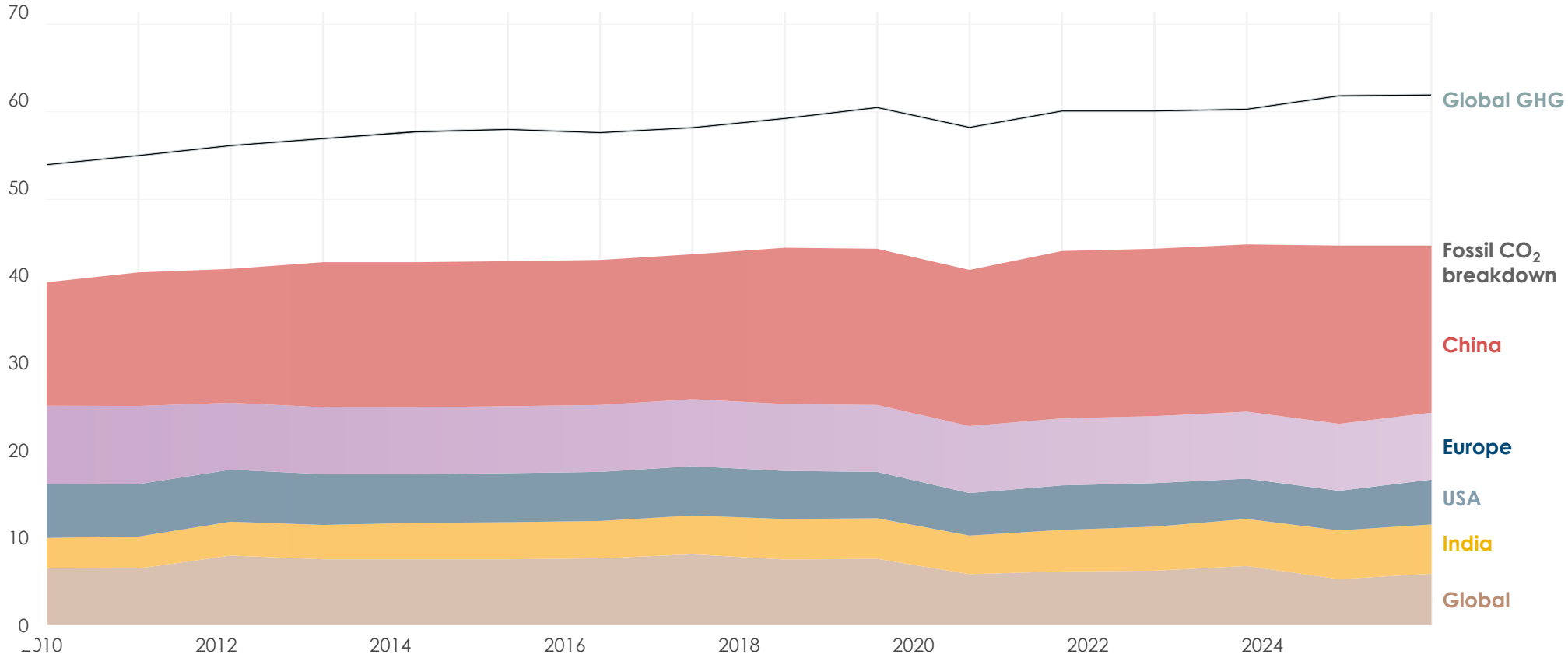
off target on emissions

Key messages | Current efforts leave us off target as emissions plateau

- **Current efforts slow the rate of emissions growth, leading to a likely plateau, but are far from falling at the rate required** to keep warming under the terms of the Paris agreement: well below 2°C and pursuing efforts towards 1.5°C.
- **The world is already experiencing around 1.5°C of global heating,** and the World Meteorological Organization (WMO) reporting a high chance of another record warming year and temperatures exceeding 1.5°C between 2026 and 2030.
- **Current or stated policies set a trajectory towards 2.5-3°C of warming by 2100** – given the gap between Net Zero and policy pathways.
- Climate change is already imposing material economic costs: **climate damages costs are estimated at ~1% per year of global GDP** and it will increase exponentially with temperature
  - **Water distress is emerging as one of the most acute short-term risks,** with growing pressure on agriculture, hydro and nuclear power, industrial production and urban resilience across many regions
  - The **incremental investment required to reach net zero is on a similar order of magnitude of current climate damage costs** and delivers lasting economic assets rather than irreversible losses
- **Investment in clean energy reached record levels of $2.1 trillion in 2025, but it remains unevenly distributed.** Clean energy capital continues concentrated in developed economies (Europe, US, China), outpacing fossil in these regions; many growth markets are yet to see clean energy investment exceed fossil.

Current policies bend the curve on emissions growth towards plateau, but we are yet to see steep reductions

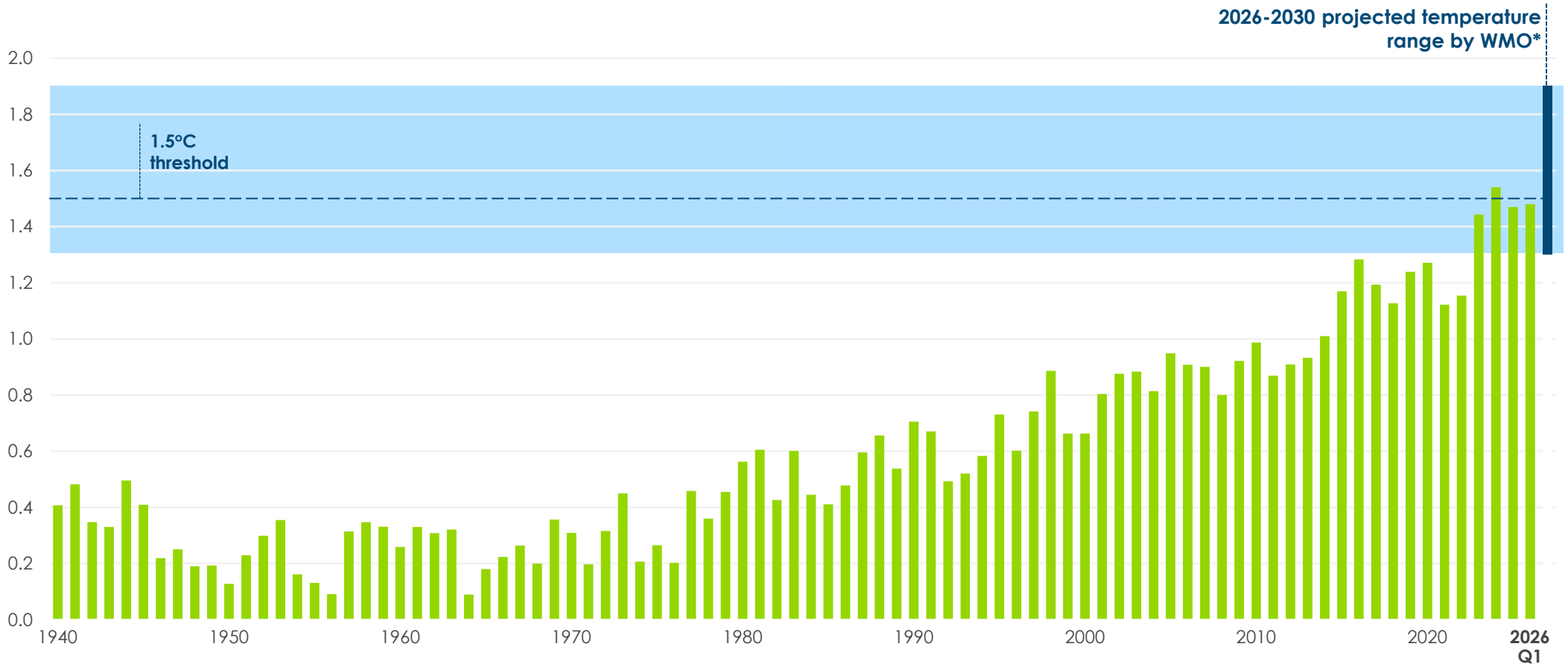
Global GHG emissions
$GtCO_2eq/year$



Notes: Gap between Global GHG and Fossil CO_2 is due to emissions from LULUCF and emissions from non-CO_2 greenhouse gases
Sources: IEA (2026), Global Energy Review 2026; Climate TRACE (2026), Emissions Data; EDGAR (2025), GHG emissions of all world countries

The world has breached 1.5°C of warming: scientists expect this threshold to be exceeded in coming years

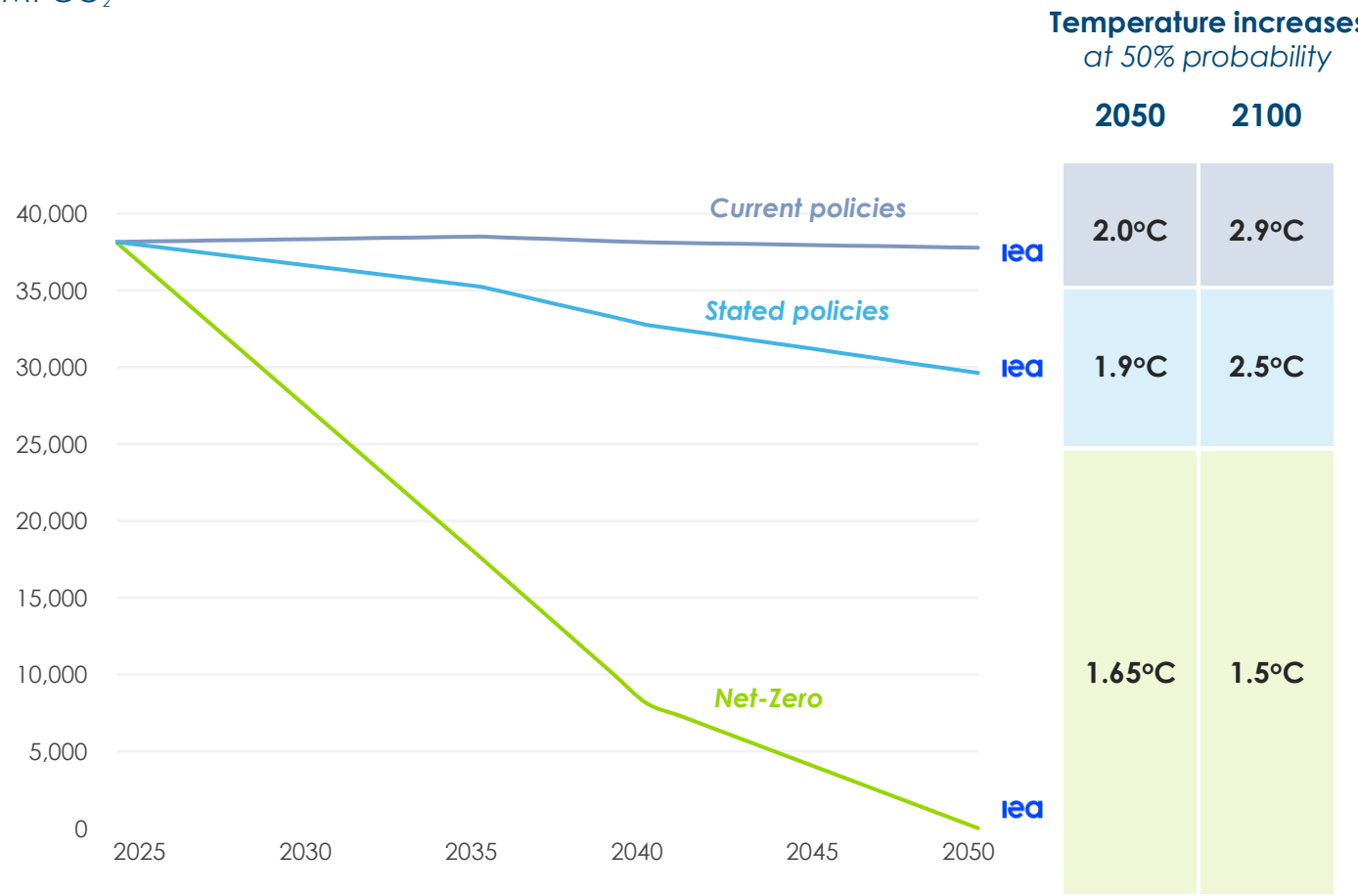
Global surface temperature increase above pre-industrial level
°C above pre-industrial levels; Reference period: pre-industrial (1850-1900)



*World Meteorological Organization
Source: Copernicus (Accessed Jan 2026), Global climate highlights 2024, NOAA global temperature; Met Office (2026) New report suggest more global temperature records ahead

Current trajectories point to 2.5-3°C of warming by 2100, with IEA's Net Zero normative scenario accepting some level of warming overshoot by 2050

Energy related CO_2 emissions, IEA 2025 Scenarios
Mt CO_2

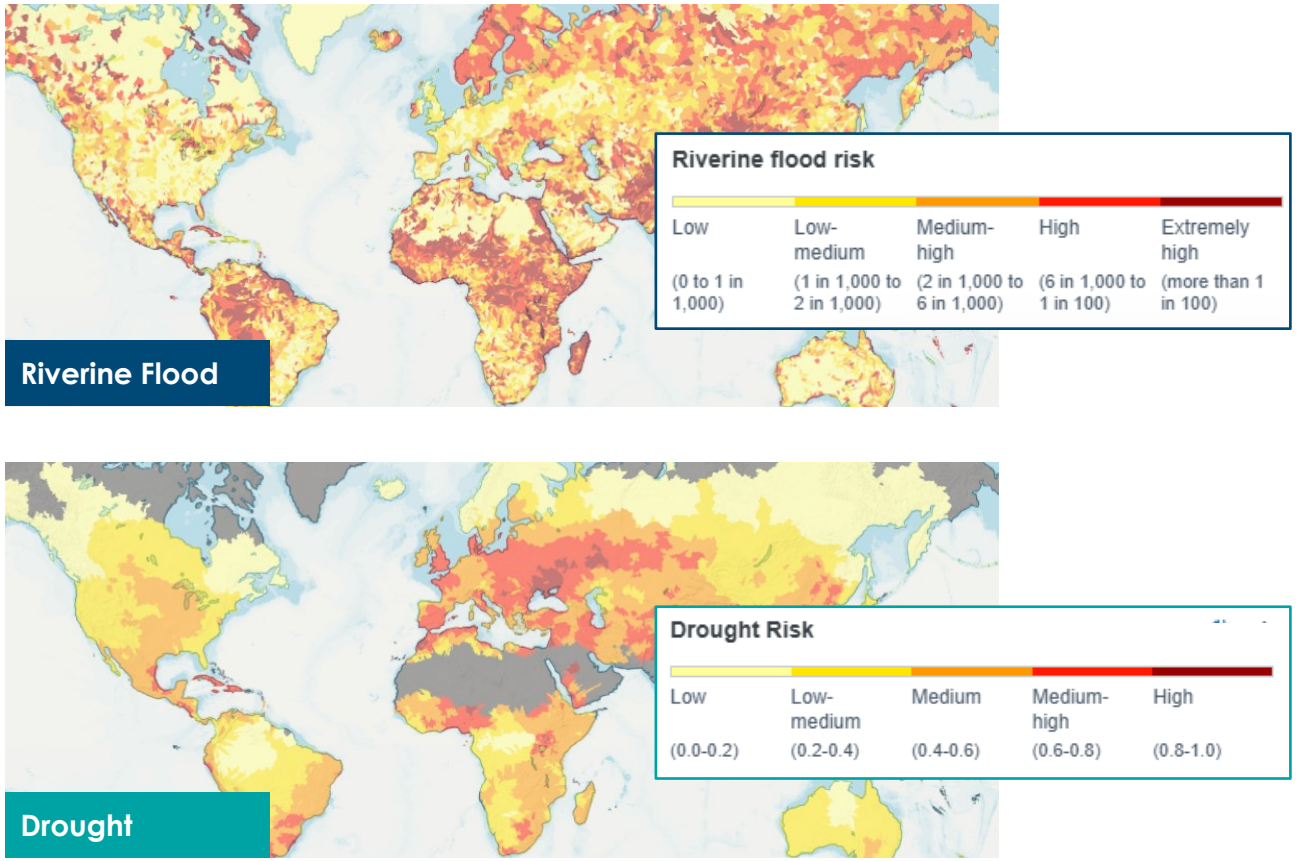


Source: IEA (2021) Net Zero by 2050; IEA (2024) A Net Zero Roadmap; IEA (2024) World Energy Outlook; IEA (2025) Global Energy Review;
Note: IEA Scenarios have emissions interpolated between 5-10 years;

- US pressure on the IEA could **undermine updates to the world's main Net Zero reference** pathway - **weakening the basis for targets** and accountability
- Risk of normalising **2–3°C pathways as the default** given gap between Net Zero and policy pathways

Water shocks are the biggest near-term risk, with a “Super El Niño” expected in 2026 increasing both droughts and floods

Global Water Risk

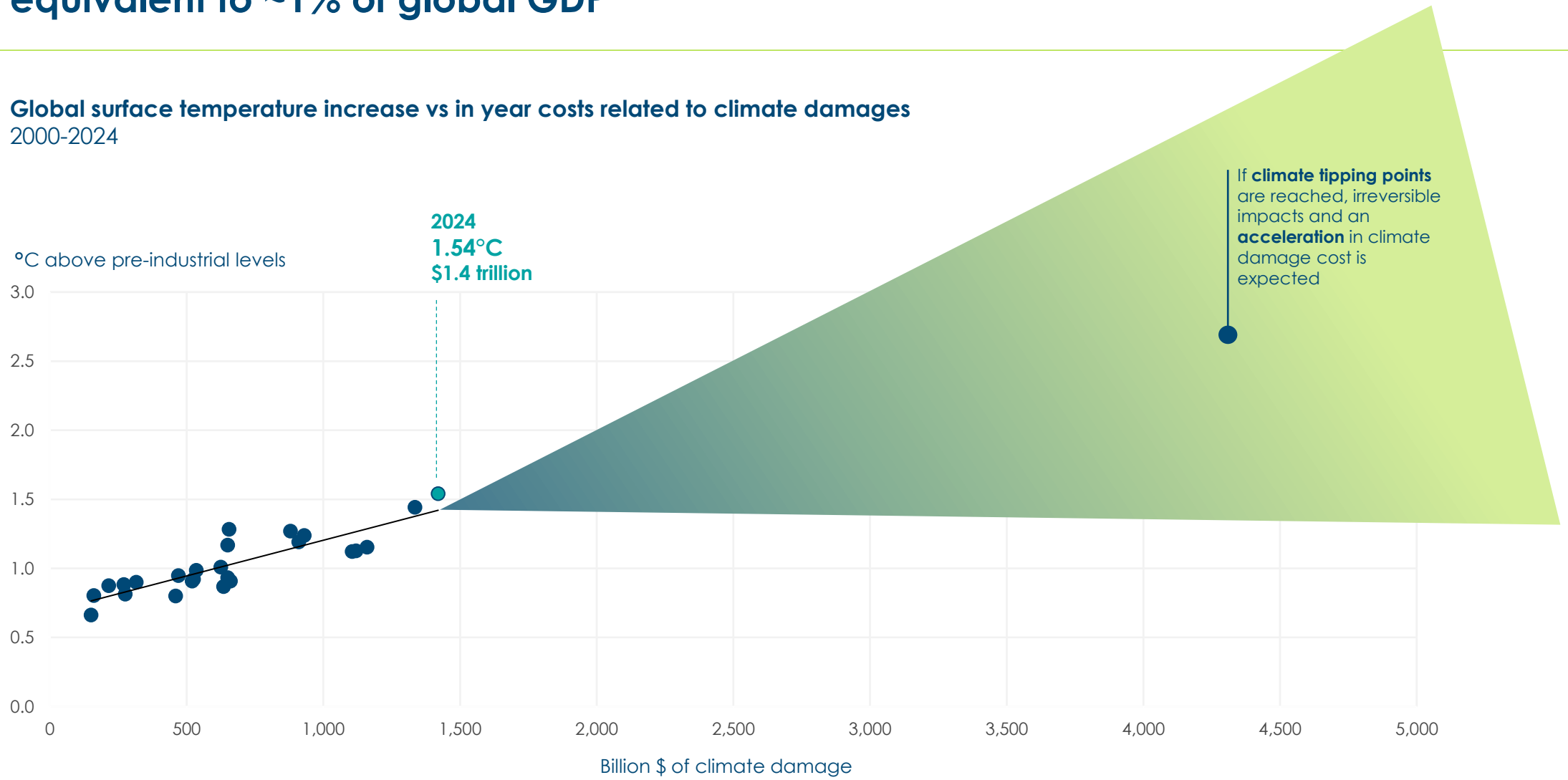


Source: WRI Aqueduct; WRI (2026), "How Might a 'Super El Niño' Affect Food, Forests and Water?"

- **Drought risk rises** where water stress is already high, as hotter conditions dry soils and reservoirs faster
- **Flood risk rises** where heavier rainfall overwhelms rivers, drainage systems and vulnerable infrastructure
- **Highest-risk regions** include Africa, India, Indonesia, Australia, Central America, East Africa and South America
- A "Super El Niño" occurs every 10-15 years and takes **Pacific temperatures >2°C**
- Hottest 11 consecutive years amplifies its impact: **soils and reservoirs will dry faster**
- **US-Iran conflict compounds negative effects** disrupting fuel and fertilizer supplies

Climate damage costs are already at $1.4 trillion per year, equivalent to ~1% of global GDP

Global surface temperature increase vs in year costs related to climate damages
2000-2024



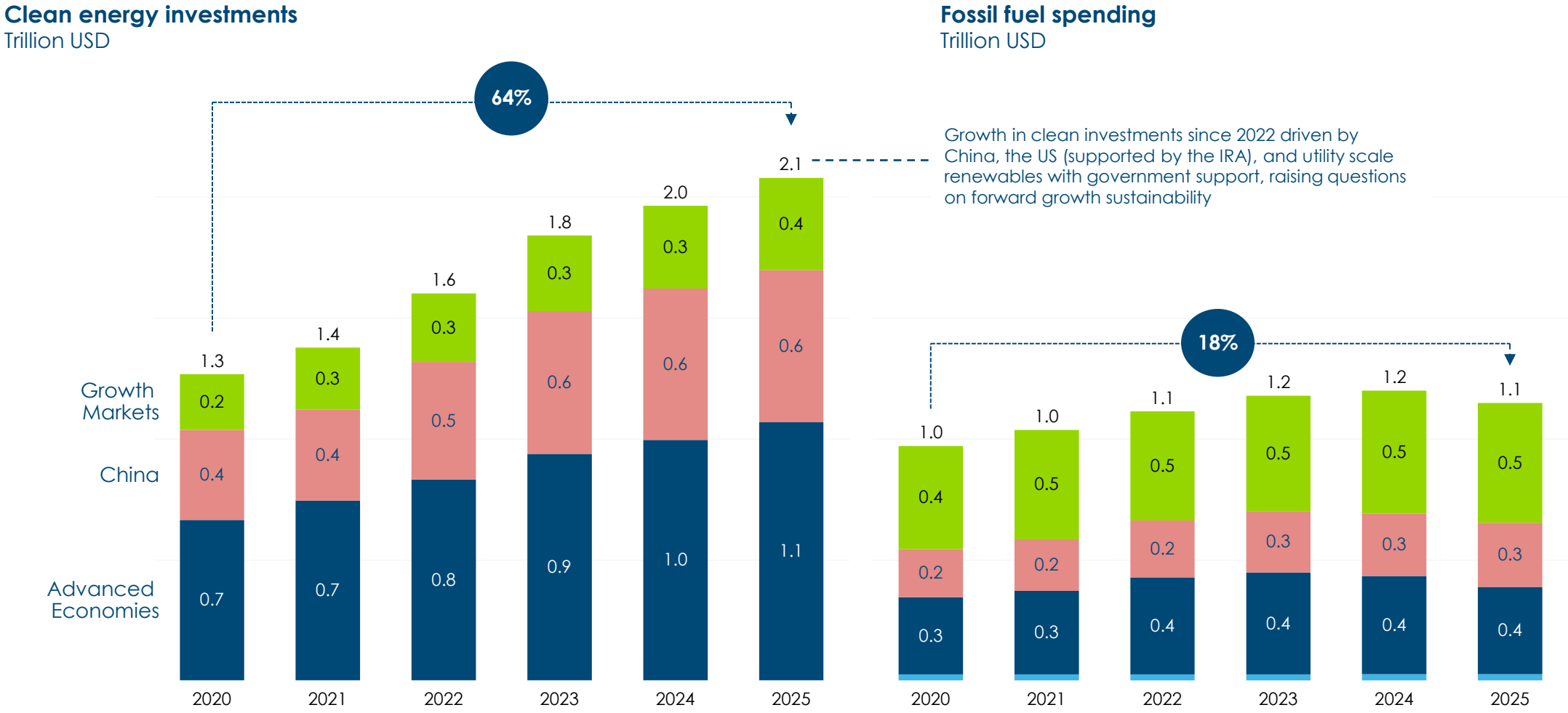
Note: Climate damages include insured and uninsured damages to property and climate-related government spending (including drainage grants, disaster prevention and recovery, environmental protection and agricultural insurance subsidies).
Source: Copernicus (Accessed Jan 2026), Global climate highlights 2024, NOAA global temperature; Bloomberg Intelligence Climate Damages Tracker, Bloomberg NEF.

Clean-energy investment reached ~$2.1tn/yr – equivalent in magnitude to annual estimates of climate damages already occurring.

	Trend in future spend over time	$ Today	Costs in 2050 under current policies	Costs in 2050 for Net Zero
Climate damages: Costs on property, life, ecosystems, business activity that incur from rising temperatures	**Damages increasing exponentially**	1% of global GDP **$1.5 – 2 trillion/yr**	10–18% of global GDP by 2050 under ~3°C	~4% of global GDP by 2050 under 1.5–2°C
Climate adaptation: Investment which reduces the probability of damage from extreme weather impacts	**Adaptation needs rising**	**$ 76 billion/yr** $187–359 billion/yr estimated need	Adaptation needs rise toward the high end of today's ~$187–359bn/yr range as physical risks intensify	Even under Net Zero, growth markets need ~$310–365bn/yr for adaptation by 2035
Climate mitigation investment: Investment which delivers economic returns	**Mitigation costs decreasing as technology costs fall**	**$ 2.1 trillion/yr in clean technologies**	Roughly flat/plateaus near current levels	$3.5trn/yr needed to 2050; falling thereafter

Notes/Sources: 1HYBRIT, SALCOS, ArcelorMittal; MPP November 2024 Update; Carbon Border Adjustment Mechanism (March 2025); Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA); Elisabetta Cornago et al. (2024) Learning from CBAM's transitional phase; BCG (September 2023) The Start of CBAM: A Major Landmark for Global Trade and Carbon Accounting, BloombergNEF (2025), 2025 Sustainable Aviation Fuel Outlook: Reaching New Highs; GreenAirNews (2025)

Overall investment is still flowing, but regional discrepancies remain strong and in growth markets fossil still half of overall investment



Source: IEA (2026) World Energy Investment

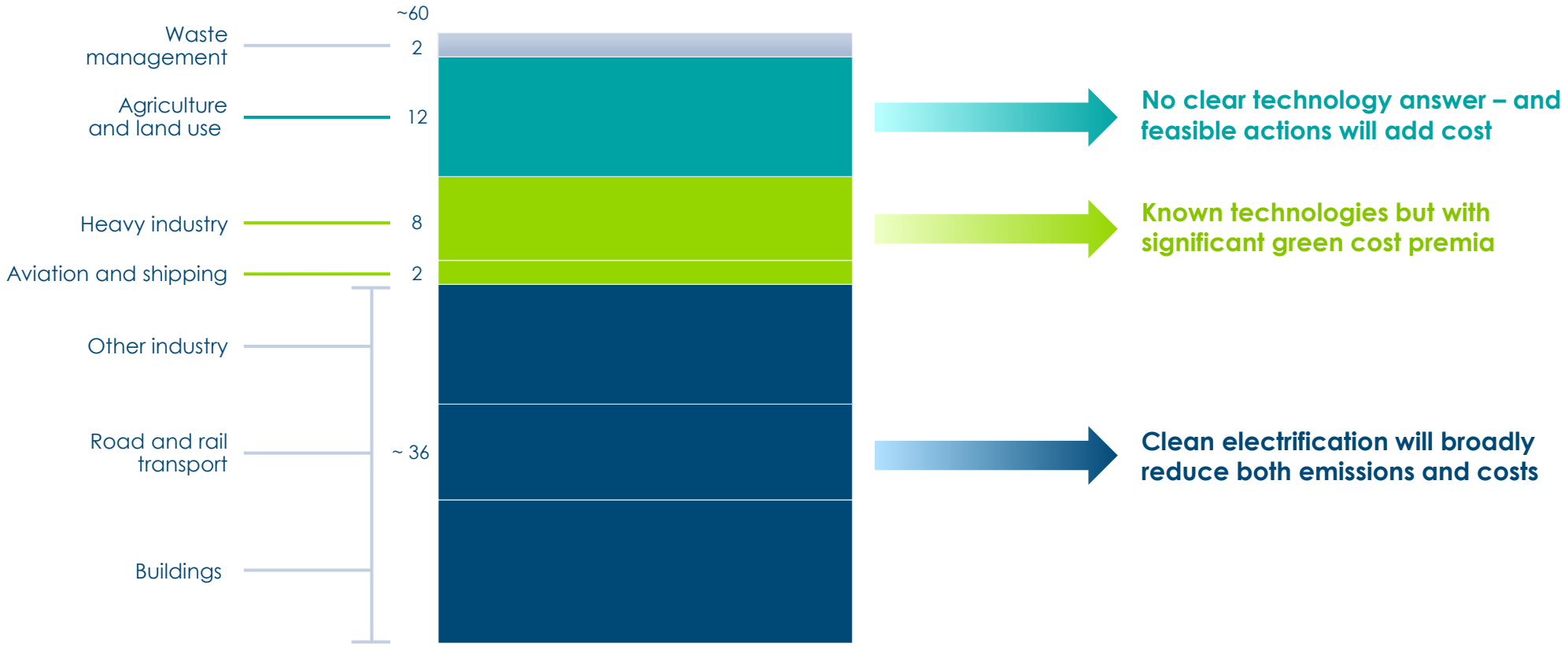
What needs to accelerate: priorities per sector and the big misses

Key messages | What needs to accelerate: coal phase out, heat electrification, action in hard-to-electrify sectors and the 3 misses of the 2020s

- **Country-level climate pledges could still deliver well below 2°C of warming,** noting China, India but also smaller regions, such as Asia Pacific, Middle East and Eurasia, relevance on the pace of decarbonising.
- **Across the transition, infrastructure, policy and investment barriers remain significant;** in hard-to-electrify sectors, they are compounded by weaker economics and less mature technologies.
  - **Around 60% of global emissions can be abated through clean electrification,** but key barriers stand out:
    - Unabated coal generation is not being phased down, with new assets being added in key geographies.
    - Heat electrification in both buildings and low-to-medium temperature industries is not picking up.
  - **Another 15% of global emissions come from heavy industry, aviation and shipping,** where decarbonisation will carry green cost premia.
    - **~1,000 clean industry projects announced but less than 20% have reached Final Investment Decision.** Carbon pricing, demand-side policies and project de-risking will determine whether today's pipeline becomes tomorrow's industrial capacity.
    - **China accounts for ~60% of new clean industry,** and supplies ~45% of plant equipment for clean industry outside China.
- **The other three biggest misses of the 2020s remain methane abatement, ending deforestation and scaling removals,** despite global pledges made.

Clean electrification will be able to abate ~60% of GHG emissions at little to no cost, but the remainder will need to be tackled by more costly solutions

GHG emissions by broad sector
$GtCO_{2eq}$



Source: Systemiq analysis for the ETC; EDGAR (2025) Community GHG Database; ETC (2021) Keeping 1.5oC Alive

Clean electrification will be able to abate ~60% of GHG emissions at little to no cost

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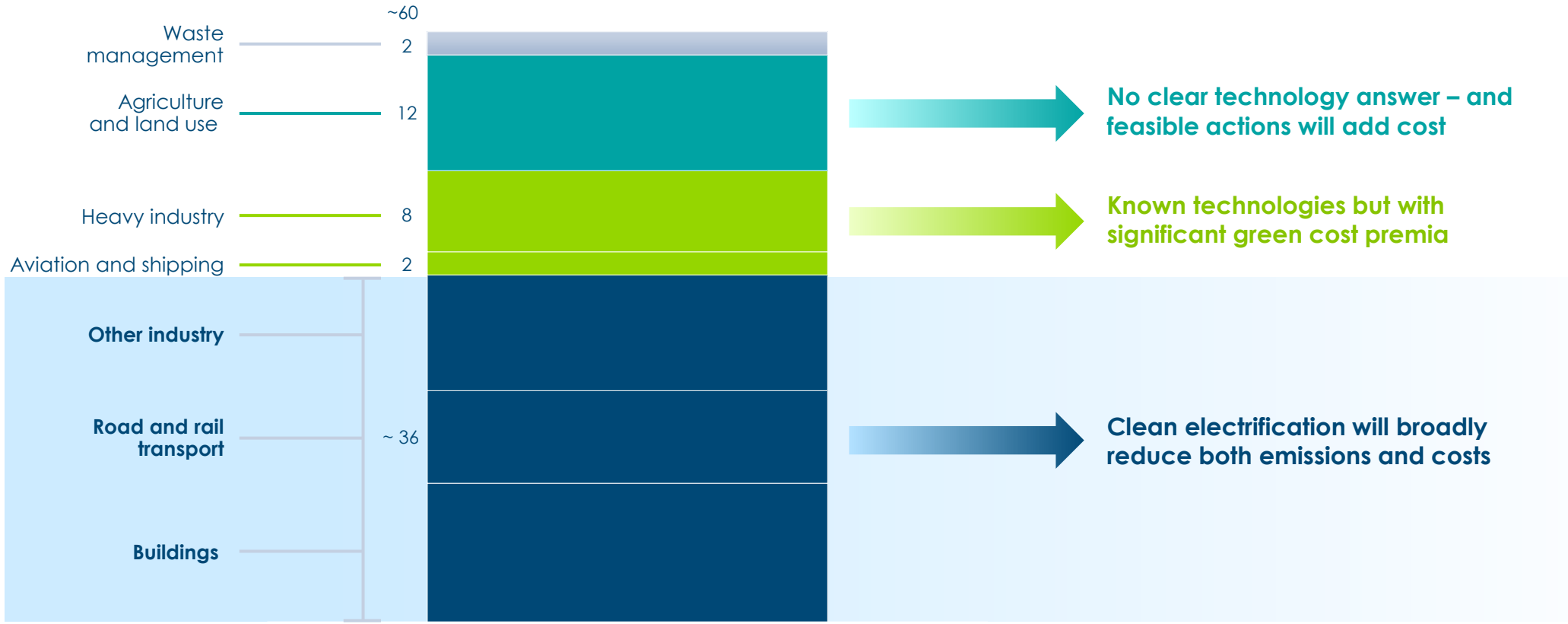
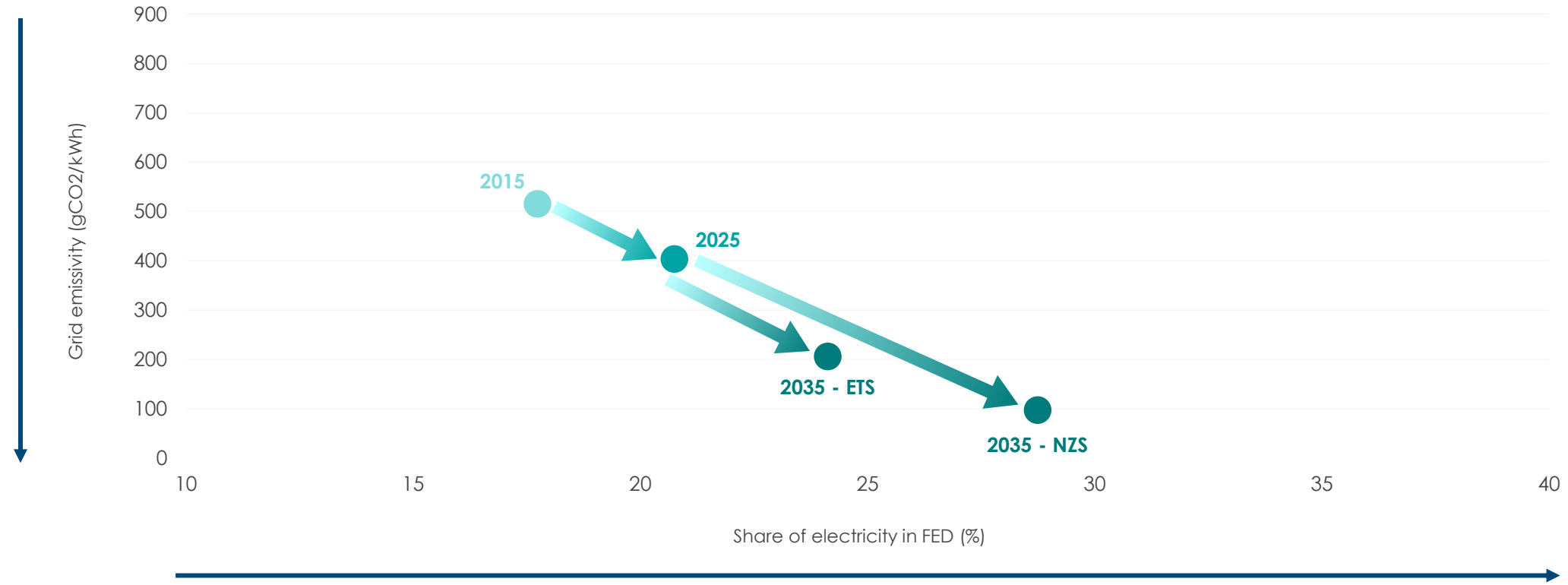


Source: Systemiq analysis for the ETC; EDGAR (2025) Community GHG Database; ETC (2021) Keeping 1.5oC Alive

Since 2015, global grid emissivity has dropped and electrification has increased, but trends need to accelerate in the next 10 years

Grid emissivity vs electrification share in final energy demand (FED) by region, 2015-2035 (BloombergNEF)
gCO_2/kWh & %, respectively



Note: ETS = Economic Transition Scenario; NZS = Net Zero Scenario
Source: BloombergNEF (2026), New Energy Outlook 2026

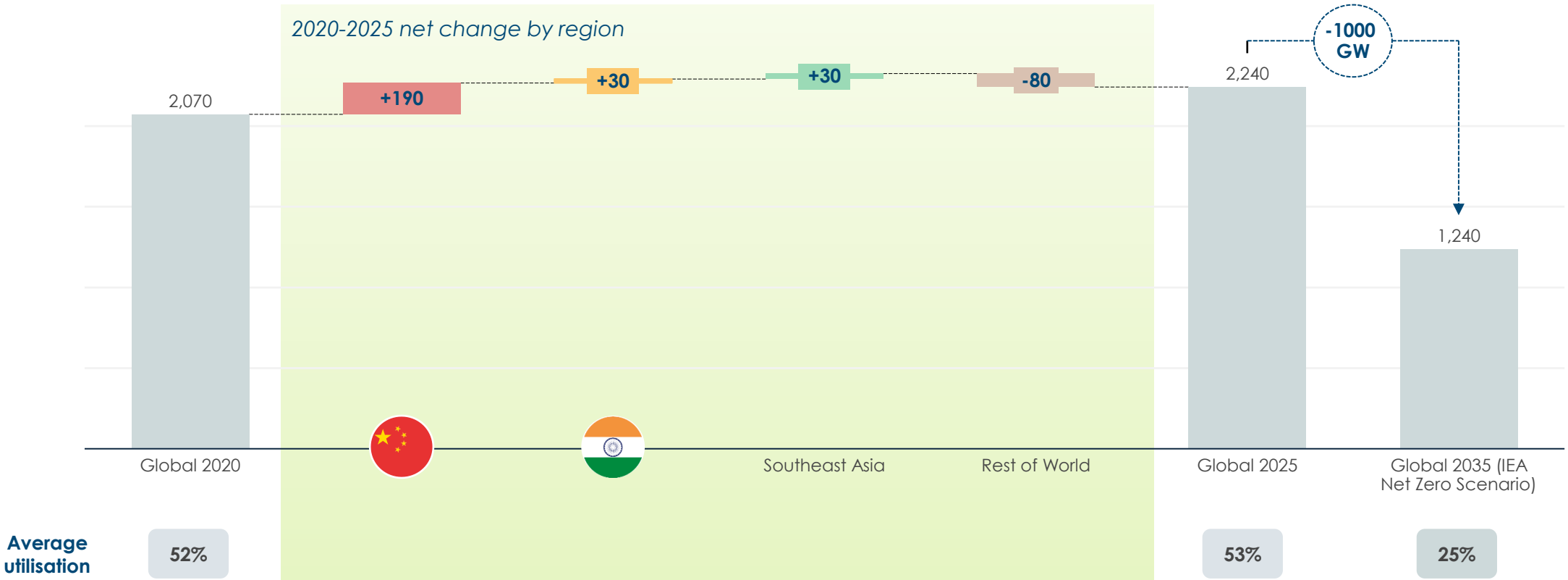
Clean power and electrification are both accelerating – but neither yet fast enough to displace fossil fuels at the required rate for a net-zero pathway

Power Decarbonisation 	Electrification 
GOING WELL **Building the new system:** Renewables are ramping up fast – record annual additions of **wind and solar capacity continue**.	GOING WELL **EV sales** are ramping up quickly globally; electrification of buildings and industry is edging upward.
NOT YET ON TRACK **Replacing the old system:** Renewables are only just keeping pace with rising electricity demand – so **coal generation has not fallen significantly**, and there is still no sign of action on legacy coal capacity.	NOT YET ON TRACK EVs start from a low base, and **stock-turnover effects keep the total electrification share low**. Buildings and industry are advancing well below the pace required for a Well-Below-2°C (WB2D) pathway.

Unabated coal phase-out needs to ramp up to keep grid decarbonisation on a net-zero trajectory

Global unabated coal capacity change by region in 2020, 2025 and 2035

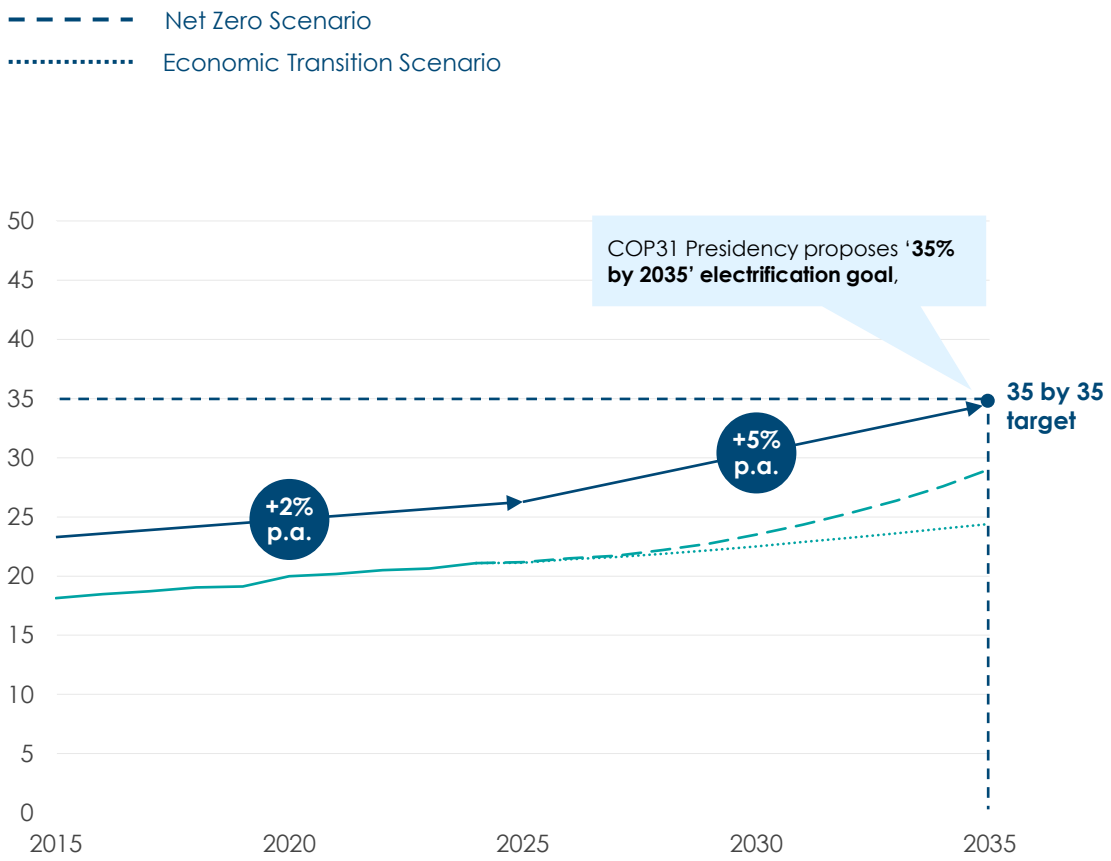
GW



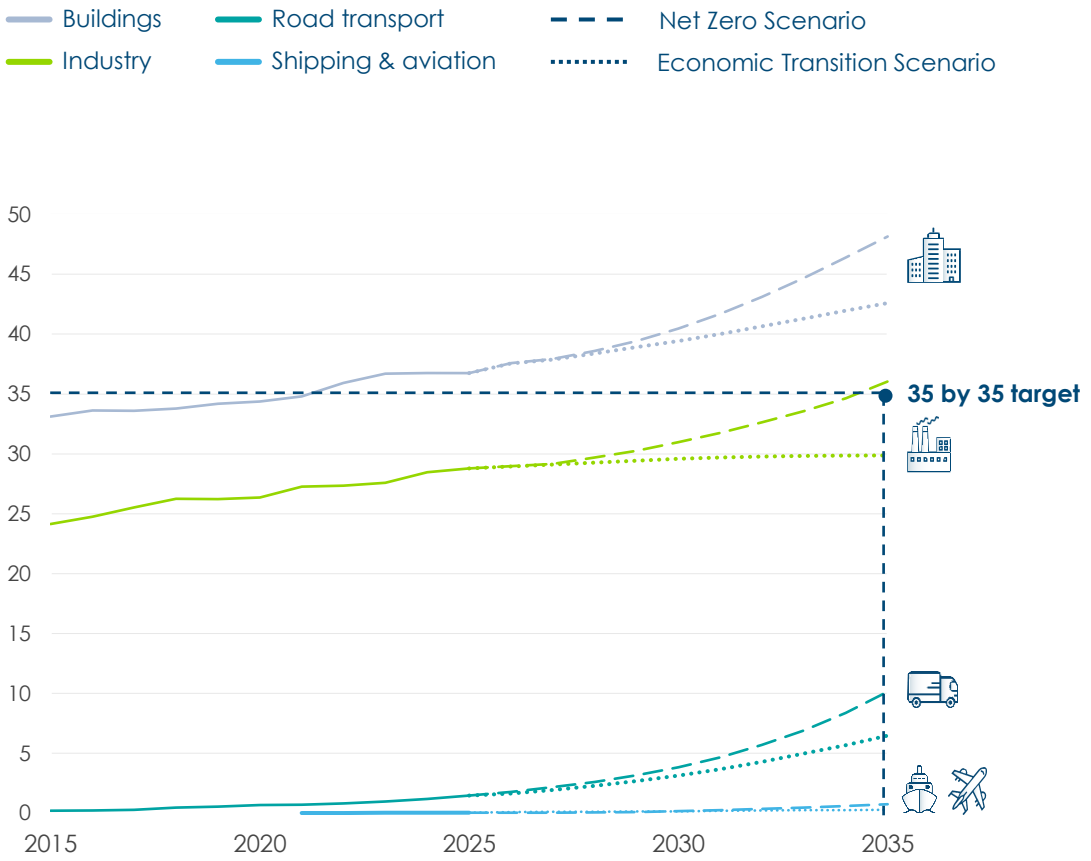
Source: Global Energy Monitor (2026), Global Coal Plant Tracker; Ember (2026) Electricity Data Explorer; IEA (2025) World Energy Outlook 2025.

A 35% electrification in final energy demand by 2035 target implies more than a doubling of the annual rate of power demand growth, with sectoral variations

Electricity share of total final energy consumption, BloombergNEF 2025, %



Electricity share of total final energy consumption by sector, %

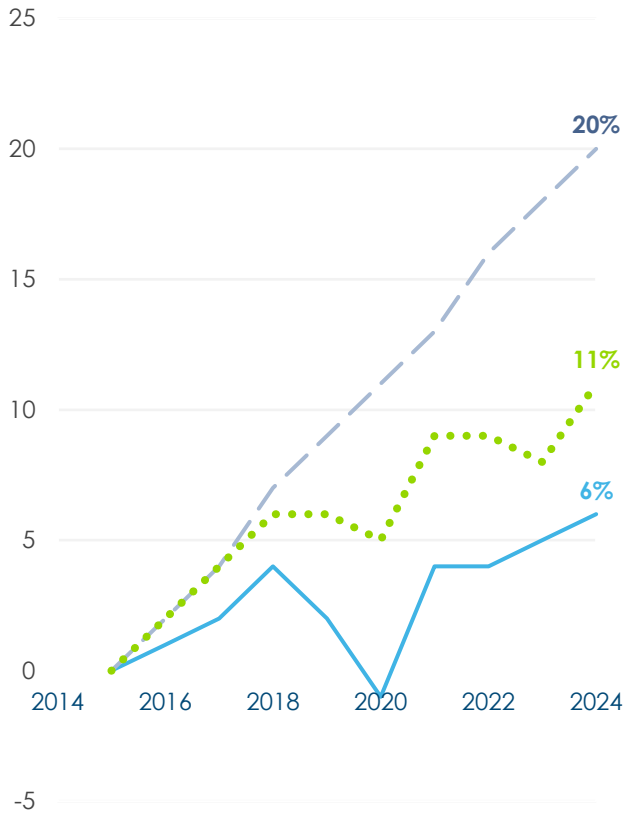


Notes: Historic data is from BNEF's ETS; Land transportation includes road and rail transport.
Source: BloombergNEF (2026), New Energy Outlook

Building decarbonisation relies on a ramp up of clean electrification and efficiency gains; heat pump rollout needs to speed up

Growth of main metrics in global buildings stock

% change relative to 2015



Floor area growth

Floor areas expanded:
- **~2x** faster than energy consumption
- **~4x** faster than emissions

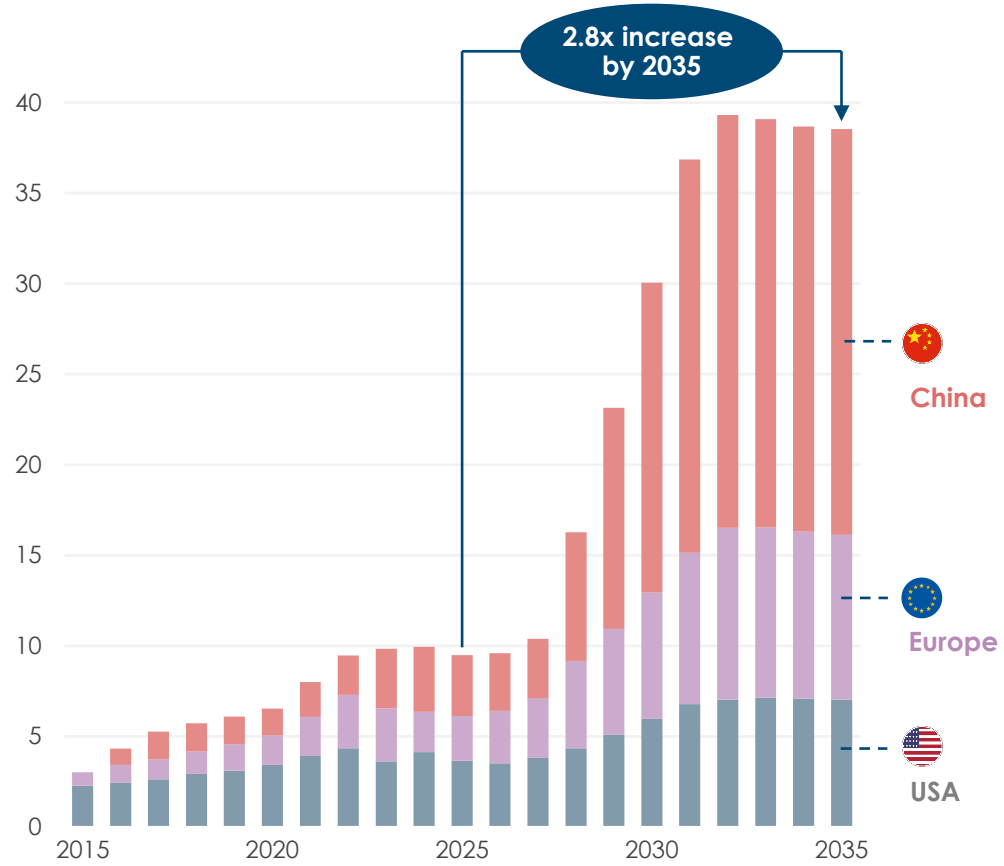
Energy consumption growth

Operational emissions growth

Limiting emissions growth will depend on:
- **Rapid stock turnover** of:
  - Gas boilers to Heat pumps
  - Combustion-based cooking to electric stoves;
- **Lower grid emissivity**
- **Appliance efficiency**

Heat pumps sales by geography (BloombergNEF Net Zero Scenario)

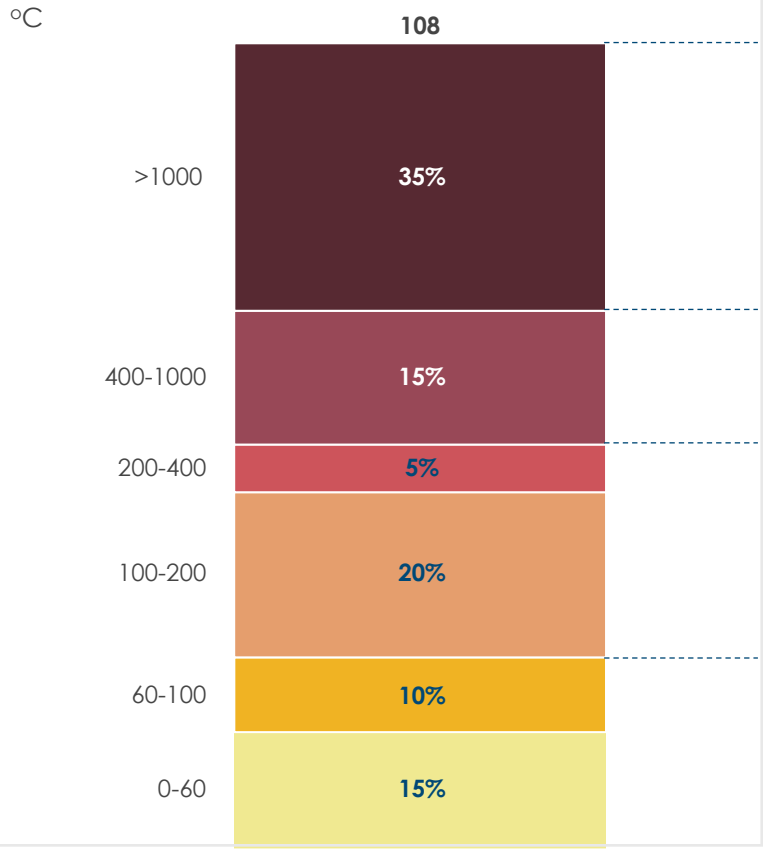
Million units per year



Note: Emissions growth trend approximately extracted from United Nations Environment Programme data. Source: BloombergNEF (2026), New Energy Outlook; United Nations Environment Programme (2026), Global Status Report for Buildings and Construction 2025-2026

Industrial heat storage is commercial below 400°C; high-temperature is still emerging

Industrial heat demand by temperature (EJ)



Example heat use

Very high temperature (>1000°C)
- Calcination of limestone for cement
- Melting in glass furnace

High temperature (400-1000°C)
- Steam reforming and cracking
- Hydrogen heating for DRI

Medium temperature (100-400°C)
- Drying
- Evaporation
- Distillation
- Activation

Low temperature (<100°C)
- Washing
- Rinsing
- Cooking
- Sterilisation

Current deployment and cost signals

Innovators breaking ground
- Resistance heating and induction are already technically ready, but have barely been deployed
- Moving to FOAK, Rondo 100 MWh in Lisbon (storage up to 1,500°C)

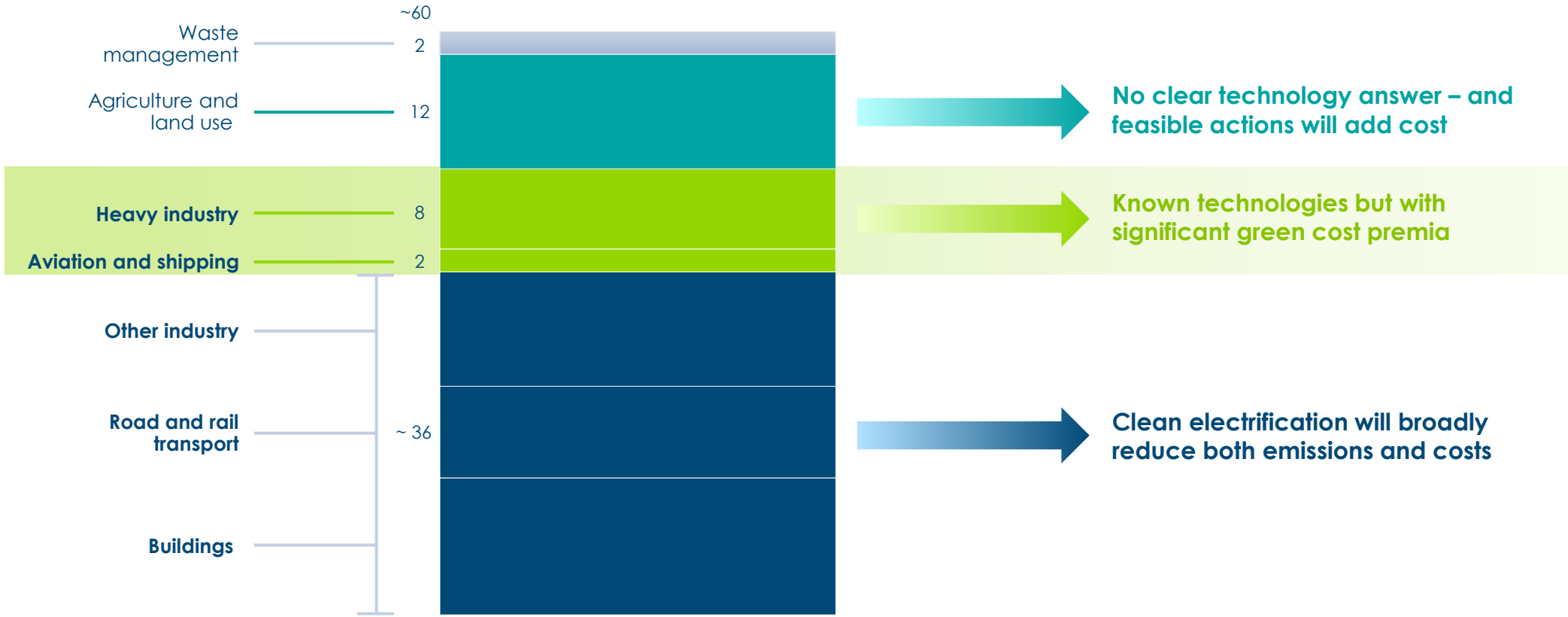
Economics closing in
- Steam generation with integrated heat pumps is close to economic viability
- BASF is building a ~50 MW industrial heat pump at Ludwigshafen
- Retail : ~€184/MWh for e-boilers, so flexibility is essential

Viable but under-deployed
- Installed EU27 industrial heat pump stock is 7 TWh vs technical potential of 722 TWh.
- Less than 1% penetration despite IEA confirming cost competitiveness in 17 EU countries (€41-74 /MWh)

Notes/Sources: IEA (2025), Can low-temperature heat in factories be electrified competitively?; EHPA (2025), Industrial heat pumps to decarbonize Europe's industry; Fraunhofer (2025), Electrification of industrial heat: An overview of the new EU auction design; Rondo (2025), Rondo Powers Up World's Largest Industrial Heat Battery; IEA, industrial-heat-demand-by-temperature-range-2018. Based on scenarios from IEA World Energy Outlook 2019, which are modelled through the World Energy Model, a data-intensive model covering the whole global energy system. McKinsey (2020) Plugging in: What electrification can do for industry.

Hard-to-electrify sectors will be more expensive to decarbonise, but rapid progress still possible

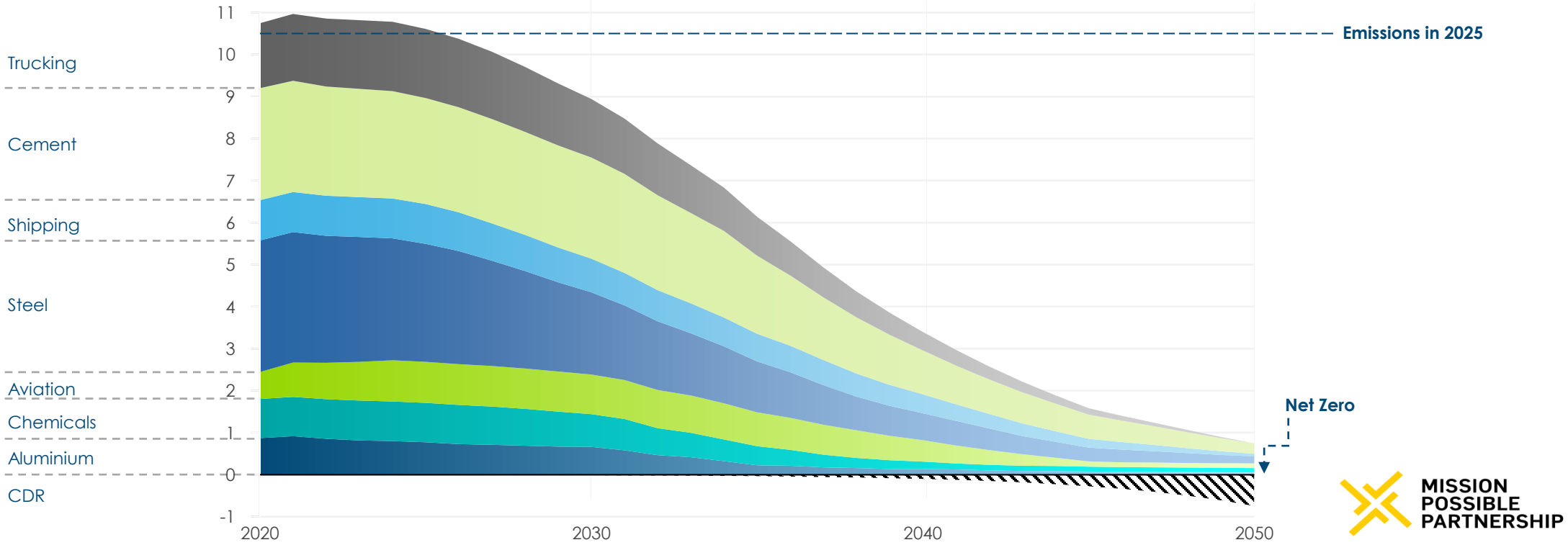
GHG emissions by broad sector
Gt CO_{2eq}



Source: Systemiq analysis for the ETC; EDGAR (2025) Community GHG Database; ETC (2021) Keeping 1.5oC Alive

In the hard to electrify sectors, rapid emissions are technically feasible, and will require an ambitious clean industry project pipeline to be built

Scope 1 & 2 emissions by sector for Net Zero by 2050
$GtCO_2$ p.a.



MISSION POSSIBLE PARTNERSHIP

Note: Updated numbers from MPP forthcoming.
Source: Mission Possible Partnership (2021-2023) Sector Transition Strategies; BloombergNEF (2026), New Energy Outlook

Carbon price and mandate foundations are strengthening, but more supportive policy is needed to unlock more projects

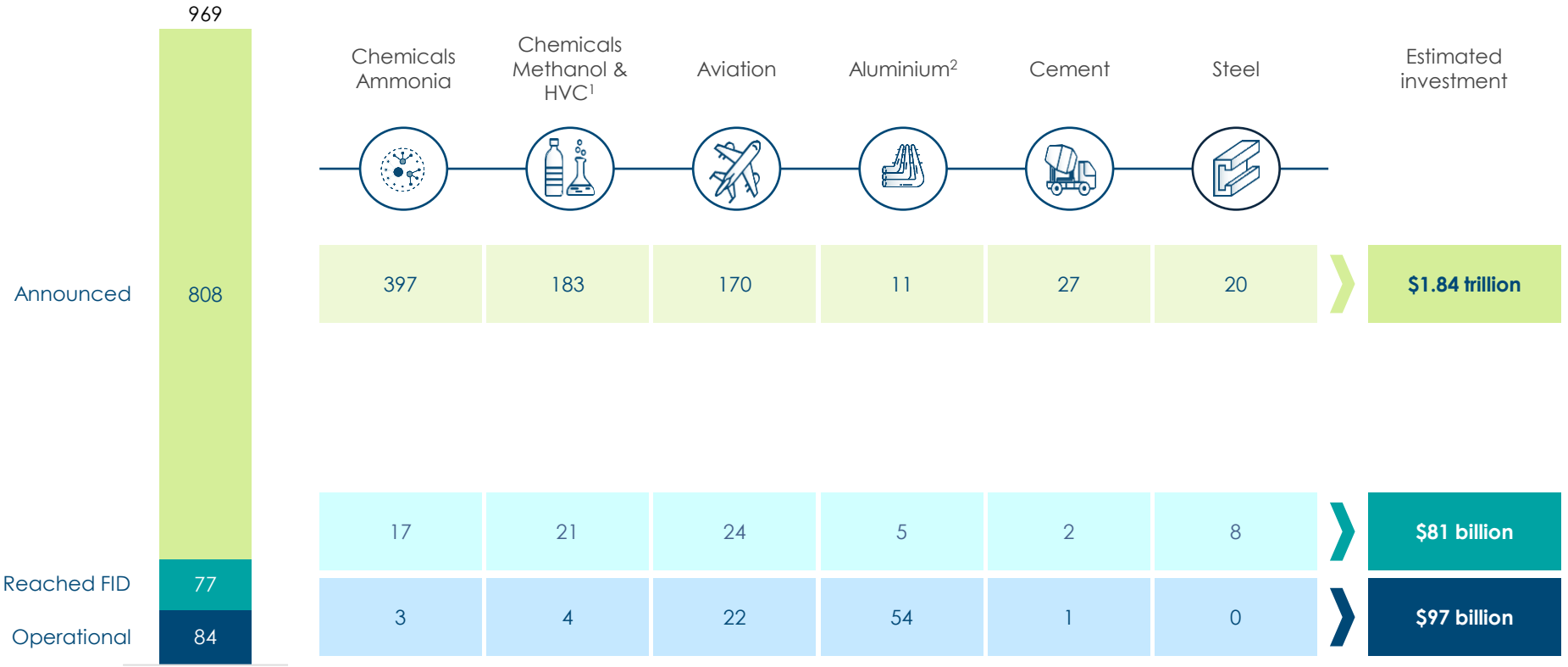
	Heavy Industry	Maritime sector policy	Aviation sector policy
	EU Carbon Border Adjustment Mechanism	Levy to start in 2028?	ICAO CORSIA & SAF Mandates
Key policies	• CBAM entered its definitive paying phase on 1 Jan 2026 • Free ETS allowances phasing out	• Carbon pricing and fuel standard approved April 2025. • Adoption postponed 1 year.	• CORSIA moves from voluntary to broader coverage from 2027
Current situation	• Low near-term cost exposure, but offtake signals improving[1] • US has no CBAM equivalent, relying more on incentives • China/India introducing or reinforcing national carbon prices	• US-led coalition drove the delay; China, Greece and Cyprus switched votes • 2027 entry into force now at risk	• Sustainable Aviation Fuel (SAF) still <0.7% of jet fuel globally • US has no federal SAF mandate, relying on tax credits and voluntary demand.
Implications	• CBAM is starting to bite, decarbonizing many industrial processes will be competitive by mid-2030s, increasing offtakes	• Regulatory uncertainty now the main brake on alternative fuel investment, prices still an issue until a fuel mandate creates demand	• CORSIA is now biting financially, but SAF supply gap means offset purchases dominate compliance

Notes/Sources: [1]HYBRIT, SALCOS, ArcelorMittal; MPP November 2024 Update; Carbon Border Adjustment Mechanism (March 2025); Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA); Elisabetta Cornago et al. (2024) Learning from CBAM's transitional phase; BCG (September 2023) The Start of CBAM: A Major Landmark for Global Trade and Carbon Accounting, BloombergNEF (2025), 2025 Sustainable Aviation Fuel Outlook: Reaching New Highs; GreenAirNews (2025)

MPP global project tracker shows progress in announced projects to decarbonise hard to electrify sectors, but very few FIDs

Global Project Tracker pipeline

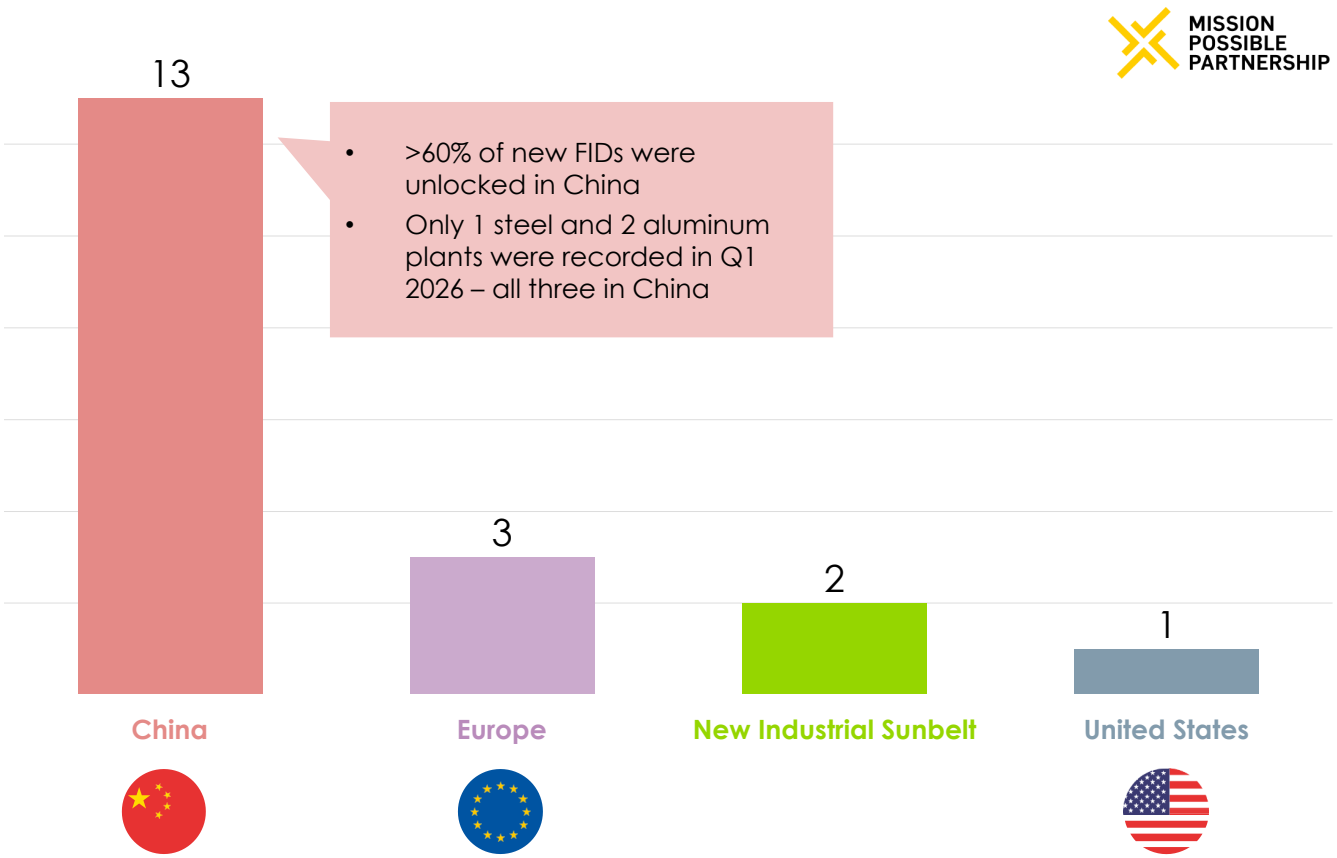
Total projects by project stage, June 2026



Notes: 1) HVC (High Value Chemicals) includes: Olefins (Ethylene, Propylene), Aromatics (Butadiene, Benzene, Toulene, Xylene) 2) Over half of operational plants are in the Aluminium sector, most of which are legacy clean assets. Source: MPP (2026), Global Project Tracker. For per sector sources, products in scope and technologies in scope please refer to MPP Global Project Tracker

China accounts for +60% of new clean industry, and supplies 45% of plant equipment for clean industry outside China

New FID per region, November 2025 – April 2026



Source: MPP (2026), Clean Industry Rising: the Foundation of Resilient Value Chains, Global Project Tracker

Chinese clean industrial leadership in figures

Pipeline share: China accounts for:

- 21% of the total global clean-industry pipeline of 969 projects
- 45% of the 161 global projects that have passed FID

Technology mix: China's pipeline is dominated by electrification:

- 69% hydrogen-based projects
- 21% biomass

Equipment leadership: China already supplies:

- **83% of renewable energy equipment**
- 45% of clean industrial plant equipment to projects passed FID globally

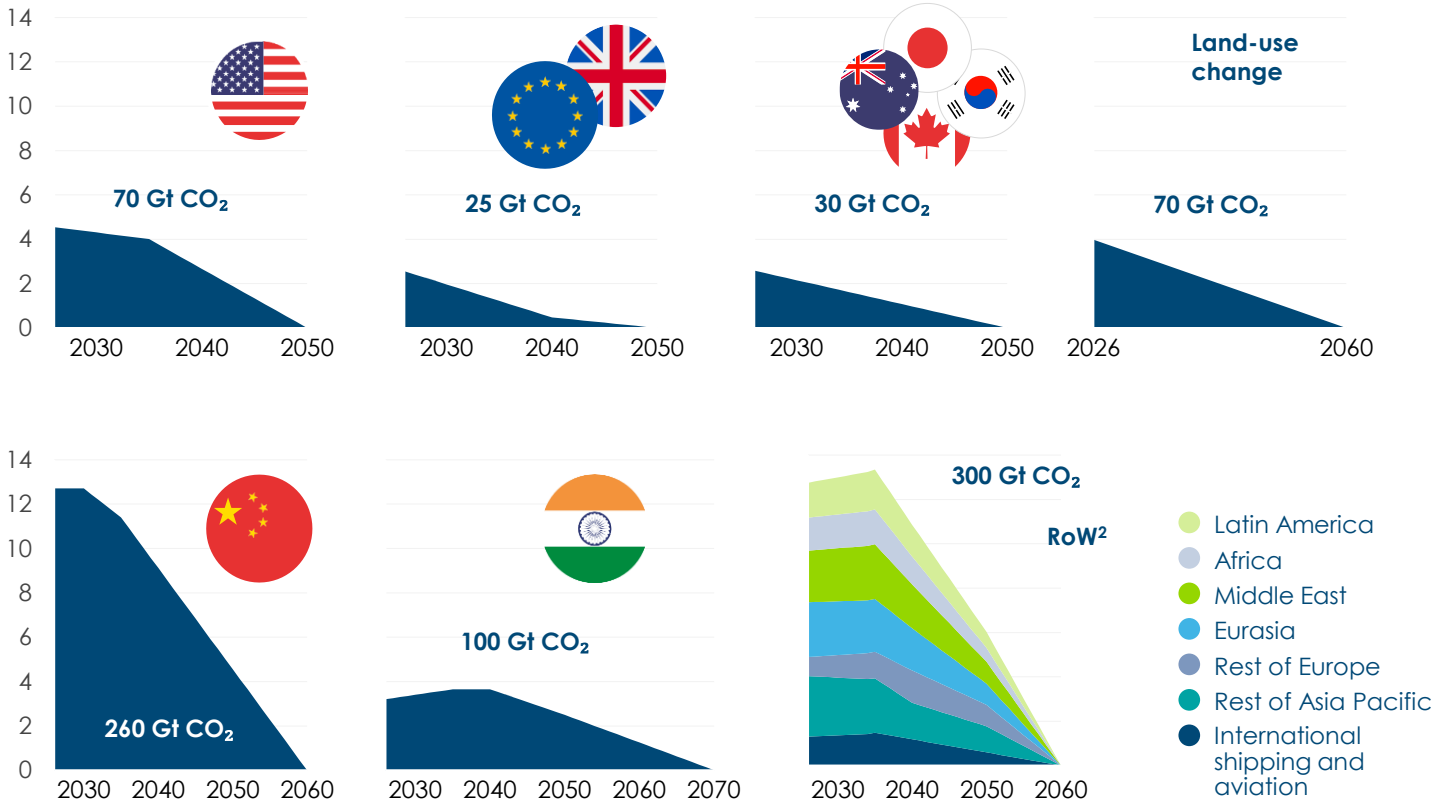
Alongside failure to phase down coal in power, there risk being 3 other big "misses" in the 2020s

Required action in 2020s for 1.5°C limit	End of deforestation	Methane emission reduction	Carbon removals
			
Required reductions in annual emissions (2021-2030) *Gt CO_2e*	-3.6	-4.6	-3.5
Actual change in annual emissions (2021-2025) *Gt CO_2e*	0.4	-0.1	-0.1
	• Global deforestation slowing compared to previous decades • Tropical primary forest loss fell 36% in 2025 versus 2024	• Fossil fuel CH4 intensity down by only 8% in past 3 years • Bio and agriculture emissions down by 2% in the past 3 years	• Massive gap between CDR demand vs. need • DAC cost pathways revised upwards

Notes: Methane emissions expectations only account for NDCs and Global Methane Pledges commitments; *MSCI CDR credit volume calculated by multiplying projected market size ($) by ETC average cost of carbon removal in each year ($/tCO$_2$)*. Source: ETC (2021) Assessing the commitments from COP26; ETC(2021) Keeping 1.5°C Alive; WRI (2025) Deforestation and Restoration Targets Tracker (Beta); IEA (2026) Global Energy Review; Global Carbon Budget (2025); MSCI Carbon Markets (2025), *Frozen Carbon Credit Market May Thaw as 2030 Gets Closer; Crippa M., Guizzardi D., Pagani F., Banja M., Muntean M. et al., GHG emissions of all world countries - 2025 Report, Publications Office of the European Union, Luxembourg, 2025, doi:10.2760/9816914, JRC143227; Global Forest Watch [Accessed Nov 2025].*

Even if all countries implement their pledges, cumulative future emissions are likely to far surpass the carbon budget for a 1.5°C trajectory

Cumulative CO_2 emission estimates[1], 2026-2070
$GtCO_2$ – illustrative trajectories towards targets



Remaining carbon budget, as of 2026, for a 50% likelihood

1010 Gt CO_2
for < 2°C

855 Gt CO_2
Global future cumulative emissions if all countries deliver their pledges

90 Gt CO_2
for < 1.5°C

Note: 1. Country estimates refers to energy-and industry related emissions; 2. Estimated based on IEA's STEPS until 2035 and then straight lined to 2060
Source: IEA (2025) World Energy Review; JRC/IEA 2025 Report (2025) GHG emissions of all world countries; Global Carbon Budget (2025) Fossil fuel CO_2 emissions hit record high in 2025; Climate Change Tracker available at: https://climatechangetracker.org/climate-change-progress/current-remaining-carbon-budget-and-trajectory-till-exhaustion [Accessed November 2025]

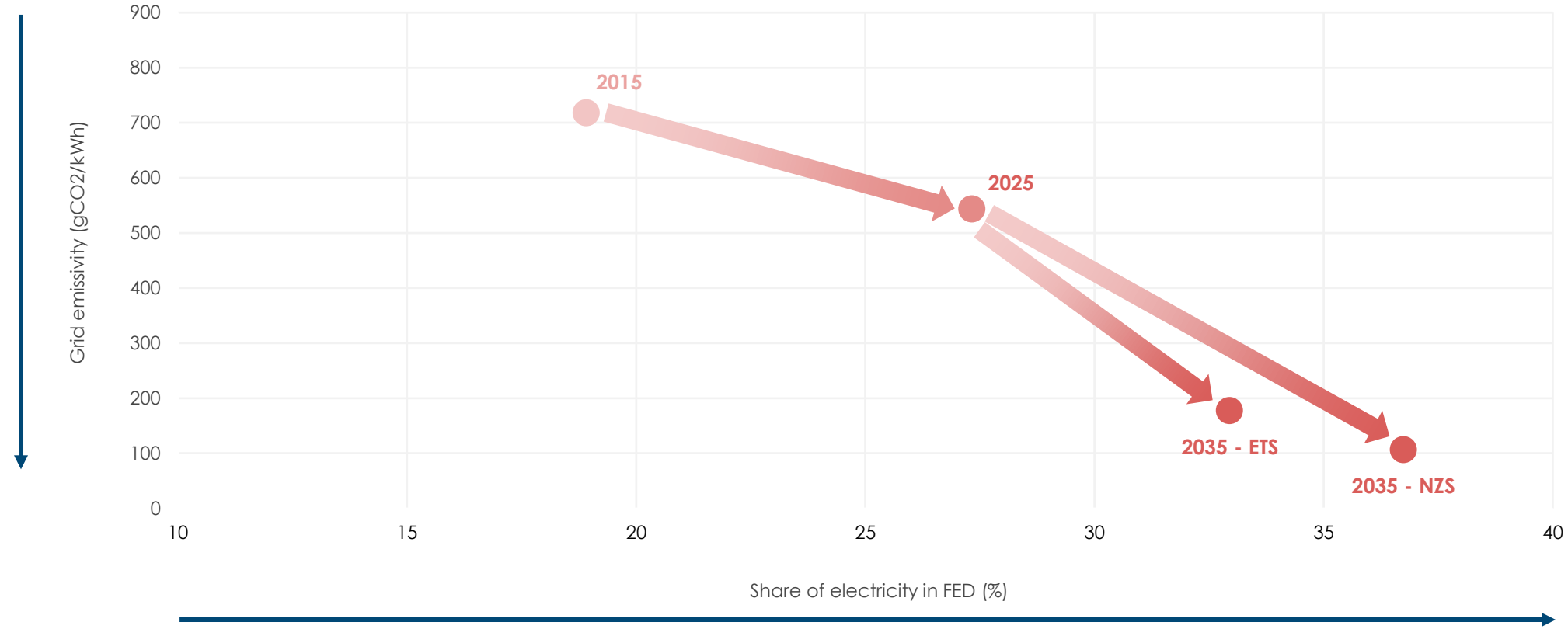
Regional progress

Key messages | Regional transition progress: China leads the world; high potential in Asia; Europe and US face implementation challenges

- **China remains the defining force in the global transition.** It now installs as much renewable capacity as the rest of the world combined, leads clean manufacturing across batteries, solar and heavy industry, and hosts the largest share of clean industrial projects reaching FID. **Removal of infrastructure and market barriers will be key to phasing down coal and increased clean electrification.**
- **India represents the largest long-term opportunity to bend the global emissions curve.** Electricity demand is growing rapidly: while low-cost renewables, grid expansion, and electrification offer potential to avoid long-term fossil lock-in but are not being deployed at sufficient pace. **A bigger challenge is in industry,** responsible for a quarter of India's emissions and demand set to continue expanding towards 2050.
- **In the rest of Asia, clean technologies are also becoming the cheapest development pathway.** Falling solar and battery costs create opportunities to expand energy access while avoiding future fossil imports; reducing financing costs will continue to be key for large projects.
- **Europe has built the world's strongest policy framework but now faces an implementation challenge.** Carbon pricing of around €70–80/tCO_2, CBAM implementation and low-carbon industrial policy provide strong foundations, yet permitting, electricity prices, hydrogen availability and grid expansion increasingly undermine competitiveness. In countries with clean grids already, electrification, not further power decarbonisation, will need to take priority in the transition – growing the demand base will also address affordability.
- **The UK sees a steady but not sharp decrease in annual emissions since 2014, with solar and wind capacity rebouncing in 2025 to historical high levels of installations.** The biggest barrier remain electrification, with high prices of power not providing incentives for fuel switch, also impacting industry decarbonisation. Strong carbon pricing in place aligned with that of EU's.
- **The United States continues to decarbonise despite federal blockages.** Market economics support the deployment of renewables, batteries and electric vehicles, but slower policy support risks widening the deployment gap with China in both manufacturing and clean industry.

In the next 10 years China should accelerate grid decarbonisation, alongside keeping pace on electrification

Grid emissivity vs electrification share in final energy demand (FED) by region, 2015-2035 (BloombergNEF)
gCO_2/kWh & %, respectively

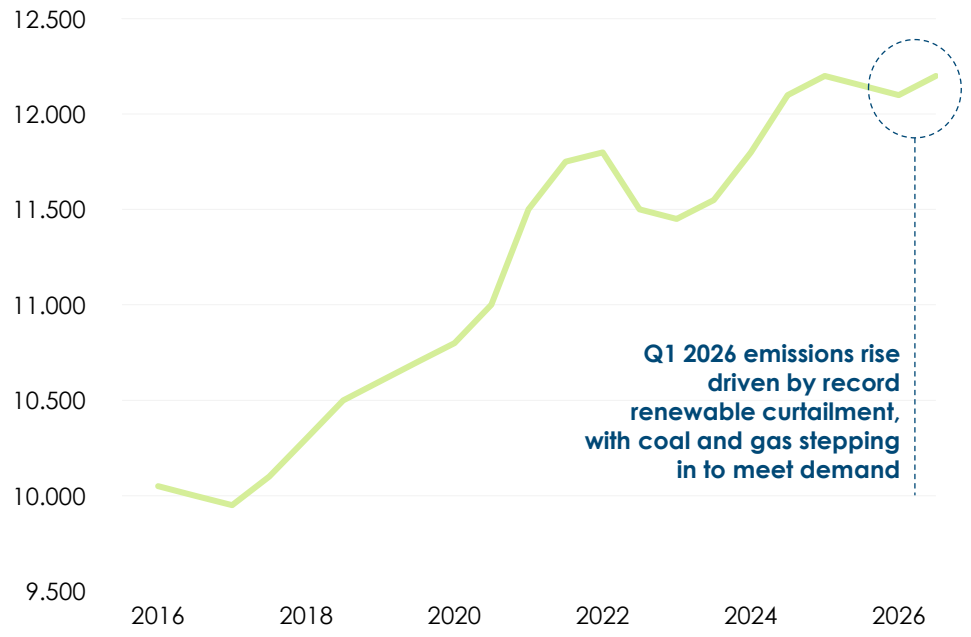


Note: ETS = Economic Transition Scenario; NZS = Net Zero Scenario
Source: BloombergNEF (2026), New Energy Outlook 2026

Coal shows signs of structural peak in power generation, but curtailed renewables & rising demand kept emissions rising in early 2026

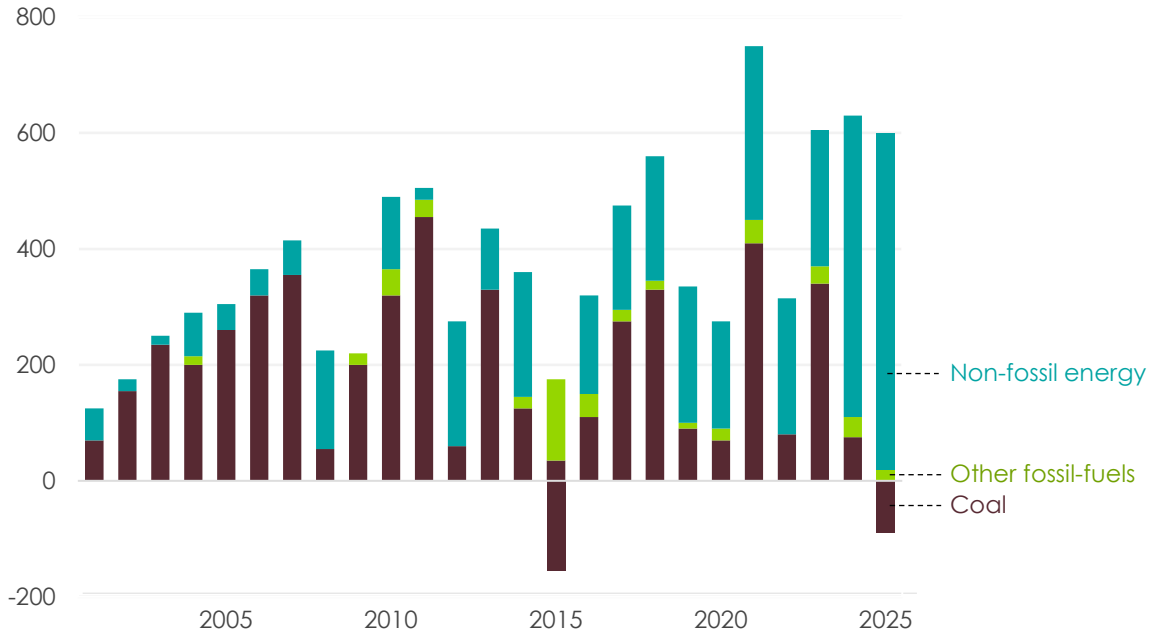
China's emissions rise in Q1 2026…

Fossil and Cement CO_2 emissions in China, 2016-Q126
$MtCO_2$, rolling 6-month totals



…despite signs of structural peak in coal generation

Change in power generation by source, per year
TWh



Source: Carbon Brief (2026) Analysis: China's CO_2 climbs 2% in early 2026 due to 'wasted' wind and solar; Carbon Brief (2026) Coal power drops in China and India for first time in 52 years after clean-energy records

Grid curtailment putting brake on Chinese strong renewable build-out; change to Contracts for Difference (CfD) revenue schemes sees small build dip

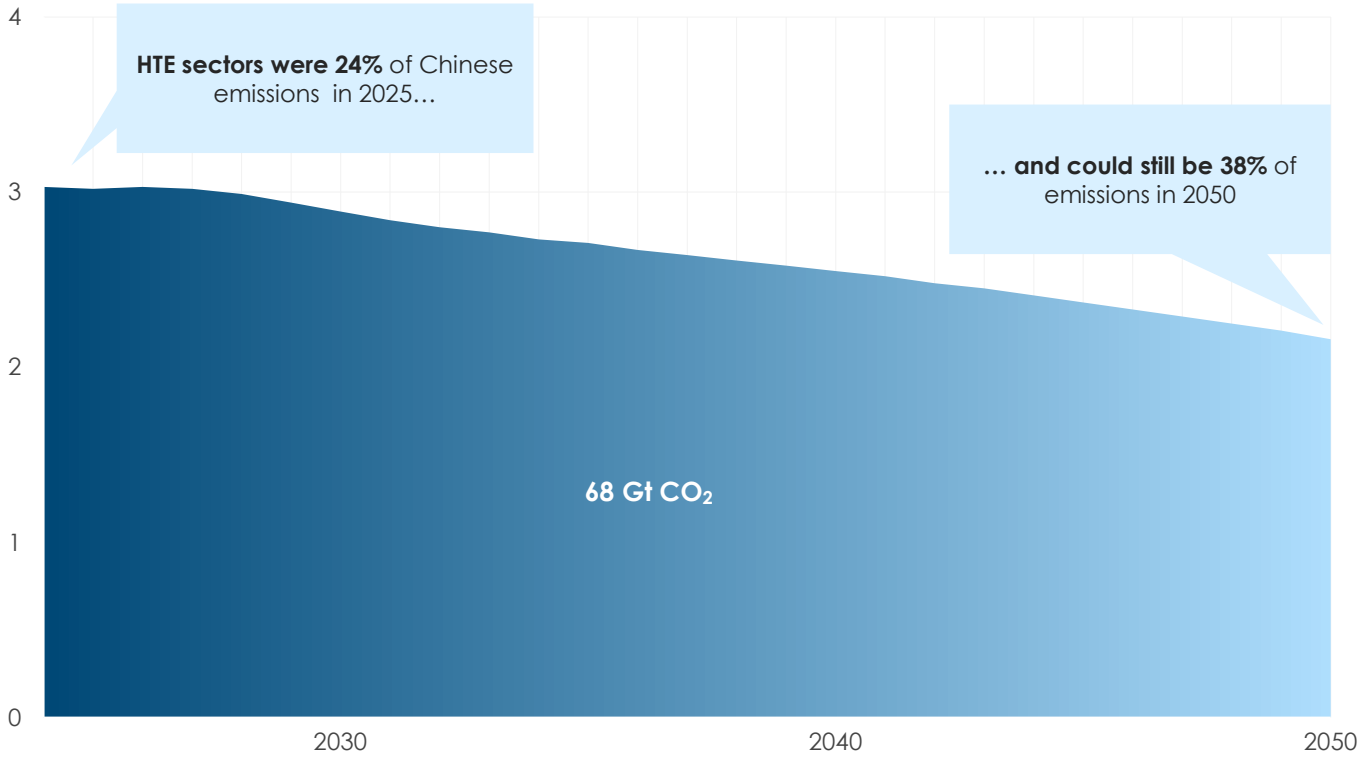
	Grid curtailment	Pricing
What's happening	• Wind and solar curtailment at 8.5 - 9.2% in early 2026, +2 x more than 2022/23	• End of fixed tariffs in 2026 to drop annual additions by ~20% • Recover of new capacity expected with maturing of CfD-style auctions
Why	• New renewable capacity coming faster than transmission and distribution grids can absorb	• Auctions in Sept. 2025 below previous fixed tariff rates: -43% for solar and -19% for wind in Shandong Province
Impact	• Delayed phase down of fossil generation, driving emissions up	• Developers' revenue uncertainty slow build rate
What could help	• Inter-provincial grid upgrades and spot market - underway, but slow progress	• Grid investments, inter-provincial power trading and direct wire to improve projects' economics

Source: BloombergNEF (2026) China Solar Build Chills as Developers Defend Revenues; The Oxford Institute for Energy Studies (2026) China's Messy Power Sector Mid-Game; BloombergNEF (2026), New Energy Outlook; BloombergNEF (2026) China Market Outlook 1H 2026: Resilience Amid Turbulence ; Taiyang News

China is also investing in decarbonising hard-to-electrify sectors, but a weak carbon price still limits the shift

CO_2 emissions[1] in hard-to-electrify industries in China, 2025-2050, BloombergNEF Economic Transition Scenario

$GtCO_2$



Notes: 1. Emissions capture direct CO_2 emissions from fuel combustion in steel, cement, aluminum and chemicals, including emissions from industrial processes. Embodied carbon, from petrochemicals for instance, not included.
Source: BloombergNEF (2025), New Energy Outlook 2025; Alpha Ladder Group (2026) China Carbon Market Weekly 27 April – 1 May 2026; S&P Global (2025) Chinese hydrogen producers target cost of production reductions; BloombergNEF (2026), New Energy Outlook

Leader in hard-to-abate clean tech investment

- 43 projects in Final Investment Decision phase
- 30 projects already in operation

Policy and cost foundations for green hydrogen at scale

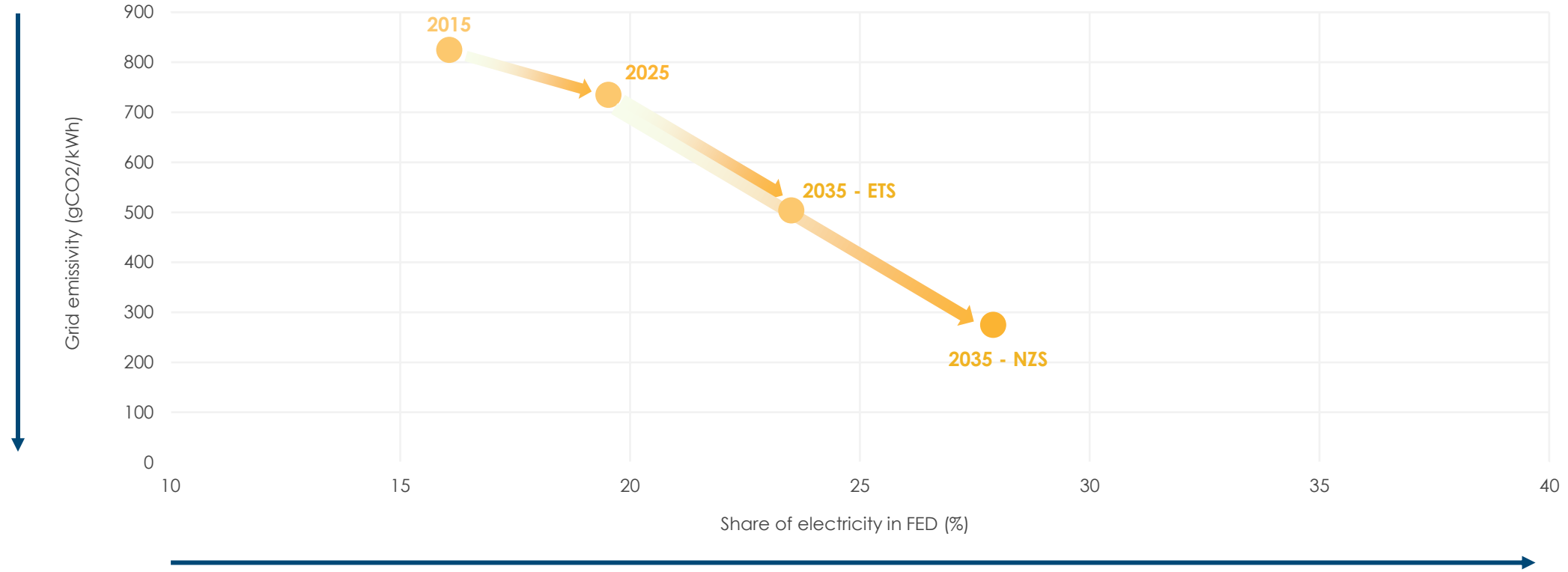
- New government fund to support green hydrogen, ammonia and methanol
- $2/kg in 2030 aim will position China as the global lowest-cost producer

Slow expansion on emissions trading schemes

- China ETS as from 2025 to allocate allowances for steel, cement and aluminium
- Still low price signals - carbon price currently at ~$11/ton vs ~$80/ton in EU ETS

India is on the right track, but far from the pace needed - both grid decarbonisation and final use electrification need reinforcement

Grid emissivity vs electrification share in final energy demand (FED) by region, 2015-2035 (BloombergNEF)
gCO_2/kWh & %, respectively

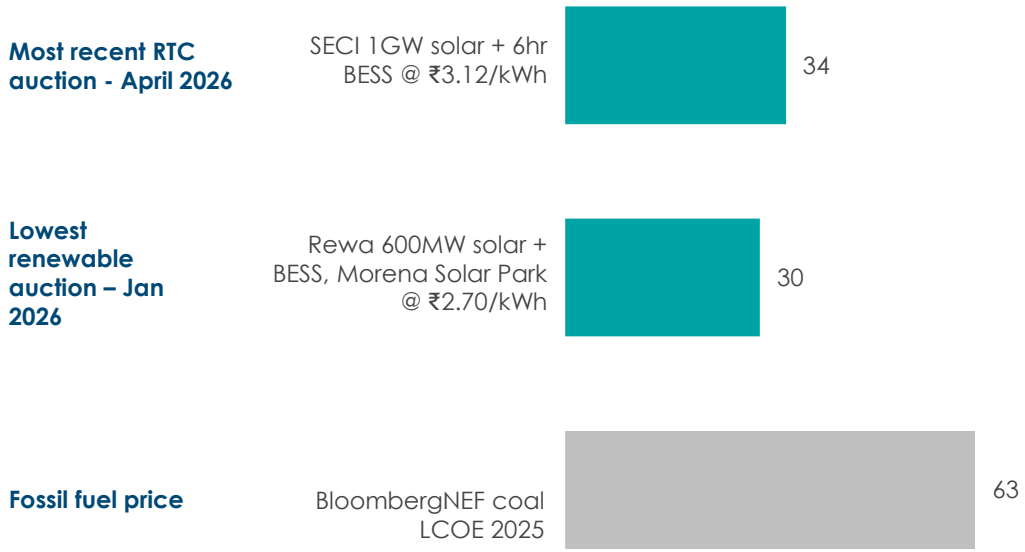


Note: ETS = Economic Transition Scenario; NZS = Net Zero Scenario
Source: BloombergNEF (2026), New Energy Outlook 2026

India has the world's lowest renewable auction prices, but deployment is slow compared to China

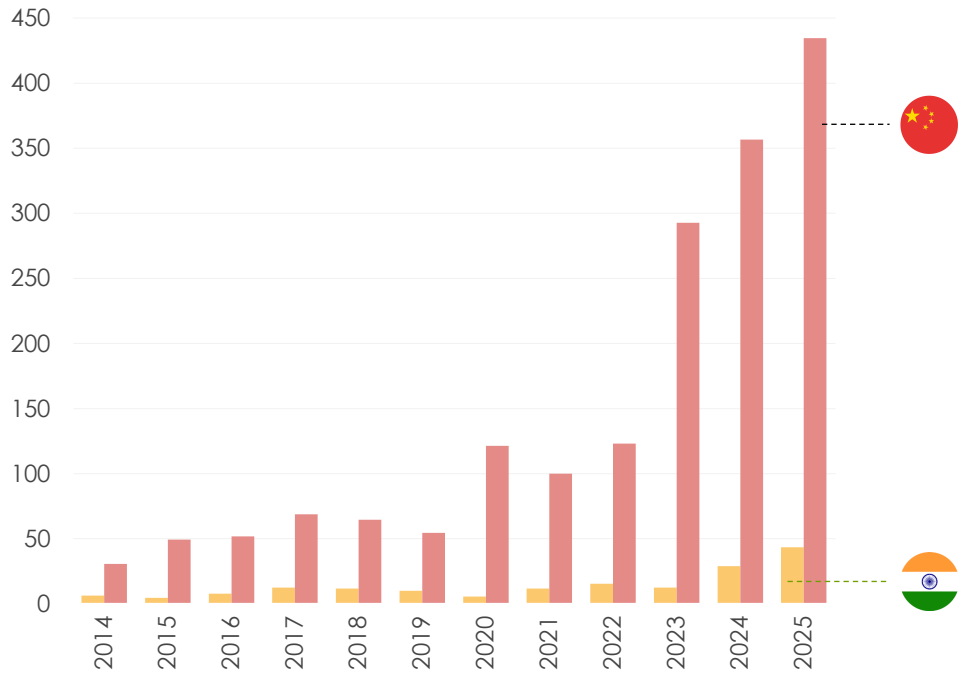
Solar + storage now 50% cheaper than coal in India

India auction results
$/MWh



But: China installing renewables 9x faster

Annual capacity addition of renewable energy, India and China (2014-2025)
GW



Note: Renewable energy includes solar PV, solar thermal, distributed solar generation (where possible), and onshore and offshore wind. 2025 figures are estimates from BNEF's New Energy Outlook. Source: Ember (2026) Battery storage is now cheap enough to unleash India's full solar potential; Mercom India (2026) Five Lowest Renewable Plus Storage Auction Tariffs in India During 2025; BloombergNEF (2025) India LCOE data; Ember (2026) Electricity Data Explorer.

Surging demand keeps coal volumes rising; grid and DISCOM gaps compound the challenge

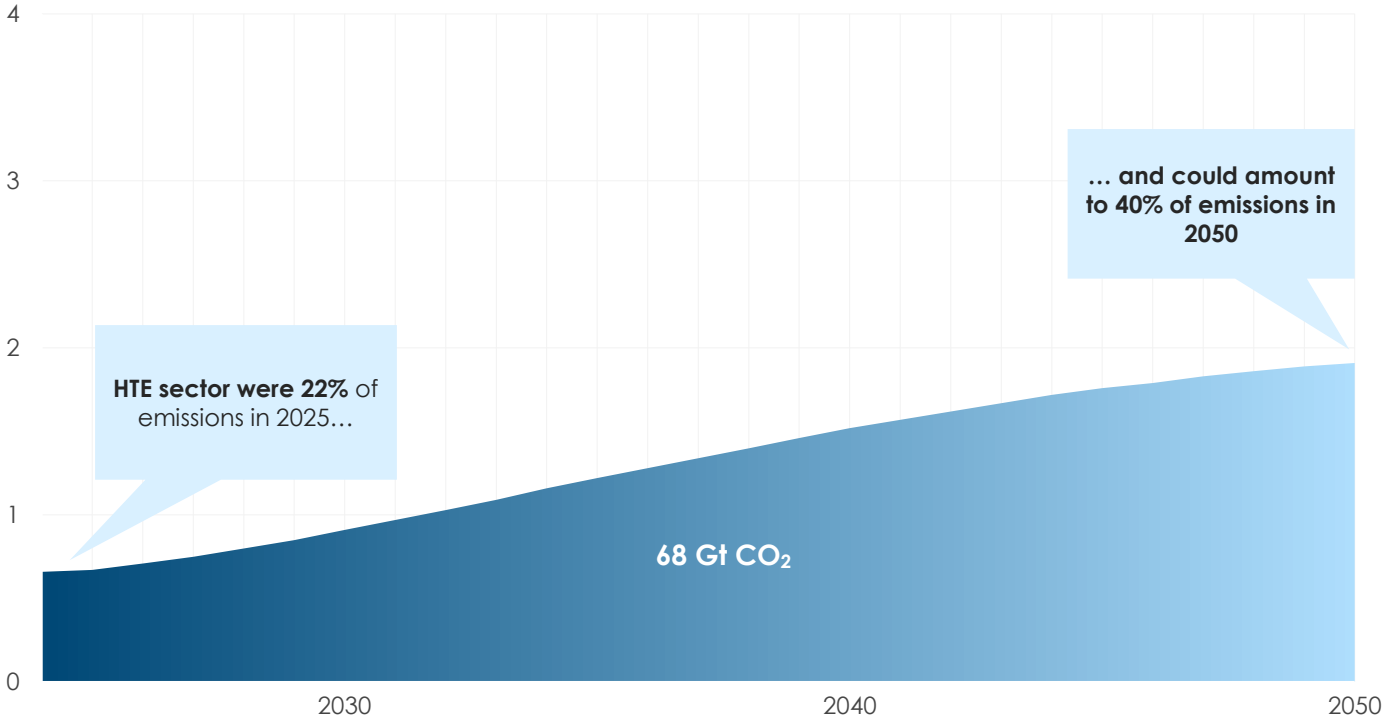
	Increasing power demand	Power offtake via DISCOMs*	Curtailment and constraints
What's happening	• Power demand growing 6.4% annually – among the fastest globally	• 44 GW of awarded solar stranded without signed PPAs;	• ~3% of renewable generation is curtailed
Why	• Demand growth absorbs new renewable generation, limiting coal displacement	• Weak DISCOM finances constrain renewable offtake	• Transmission build lags solar by 18–20 months • Coal inflexibility drives midday solar curtailment
Impact	• Coal share falls, but coal volume (and emissions) keeps growing	• DISCOM counterparty risk increases solar bid prices	• 20 GW faces grid connection delays; curtailment risks increase with more solar
What could help	• Faster solar deployment could meet a larger share of demand growth	• Expand SECI/NTPC offtake while accelerating DISCOM reform	• Accelerate transmission build; battery storage to absorb flux • Make coal plants flexible

Note: DISCOMs, or Distribution Companies, are state-owned electricity distributors and the sole licensed buyers of renewable power in most Indian states; their financial weakness is the primary bottleneck to renewable deployment as all solar projects require a signed power purchase agreement (PPA) with a DISCOM to proceed. Source: Ember (2026) Transmission gaps are beginning to constrain India's rapid renewables integration; JMK Research (2025) India's 2025 Renewable Energy Sector Review; IEEFA (2025) India's Distribution Sector: Financial Health and Reform Pathways; IEA (2026) Electricity 2026; PRS India (2026) Electricity Sector Review

In hard-to-electrify sectors, India is scaling green hydrogen fast, however sector targets and carbon pricing still lag

CO_2 emissions[1] in hard-to-electrify industries in India, 2025-2050, BloombergNEF Economic Transition Scenario

$GtCO_2$



Notes: 1. Emissions capture direct CO_2 emissions from fuel combustion in steel, cement, aluminum and chemicals, including emissions from industrial processes. Embodied carbon, from petrochemicals for instance, not included; 2. supported by SIGHT programme subsidies (₹17,490 crore outlay) and interstate transmission charge waivers.
Source: Bloomberg (2026) India Records Lowest-Ever Price for Green Hydrogen; MNRE (2023) National Green Hydrogen Mission; ICAP (2026) Indian Carbon Credit Trading Scheme; NITI Aayog (2026) Sectoral Decarbonisation Roadmaps; CEEW (2023) Decarbonising India's Steel & Cement; ICAP (2026) Compliance obligations under India's Carbon Credit Trading Scheme enter into force for seven sectors; BloombergNEF 2026), New Energy Outlook

Heavy industry dominates emissions

- Industry is a quarter of India's emissions;
- #2 Globally on steel and cement production, with demand surging

Green hydrogen is scaling fast

- Record-low green hydrogen bid of ₹279/kg ($3/kg) in Feb 2026, less than half the cost in EU
- National Green Hydrogen Mission targets 5 Mt/yr by 2030

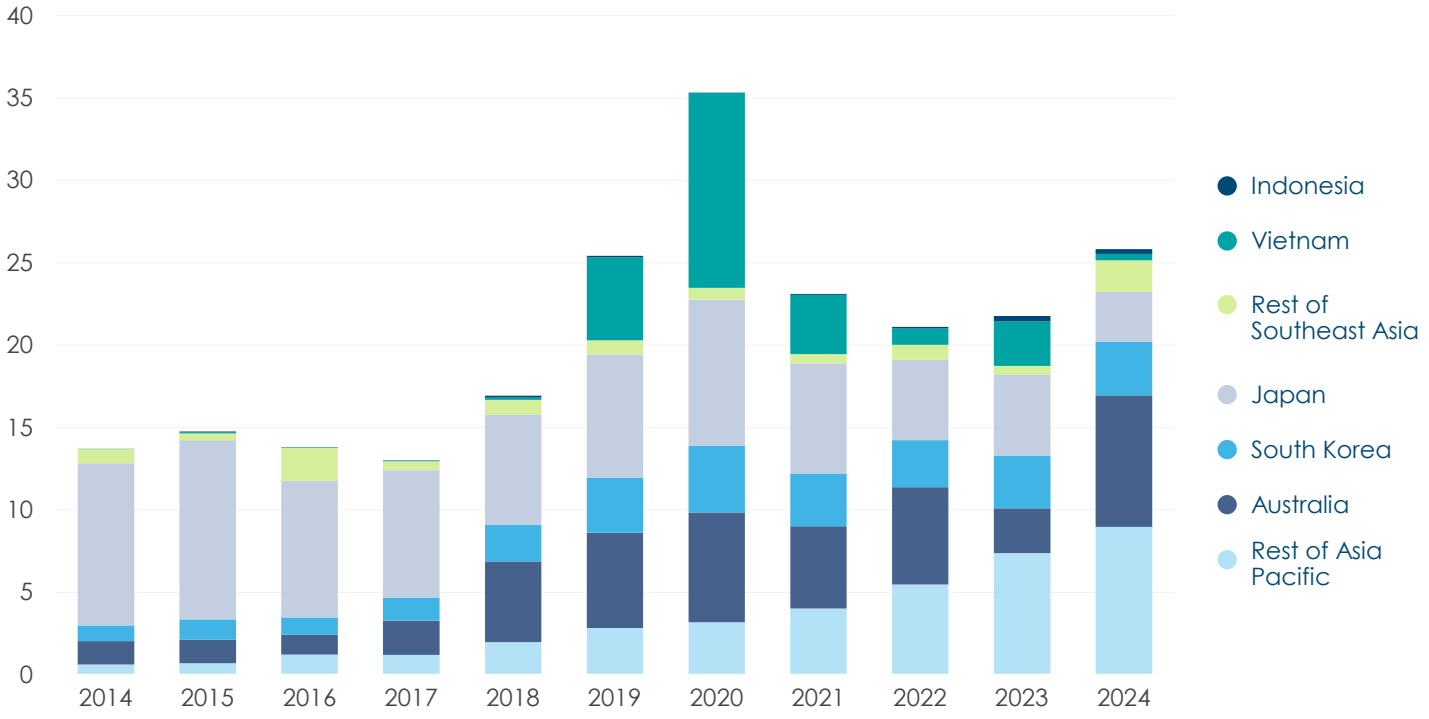
Carbon pricing ambition emerging

- Carbon Credit Trading Scheme expected in 2026;
- Intensity-based scheme with modest early reductions in 7 sectors; power not covered

Rest of Asia shows wide variation in clean energy deployment; aggregate progress not significantly accelerating

Annual capacity addition of renewable energy in Asia Pacific, Ember

GW



Notes: 1) Other Southeast Asia: Malaysia, Philippines and Thailand; 2) Other Asia Pacific: Afghanistan, Armenia, Azerbaijan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, Georgia, Hong Kong, Kazakhstan, North Korea, Kyrgyzstan, Lao PDR, Macao, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Singapore, Sri Lanka, Taiwan, Tajikistan, Timor-Leste, Turkmenistan, Uzbekistan, American Samoa, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Nauru, New Caledonia, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu; 3) Emissions are assumed to decline linearly over the period 2050–2070; 4) Renewable energy includes solar PV, solar thermal, distributed solar generation (where possible), and onshore and offshore wind. Source: Systemiq analysis for ETC; Ember (2026) Electricity Data Explorer.

Renewables reached 62% of new capacity additions in 2024, yet absolute volumes remain well below the pace required.

Indonesia, with a population of 287 million people, has just 1.49 GW of solar power, held back by state utility dominance and fossil fuel subsidies

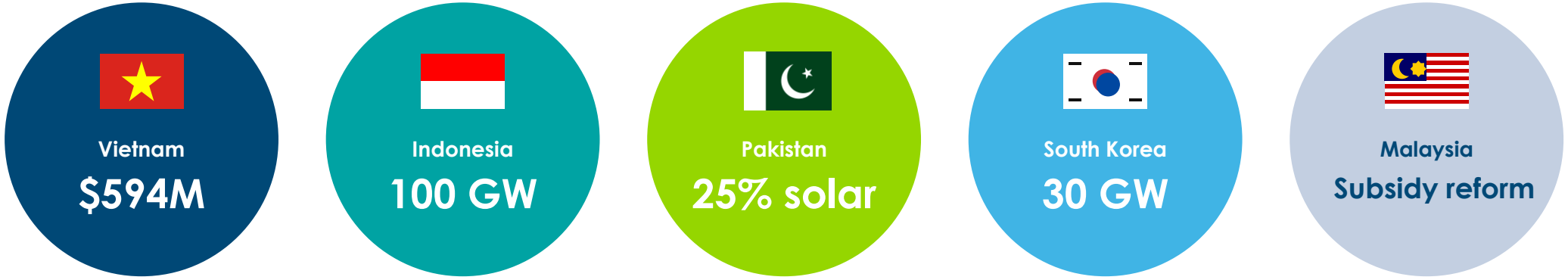
Vietnam's solar surge collapsed after feed-in tariffs expired, with no replacement policy to sustain momentum

Japan's additions have plateaued since 2019, with grid bottlenecks and permitting delays are holding back new capacity

Australia leads the region with strong rooftop solar and battery build-out

However, energy security imperatives are emerging as a new driver of clean energy momentum across the region

Energy security and clean energy are being seen as the same argument in the Asia Pacific



Post-Hormuz:
security now drives clean energy

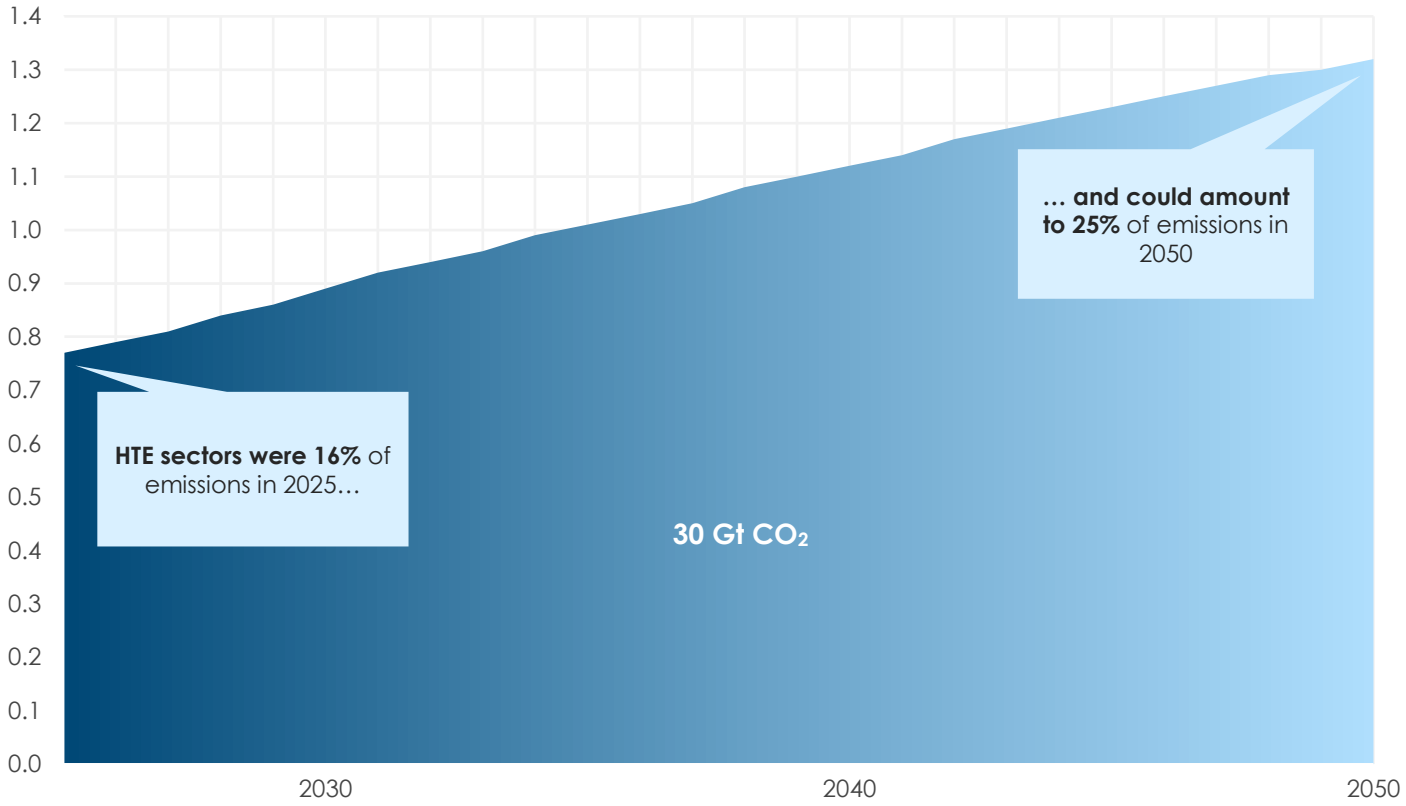
Nuclear revival:
clean firm power to replace coal

Source: Zero Carbon Analytics (2026) Solar could help Vietnam avoid almost USD 600 million from coal and gas imports, as Iran war drives up energy prices; Indonesia MEMR & IESR (2025) Indonesia Solar Energy Outlook 2025; Ember (2025) Pakistan Electricity Review 2025; Republic of Korea Ministry of Trade, Industry and Energy (2025) 11th Basic Plan for Long Term Electricity Supply and Demand; Malaysia Ministry of Finance (2025) Fiscal Outlook 2026: BUDI MADANI and Fuel Subsidy Rationalisation.

Despite rapid industrial growth, Asia Pacific lacks the carbon pricing and clean investment to decarbonise hard-to-abate sectors

CO_2 emissions[1] in hard-to-electrify industries in Asia Pacific, 2025-2050, BloombergNEF Economic Transition Scenario

$GtCO_2$



Notes: Countries included : Australia, South Korea, Japan, Indonesia, Vietnam and Other Southeast Asia and Other Asia Pacific according to BloombergNEF categorization, excluding China and India.
Source: OECD (2026) Steel Outlook 2026; EIC (2026) EIC Asia Pacific Hydrogen Report 2026; IEEFA (2025) Carbon Pricing in Asia; DCCEEW (2025) Safeguard Mechanism; NCCS (2026) Carbon Tax; BloombergNEF (2026), New Energy Outlook 2026

Increasing challenge on heavy industry

- Japan and South Korea are the largest industrial emitters (mainly steel), but small relative to India and China
- Indonesia and Vietnam industrial capacity growing the fastest, led by steel and cement

Hydrogen on the edge

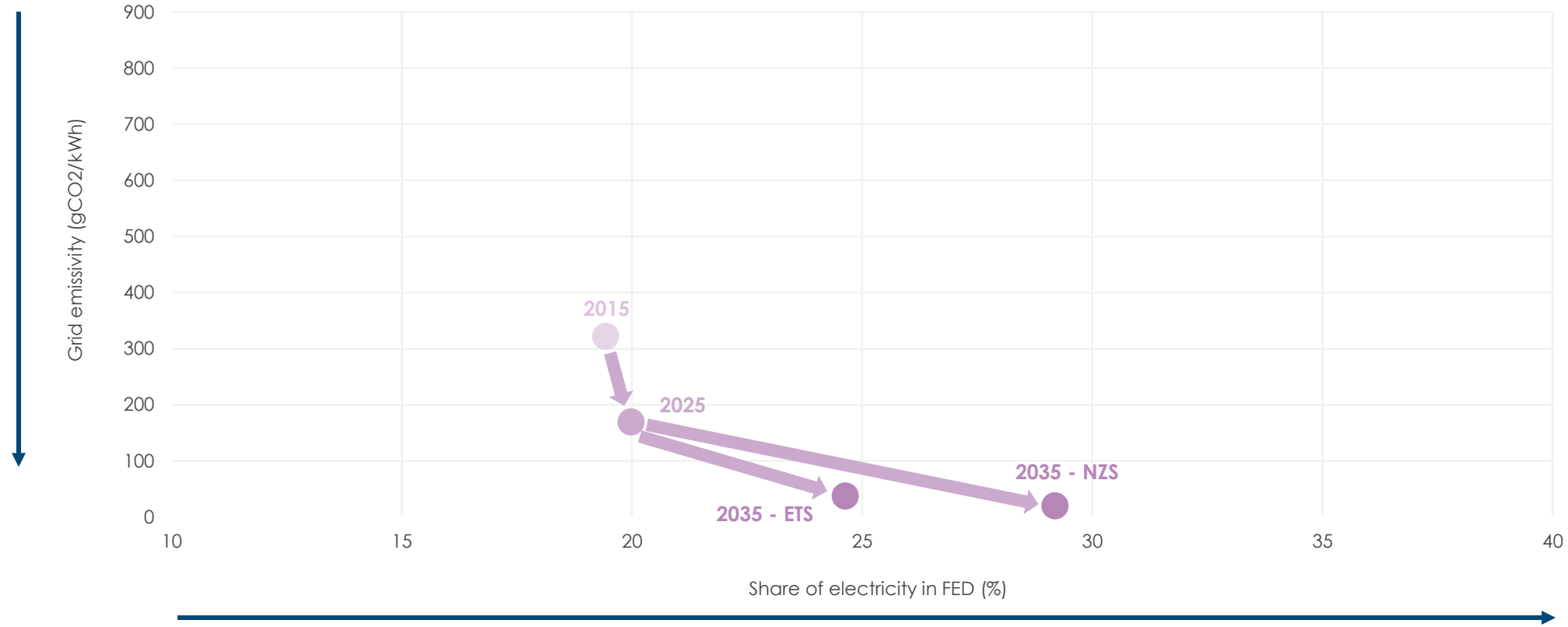
- 221 announced projects (~US$407 bn), only 11% under construction
- Japan and South Korea potentially import markets vs. Australia as an export one;
- Green H_2 costs at $5–9/kg

Limited carbon pricing ambition

- Weak carbon pricing overall, with ETS operating in Japan and South Korea
- Singapore leads on carbon pricing; but worth noting Australia's Safeguard Mechanism

Europe's challenge lies in electrifying its energy demand alongside decarbonisation

Grid emissivity vs electrification share in final energy demand (FED) by region, 2015-2035 (BloombergNEF)
gCO_2/kWh & %, respectively

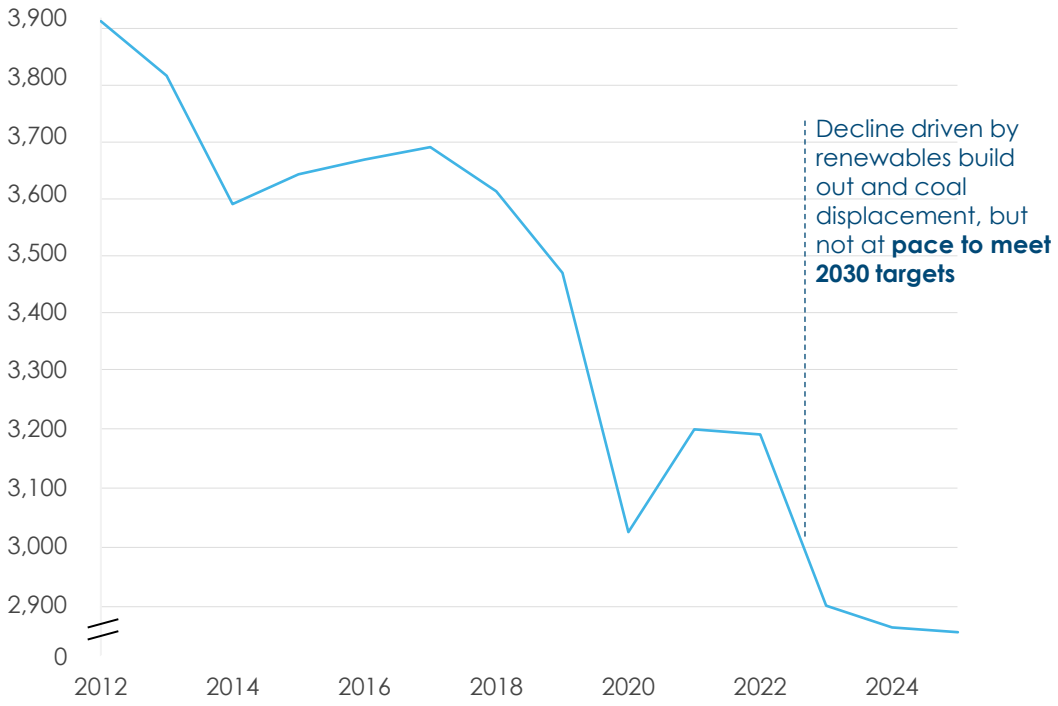


Note: ETS = Economic Transition Scenario; NZS = Net Zero Scenario
Source: BloombergNEF (2026), New Energy Outlook 2026

Strong renewable build-out is driving Europe's emissions to 60-year lows, but momentum is showing early signs of slowing

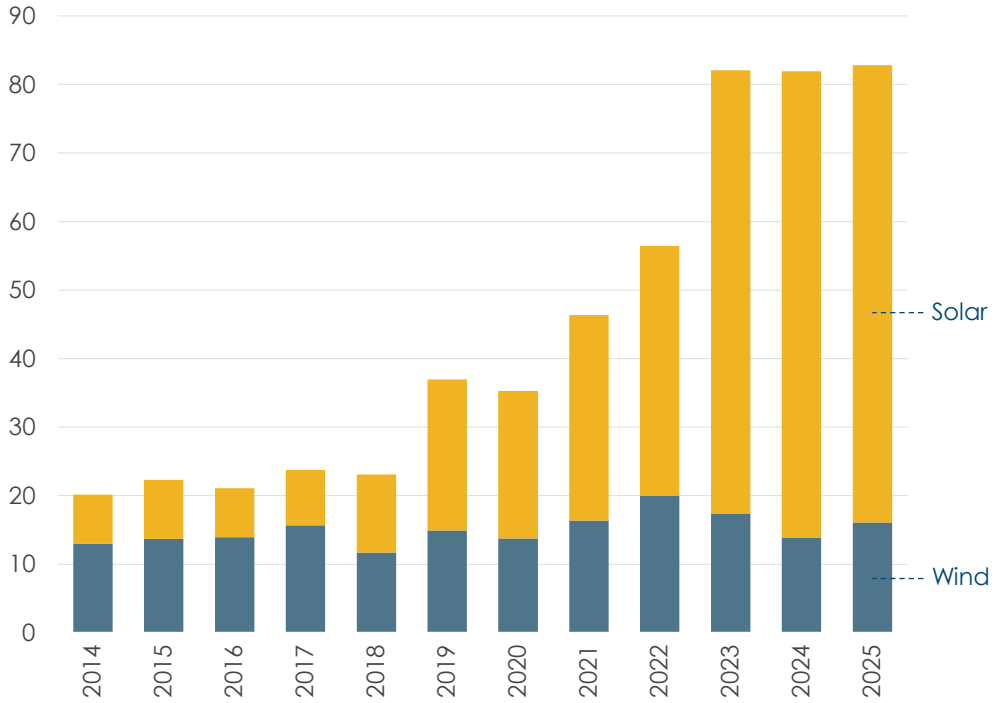
Renewable build-out is driving emissions to 60-year lows

CO_2 emissions from fuel combustion, Europe
$MtCO_2$, rolling 12-month totals



Build-out slowing from historically strong growth

Annual capacity addition of renewable energy, Europe (2014-2025)
GW



Note: Renewable energy includes solar PV, solar thermal, distributed solar generation (where possible), and onshore and offshore wind. Source: BloombergNEF (2026), New Energy Outlook; SolarPower Europe (2025) New report: EU hits 2025 solar target but market contraction puts 2030 goal at risk; Ember (2026) Electricity Data Explorer.

Connection queues and grid build are slowing Europe's renewables buildout; renewable auctions & electrification must accelerate

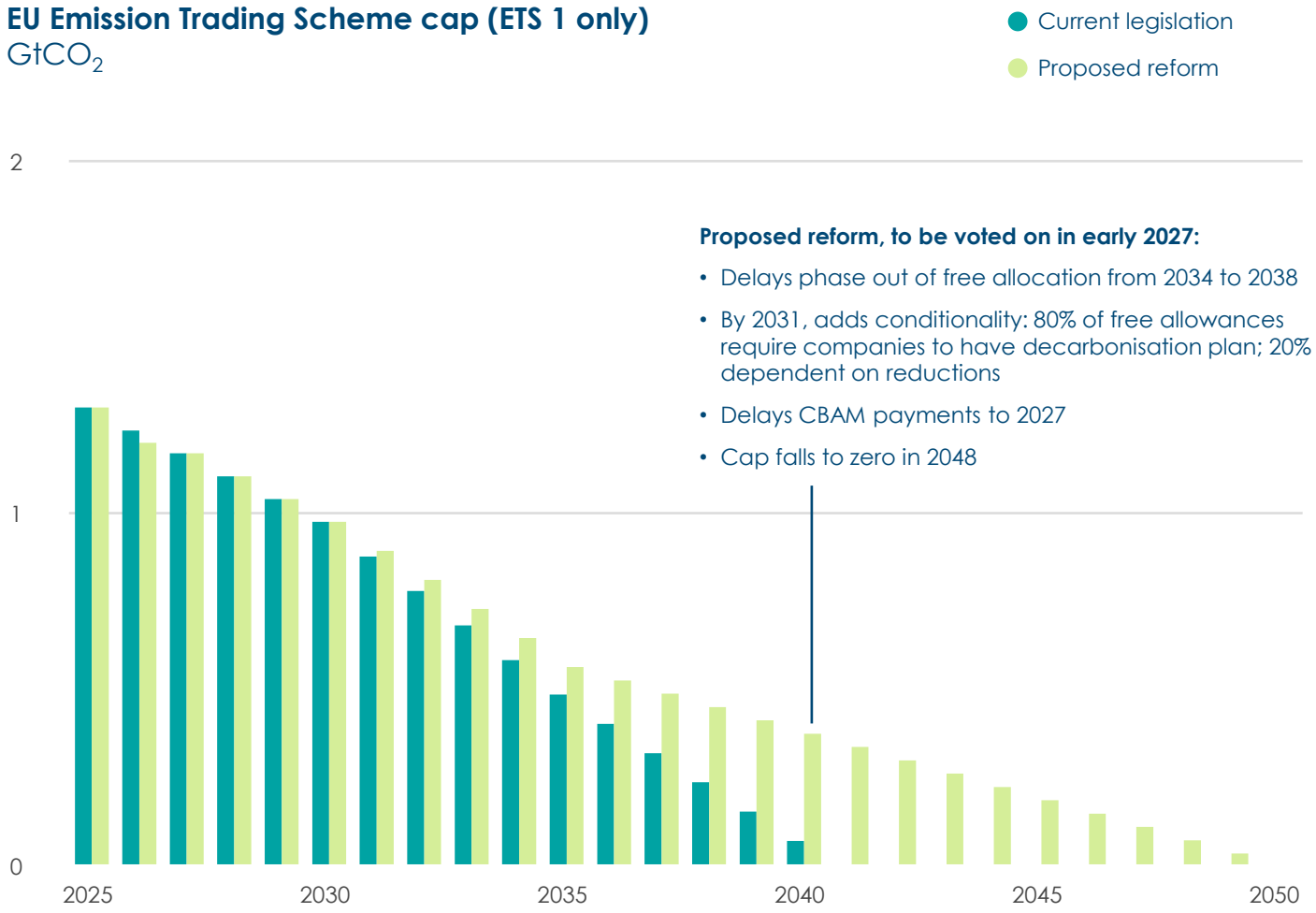
	Permitting & grid connection queues	Grid build-out	Auctions	Electrification
What's happening	• 375 GW of renewables and 455 GW of BESS stuck in queues	• Grid build lags the pace needed	• Wind auctions seeing higher prices and lower bid volume (DE, UK, DK, NL)	• EV momentum strong, but heat-pump uptake lags
Why	• Renewable Energy Directive reforms not yet implemented; speculative applications persist	• Long lead times and under-investment in transmission	• Supply chain costs and weak near-term demand increase risk	• Subsidy gaps and poor gas/electricity price ratios slow adoption
Impact	• Project delays, weaker investor confidence and rising curtailment risk	• Connection delays and rising curtailment risk	• Slower build-out and delayed investment decisions	• Weak investment, slow electrification
What could help	• Fully implement RED • Reform queue management	• Innovative grid technologies • Anticipatory grid investment	• Two-way CFDs • Consistent auction pipeline;	• Rebalance electricity/gas price ratios; • Targeted heat-pump subsidies • Maintain EV ambition

Source: Ember (2026) European Electricity Review; IEA (2025) Electricity 2025; WindEurope (2025) Wind energy in Europe – 2024 statistics; EY (2025) Renewable Energy Country Attractiveness Index (RECAI 64); Beyond Fossil Fuels (2026) Grid Expectations: The distribution backlog stalling Europe's energy transition; European Heat Pump Assocation (2026) Heat pump sales testify to government action

Europe has strong policy foundations for clean industry globally, but clean investment is not yet flowing at the pace or scale needed

EU Emission Trading Scheme cap (ETS 1 only)

$GtCO_2$



Source: Alpha Ladder Group (2026) China Carbon Market Weekly 27 April – 1 May 2026; MPP (2026) Global Project Tracker; EIC (2026) Asia Pacific Hydrogen Report 2026; European Commission (2026) CBAM enters definitive phase; IEEFA (2025) Carbon Pricing in Asia

Clean industry projects under development

- China secured 12 clean industry projects last year vs. 3 in Europe
- 70 near-zero steel plants needed by 2030; only 9% at FID

Green hydrogen remains costly

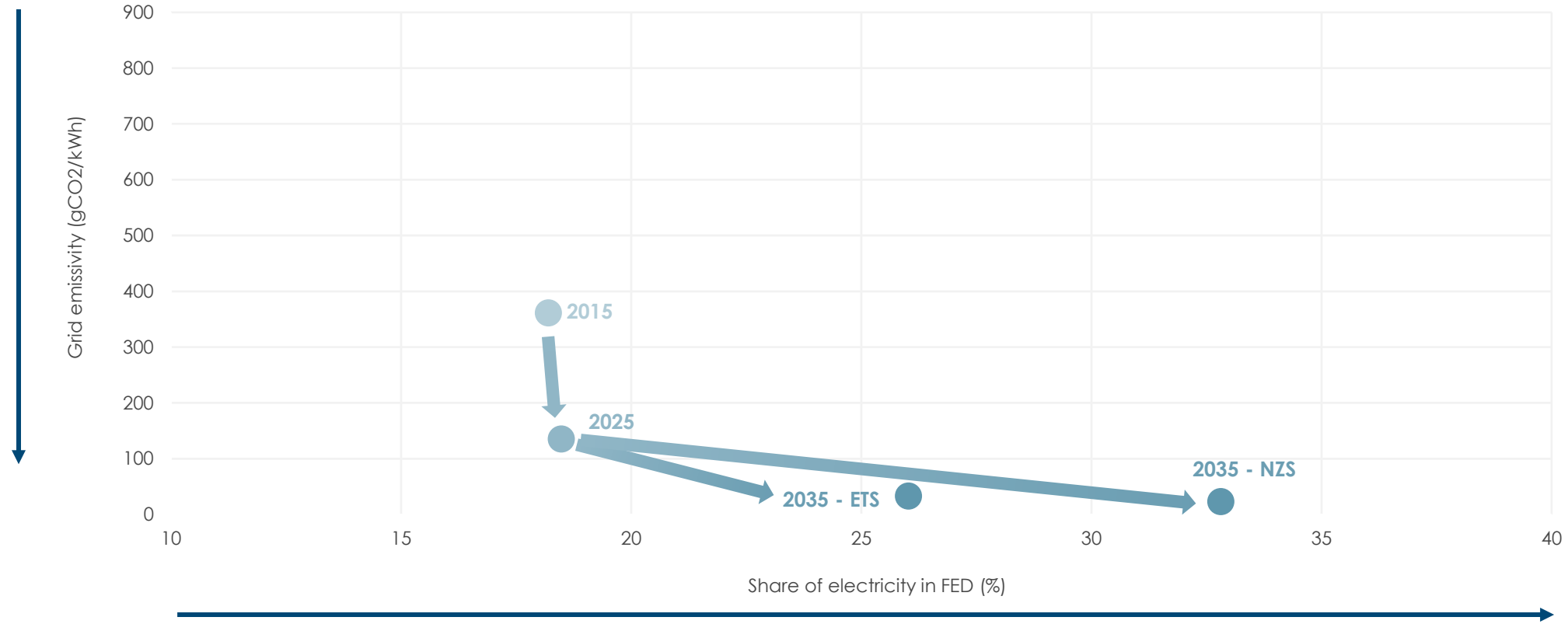
- Domestic green H_2 at €7–9/kg is uncompetitive against other regions
- Import corridors at pre-Final Investment Decision phase

Strong carbon pricing

- EU Emission Trading Scheme (~€70–80/tCO_2) is the world's strongest carbon price
- Carbon Border Adjustment Mechanism (CBAM) phased-in 2026 accelerates free allowance phase-out and extends decarbonisation incentives to imports

The UK has a similar challenge to the EU: electrification needs to rapidly accelerate

Grid emissivity vs electrification share in final energy demand (FED) by region, 2015-2035 (BloombergNEF)
gCO_2/kWh & %, respectively

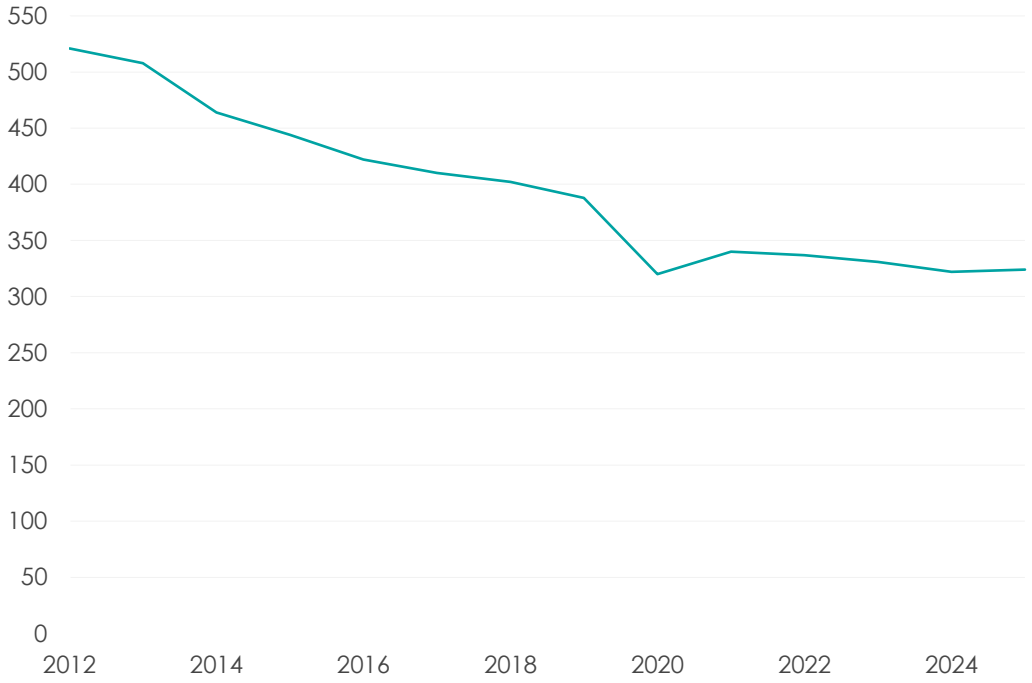


Note: ETS = Economic Transition Scenario; NZS = Net Zero Scenario
Source: BloombergNEF (2026), New Energy Outlook 2026

Past renewable success has cut UK emissions sharply, but maintaining momentum is now the challenge

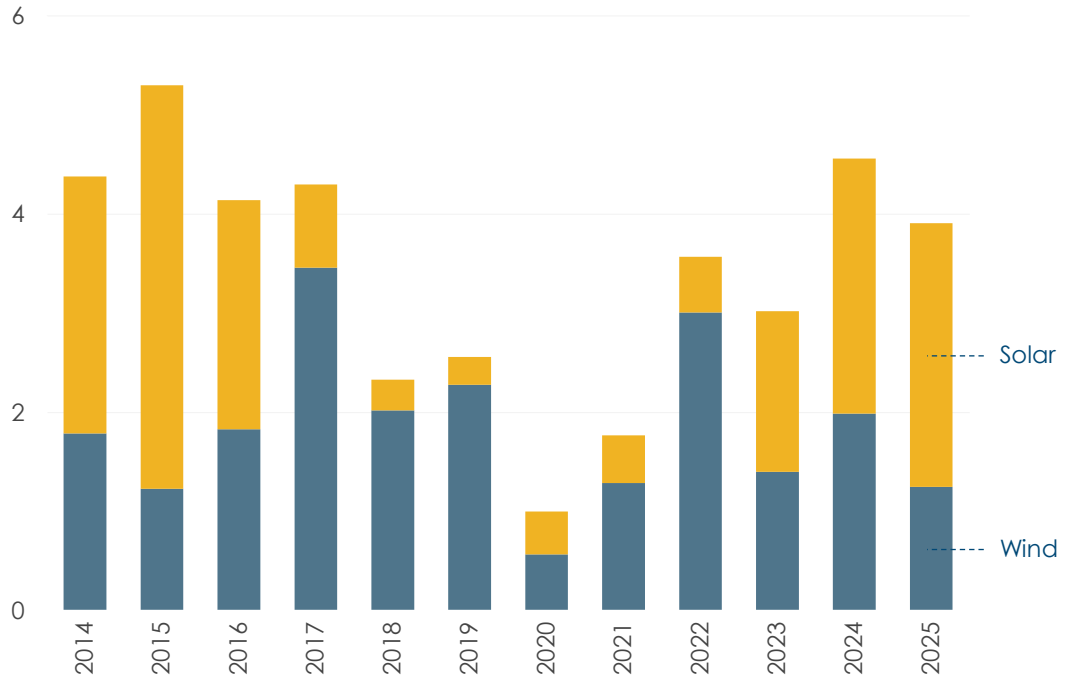
Slower rate of emissions reduction in recent years, but…

CO_2 emissions from fuel combustion, UK
$MtCO_2$, rolling 12-month totals



Renewables additions rebounced after years of slow growth

Annual capacity addition of renewable energy, UK (2014-2025)
GW



Note: Renewable energy includes solar PV, solar thermal, distributed solar generation (where possible), and onshore and offshore wind.
Source: BloombergNEF (2026), New Energy Outlook 2026; Ember (2026) Electricity Data Explorer.

UK electrification being held back by high power costs and grid delivery

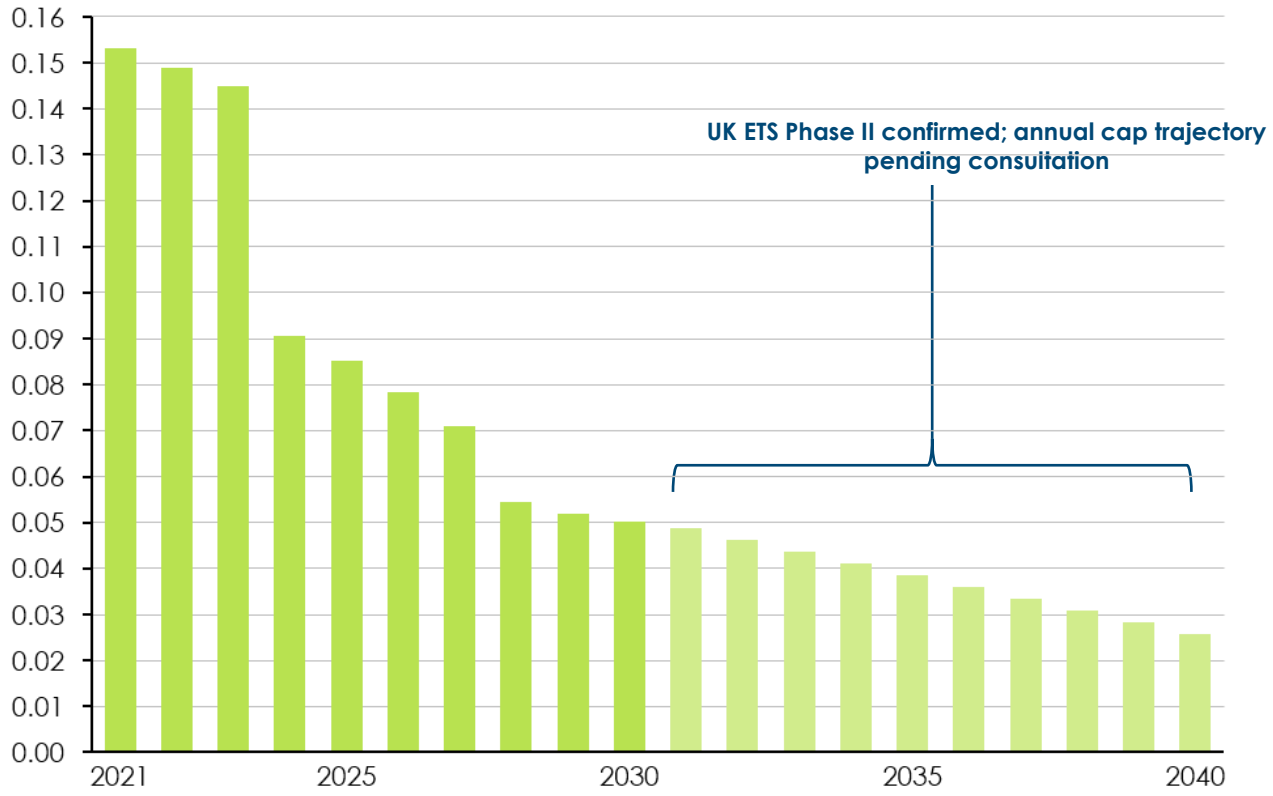
	Auctions and permitting	Grid build out	Electrification
What's happening	• Record renewables contracted; deployment broadly on track	• Queue reform underway; lagging grid delivery	• Heat-pump uptake lags (<2% of UK homes own a heat-pump) • EV uptake taking off (>2mn in fleet as of 2026)
Why	• Strong auction pipeline, but slow project delivery	• Rapid grid build required amid high connection demand	• High power prices due to large exposure to gas; ECO1 closure reduced heat pump affordability
Impact	• 2030 clean-power ambitions remain at risk	• Delayed electrification; risk of missing out on datacenter market potential	• Slow electrification, continued fossil-bill exposure
What could help	• Secure more capacity; • Shorten delivery times	• Accelerate (smart) grid investment, connections reform and flexibility	• Rebalance electricity/gas price ratios; targeted heat-pump subsidies, cut public charging VAT

Notes: 1. Energy Company Obligation (ECO), a UK scheme requiring larger energy suppliers to fund insulation and heating improvements for low-income and fuel-poor households. Source: CCC (2026) Progress in reducing emissions, 2026 report to Parliament

The UK ETS provides a credible long-term carbon price, but is still at the early stages of industrial decarbonisation

UK Emission Trading Scheme free-allowances

$GtCO_2$



Slow clean industry project development

- 24 projects announced (of which 11 eSAF), 5 reached FID
- CCS projects in cement, energy from waste likely to proceed – more comprehensive pipeline needed

Hydrogen not finding scale

- 120 MW of low-carbon hydrogen production expected online, far from initial 10 GW 2030 target off
- Delays, cancellations and slow infrastructure constrain scale-up

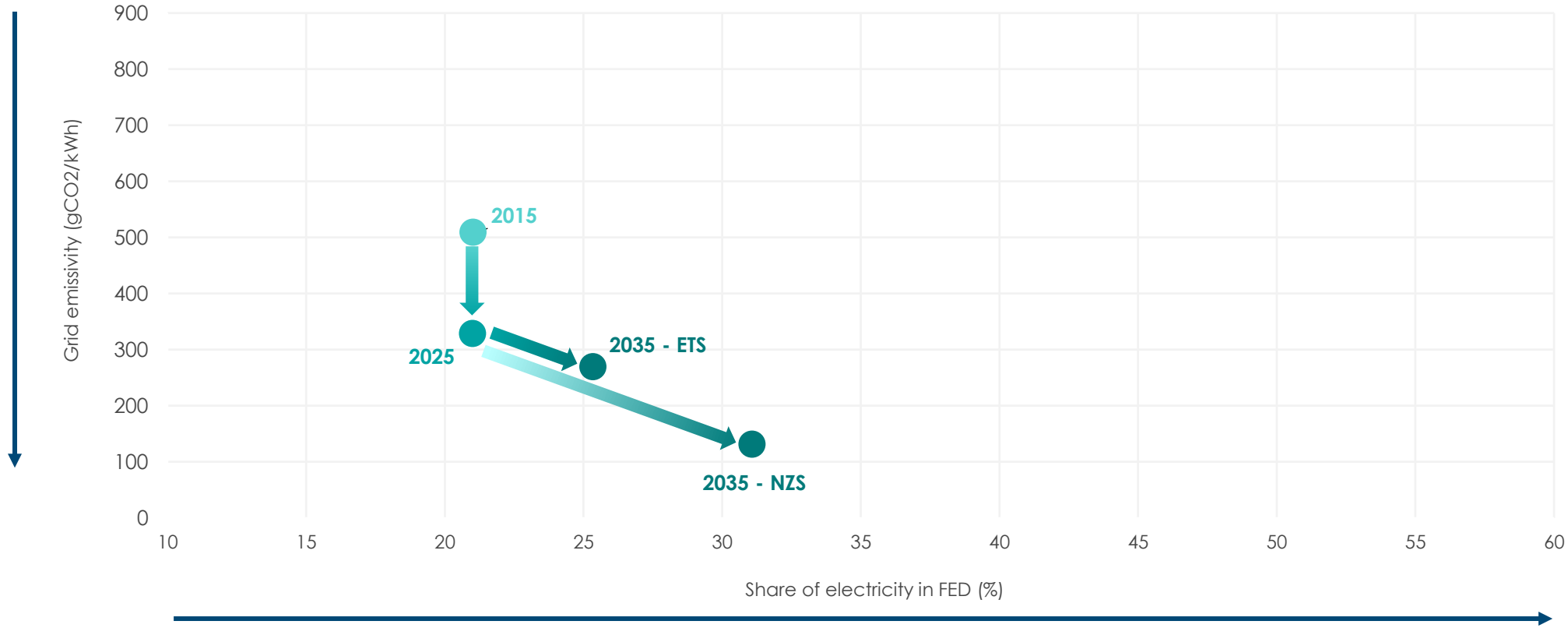
No federal carbon pricing ambition

- UK ETS costs carbon at around £50/tCO_2, broadly mirroring EU ETS' but not formally attached
- Similar Carbon Boarder Adjustment Mechanism (CBAM) to EU ETS to come online in 2027

Source: UK Government (2026), UK Emissions Trading Scheme (UK ETS): a policy overview; CCC (2026) Progress in reducing emissions, 2026 report to Parliament; Offshore Energy (2026), Second UK CO_2 storage licensing round yields interest for over 2 million North Sea acres

US grids have decarbonised in the last 10 years, but the pace needs to maintained alongside faster electrification

Grid emissivity vs electrification share in final energy demand (FED) by region, 2015-2035 (BloombergNEF)
gCO_2/kWh & %, respectively

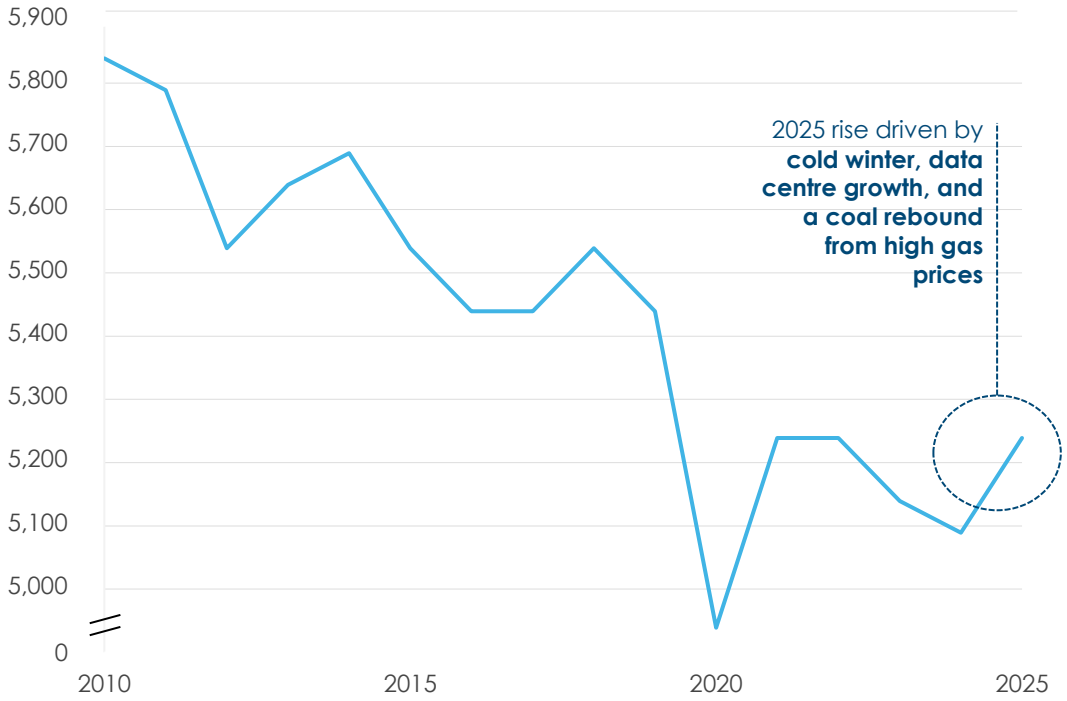


Note: ETS = Economic Transition Scenario; NZS = Net Zero Scenario
Source: BloombergNEF (2026), New Energy Outlook 2026

Renewable installation continues in US despite policy headwinds, but not enough to curb rise in emissions in 2025

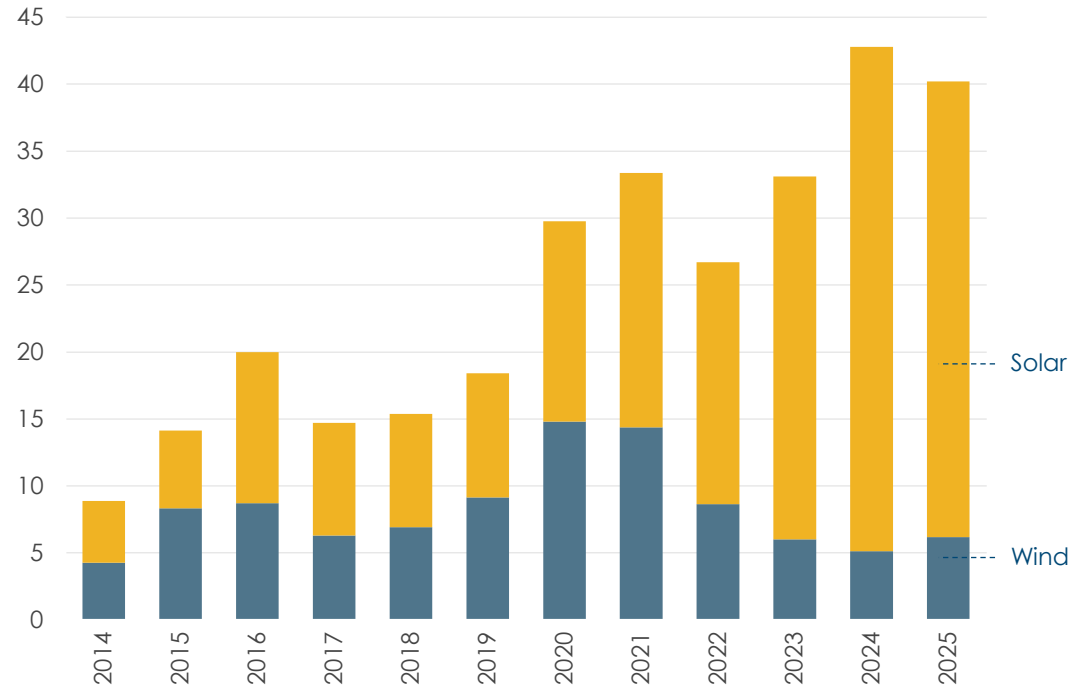
US's emissions rise in 2025 after two years of decline…

CO2 emissions in US, 2010-Q126
Million tonnes of CO_2



…with installations remaining steady despite policy limitations

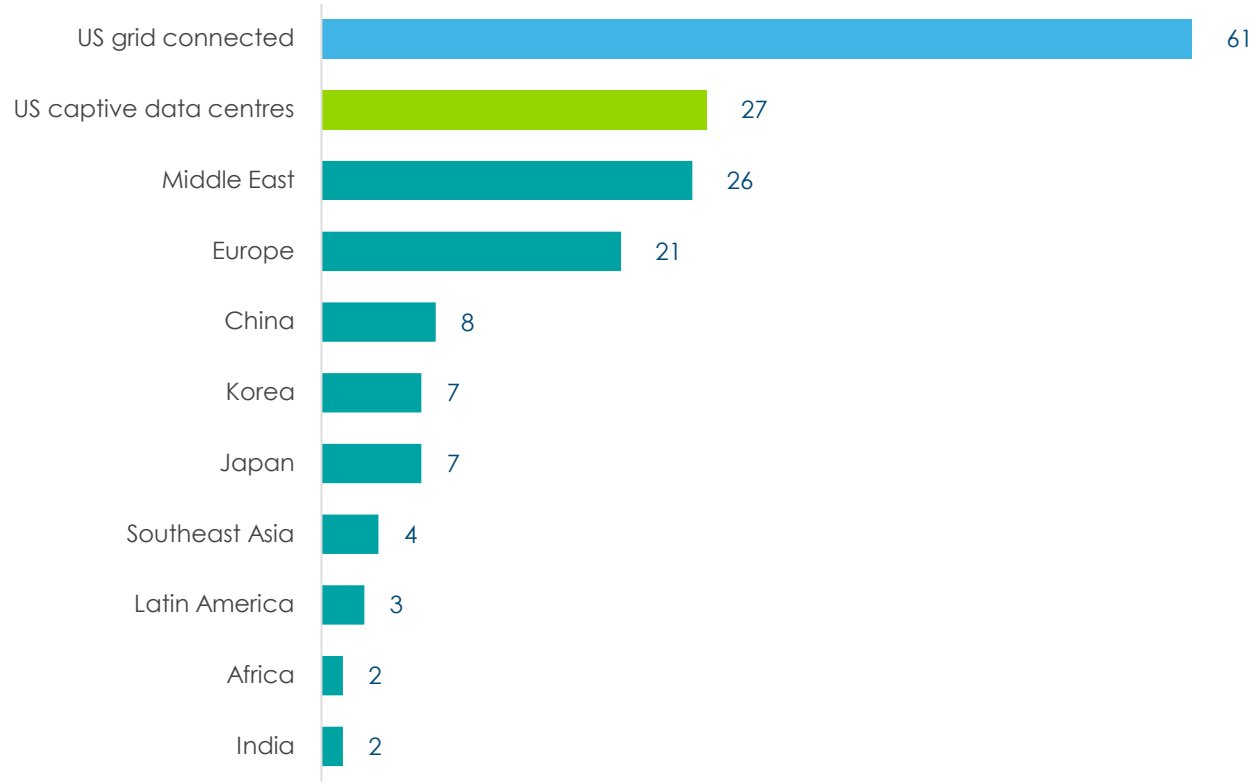
Annual capacity addition of renewable energy, US
GW



Note: Renewable energy includes solar PV, solar thermal, distributed solar generation (where possible), and onshore and offshore wind. Source: Washington Post (2026) US carbon emissions rise in 2025 after two-year decline; FERC, via Environment America, January 2026. Ember (2026) Electricity Data Explorer.

US data centres are simultaneously the biggest driver of new fossil fuel (gas) demand globally, & a powerful new customer for clean power

Value of new gas generation final investment decisions by country, region or use-case, 2025 Q1 – Q1 2026
$bn



Fossil signals:

- Non-renewable capacity additions up by 71% in 2025–26; with renewable growth slowed by 2%
- US now investing more in fossil fuel power than China

The clean signal:

- Data centres account for 50% of new corporate clean PPAs
- SMR pipeline nearly doubled (25 GW → 45 GW) since 2024, driven by tech demand

Source: Carbon Brief (2026) AI boom means US is now 'investing more' in fossil-fuel power than China; BloombergNEF (2026) AI Data Center Build Advances at Full Speed; IEA (2025) Energy and AI

US faces major barriers from Inflation Reduction Act rollbacks and interconnection queues

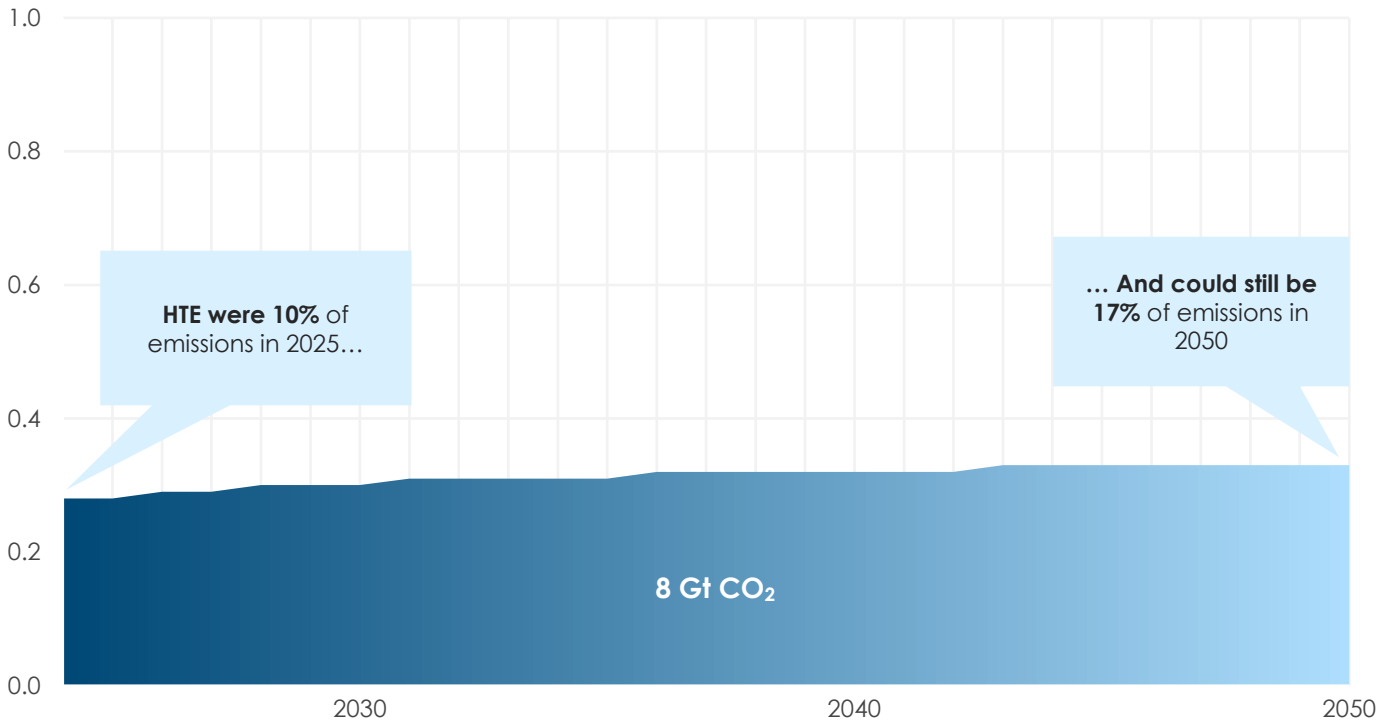
	IRA rollback	Interconnection queues	Grid build-out	Supply chain
What's happening	• Wind & solar tax credits expire unless construction starts by Jul 2026	• 2,300 GW in queues; median wait exceeds 4 years	• Transmission must expand 50–100%; but not enough investment	• Solar imports halved since Q4 2024; 175% tariff on Chinese panels
Why	• Big Beautiful Bill reversed Biden-era clean energy incentives	• Connection demand surge overwhelms grid reform	• Federal–state disputes and utility opposition delay new lines	• China dominates manufacturing; tariffs narrow sourcing options
Impact	• 21 GW of renewables cancelled since Jan 2025; pipeline cliff post-2027	• 112 GW of solar & storage projects abandoned in 2024; investor uncertainty rising	• Rising curtailment and project delays	• Higher costs and regulatory uncertainty
What could help	• State targets & corporate PPAs provide a floor	• Federal grid reforms	• Strengthen federal planning and approval power alongside interstate siting (routing + permits)	• Expand domestic manufacturing, diversify imports, clarify rules for developers (all assuming no change in tariffs)

Source: Rhodium Group (2025) Assessing the Impacts of the Final One Big Beautiful Bill Act; Lawrence Berkeley National Laboratory (2025) Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2024; Morgan Lewis (2026) Federal Energy Priorities Reset the Rules for US Permitting; Wood Mackenzie (2025) US Solar Supply Chain Faces Critical Crossroads as Tariffs and FEOC Restrictions Threaten Domestic Manufacturing Crisis; WRI (2026) Despite Unprecedented Challenges, Clean Energy Is Still Growing in the US

US clean industry investment and regulation are far behind the pace needed

Cumulative CO_2 emissions[1] in hard-to-electrify industries, 2025-2050, BloombergNEF ETS

$GtCO_2$



Source: Mission Possible Partnership (2025) Clean Industry: Transformational Trends — Global Project Tracker Update; Clifford Chance (2025) One Big Beautiful Bill Act: Notable Terminations of Tax Credits for Solar, Wind, Hydrogen and Clean Vehicles; Clean Air Task Force (2025) The High Cost of Retreat: Impacts of Department of Energy Project Cuts; Niskanen Center (2026) Where US Carbon Policy is Being Decided in 2026; Canary Media (2026) 2025 Wasn't a Great Year for Green Steel Ambitions; Canary Media (2025) SSAB Quietly Pulls Out of $500M Green Steel Award Negotiations; Clean Investment Monitor / Rhodium Group (2025) Q3 2025 Update; BloombergNEF (2026), New Energy OUtlook

No new clean industry project development

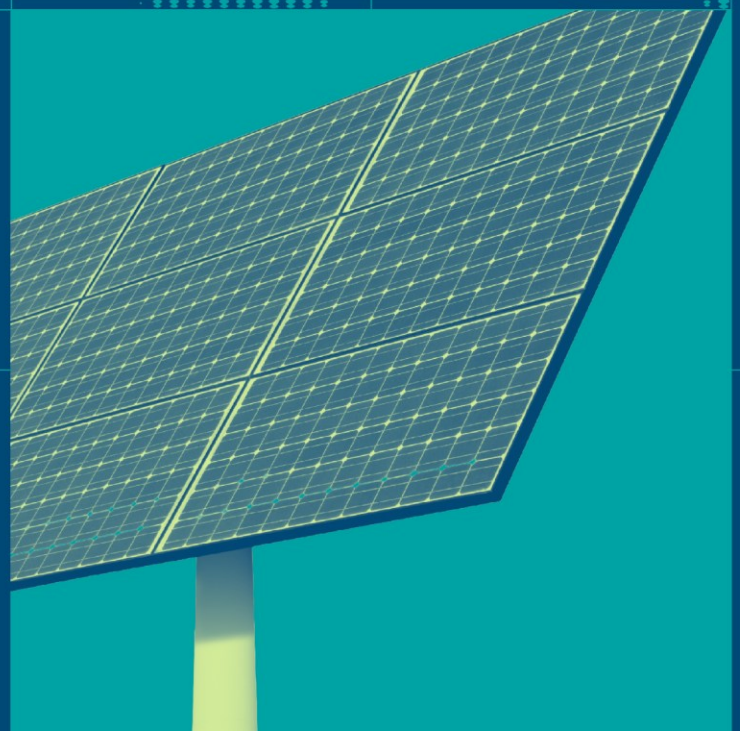
- 4 new project FIDs in 2025 (vs. Europe 17; China 48)
- CCS pipeline remains strong with $85/$tCO_2$ tax credits still available

Green hydrogen capacity hit by IRA termination

- End of 45V credits by 2028 puts 95% of announced H_2 capacity at risk
- Funding pulled for green hydrogen hubs in California and Pacific Northwest

No federal carbon pricing ambition

- CBAM resistance not currently swaying Europe



Impact of geopolitics and the Strait of Hormuz closure

Key messages | Geopolitical fragmentation risks delays, however, energy security crises drive acceleration

- **Lack of international cooperation risks slowing the energy transition** through trade restrictions, supply-chain disruption and policy uncertainty, while increasingly polarised political and media narratives risk undermining public support despite continued backing for climate action.
  - Measures such as the EU's Carbon Border Adjustment Mechanism (CBAM), expanding carbon markets and local-content requirements are increasingly shaping investment decisions and industrial competitiveness.
  - Delays to the IMO Net Zero Framework and rising trade tensions demonstrate how geopolitical uncertainty can delay investment, particularly in hard-to-abate sectors.
- **The Strait of Hormuz crisis reinforced that dependence on fossil fuels remains a major source of economic vulnerability.** Price spikes and supply disruptions rapidly translated into inflationary pressures and higher costs for households and industry, strengthening the case for domestic clean energy as a resilience strategy.
  - Governments responded with a mix of short-term crisis management and long-term structural reforms. While some countries cushioned consumers through temporary fuel-price interventions, others accelerated renewables, storage, electrification and power-market reforms to reduce future exposure to imported fossil fuels.
  - Demand for electrification, rooftop solar, batteries and energy efficiency from end users increased as households and companies sought greater protection from future price volatility and supply disruptions.
- **China has become the indispensable manufacturing engine of the clean energy transition.** Its scale and cost competitiveness have dramatically reduced the cost of clean technologies worldwide, while simultaneously raising legitimate concerns around supply-chain concentration and industrial resilience.
- **Maintaining open, resilient international markets will be critical to accelerating the transition.** Diversified supply chains and international cooperation can strengthen competitiveness, improve energy security and accelerate emissions reductions, while fragmentation risks increasing costs and slowing deployment.

We currently face a challenging geopolitical scenario that is delaying the transition on many fronts…

Carbon policy

Carbon policy is becoming part of trade, but fragmented standards can turn climate policy into trade friction

Example:
CBAM entered its definitive phase in 2026, linking import carbon costs to EU ETS prices

Supply chain

Low-cost clean-tech scale is concentrated, while tariffs and local-content rules can raise costs

Example:
China is the lowest-cost clean-tech manufacturing base; clean-tech trade is set to triple by 2035

Geopolitical pressures

One major-power shift – US, EU - can delay global rules and weaken investment certainty

Example:
IMO shipping fuel and pricing rules were approved in April 2025, but adoption was delayed after US-led pressure

Source: European Commission (2026), Carbon Border Adjustment Mechanism; IMO (April 2025), IMO approves net-zero regulations for global shipping; Guardian (October 2025), Shipping emissions levy shelved as countries bow to US pressure; IEA (2024), Energy Technology Perspectives 2024;

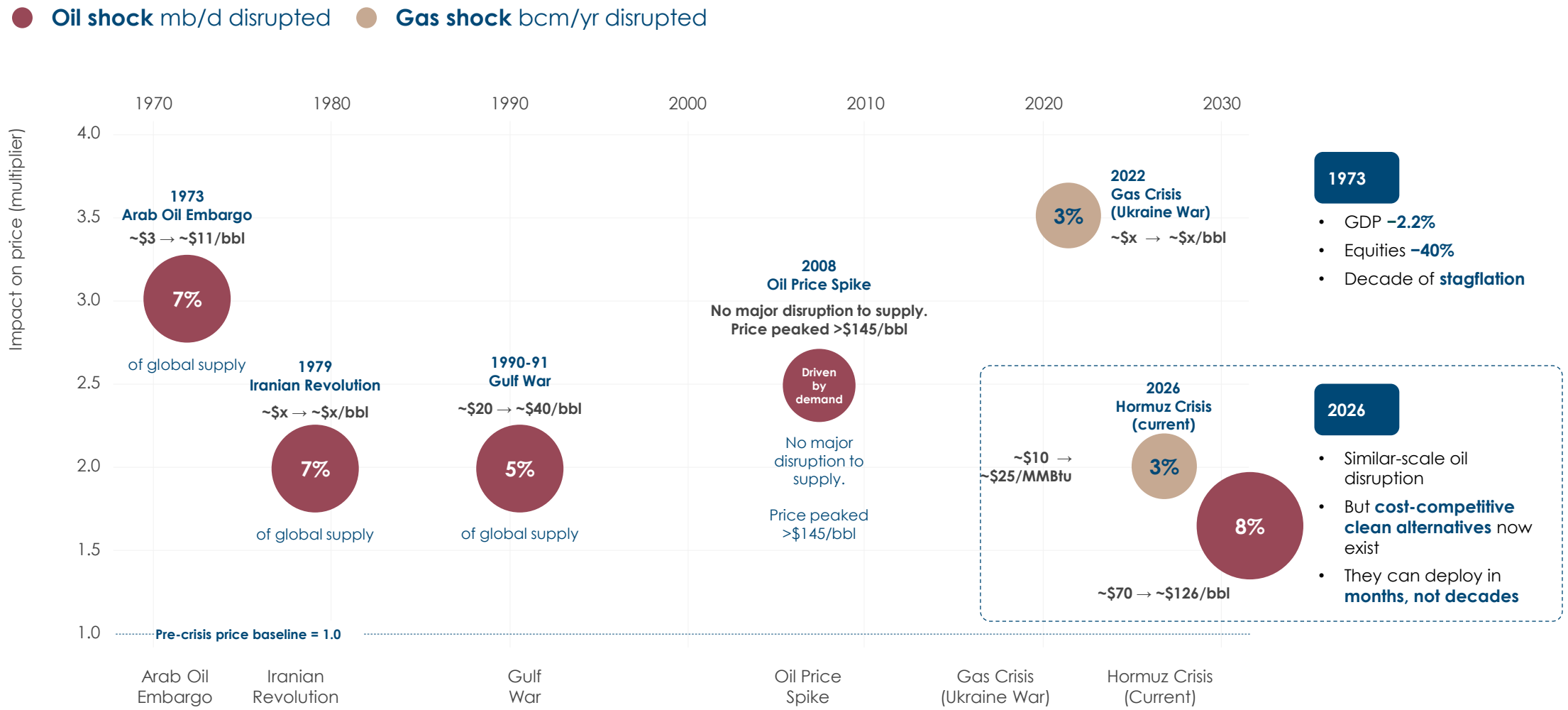
… in addition, general media and political discourse have become substantially more sceptical of climate action than underlying public opinion

The public wants stronger climate action	Parts of the media are amplifying pushback
International surveys show: • **89%** of people globally want **stronger climate action** • **>2/3rds would give 1% of income** to fight climate crisis • People **systematically underestimate** how much others support action nature	"2025 online UK media coverage was **160% more negative than public sentiment"** IPPR
	"Australian's fed up with News Corp climate scepticism – **coverage over half anti-climate**" ALJAZEERA
• **72%** of citizens across G20 countries support a **rapid transition away from fossil fuels** G20	"The Climate Crisis **Clashed With Affordability**, and Affordability Won" WSJ

Elite political and media narratives now substantially more negative than underlying public opinion pushing climate down the political agenda

Source: Nature (2024), Globally representative evidence on the actual and perceived support for climate action; Ipsos (2024), Global Commons Survey 2024; Carbon Brief (2026), Analysis: UK newspaper editorial opposition to climate action overtakes support for first time; IPPR (2026), Revealed: political and media narratives driving false "backlash" against net zero, says IPPR; Wall Street Journal (2025), The Climate Crisis Clashed With Affordability, and Affordability Won

… and we currently face the largest oil supply shock since 1973; but unlike then we now have cost-competitive clean alternatives to deploy at scale

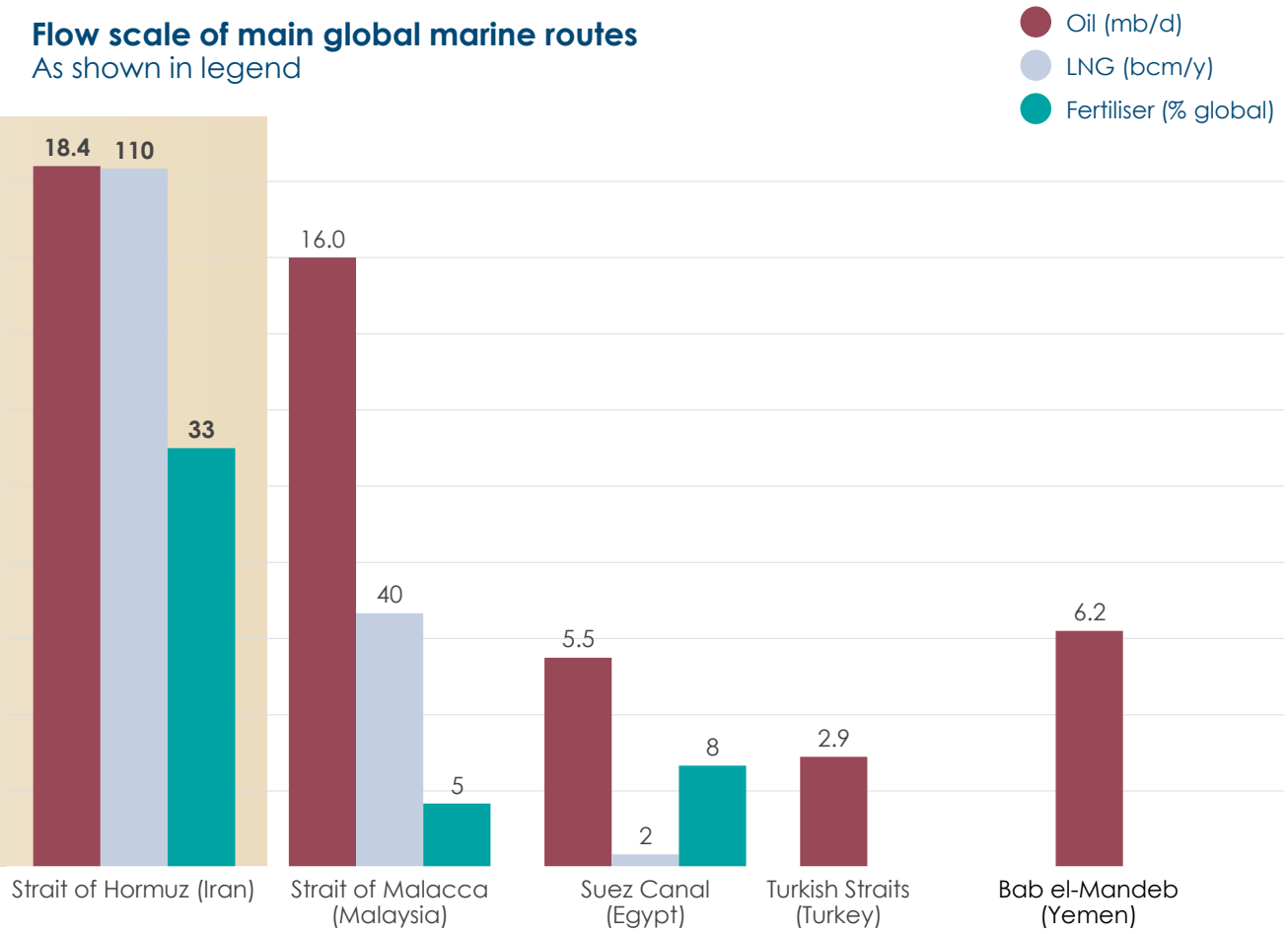


Source: Adapted from IEA Oil Market Report (2026)I ETC analysis, IMF World Economic Outlook (2026); ETA historical data

Hormuz is the world's most critical energy chokepoint

Strait of Hormuz

- **1/3 of crude oil** global trade
- **1/5 of LNG** global trade
- **1/3 of fertilizer** global trade
- Relevant shares of LPG, refined oil products and other commodities including:
  - **9% aluminium** production
  - **39% helium** production
  - **20% sulphur** production
- ~85% of crude oil and LNG **destined to Asia**, with access to fertilizers disproportionally impacting least developed countries



Notes: Bar heights rescaled for visual comparison; Oil = mb/d; LNG = bcm/year (bars scaled /6 for comparison); Fertiliser = % of global trade (bars scaled /3 for comparison);
Source: UKMTO and Vaguard, 12 March 10:00 GMT; IEA Oil Market Report (2026); IEA Today in Energy (2025); UNCTAD (2026); ETC analysis.

Fossil fuel systems are more exposed to price volatility and buffers are limited

Brent crude price (Mar – Aug 2026)

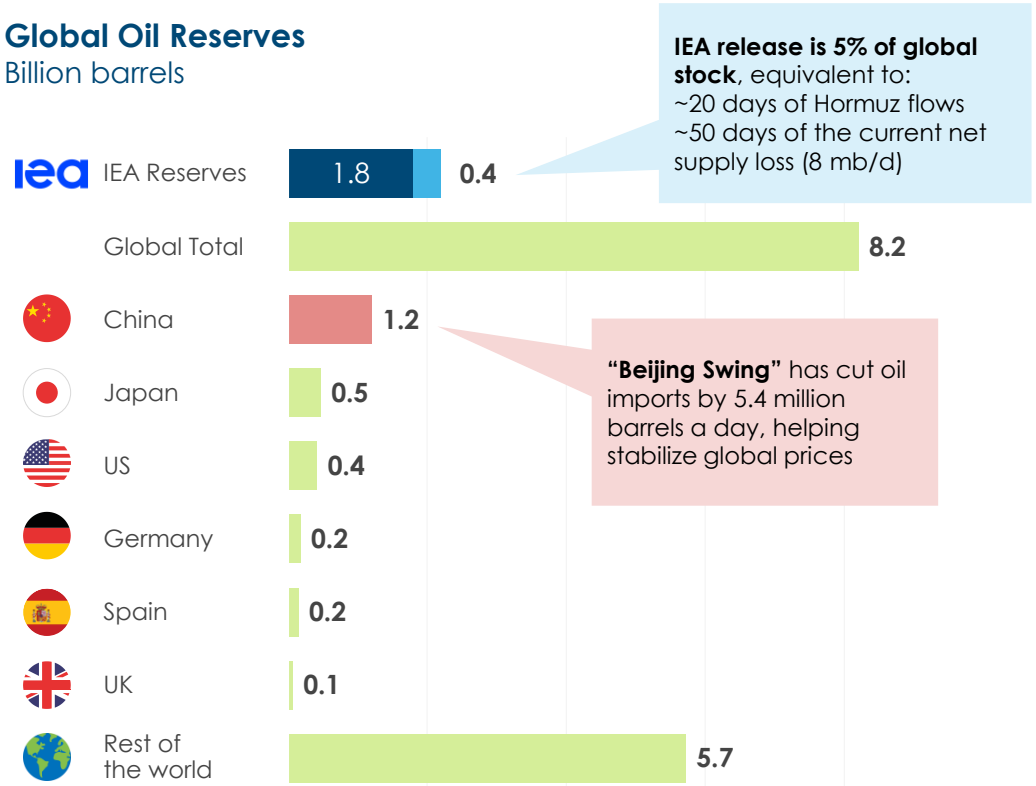
Dollars per Barrel

TTF natural gas price, month ahead (Mar – Aug 2026)

€ per MWh

Global Oil Reserves

Billion barrels



IEA release is 5% of global stock, equivalent to:
~20 days of Hormuz flows
~50 days of the current net supply loss (8 mb/d)

"Beijing Swing" has cut oil imports by 5.4 million barrels a day, helping stabilize global prices

Limited rerouting (~2.5 mb/d vs ~20 mb/d disrupted) and slow infrastructure (5+ years for new pipelines) mean disruptions would translate directly into higher prices

Source: IEA (2026), Oil Market Report; The Wall Street Journal (2026), IEA Will Launch Largest-Ever Oil Release From Global Strategic Reserves; Reuters (2026), How much oil do G7 countries hold in emergency reserves?; Financial Times (2026), Iran war tests Xi Jinping's plan to build China's stockpiles; Trading Economics, Brent crude oil accessed 13/08/2026, EU Natural Gas accessed 13/08/2026; The Dispatch (2026) How China Saved the Global Oil Market

Governments' responses diverge between crisis management today and clean resilience tomorrow

Europe

Short term

- **EU** crisis costing **€500m per day**
- 16/27 states intervened with targeted household support
- More targeted than 2022, but still mostly short term: only 7 Member States explicitly support electrification

Structural acceleration

- **Germany** €8bn clean energy package
- **France** doubled electrification support
- **Spain & Portugal** fast-tracked renewables and grid access
- **Netherlands** directed ~40% of crisis spending to EVs, renovations, and SME/farmers fossil-fuel reduction
- **EU** accelerating power market reform to decouple electricity from gas prices

Asia

Short term

- **South Korea** delayed coal phase-out
- **Japan** increased coal burn;
- **China** capped domestic fuel prices
- **Pakistan/Bangladesh/Thailand** closed schools, remote work, reduced hours

Structural acceleration

- **South Korea** renewables target tripled 37→100 GW by 2030
- **Indonesia** 100 GW solar + cooking electrification
- **Philippines** 250 MW solar + 450 MWh battery deployed
- **India** accelerating wind and battery storage clearances

Growth Markets/Rest of the world

Short term

- **Australia** fuel excise cuts
- **Brazil** diesel subsidies

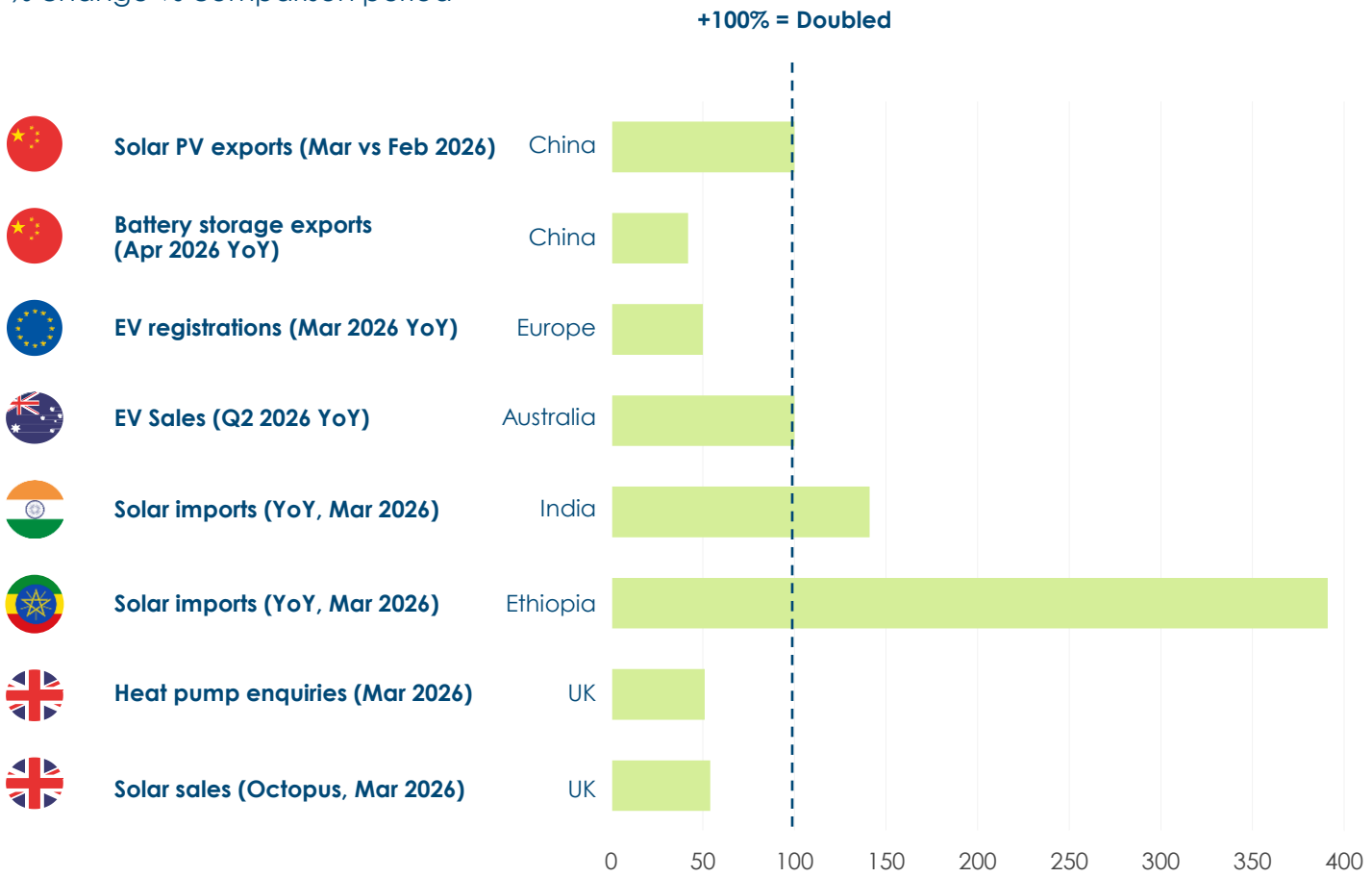
Structural acceleration

- **Egypt** signed PPAs for 5,620 MW solar, wind and storage (March 2026)
- **Chile** approved $1bn+ renewables (April 2026)
- **Brazil** 107 GW solar plan to 2035
- **Türkiye** reaffirmed 120 GW solar and wind by 2035
- **Kenya** waived import duty on the first 100,000 EV imports

Source: Reuters (2026), Brazil proposes new plan for diesel subsidies as prices jump; The Guardian (2026), Australians may not see cheaper fuel for weeks despite Labor's excise cuts; Reuters (2026), China curbs domestic fuel price hike again to soften impact of surging oil prices; The Korea Times (2026), Korea delays shutdown of coal-powered plants amid energy crisis; Philippine Information Agency (2026), 250 MW Solar, 450 MWh Battery Storage Boosts Power Supply, Strengthens Energy Independence; Cabinet Secretariat of the Republic of Indonesia (2026); Climate Diplomacy Brief (2026); Institut Jacques Delors (2026)

The crisis is accelerating the transition more effectively than any subsidy program with surging demand for clean technologies

Clean technologies
% change vs comparison period



YoY = year-on-year. Week-on-week for Australia EV searches. Octopus Energy UK data for heat pumps and solar.
Sources: EMBER (2026); Reuters (2026); Euronews (2026); Zecar (2026); Octopus Energy (March 2026).

Capital is reallocating to clean energy.

Chinese PV exports doubled in a month;

Philippines' pension fund launched $8,300 solar loans

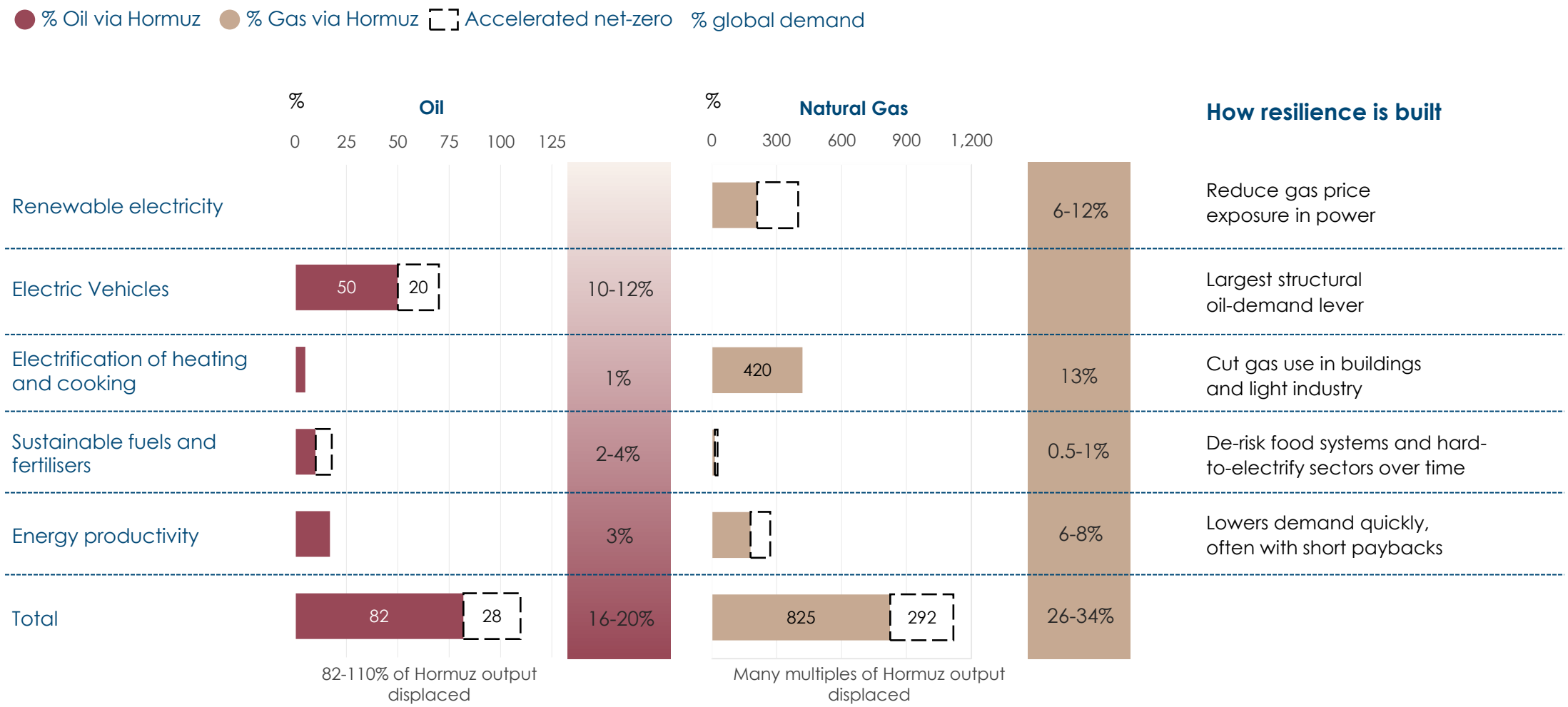
Behavioral change is accelerating the EV pivot.

Record EV searches and sales in developed countries

50 countries hit record highs for solar imports.

- India +141%,
- Ethiopia +391%,
- Kenya +207 %

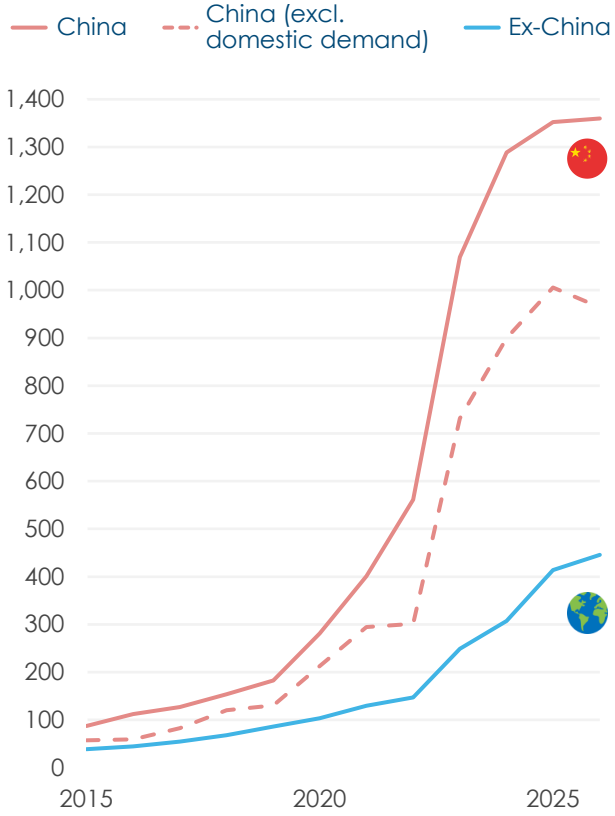
Win-win interventions avoid Hormuz dependency by 2035



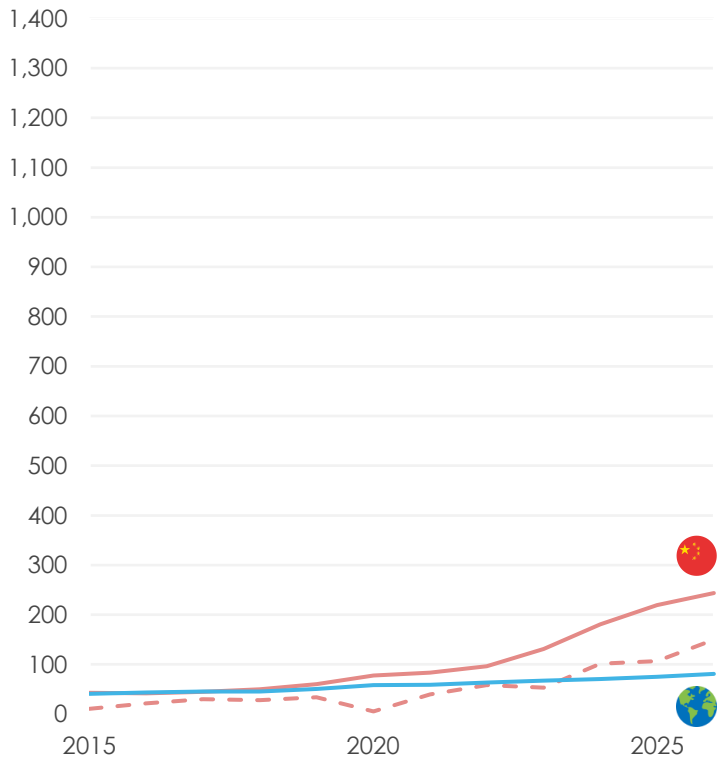
Notes: Lower range is based on ETC's ACF and IEA's STEPS scenarios. Higher rang is based on ETC's PBS/Unconstrained and IEA's Net-zero scenarios
Sources: ETC (2025), The Road Ahead: Electrification, Design and Mobility Choices for Efficient Transport; IEA (2025), World Energy Outlook;

But a potential trade-off of a faster transition is higher dependency on Chinese manufacturing of clean energy technologies

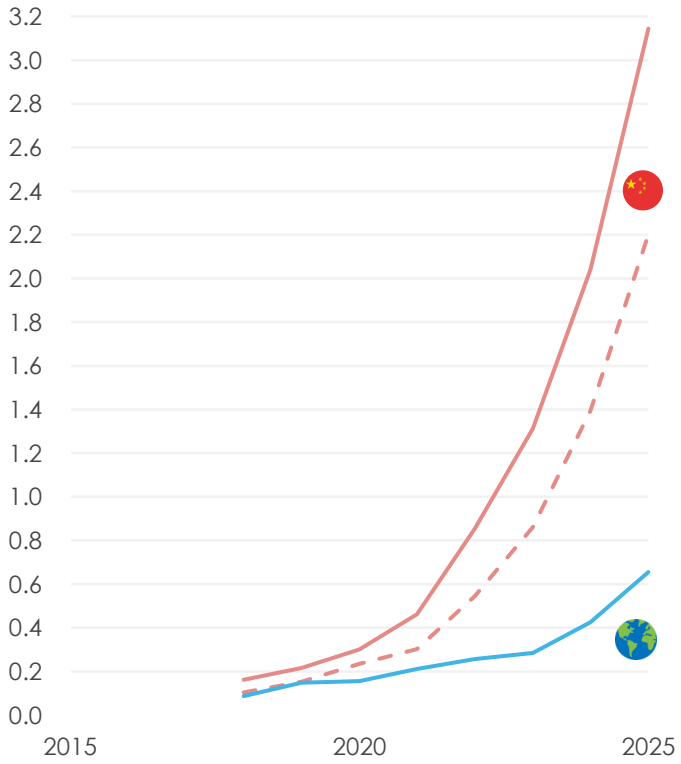
Solar module manufacturing capacity, 2010-2026 (BloombergNEF),
GW/year



Wind turbine nacelle manufacturing capacity, 2020-2026 (BloombergNEF),
GW/year



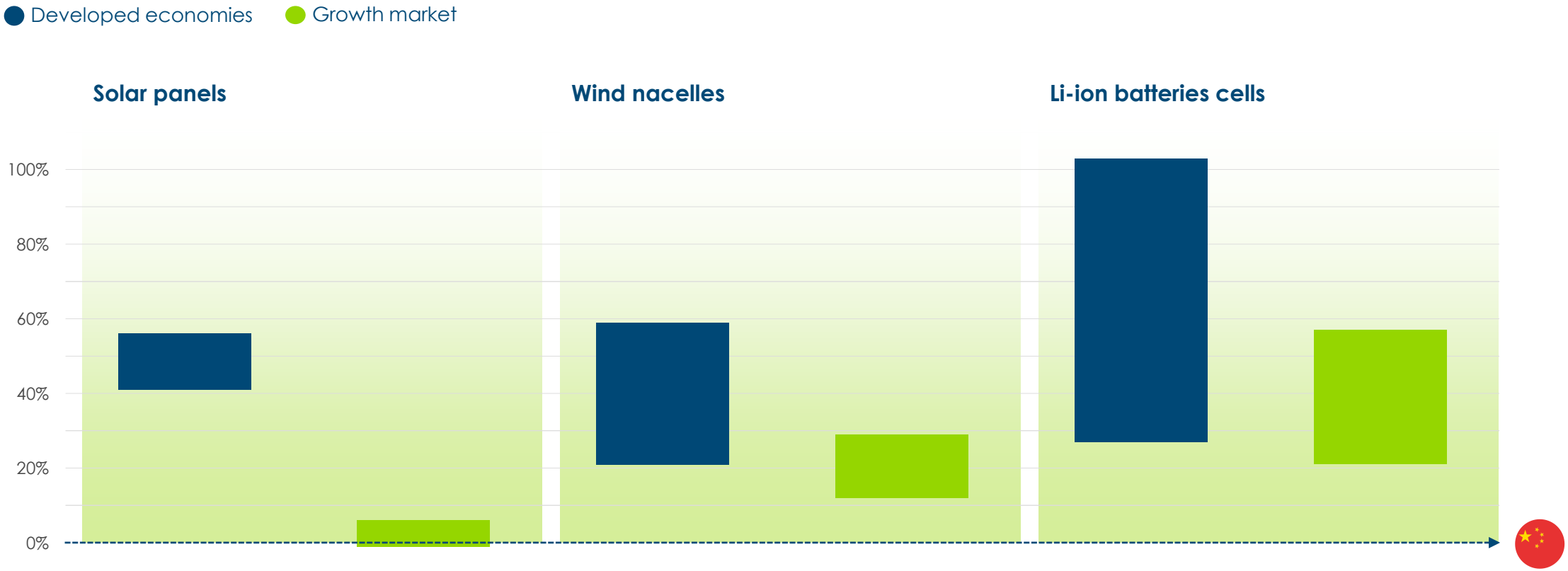
Battery cell manufacturing capacity, 2018-2025 (BloombergNEF),
TWh/year, usable



Notes: China (excl. domestic demand) is the net manufacturing capacity by technology, subtracting annual domestic installations for the corresponding year. Solar module manufacturing capacity refers to solar crystalline silicon module manufacturing capacity in direct current, split between China and global (including China). Source: BloombergNEF (2026), Solar Manufacturing Assets; BloombergNEF (2023-2026), Global Wind Turbine Nacelle Manufacturing Capacity 2023-2026; BloombergNEF (2025), Long-Term Electric Vehicle Outlook 2025; BloombergNEF (2026), New Energy Outlook 2026; CABIA (2019–2026), annual power-battery installation volumes (装车量), China Automotive Battery Innovation Alliance; accessed via Gasgoo, CnEVPost, SMM and Business Wire.

Chinese made renewables and battery systems are significantly cheaper than alternative sources – presenting an opportunity for lowest cost transition

Additional cost of manufacturing selected clean energy technologies compared with China
(Solar 2025; Wind 2024; Batteries 2024) %

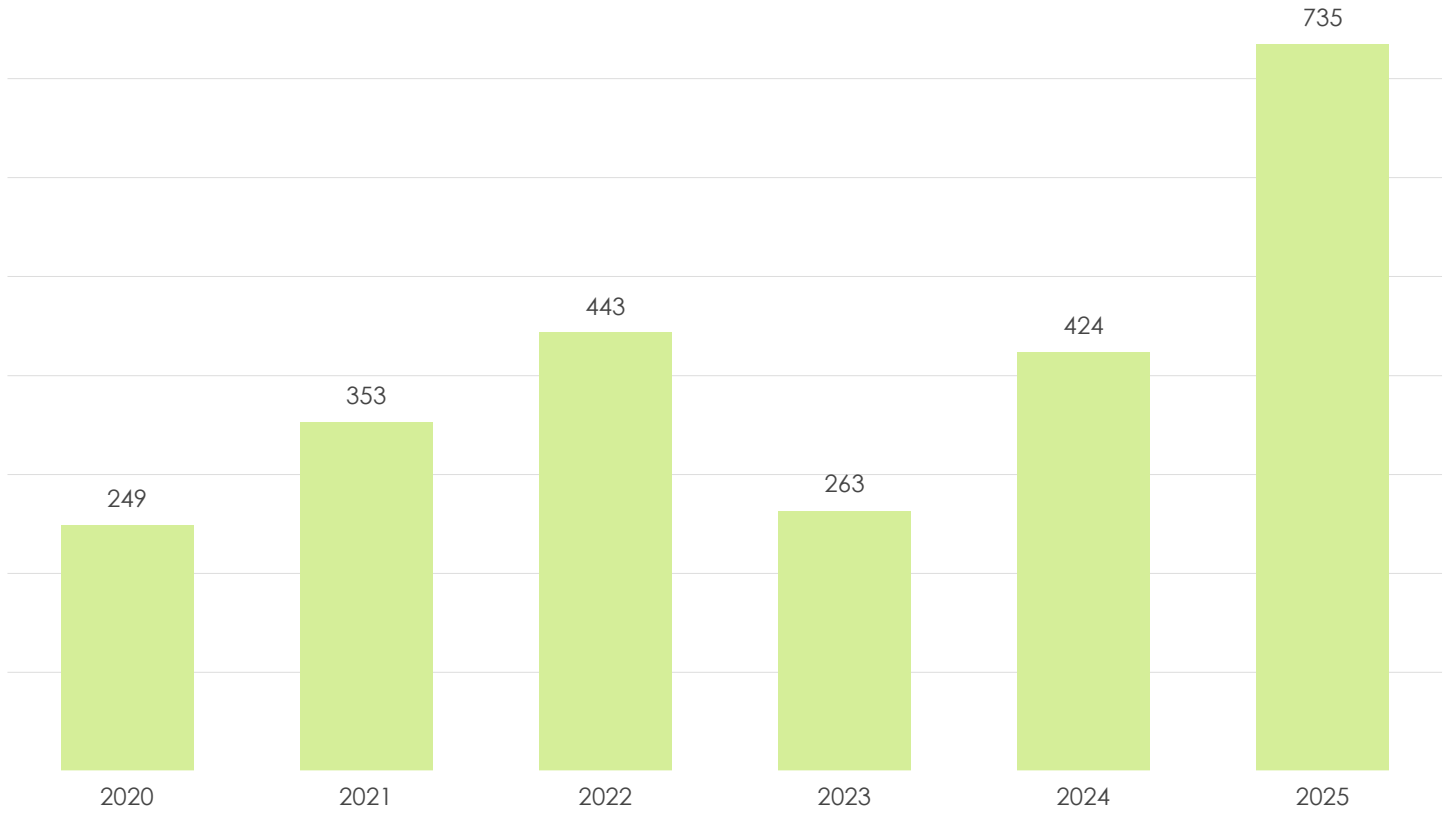


Note: Ranges in solar panels reflect USD per watt-peak domestic cost of manufacturing differences
Source: IEA (2026) Energy Technology Perspective; IRENA (2026) Solar PV Supply Chain Cost Tool

China's clean tech export is the result of a deliberate long-term strategy, and leads to a significant trade surplus that the world can benefit from

China current account surplus 2020-2025

$bn

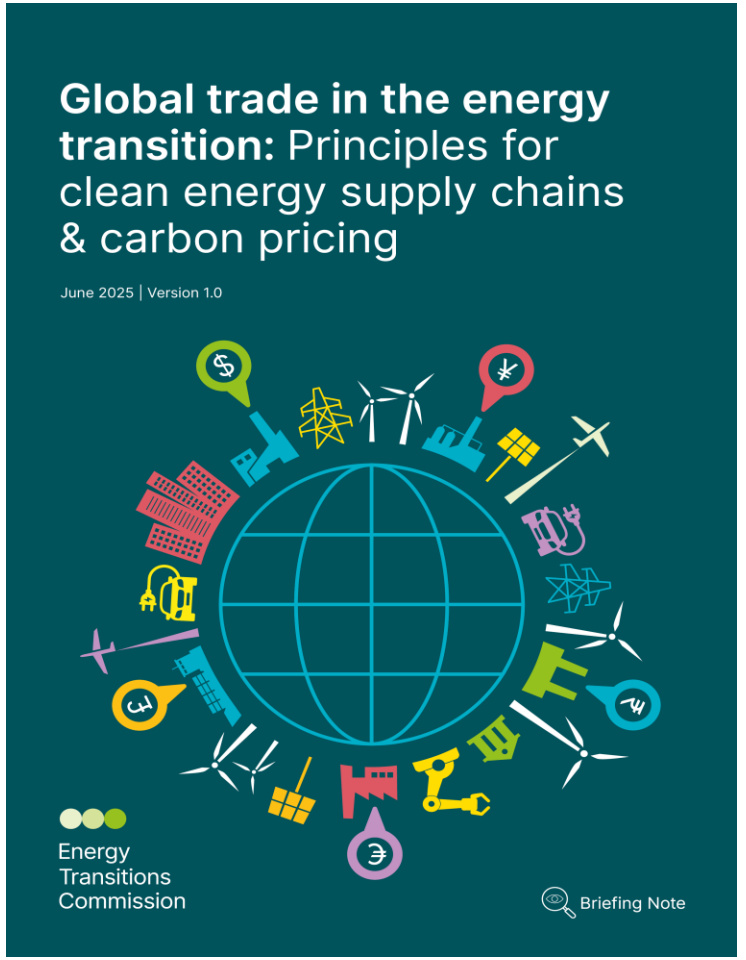


- China has **extensive spare capacity for manufacturing clean technologies** that the world need
- China's large current account surplus creates **pressure to export capital as well as goods**
- For the transition, this could mean cheaper clean technologies, financing and **cost of capital in growth markets**

Source: The GlobalEconomy.com, China: Current account, in dollars [Accessed on June, 2026], Trading Economics, China Current Account [Accessed on June, 2026]; Financial Time article

Dependence on Chinese electrotech is not the same as fossil fuel dependence: six principles offer nuanced guidance for policymakers

1. Aim for diversified supply chains but **not complete autarky**
2. Think straight about **different dimensions of "security"**
3. **Vary policy by sector** to reflect different starting points and inherent characteristics
4. Use **tariffs in a fact-based and WTO compliant** fashion
5. Focus primarily on the **location of employment and value added**, rather than ownership.
6. Work with China to **increase climate finance flows to lower income countries** to support the accelerated deployment of clean technologies



Energy Transition Monitor: Summary

Energy Transitions Commission

The energy transition is moving faster than ever, with solar, batteries and electric vehicles continuing to outperform expectations as clean technologies increasingly make economic sense over fossil alternatives;

However, current trajectories still point towards around 2.5°C of warming, emissions remain far from declining at the pace required, and progress is just leaning forward in areas such as coal phase out, heavy industry and long-distance transport.

The solution sits in the balance of system transformation: phasing out the old alongside building the new.

Learn more: www.energy-transitions.org