Energy Transitions Commission

Protecting Paris: challenge of the Hard-to-Electrify sectors

ETC Representatives Meeting

14 May 2026

Plan for the day

Agenda item	Presentation time	Discussion time
The impact of cumulative emissions until and beyond 2050	10’	
ETS & CBAM: challenges for Europe’s transition	5’	
ETC partnership with China Iron and Steel Research Institute	5’	40’

Agenda

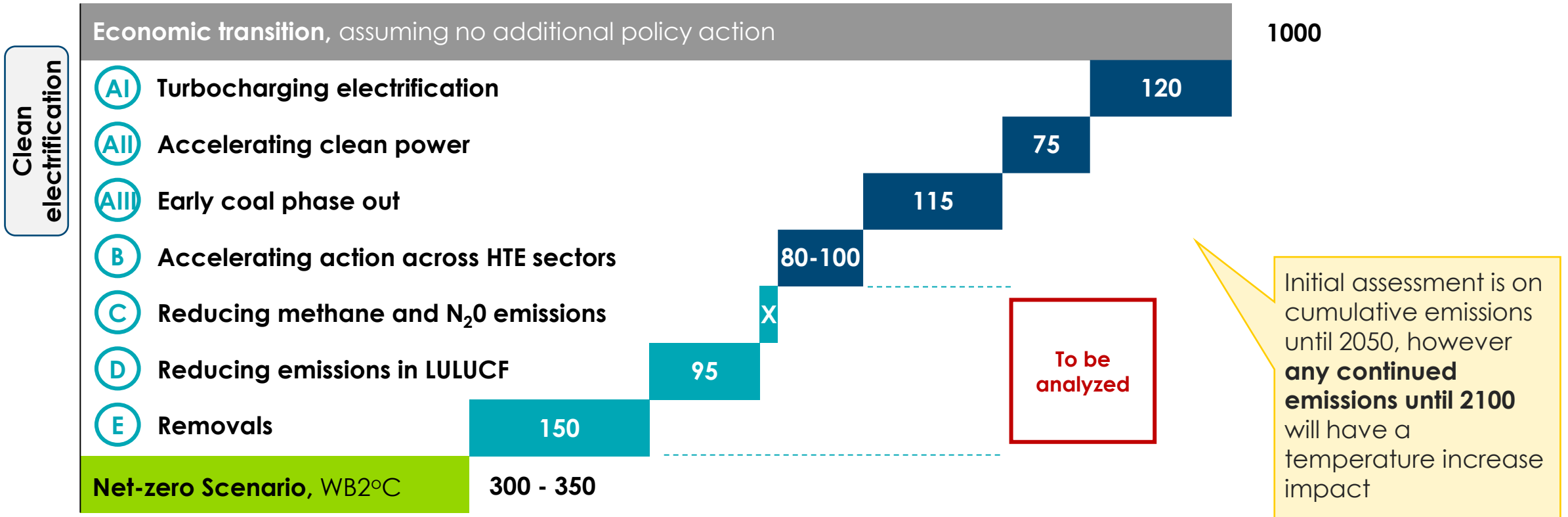
- **The impact of cumulative emissions until and beyond 2050**
- ETS & CBAM: challenges for Europe's transition
- ETC partnership with China Iron and Steel Research Institute

RECAP: Using BNEF's scenarios, we started sizing the mitigation blocks for a well below 2°C energy transition

Preliminary

Key mitigation areas

Cumulative $GtCO_2$ 2026-2050

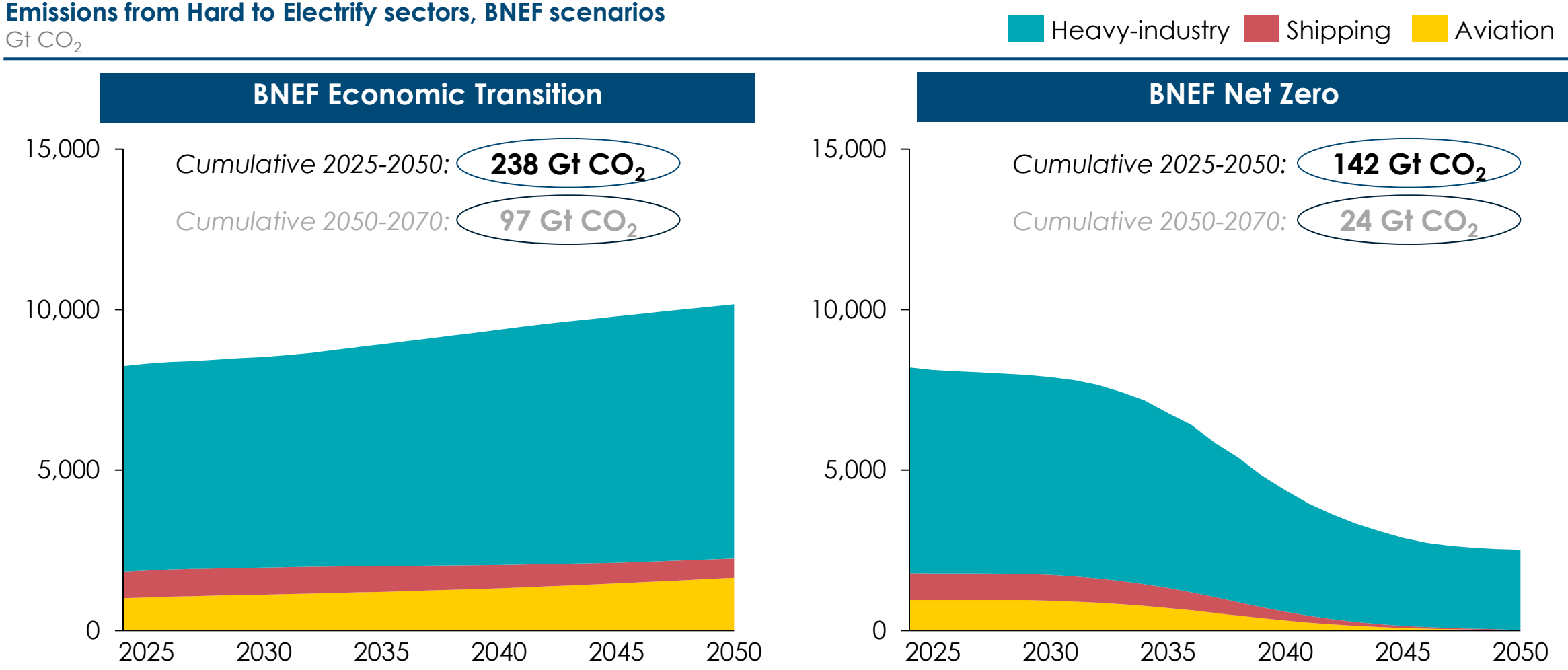


Initial assessment is on cumulative emissions until 2050, however **any continued emissions until 2100** will have a temperature increase impact

Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025

According to BNEF, decarbonising HTE sectors cannot be deferred to mid-century, as early action is needed to avoid ~170 Gt of CO_2 emissions by 2070

Emissions from Hard to Electrify sectors, BNEF scenarios
Gt CO_2

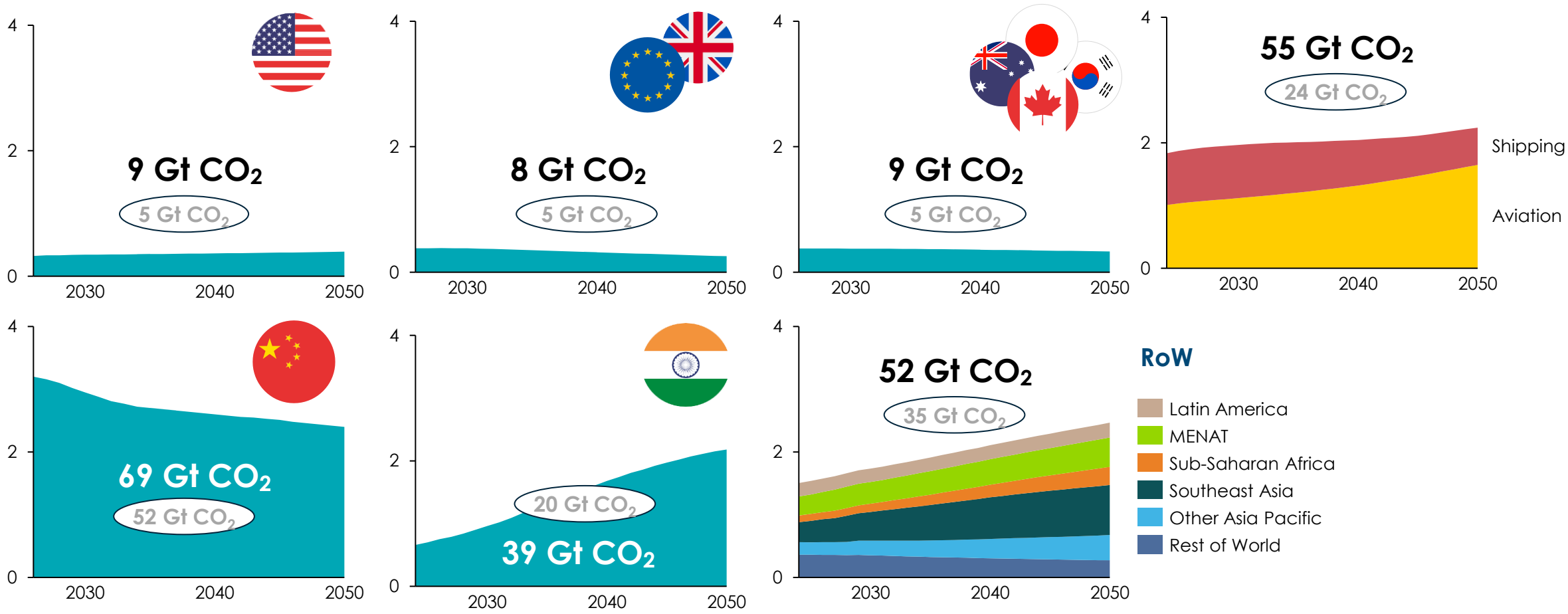


Note: 1. Emissions are assumed to decline linearly over the period 2050–2070; 2. Emissions capture CO_2 emissions from fuel combustion and cement (clinker production), embodied carbon, from petrochemicals for instance, not included;
Source: BNEF (2025), *New Energy Outlook 2025*.

Under BNEF ETS, hard-to-electrify emissions remain concentrated in China and India, but RoW and long-distance transport offer big abatement potential

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

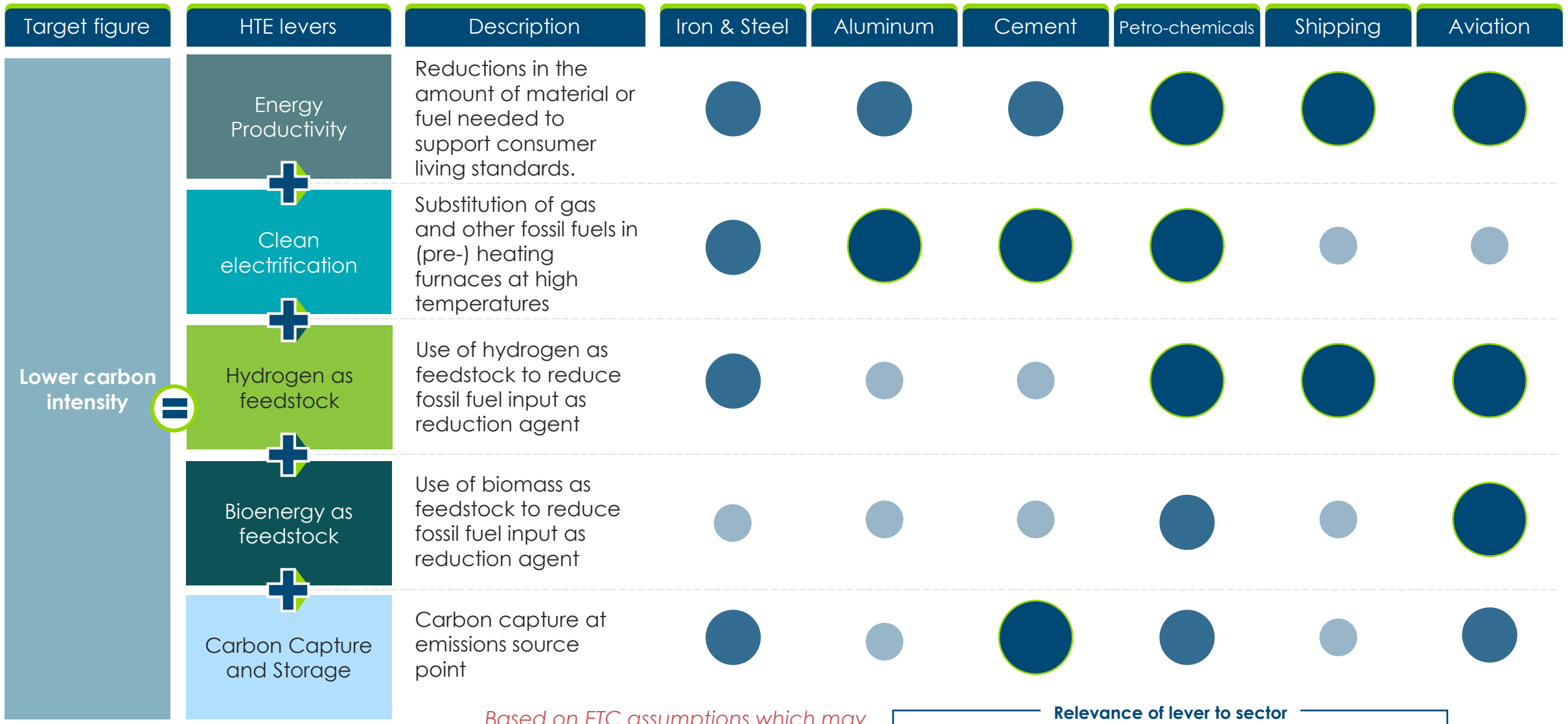
$GtCO_2$



Notes: 1. Emissions are assumed to decline linearly over the period 2050–2070; 2. Emissions capture direct CO2 emissions from fuel combustion in steel, cement, aluminum and chemicals, including emissions from industrial processes. Embodied carbon, from petrochemicals for instance, not included; 3. Countries included are the same as BNEF provides and defines.

Source: BNEF (2025), *New Energy Outlook 2025.*

5 main levers to decrease carbon intensity across hard-to-electrify sectors, with relative relevance differing by sector



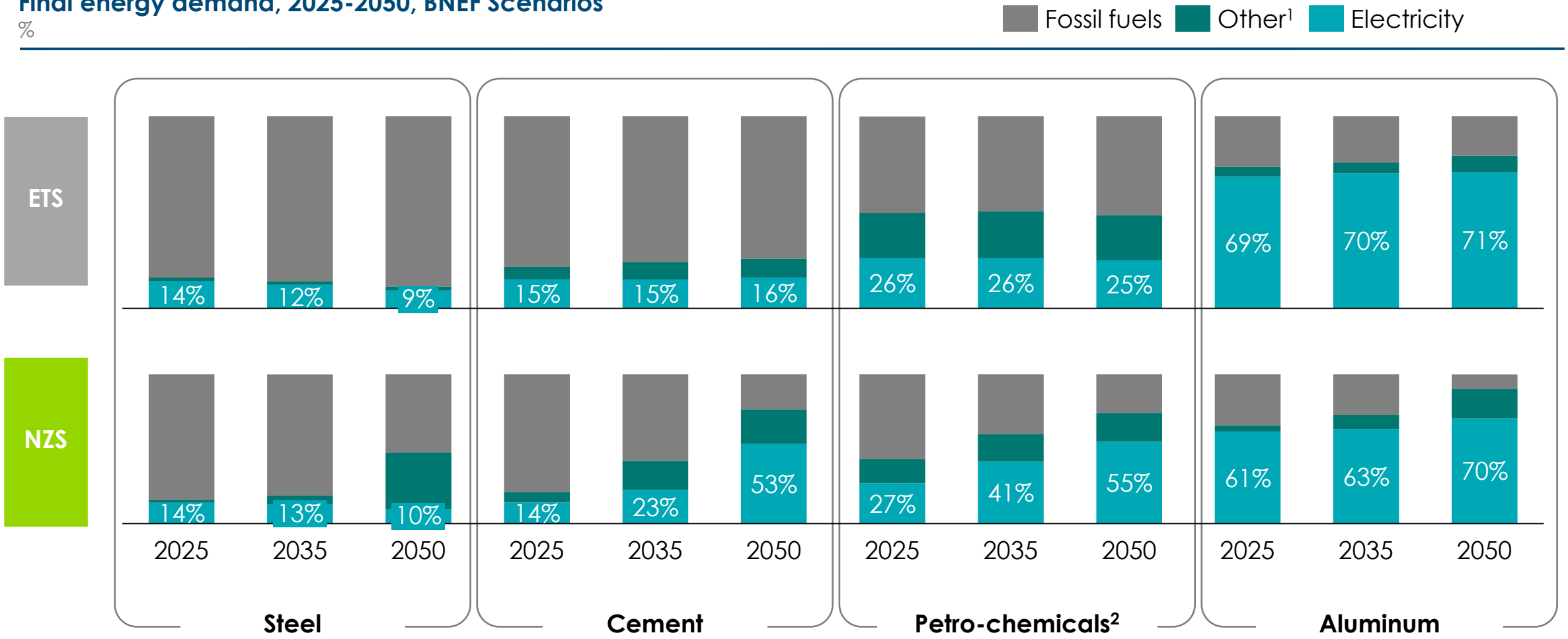
Source: Systemiq analysis for the ETC.

Based on ETC assumptions which may slightly differ from BNEF Scenarios

According to BNEF, some potential for higher shares of electrification exists, especially in cement and chemicals

Final energy demand, 2025-2050, BNEF Scenarios

%

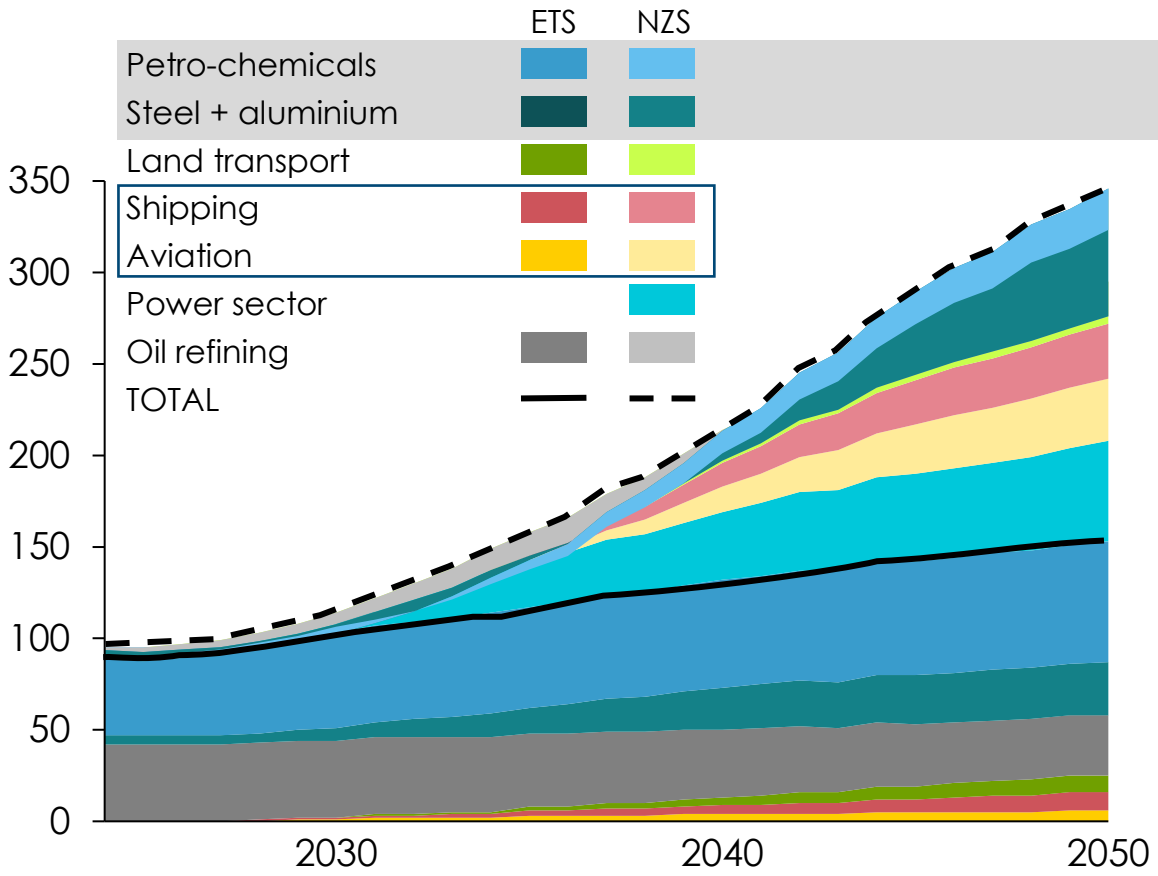


Notes: 1. Other includes heat, hydrogen, bioenergy, and other renewables; 2. Chemicals include Aromatics, ethylene, HDPE, LDPE, PP, PET, Propylene;
Source: BNEF (2025), *New Energy Outlook 2025;*

Hydrogen demand under BNEF ETS driven by petro-chemicals and scale-up in NZS by 2035 is led by the power sector, shipping and aviation

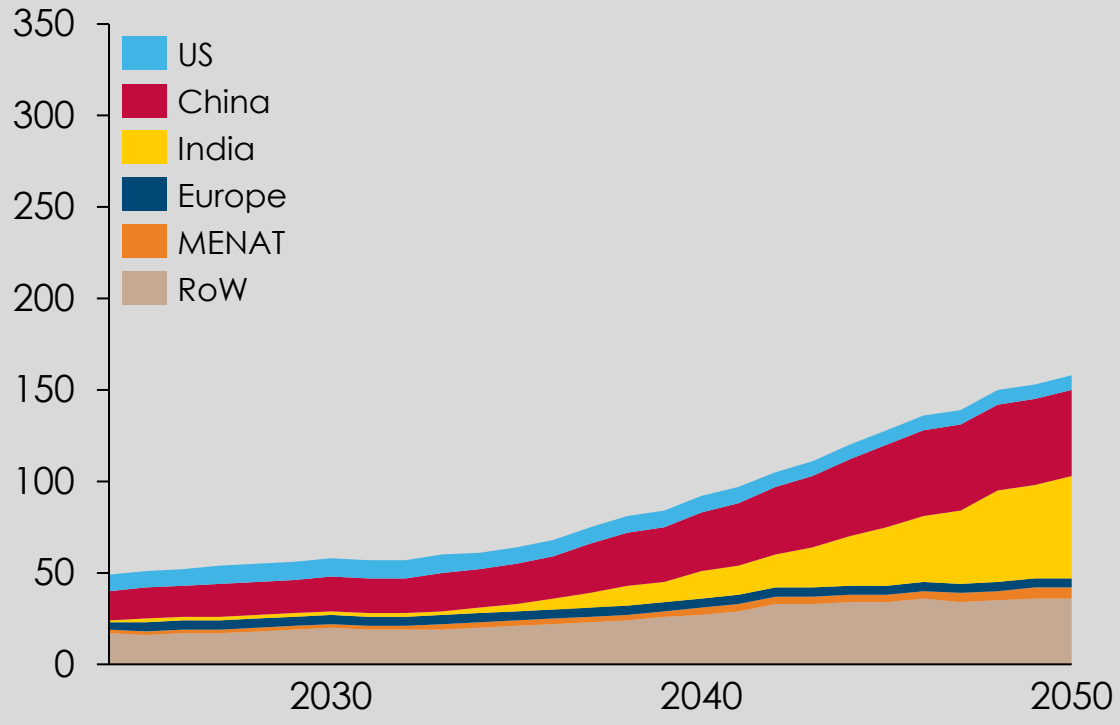
Hydrogen consumption per sector, BNEF, Global, 2024 - 2050

Mt H_2



Global hydrogen consumption of HTE sectors, 2025-2050, BNEF NZS

Mt H_2

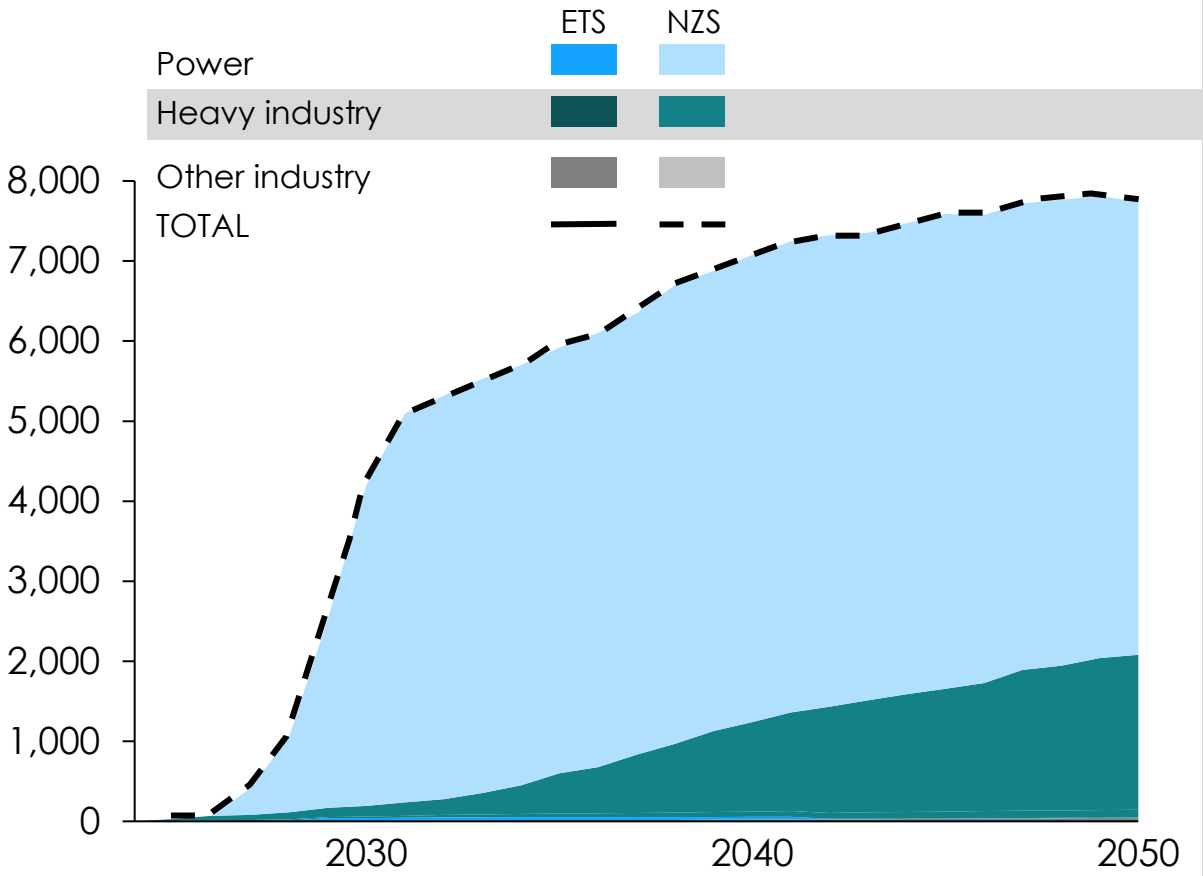


Notes: Land transport includes road and rail transport; Petro-chemicals excludes demand for shipping and aviation hydrogen derivative fuels.
Source: BNEF (2025), *New Energy Outlook 2025;*

In BNEF NZS, "well below 2°C" is tightly reliant on ramp-up of CCS in the power sector and heavy industry decarbonization

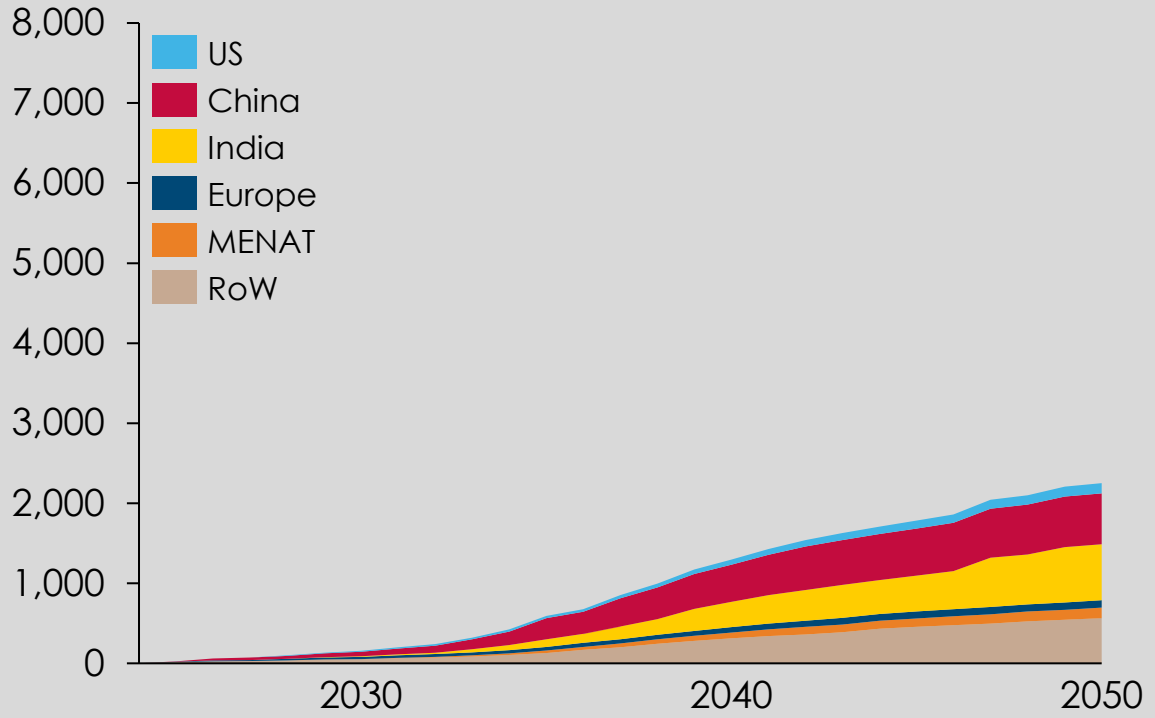
Global CO_2 captured by sector, BNEF scenarios 2024 - 2050

Mt CO_2



Global CO_2 captured in heavy-industry, 2025-2050, BNEF NZS

Mt CO_2

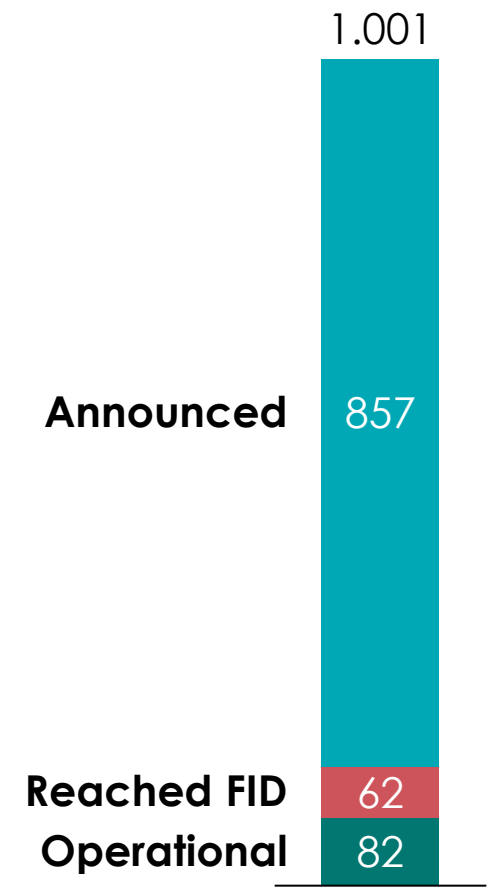


Notes: 1. Land transport includes road and rail transport2. NZS'other sectors include power & energy industry;
Source: BNEF (2025), *New Energy Outlook 2025;*

MPP global project tracker shows progress in announced projects to decarbonise HTE sectors, but very few FID of large commercial plants

Global Project Tracker pipeline

Total projects by project stage, November 2025

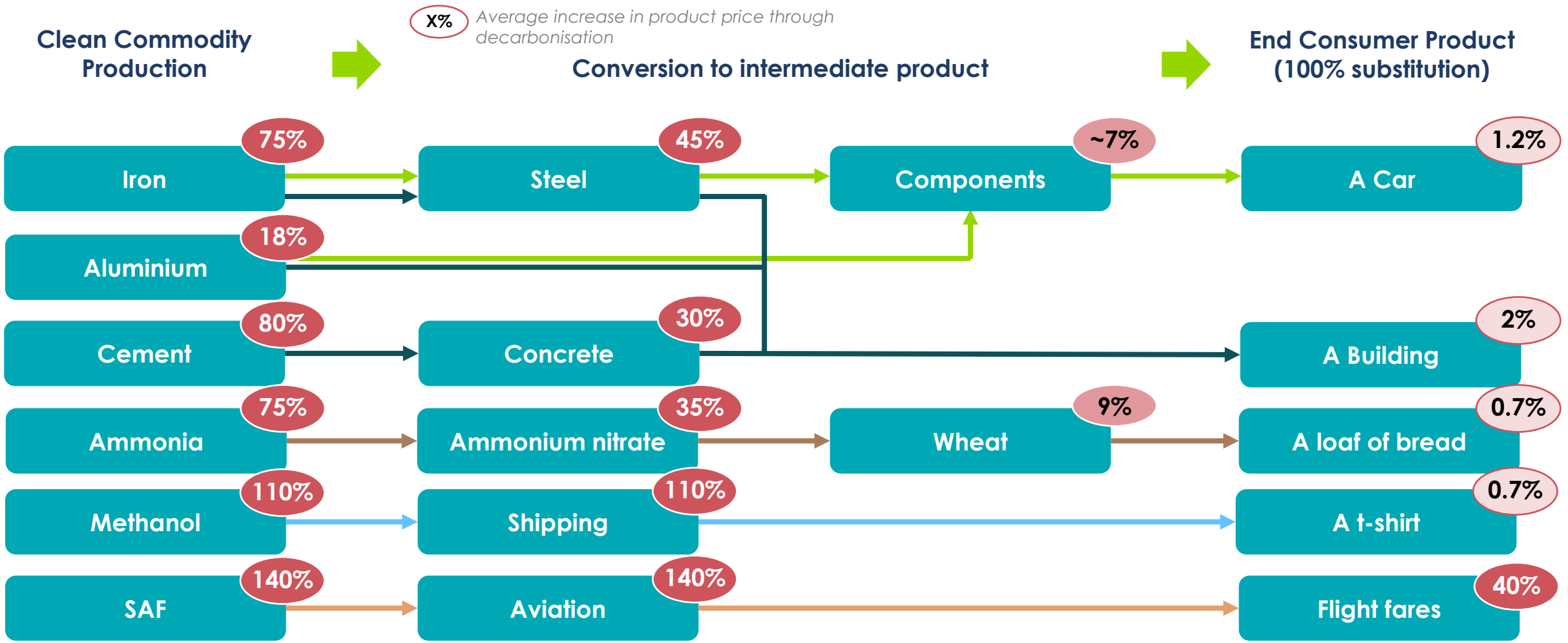


	Chemicals Ammonia	Chemicals Methanol & HVC[1]	Aviation	Aluminium[2]	Cement	Steel	Estimated investment
Announced	434	167	208	5	28	15	$1.84 trillion
	19	15	17	3	1	7	$81 billion
Reached FID	2	5	28	46	1	0	$97 billion
Operational							

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.

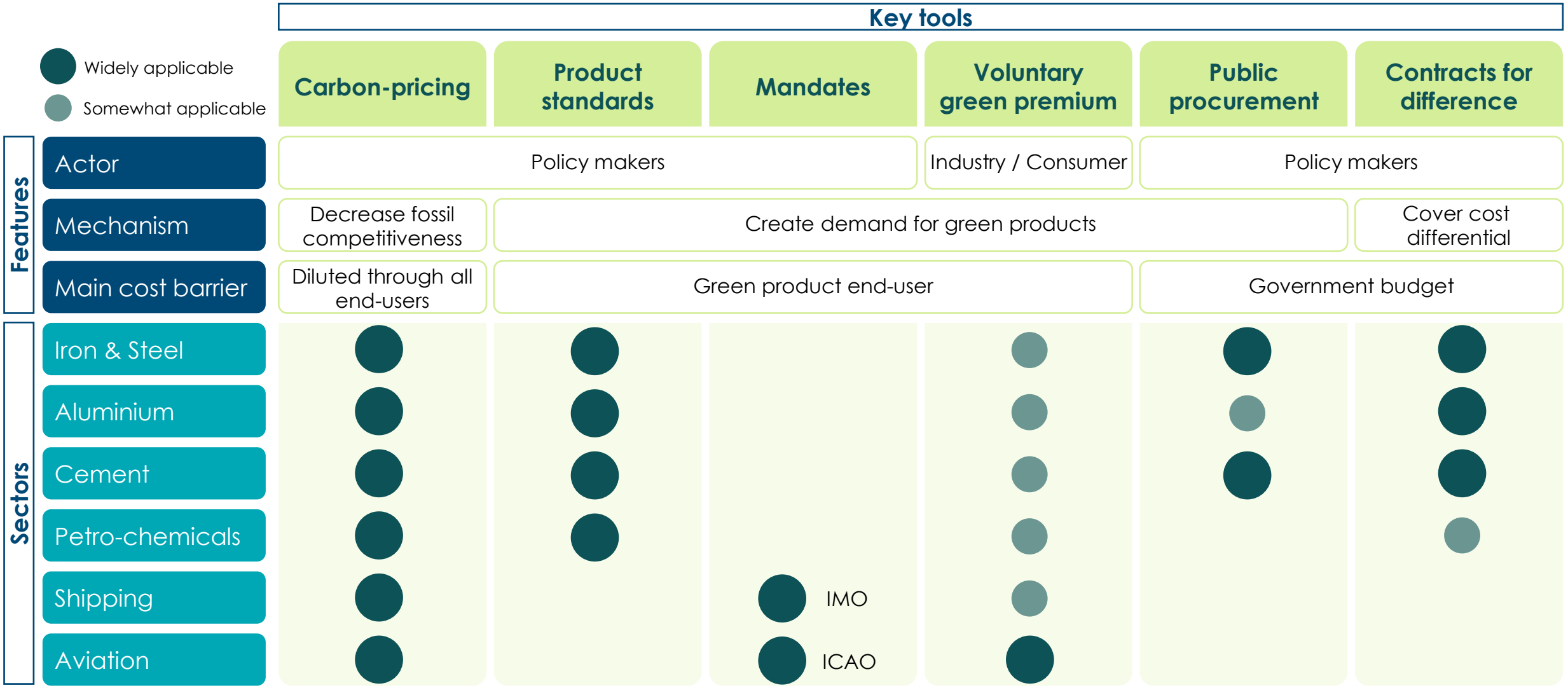
Source: MPP (2025), *Global Project Tracker*. For per sector sources, products in scope and technologies in scope please refer to MPP Global Project Tracker

Green premiums are needed to decarbonise HTE sectors; but consumer price impacts, in most sectors, are expected to be minimal



Note: Assumes 100% cost pass through, costs are based on productions in low-cost regions of Europe. Upstream costs are based on MPP analysis of data produced by Bloomberg NEF, MPP and Energy Transitions Commission – full assumptions can be found in the technical annex.
Source: E3G, Industrial Transition Accelerator (2025) Building the EU's Clean Industrial Future: Unlocking Investment through Lead Markets; Industrial Transition Accelerator (2025) Clean industry: Transformational trends

Carbon pricing is the main technology agnostic cross-sectoral tool to close green premium, but further demand-side tools might be necessary

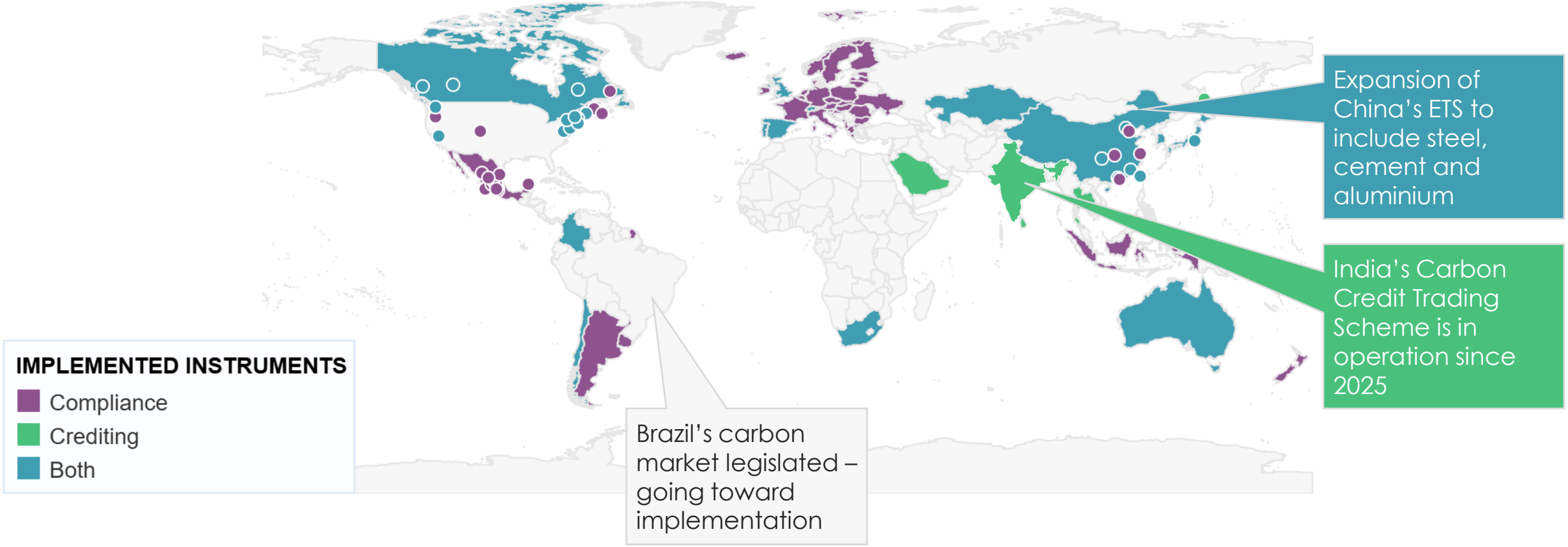


Source: Systemiq analysis for the ETC; ETC (2021) Making the Hydrogen Economy Possible: Accelerating Clean Hydrogen in an Electrified Economy

Carbon pricing is spreading but unevenly, question if EU ETS CBAM can force convergence

Carbon pricing instruments around the world, 2025

Map shows jurisdictions that have implemented Direct Carbon Pricing Instruments - Compliance instruments (Emissions Trading Systems (ETS) and Carbon taxes) and/or domestic carbon crediting mechanisms, subject to any filters applied. The year can be adjusted using the slider below the map.



Source: World Bank (2025) State and Trends of Carbon Pricing Dashboard; China's State Council (2025) China expands carbon trading market to steel, cement, aluminum smelting sectors; Brazil's Federal Government website (2025) The Brazilian System of Emissions' Market; International Carbon Action Partnership(2025) Indian Carbon Credit Trading Scheme

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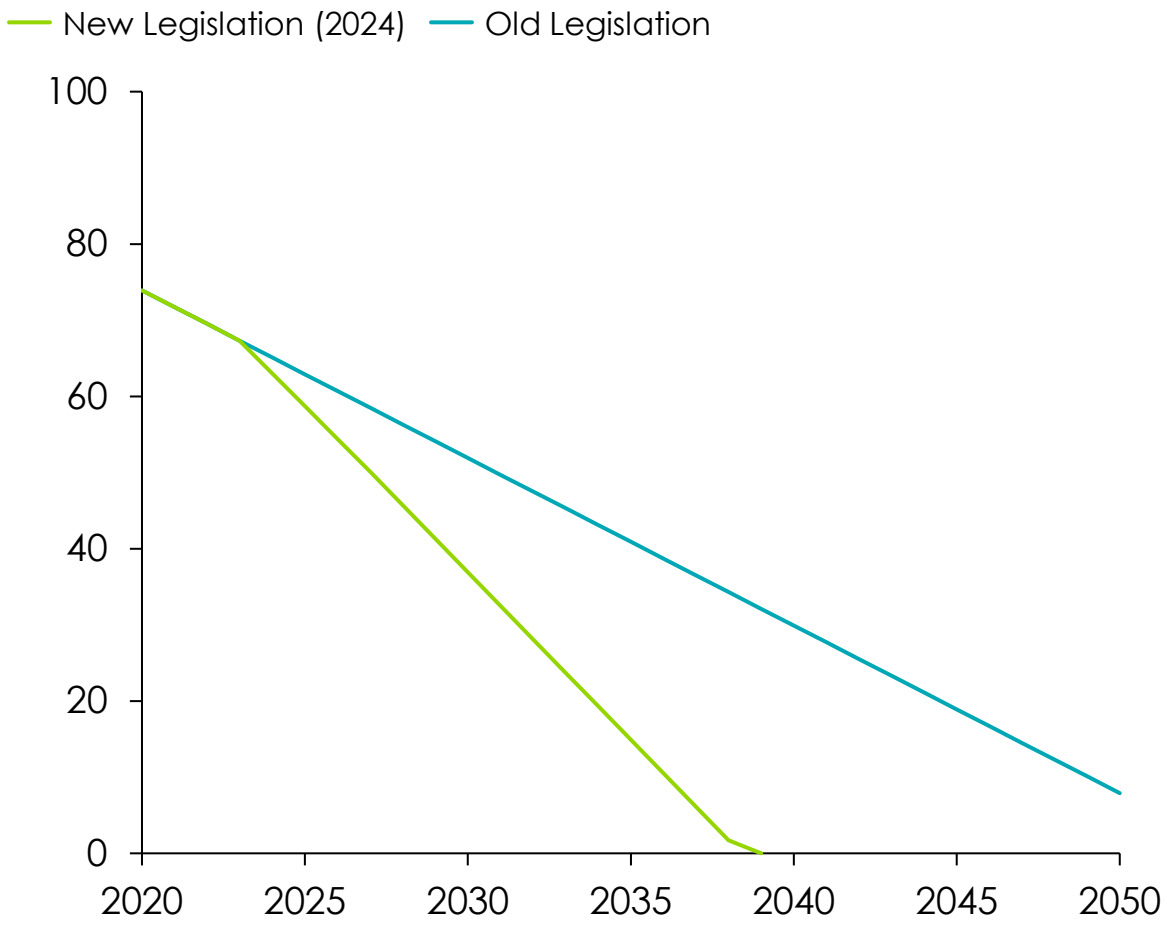
The EU and the UK have strong NDC targets, committing to reduce GHG emissions by 70 and 80% by 2035

EU emissions cap as share of 2005 emissions

%



- Reducing GHG emissions by **66-73% by 2035** compared to 1990 levels
- Legally binding target to cut net emissions by **90% by 2040**, relative to 1990 emissions
- **One-year delay** for the inclusion of transport and housing under ETS scheme (**ETS2**)
- Ban on ICE cars sales by 2035 diluted but still strong

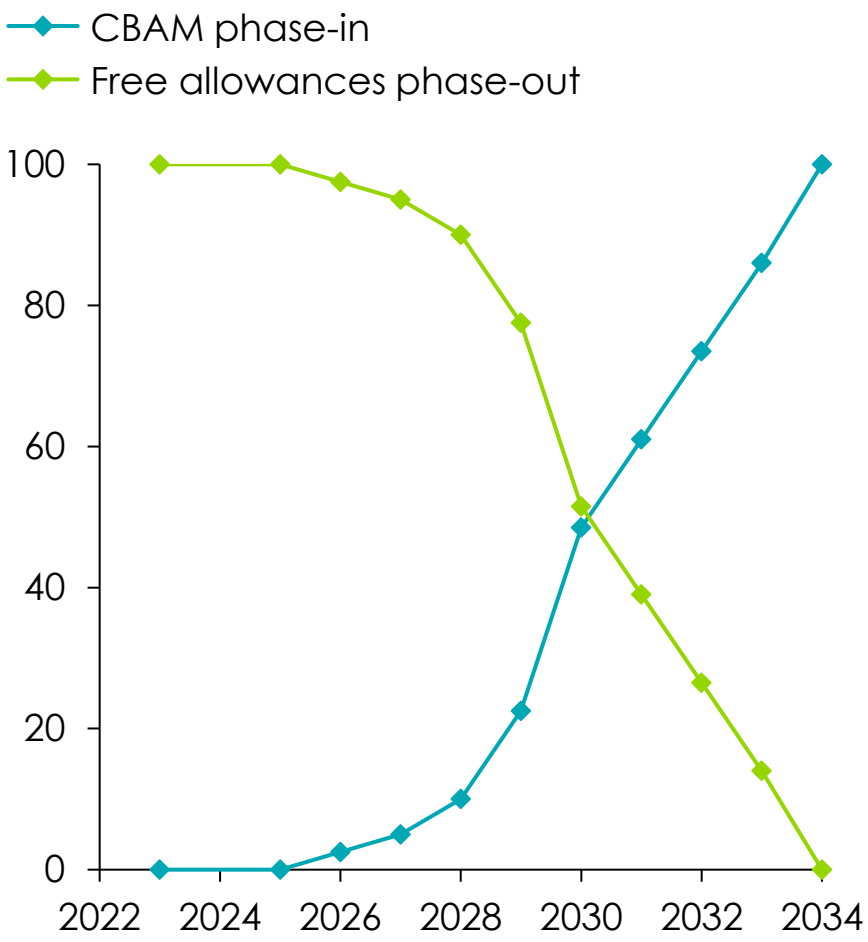
- Reducing GHG emissions by **81% by 2035** compared to 1990 levels
- Pledge to achieve at least **95% clean electricity by 2030**, alongside the phase out of coal power
- UK ETS under consultation for extending scope to international maritime voyages
- Ban on ICE cars and vans sales by 2030

Source: S&P (2026) European carbon prices slide as Germany's Merz says EU ETS may need revamping; Politico (2026) Italy calls for suspension of carbon price in major attack on EU climate policy

CBAM is a key pillar in phasing out free allowances, but just after a few months of implementation, it is being used as a scapegoat

Phase out of free allowances. EU ETS

%



*"This system [EU ETS] is implemented to reduce CO_2 emissions and… enable the companies to come to CO_2-free production lines… if this is not achievable… **we should be very open to revise it [EU ETS] or at least to postpone it"*** Friedrich Merz, Federal Chancellor, Germany - *February 2026*

German Chancellor walk back to defend the ETS a day after as an effective system that have decrease industry emission by 70% since its implementation

***"The ETS mechanism, as currently designed, is nothing more than a tax, a levy on energy-intensive companies**… It is necessary to revise it substantially … To do this properly, the ETS mechanism must be suspended pending a reform"* Adolfo Urso, Industry Minister, Italy - *February 2026*

Italy called for a suspension of the ETS after threating to remove its power market from the scheme

Source: S&P (2026) European carbon prices slide as Germany's Merz says EU ETS may need revamping; Politico (2026) Italy calls for suspension of carbon price in major attack on EU climate policy

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- **ETC partnership with China Iron and Steel Research Institute**

China's steel sector will be pivotal to deep decarbonisation outcomes by mid-centry

CISRI 中国钢研

Who they are: China Iron & Steel Research Institute (CISRI) is a SASAC-backed state research institute with deep technical capacity and direct links into China's industrial policy system.

Why they matter: CISRI runs leading pilots such as the Linyi H2-DRI project and advises NDRC and MIIT on technology and standards.

Our partnership: ETC and CISRI have a signed MoU, with visits to CISRI HQ and the H2-DRI pilot site, giving trusted access to data and decision-makers.

Complementary roles: CISRI brings data and ~10 FTEs of technical work; ETC–Systemiq brings Steel-IQ, ETS/CBAM understanding and global benchmarks.

China's steel sector will be pivotal to deep decarbonisation outcomes by mid-centry

- **Scale:** China produces **~1.0 Gt of crude steel – about 54% of global output – and over 2 Gt of CO_2 per year** from the sector.
- **Exports:** Around **130 Mt of exports** increasingly set global price floors and fall under CBAM-type measures.
- **Policy pivot:** Steel is now under China's **2060 net-zero / "1+N"** framework, with the 15th FYP and ETS expansion set to make **carbon pricing a core competitiveness lever**.

Economic pathways for green steel in China

Project setup

Partners

- ETC
- China Iron and Steel Research Institute (CISRI)
- Systemiq steel decarbonisation team
- Global Industry Hub

Core idea

- Joint economic pathways study to support China's steel **Dual Carbon** and **15th FYP** goals.
- Focused on real-world costs of **hydrogen DRI** and other low-carbon routes under China-specific conditions
- External funding for ETC–Systemiq; **CISRI provides data, experts and policy access** in-kind

ETC rationale

Steel now inside the ETS

- Steel, cement and aluminium are being brought into the national carbon market, taking coverage to well over half of China's emissions.

Tightening ahead

- Today: free, intensity-based ETS allocation. Next: stricter benchmarks, tighter caps and some auctioning after 2027

Critical design window

- This 15th FYP ETS design will lock in the investment case for hydrogen steel and shape CBAM exposure for years

Project objectives

1. Calibrate China's H_2-DRI cost frontier

- Use CISRI data and Steel-IQ to map cost curves for hydrogen steel vs BF-BOF, with key sensitivities
- Pinpoint levers (power price, utilisation, cost of capital) to close the green premium

2. Design ETS pathways that unlock investment

- Test ETS caps, price paths and allocation options for profitability, investment signals and leakage risk
- Provide "safe options menus" aligned with hydrogen rollout and avoiding stranded assets

3. Strengthen export resilience

- Quantify exposure to CBAM and other trade measures
- Show how robust carbon pricing and MRV can turn low-carbon steel into a competitiveness and market-access edge

Core questions for the China steel pathways study

Q1. How low can green hydrogen go – and how cheap can H2-DRI be?

Use CISRI data and Steel-IQ to map China-specific cost curves for hydrogen production and hydrogen-based DRI

Q2. What is the remaining green cost premium vs conventional blast furnaces?

Compare H2-DRI (and other viable technologies) to BF-BOF under realistic assumptions on power, ore quality, utilisation and financing

Q3. What carbon price is required to bridge that premium?

Identify ETS price paths and supporting policies that make low-carbon steel investable without carbon leakage

Q4. What does this imply for ETS evolution and EU CBAM?

Set out options for China's ETS design and MRV that minimise CBAM liabilities and turn low-carbon steel into a competitive edge

Energy
Transitions
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