

Free allocation is not driving investment in steel decarbonisation

The EU Emissions Trading System (ETS) is intended to drive decarbonisation investment through the price it places on CO₂ emissions: as the cap tightens and the allowance price rises above the cost of abatement, investing in cleaner production becomes more economic than continuing to emit. However, for the past 20 years, steelmakers have received most of their emission allowances for free through free allocation. Here, we show that free allocation has acted as an anesthetic for investment in decarbonisation, rather than a catalyst.

This brief compares the market value of free allowances received with the decarbonisation investment actually committed by the EU27's three largest steelmakers by output: ArcelorMittal, thyssenkrupp, and voestalpine¹.

Over the first half of Phase IV (2021–2025), the three steelmakers received free allowances worth €25.73 billion but committed just €5.36 billion to decarbonisation investment. Of that, €2.16 billion is covered by public support, leaving €3.2 billion of net investment — a reinvestment deficit of €22.52 billion, or €8 of free allowances for every €1 of net investment. The gap is widest for ArcelorMittal: it received free allowances worth €15.67 billion against just €0.66 billion of net investment², less than 5% of its free allocation value. thyssenkrupp and voestalpine received free allocation worth roughly seven times and two times their net investment respectively.

Table 1: Market value of EU ETS free allocation received versus decarbonisation investment committed within EU27, 2021–2025. The comparison is deliberately generous as it compares free allowances *received* with capital *committed*, that is, not capital *spent*. For definitions and specifics, see Appendix. All figures are in nominal currency.

Company	Free allocation market value	Committed investment in decarbonisation			Free allowance reinvestment deficit
		Gross committed (A)	Covered by aid (B)	Net investment (A – B)	
ArcelorMittal	€15.67 bn	€0.69 bn	€0.027 bn	€0.66 bn	€15.01 bn
thyssenkrupp	€6.71 bn	€3.00 bn	€2.00 bn ³	€1.00 bn	€5.71 bn
voestalpine	€3.35 bn	€1.67 bn	€0.13 bn	€1.54 bn	€1.80 bn

The competitiveness protection that free allocation has provided has not been matched by decarbonisation investment of comparable scale. Free allocation is not driving the sector's transition: it suppresses the very price signal the EU ETS relies on to compel investment, prolonging the economic viability of emissions-intensive manufacturing and starving decarbonisation efforts.

The experiment of EU ETS with free allocation has now run for 20 years, and yet there is no green steel at commercial scale. The gap documented here suggests that increasing the planned supply of free allocation is unlikely to alter these investment dynamics. This underscores the case for swiftly replacing free allocation with the CBAM — so that the EU ETS acts as a mechanism that drives the transition rather than prolonging the status quo.

¹ The investment and ownership data ledger was built bottom-up from more than 230 company reports, filings, and primary sources. For details, see Appendix.

² ArcelorMittals' EAF investment at Dunkirk of €1.3 bn, equating to €0.65 bn net investment, falls outside the free allocation comparison window as it was made in Q1 2026.

³ Includes €1.45 bn conditional payment mechanism.

Appendix

This appendix documents both sides of Table 1 for the EU27 operations of the three companies over 2021–2025. **Part A** lists the investment items that are summarised in Table 1, committed investments in decarbonisation, and the aid covering those committed projects. **Part B** sets out the free-allocation methodology and the number of allowances received, by company, by year, and by installation.

Part A — Investment in Table 1

Definitions and system boundaries

“Committed investment”

Defined as the gross capital cost, before factoring in public support, measured in nominal euros of the commitment year, of a company's EU27 steel project that has passed a formal final investment decision (FID)⁴ for at minimum a demonstration-scale plant.

Included:

- Projects at minimum demonstration-scale that have officially passed FID with a confirmed and binding capital expenditure commitment (e.g. voestalpine Hy4Smelt is included; ArcelorMittal's Hamburg H₂-DRI⁵ announced in 2021 is not).
- Projects already operating that have a gross capital cost officially committed within the 2021–2025 financial window.

Excluded:

- Announced projects, stated corporate intentions, pre-FID budget allocations, and any public funding attached to them.
- Research, laboratory, bench-scale, and pilot activity (e.g. Siderwin⁶).

“Decarbonisation”

Defined as any primary technological addition, asset conversion, or chemical process shift that directly transforms the chemical carbon balance of primary iron production or crude steelmaking capacity to low- or near-zero-emissions pathways.

Included:

- The addition or conversion of existing primary iron or crude steelmaking capacity to low-carbon configurations (e.g. EAF, DRI, smelting reduction, CCU/S).
- Upstream chemical processes that directly enable the supply of the chemical reductant used to decarbonise iron ore reduction (e.g. hydrogen generation for DRI).
- Structural retrofits to the existing blast-furnace route that directly reduce Scope 1 emissions by acting on its chemical carbon balance, either via substituting fossil carbon inputs (e.g., bio-coal or bio-charcoal injection) or capturing carbon outputs before atmospheric release (e.g., blast-furnace CCU/S)⁷.

⁴An announced project, stated intention, or budget allocation, is *not* counted as an FID. Announced (pre-FID) projects and aid attached to them are excluded.

⁵The Hamburg 100%-hydrogen DRI demonstrator (~100,000 t/yr) is an announced project: ArcelorMittal stated it had “allocated €65 million”, and the German federal government expressed an intention to provide €55 million of a stated €110 million total capital cost, conditional on European Commission approval “before the installation of the new plant can begin”; no final investment decision, construction start or commissioning has been publicly confirmed. *Source:* ArcelorMittal Press Release: “German Federal Government commits its intention to provide €55 million of funding for ArcelorMittal's Hydrogen DRI plant” (7 September 2021).

⁶Siderwin is R&D — an EU-funded electrolysis (electrowinning) pilot at ArcelorMittal's Maizières research campus at the scale of “up to a hundred kilograms of iron metal” — with no public information about progress to demonstration or industrial scale. *Source:* ArcelorMittal, “Clean power steelmaking” (automotive.arcelormittal.com).

⁷SteelWatch does not necessarily endorse all such projects as appropriate decarbonisation.

Excluded:

- Downstream finishing lines, or downstream steel processing facilities that the operating company itself explicitly states are not decarbonisation initiatives (e.g. ArcelorMittal Mardyk electrical steels).
- Electricity supply and generation assets that address Scope 2 emissions without fundamentally changing the chemical iron or steelmaking process (e.g., grid utility connections, power-purchase agreements, or on-site solar and wind farms).
- Energy-efficiency retrofits that lower generic fuel or power consumption without directly altering the chemical carbon balance of iron reduction (e.g. waste-heat recovery units or other process-efficiency measures that are individually small by comparison and immaterial to the totals even if aggregated).

“Covered by aid”

Defined as any form of financial or structural backing for an investment project that is provided by external public, national, or institutional entities rather than funded directly by the operating company's own balance sheet.

Included:

- All forms of public, third-party support that the company does not fund itself, provided it is tied directly to a post-FID capital investment, regardless of the distribution or payment timeline (e.g., European Commission and national state aid, RRF, IPCEI, and regional, local, or Ministry financial support).

Excluded:

- Financially repayable corporate debt instruments, commercial bank lines, or institutional credits (e.g. credit arrangements or revolving loans provided by the European Investment Bank (EIB)).
- Indirect Cost Compensation (ICC) for electricity.

“Net investment”

Defined as the investment burden carried by the company after public support is deducted.

Investment items in Table 1

“c.” marks a figure the source gives as approximate; an asterisk (*) marks an item included under a deliberately generous definition although it does not durably reduce steelmaking emissions.

Table A1: ArcelorMittal S.A.

Project / item	Site	Year	€m	Source
Decarbonisation — committed				
Sestao EAF capacity expansion	Sestao, ES	2022	150	ArcelorMittal press release: <i>El crecimiento de ArcelorMittal Sestao impulsa la actividad industrial en Euskadi</i> (2026)
Steelanol (CCU)*	Ghent, BE	2022	200	ArcelorMittal Q4 2022 earnings release, p. 4
Belval steel plant upgrade, incl. a new EAF	Belval, LU	2023	67	ArcelorMittal Europe Fact Book 2024 (FY2023), p. 12
Torero (bio-coal)*	Ghent, BE	2023	55	ArcelorMittal Annual Report 2023, p. 52
Gijón new 1.1 Mt EAF	Gijón, ES	2024	213	ArcelorMittal Europe Fact Book 2026 (FY2025), p. 12
Covered by aid				
Steelanol public funding (Horizon 2020)	Ghent, BE	2022	>3.82 ⁸	EU Horizon 2020 grant 656437 DOI 10.3030/656437

⁸Total public financing exceeds this amount, as Flemish regional and Belgian federal asset grants have not been transparently consolidated by the company.

Project / item	Site	Year	€ m	Source
Torero public funding (Horizon 2020)	Ghent, BE	2023	7.78 ⁹	EU Horizon 2020 745810 DOI 10.3030/745810
Belval — Luxembourg State support	Belval, LU	2023	c. 15	ArcelorMittal Press Release: <i>67 million euros in a new electric arc furnace at its Belval site, with the support of the Ministry of Economy</i>

Table A2: thyssenkrupp AG, steel operations

Project / item	Site	Year	€ m	Source
Decarbonisation — committed				
tkH2Steel — H ₂ -ready DR plant + 2 melting units	Duisburg, DE	2023	c. 3,000	thyssenkrupp press release: <i>thyssenkrupp and EP Corporate Group enter into strategic partnership(2024)</i>
Covered by aid				
tkH2Steel state aid	Duisburg, DE	2023	2,000 ¹⁰	thyssenkrupp Annual Report 2022/2023 p.71; European Commission, State Aid Aid SA.105244 (2023/N) – Germany Aid to ThyssenKrupp for project tkH2Steel (2023)

Table A3: voestalpine AG

Project / item	Site	Year	€ m	Source
Decarbonisation — committed				
greentec steel — EAF Linz + EAF Donawitz	Linz & Donawitz, AT	2023	c. 1,500	voestalpine Annual Report 2025/26 p.61
Hy4Smelt — H ₂ -DRI + electric smelter demo	Linz, AT	2025	c. 170	voestalpine Annual Report 2025/26 p.61
Covered by aid				
Hy4Smelt public co-financing	Linz, AT	2025	c. 128	voestalpine Annual Report 2025/26, p. 237

⁹Including C-SHIFT, a wholly owned subsidiary of ArcelorMittal Belgium, which is a wholly owned subsidiary of the ArcelorMittal Group.

¹⁰€550 m grant + up to €1.45 bn conditional; ~€1.4 bn federal + ~€0.6 bn NRW

Part B — Free allocation received (EU ETS)

Methodology

Free allocation is the number of EU ETS allowances (EUAs; 1 EUA = 1 t CO₂) allocated to each company's installations free of charge each year, taken from the EUTL¹¹ registry dataset. The free allocation market value is the total number of EUAs multiplied with the average EUA price¹² for each year.

Allowances counted belong to activity codes 20, 22–25, and 30, and are allocated under EU ETS Directive 2003/87/EC Art. 10a(1) (main allocation) plus transitional Art. 10c where applicable, and *excludes* new-entrant reserve allocations (Art. 10a(7)). Source values of –1 / “Excluded” / blank are treated as zero. Electricity is excluded.

Ownership attribution: The unit is the Operator — the legal entity holding the installation's greenhouse-gas permit in the registry. For each installation-year: if one corporate parent controls and consolidates the Operator, 100% is attributed to that parent (a non-controlling minority investor is not attributed); if control is genuinely shared (a joint venture with no single consolidator), it is split by equity. A plant is counted only for the years that parent controlled the Operator. Ownership dates and shares come from company filings (20-F / annual reports / shareholdings lists) and involve documented judgement at ownership-change boundaries.

Company-specific judgements:

- **ArcelorMittal S.A.** — Taranto (Acciaierie d'Italia) was deconsolidated and equity-accounted, so it is counted at 62% for 2021–2023 only and excluded from 2024 (exit Feb 2024). Ostrava, Galați and Dudelange were sold to Liberty in mid-2019, before the window.
- **thyssenkrupp AG, steel operations** — HKM (Hüttenwerke Krupp Mannesmann) is a joint venture (tk 50% / Salzgitter 30% / Vallourec 20%) with no single consolidator, so only thyssenkrupp's 50% equity share is counted. EP Corporate Group's 20% stake in thyssenkrupp Steel Europe (Jul 2024) was returned on 30 Sep 2025; thyssenkrupp fully consolidated Steel Europe throughout, hence the Duisburg works is counted at 100%.
- **voestalpine AG** — voestalpine Tubulars is fully consolidated (voestalpine 49.89%; non-controlling interests 50.11%, Nippon Steel), so 100% is attributed to voestalpine. Buderus Edelstahl (Germany) was sold on 31 Jan 2025, so it is counted 2021–2024 and excluded from 2025.

¹¹European Commission, EU Emissions Trading System (EU ETS) — *verified emissions and allocation data for stationary installations and aircraft operators*, Union Registry Public Website, European Union Transaction Log (EUTL) [data extraction date 1 April 2026].

¹²International Carbon Action Partnership, *Allowance Price Explorer* [data extraction date 22 June 2026].

Results summary

Table A4: ArcelorMittal S.A. — free allocation by year (2021–2025)

Year	Total number of EUAs
2021	48,834,856
2022	46,686,739
2023	48,384,434
2024	37,926,077
2025	37,626,430
2021–25	219,458,536

Table A5: ArcelorMittal S.A. — installations (2021–2025)

Installation (site)	Country	Share	Years counted	Total number of EUAs (2021–25)
ArcelorMittal France- Dunkerque	France	100%	2021–2025	41,305,035
ArcelorMittal Gent	Belgium	100%	2021–2025	37,289,837
ARCELORMITTAL ESPAÑA, S.A.	Spain	100%	2021–2025	28,962,992
ARCELORMITTAL MEDITERRANEE	France	100%	2021–2025	25,124,336
WIELKI PIEC STALOWNIA ARCELORMITTAL DĄBROWA GÓRN.	Poland	100%	2021–2025	22,203,959
ArcelorMittal Bremen	Germany	100%	2021–2025	21,704,758
ArcelorMittal Eisenhüttenstadt	Germany	100%	2021–2025	13,393,439
ArcelorMittal Italia / Acciaierie d'Italia — Taranto (ex-Ilva)	Italy	62%	2021–2023	11,940,396
SPIEKALNIA ARCELORMITTAL DĄBROWA GÓRNICZA	Poland	100%	2021–2025	3,569,000
KOKSOWNIA ARCELORMITTAL ZDZIESZOWICE	Poland	100%	2021–2025	3,363,379
ArcelorMittal Bottrop — Kokerei Prosper (coking plant)	Germany	100%	2021–2025	1,537,616
WAPNIALNIA ARCELORMITTAL DĄBROWA GÓRNICZA	Poland	100%	2021–2025	1,199,553
ArcelorMittal France- Florange	France	100%	2021–2025	1,024,543
WALCOWNIE ARCELORMITTAL KRAKÓW	Poland	100%	2021–2025	868,292
WIELKI PIEC+STALOWNIA ARCELORMITTAL KRAKÓW	Poland	100%	2021	706,922
ArcelorMittal Belval & Differdange-Site de Belval	Luxembourg	100%	2021–2025	694,728
WALCOWNIA ARCELORMITTAL DĄBROWA GÓRNICZA	Poland	100%	2021–2025	669,549
ArcelorMittal Belval et Differdange - site Differd	Luxembourg	100%	2021–2025	644,235
KOKSOWNIA ARCELORMITTAL KRAKÓW	Poland	100%	2021–2025	552,657
Fábrica de Olaberria	Spain	100%	2021–2025	424,565
ArcelorMittal France- Mardyck	France	100%	2021–2025	239,287
Arcelormittal Sestao, S.L.U	Spain	100%	2021–2025	236,095
ARCELORMITTAL ESPAÑA, S.A.	Spain	100%	2021–2025	227,423
WALCOWNIA ARCELORMITTAL SOSNOWIEC	Poland	100%	2021–2025	205,361
ArcelorMittal France- Montataire	France	100%	2021–2025	181,231
ARCELORMITTAL HUNEDOARA SA	Romania	100%	2021–2025	151,563
OBRÓBKA METALI ŻELAZNYCH ARCELORMITTAL ŚWIĘTOCHŁÓW	Poland	100%	2021–2025	144,230
ArcelorMittal Piombino S.p.A.	Italy	100%	2021–2025	138,213
ArcelorMittal España, S.A.-Fáb. Etxebarri	Spain	100%	2021–2025	97,236
SC ARCELORMITTAL TUBULAR PRODUCTS ROMAN SA	Romania	100%	2021–2025	89,847
ARCELORMITTAL GANDRANGE AMNEVILLE	France	100%	2021–2025	82,588
ARCELORMITTAL - site de Ramet - IVOZ-RAMET	Belgium	100%	2021–2025	82,133
ARCELORMITTAL FRANCE - Basse Indre	France	100%	2021–2025	75,695
Fábrica de Bergara	Spain	100%	2021–2025	75,499
AM Rodange et Schifflange - Site de Rodange	Luxembourg	100%	2021–2025	70,533
ArcelorMittal Lesaka, S.A.	Spain	100%	2021–2025	67,780
Walcownia ArcelorMittal Chorzów	Poland	100%	2021–2025	40,781
Arcelormittal Building Solutions France- Site 1	France	100%	2021–2025	21,745
ELEKTROCIĘPŁOWNIA ARCELORMITTAL ZDZIESZOW-ICE	Poland	100%	2021–2025	20,236
ArcelorMittal Tubular Products Karviná	Czechia	100%	2021–2025	12,087
ELEKTROCIĘPŁOWNIA ARCELORMITTAL SOSNOWIEC	Poland	100%	2021–2025	10,927
ARCELORMITTAL Building Solutions France- Site 2	France	100%	2021–2025	8,255

Table A6: thyssenkrupp AG, steel operations — free allocation by year (2021–2025)

Year	Total number of EUAs
2021	19,160,171
2022	18,871,915
2023	18,872,438
2024	18,873,073
2025	18,887,265
2021–25	94,664,862

Table A7: thyssenkrupp AG, steel operations — installations (2021–2025)

Installation (site)	Country	Share	Years counted	Total number of EUAs (2021–25)
thyssenkrupp Steel Europe — Duisburg integrated works	Germany	100%	2021–2025	73,767,156
HKM — Hüttenwerke Krupp Mannesmann, Duisburg-Huckingen	Germany	50%	2021–2025	15,749,654
Schwelgern coking plant, Duisburg	Germany	100%	2021–2025	2,767,215
tk Steel Europe — Bochum hot-strip mill (Warmbandwerk 3)	Germany	100%	2021–2025	642,820
tk Steel Europe — Hohenlimburg, Hagen (medium-wide strip)	Germany	100%	2021–2025	344,429
tk Steel Europe — cold-rolling mill 2	Germany	100%	2021–2025	300,692
AST Terni — stainless melt shop (Italy)	Italy	100%	2021	254,691
tk Steel Europe — Duisburg combined heat & power	Germany	100%	2021–2025	193,148
tk Rasselstein — Andernach packaging-steel CHP	Germany	100%	2021–2025	154,850
tk Steel Europe — cold-rolling mill 3	Germany	100%	2021–2025	150,452
tk Electrical Steel — Isbergues (France)	France	100%	2021–2025	99,804
tk Steel Europe — galvanizing line, Dortmund	Germany	100%	2021–2025	84,061
tk Steel Europe — galvanizing line, Bochum	Germany	100%	2021–2025	77,770
tk Steel Europe — galvanizing line, Kreuztal-Eichen	Germany	100%	2021–2025	76,460
HKM — Huckingen power plant	Germany	50%	2021–2025	1,660

Table A8: voestalpine AG — free allocation by year (2021–2025)

Year	Total number of EUAs
2021	9,208,604
2022	9,508,518
2023	9,524,184
2024	9,503,307
2025	9,434,759
2021–25	47,179,372

Table A9: voestalpine AG — installations (2021–2025)

Installation (site)	Country	Share	Years counted	Total number of EUAs (2021–25)
voestalpine Stahl GmbH — Linz integrated works	Austria	100%	2021–2025	34,309,593
voestalpine Stahl Donawitz GmbH — Donawitz works	Austria	100%	2021–2025	10,137,688
voestalpine Stahl — Kalkwerk Steyr (lime)	Austria	100%	2021–2025	1,284,955
voestalpine Böhler Edelstahl — Kapfenberg	Austria	100%	2021–2025	435,403
voestalpine Tubulars — Kindberg	Austria	100%	2021–2025	231,167
voestalpine Rail Technology — Donawitz	Austria	100%	2021–2025	167,504
voestalpine Wire Rod Austria — Donawitz	Austria	100%	2021–2025	137,878
Uddeholm — Hagfors steelworks (Sweden)	Sweden	100%	2021–2025	130,679
Buderus Edelstahl — Wetzlar open-die forge	Germany	100%	2021–2024	97,825
Buderus Edelstahl — Wetzlar electric steelworks	Germany	100%	2021–2024	85,796
Buderus Edelstahl — Wetzlar hot-rolling mill	Germany	100%	2021–2024	61,220
voestalpine Böhler Bleche — Hönigsberg	Austria	100%	2021–2025	44,528
Buderus Edelstahl — Wetzlar heat-treatment	Germany	100%	2021–2024	39,994
voestalpine Böhler Aerospace — Kapfenberg	Austria	100%	2021–2025	15,142