CESISP

Centre for Research in Economics and Regulation of Services, Industry, and the Public Sector

UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA

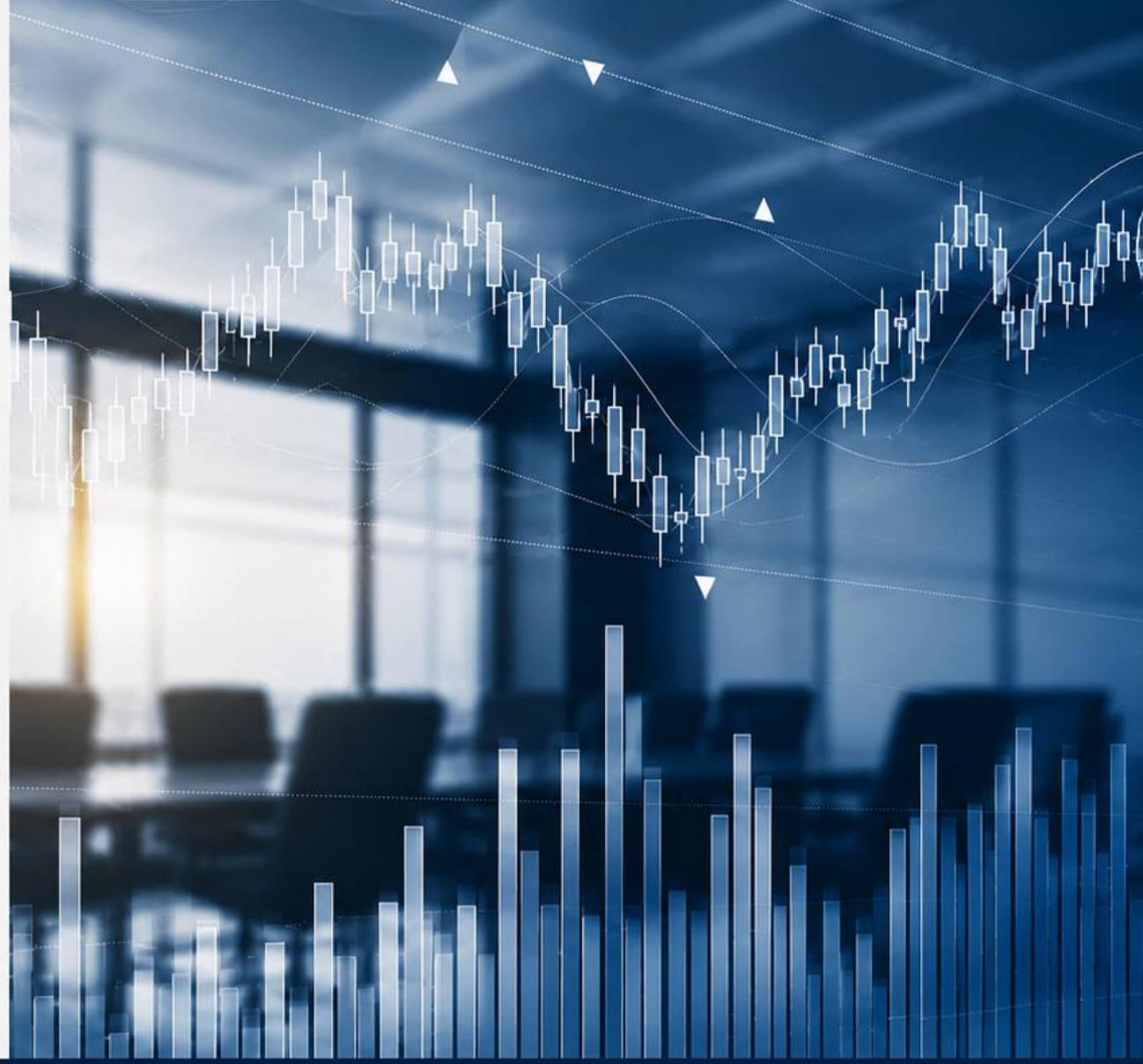
University of Milano–Bicocca

PRESENTATION OF THE REPORT

EU ETS Assessment and Reform Directions

Towards a more effective, coherent and sustainable transition framework

MAY 2026



Analysis, evidence and policy directions to strengthen the role of the ETS within the European climate strategy.

European coherence

Market effectiveness

Competitive fairness

Transition sustainability

RESEARCH METHODOLOGY AND ANALYTICAL FRAMEWORK

A systemic and multidimensional analysis of the evolution of the ETS and its interactions with markets, industry and finance

Research Center CESISP — Università degli Studi di Milano-Bicocca

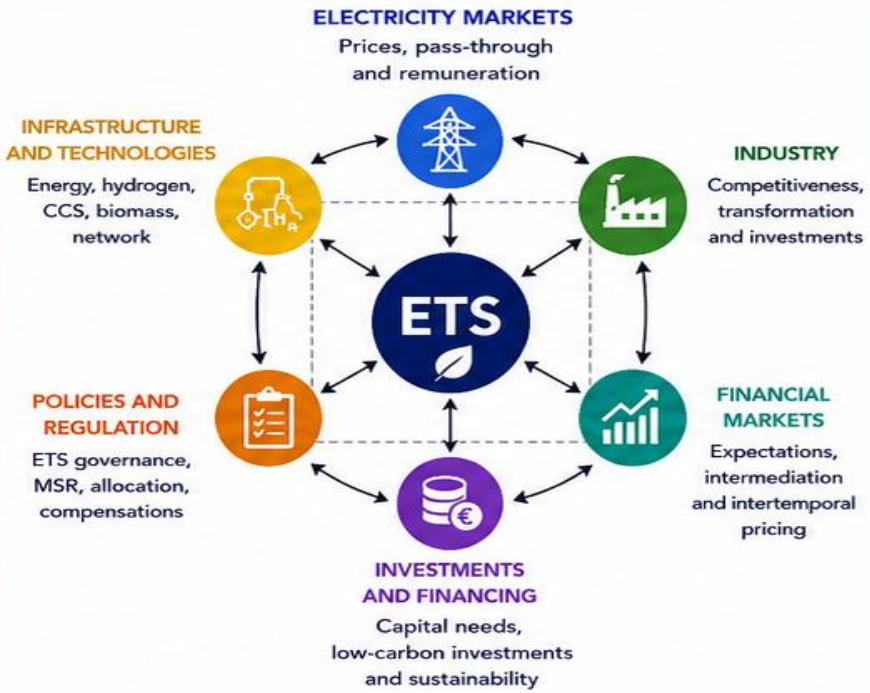
This study was carried out by the Research Center CESISP (Center for Research in Economics and Regulation of Industry and Public Services) of the University of Milano–Bicocca, in collaboration with industrial associations of the sectors covered by the ETS.

Study objective: to analyze, through an evidence-based and independent approach, how the ETS functions over time and its interactions with electricity markets, industrial dynamics, financial and long-term investment flows, assessing potential tensions, asymmetries and coordination challenges for future reforms.

THE 5 ANALYTICAL DIMENSIONS (STUDY STRUCTURE)

1. **Electricity markets and price formation**
   How the ETS price is transmitted into electricity prices and generates inframarginal rents and compensation mechanisms.
2. **Manufacturing industry and competitiveness**
   Evolution of plants, production and emissions in energy-intensive sectors (e.g. steel, cement, chemicals, infrastructure, electricity, input goods).
3. **Carbon markets and financial dynamics**
   The role of financial variables, expectations, intermediation, and the intertemporal formation of the EUA price.
4. **Benchmarking and free allocation**
   Assessment of national allocation benchmarks and free allocation with respect to technological performance in energy and infrastructure-intensive sectors.
5. **ETS revenues and transition financing**
   Scenarios 2031–2040: projected auction revenues and investment needs for decarbonization, infrastructure and industrial resilience.

A SYSTEMIC AND INTEGRATED APPROACH



The ETS is no longer an isolated mechanism: it operates within a complex ecosystem in which markets, policies, instruments and finance interact and mutually influence each other.

CROSS-CUTTING THEMES (EMERGING FROM THE ANALYSIS)

- **Overlap of incentives and support mechanisms**
  ETS incentives, CfDs, PPAs and indirect compensations may generate cumulated transfers and distortions.
- **Uneven carbon constraints**
  Heterogeneous conditions across countries may create competitive asymmetries and green input distortions across sectors.
- **Financialization of the carbon price**
  Expectations, intermediation and financial mechanisms play an increasingly important role in shaping the EUA price.
- **Pressure on industry and investment sustainability**
  Rising costs and compressed margins affect firms' ability to invest and finance the transition.
- **Tight cap, falling revenues**
  The reduction in auction volumes under a tighter cap may weaken the system's ability to finance the transition over the long term.

Our approach: academic independence • methodological rigor • transparency • empirical evidence

We do not evaluate climate objectives, but the coherence, effectiveness and economic sustainability of the mechanisms that support them.

The contribution of the study

Delivering elements of reflection and analysis to inform the debate on future reforms of the ETS and the architecture of the European transition.

Deindustrialisation or Decarbonisation?

What is really driving the decline in industrial emissions in Europe?

KEY MESSAGES

1 European industrial emissions are declining.

This is a fact. But the drivers behind this decline need to be carefully analysed.

2 But industrial plants are also decreasing and industrial production capacity is shrinking.

The number of ETS installations has fallen significantly over the period 2013–2024.

3 Different hard-to-abate sectors show structural contraction signals.

Since 2013, industrial production has remained below early levels in most sectors.

4 There is a risk of interpreting the loss of industrial capacity as climate progress.

Reducing emissions by producing less is not equivalent to decarbonising industry.

POSSIBLE ELEMENTS TO MONITOR

- Evolution of industrial production by ETS sectors
- Use of productive capacity
- Productivity trends in hard-to-abate sectors

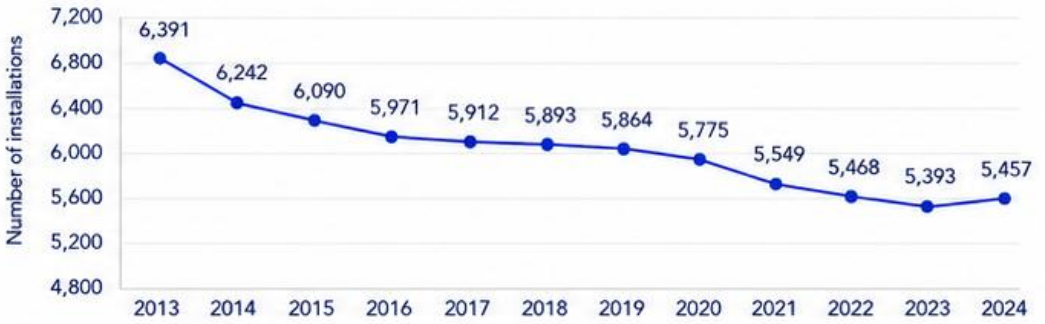
> REDUCING EMISSIONS BECAUSE WE PRODUCE LESS IS NOT EQUIVALENT TO DECARBONISING INDUSTRY.

Emissions are going down. But so are plants and production.

The data suggest that part of the decline in industrial emissions coincides with a contraction of the industrial base and lower production levels.

NUMBER OF ETS MANUFACTURING INSTALLATIONS IN THE EU27

Number of installations

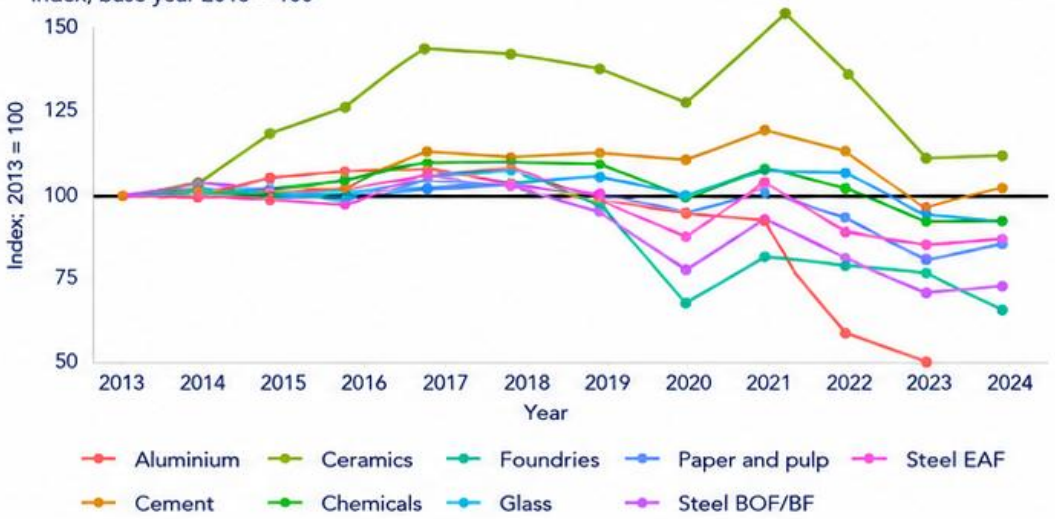


-14.6%

Change in the number of installations 2013–2024

PRODUCTION EVOLUTION BY SECTOR

Index, base year 2013 = 100



Since 2013, several hard-to-abate sectors have been at or below early levels.

EMISSIONS ARE FALLING. BUT SO ARE PLANTS, PRODUCTION AND INDUSTRIAL CAPACITY.

The decline in emissions does not automatically coincide with the strengthening of Europe's industrial base.

Source: European Commission (EU ETS data viewer), Eurostat (industrial production)

THE ETS BENCHMARK COMPARED WITH EUROPEAN POWER PLANTS OPERATING IN NATIONAL ENERGY SYSTEMS THAT ARE DEEPLY DIFFERENT

ETS performance reflects not only industrial efficiency, but also the availability of decarbonized energy, infrastructure and national energy policies.

Objective of this block: to understand why the distance from the ETS frontier does not depend solely on industrial performance, but also on the energy, infrastructural, technological and regulatory contexts in which power plants operate.

1. THE ETS BENCHMARK SETTING

- **Same European benchmark** for product and sector
- **Same tightening trajectory** and same climate ambition
- **Same carbon price** across the EU
- **Same reference technology frontier**

THEORETICAL EXPECTATION

Progressive convergence towards the ETS frontier:

- ✓ higher technological efficiency
- ✓ lower specific emissions
- ✓ greater industrial competitiveness

2. EMPIRICAL EVIDENCE SHOWS THAT...

The distance from the ETS frontier also depends on external factors specific to each system

- **Cost and availability of electricity** national energy mix and market prices
- **Access to sustainable biomass and other low-carbon inputs** physical availability and costs
- **Hydrogen infrastructure and other low-carbon vectors** storage, transport, supply
- **CCUS infrastructure** network, capacity, maturity and costs
- **Infrastructure and grid capacity and costs** electricity, gas, hydrogen, CO_2
- **Industrial structure and energy intensity of sectors** productive specialization and plant size
- **National energy policies and governance** incentives, regulation, planning, permitting

3. SYSTEMIC IMPLICATIONS

RISK

A harmonized benchmark may generate asymmetric economic outcomes among Member States:

- **Uneven access to vectors and necessary inputs** for the transition
- **Different adjustment speeds** and decarbonization times
- **Diverging transition costs** and industrial competitiveness
- **Different investment capacity** and access to financing
- **Risk of persistent asymmetries** and industrial fragmentation within the EU

KEY MESSAGE

The ETS benchmark measures the distance from the technology frontier, but it does not consider that power plants operate in national energy and infrastructure systems that are deeply different due to autonomous and non-harmonized energy policies.

Effective ETS governance must recognize this heterogeneity and integrate structural differences in the design of rules and incentives.

5 HARD-TO-ABATE SECTORS
Steel, Cement, Chemicals, Pulp & Paper, Ceramics

27 EU MEMBER STATES
Analysis of energy mix, costs, infrastructure and availability of low-carbon inputs

ANALYSIS PERIOD
2021–2024
Updated and harmonized data

EVIDENCE-BASED APPROACH
Descriptive, econometric and benchmark analysis

FINAL GOAL
Provide useful insights for future ETS reforms and the debate on European governance

The ETS benchmark incentivises convergence towards best performers only if energy and infrastructure conditions are comparable

The distance from the ETS frontier may reflect not only industrial inefficiency, but also external structural energy constraints faced by installations.

THE ETS BENCHMARK LOGIC

Best performers (top ~10%) define the implicit efficiency frontier of the sector.

↓

Emission benchmark standardised ex ante (by product/sector).

↓

Free allocation of allowances based on the benchmark (coverage up to 100%).

↓

Incentive to converge towards the frontier (VE = FA).

WHY CONVERGENCE IS NOT HOMOGENEOUS

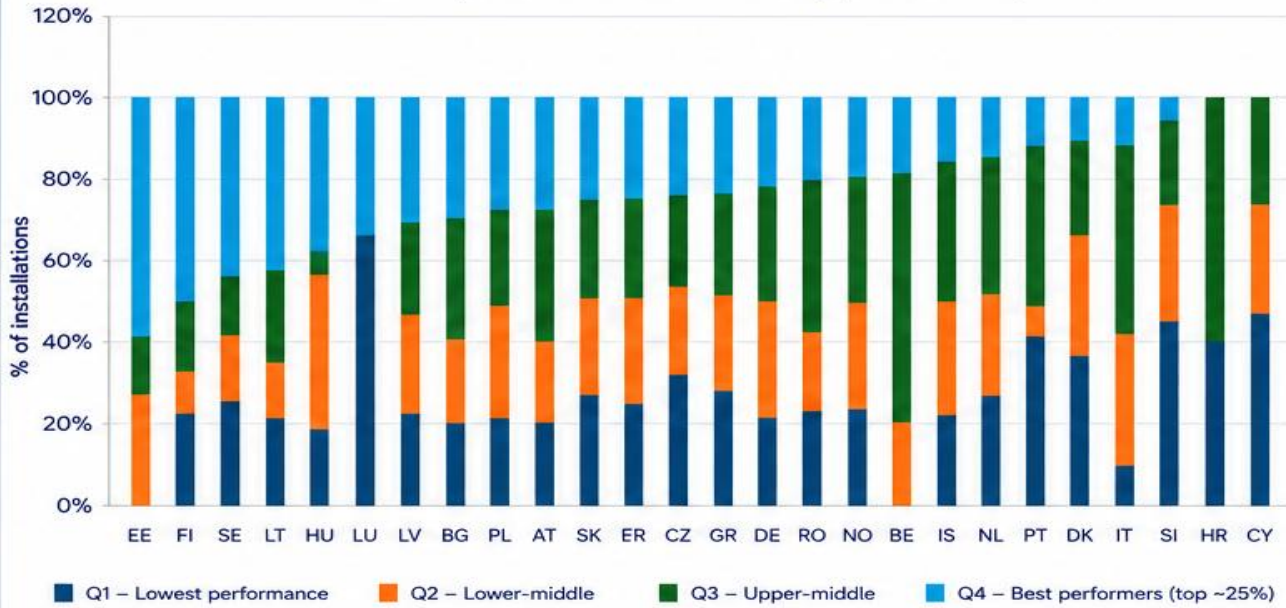
- Availability of low-carbon electricity
- Availability of sustainable biomass
- Access to renewable hydrogen and alternative fuels
- CCUS infrastructure, transport and storage networks
- Energy costs and grid capacity
- Regulatory framework and national policies

An harmonised benchmark does not automatically imply an homogeneous capacity to converge towards the ETS frontier.

DISTRIBUTION OF BEST PERFORMERS (Q4) ACROSS EU COUNTRIES

Share of installations by performance quartile* in the period 2021–2024

Relative comparison within each country (sum = 100%)



Q4 – Best performers (top ~25%): installations with the highest relative efficiency, i.e. those with the largest surplus of free allocation of allowances over verified emissions. It represents a proxy for the capacity to operate below the ETS frontier.

HOW TO READ THE CHART

Nordic and Baltic countries (EE, FI, SE, LT): high share of best performers (Q4), consistent with high availability of decarbonised energy and infrastructure.

Central-Western countries: more balanced distribution, with similar shares across all quartiles.

Southern Europe and some Eastern countries (IT, SI, HR, CY, IE): lower presence of best performers and higher concentration in the lower quartiles.

KEY MESSAGE

The relative positioning with respect to the ETS frontier does not depend exclusively on internal technological efficiency, but also on the **availability of decarbonised energy vectors and free allocation of allowances**, which reflect policy choices and structural conditions at national level.

IMPLICATION

Benchmarks can lead to **asymmetric outcomes** if enabling factors — energy, infrastructure, costs and policy — remain structurally heterogeneous across Member States.

CONSEQUENCE

Observed differences across performance quartiles reflect not only firms' choices, but also external constraints beyond their control.

POLICY OBJECTIVE

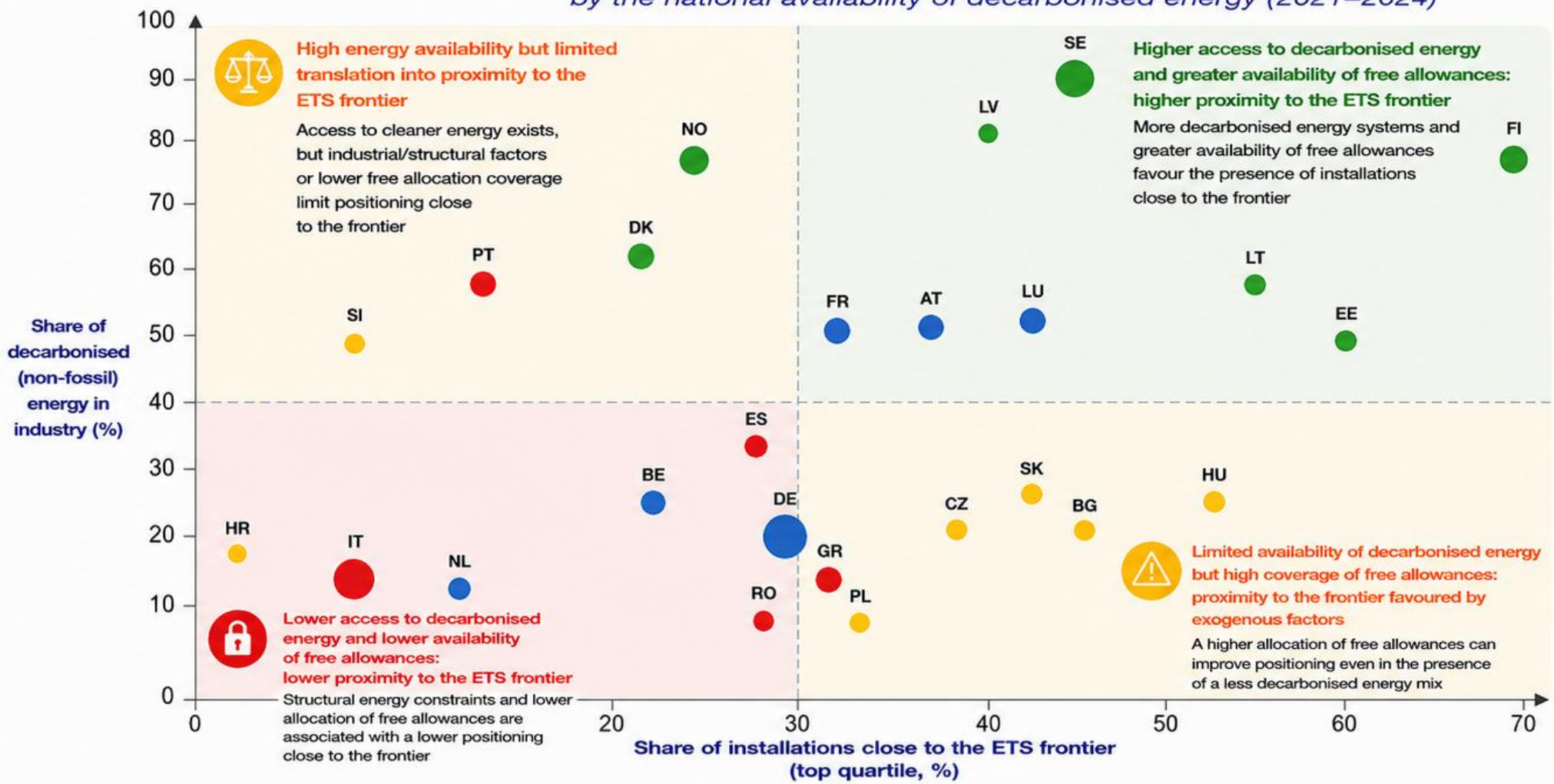
Strengthen the convergence towards the ETS frontier requires not only an effective carbon price signal, but also alignment in access to energy and infrastructure across the EU.

Methodological note: Quartiles are calculated for each country based on the efficiency indicator (FA–VE)/(FA+VE), normalised from 0 to 1 within each sector.
Q4 identifies the top quartile (installations with the highest relative efficiency).

Source: Authors' elaboration based on EU ETS (Union Registry, Verified Emissions & Free Allocation) and Eurostat (industrial decarbonised energy share) — period 2021–2024

Ex post assessment of the ETS benchmarking system shows results influenced by structurally heterogeneous national energy systems

The relative positioning of installations with respect to the ETS frontier appears to be influenced by the national availability of decarbonised energy (2021–2024)



LEGEND

Geographical area

- Nordics & Baltics
- Western & Central Europe
- Central & South-Eastern Europe
- Southern Europe

Bubble size: industrial scale
(number of ETS installations)

- Small
- Medium
- Large
- Very large

HOW TO READ THE CHART

X-axis: share of installations in the top quartile within each sector (closest to the ETS frontier).

Y-axis: share of decarbonised (non-fossil) energy in industry.

Higher values on both axes indicate structural conditions that favour a greater presence of installations close to the ETS frontier.

KEY MESSAGE

The ex post assessment of the ETS frontier shows that installations' positioning **does not depend solely on internal technological efficiency, but also on the availability of decarbonised energy and the allocation of free allowances**, which reflect national choices and structural conditions.

A common ETS interacts with energy, infrastructural and regulatory systems that remain strongly differentiated across Member States. The harmonisation of EU carbon pricing does not imply homogeneity in underlying energy and technological conditions.

Source: authors' elaboration on EU ETS (Union Registry) and Eurostat data (share of decarbonised energy in industry) – period 2021–2024

ETS economic impact is heterogeneous: national energy policies shape firms' ability to self-finance decarbonisation investments

The same carbon pricing framework generates different economic outcomes across Europe depending on energy mix, industrial structure and allocation profiles.

HOW ETS COSTS/REVENUES ARISE AT FIRM LEVEL

VE > FAR

Firms are net buyers of allowances → **Net cost** (compliance cost)

FAR > VE

Firms are net sellers of allowances → **Net revenue** (surplus allowances)

ETS MONETARY COMPONENT

$$neteua_{it} = (VE_{it} - FAR_{it}) \times EUA_t$$

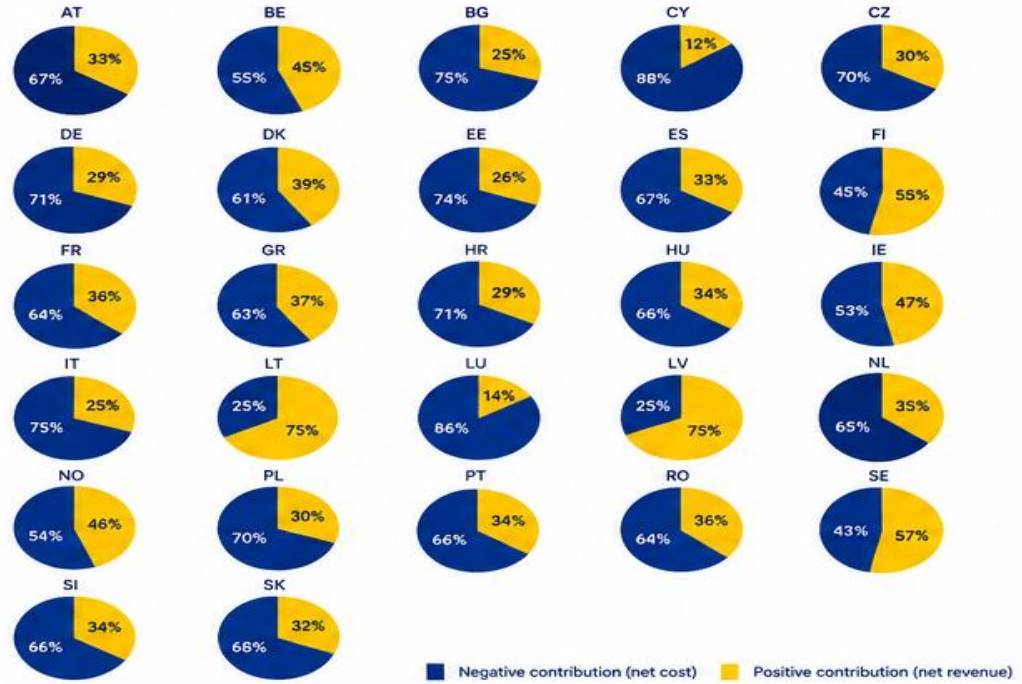
Revenue or cost accordingly

WHAT DRIVES HETEROGENEITY?

- Electricity mix and access to low-carbon energy
- Industrial structure and emission intensity
- Technological efficiency and production processes
- Allocation of allowances and benchmarking rules
- Energy costs and national energy policies

DISTRIBUTION OF ETS CONTRIBUTION SIGN BY COUNTRY (2021–2024)

Share of firms with negative (cost) vs positive (revenue) ETS contribution to EBITDA



Source: Authors' elaboration based on EEX EUA prices, ORBIS financial data, and the EU ETS Union Registry (VE & FA).

KEY MESSAGES

In most countries, negative ETS contributions prevail: for a large share of firms the ETS represents a net cost that reduces profitability.

Northern countries (SE, FI, LT, LV) show a higher incidence of positive ETS contributions, consistent with cleaner energy systems and different industrial structures.

The economic impact of the ETS is not homogeneous across Europe under the same carbon pricing framework.

National energy policies and the availability of decarbonised energy vectors limit firms' ability to self-finance decarbonisation investments.

HIGH FOSSIL INTENSITY OR LIMITED ACCESS TO DECARBONISED ENERGY

Higher ETS costs → pressure on margins and cash flows

→ **WEAKER ABILITY TO GENERATE SURPLUS ALLOWANCES**

Lower potential revenues from allowances sales

→ **REDUCED CAPACITY TO SELF-FINANCE INVESTMENTS IN DECARBONISATION**

Less resources available for low-carbon technologies and process innovation

→ **RISK OF COMPETITIVENESS GAPS AND SLOWER TRANSITION TRAJECTORIES**

Structural conditions matter as much as carbon prices

Carbon pricing alone cannot ensure a level playing field.

Without comparable access to clean energy and infrastructure, the ETS generates asymmetric outcomes and limits firms' capacity to invest in decarbonisation.

Note: Negative contribution = net cost (VE > FAR); Positive contribution = net revenue (FAR > VE). Percentages may not sum to 100 due to rounding.

The pace of ETS cap reduction and sectoral technological maturity do not necessarily evolve in a synchronised way

The industrial feasibility of decarbonisation depends on the interaction between technological maturity, infrastructure availability, energy costs and investment timelines.

Sector	Main decarbonisation pathways	Relative technological maturity	Indicative large-scale deployment horizon	Main structural constraints	Residual ETS exposure risk
Steel	• Hydrogen-based DRI • Integration of electric arc furnaces (EAF) • CCUS	Partial / emerging	Long-term (>10 years)	Hydrogen availability, electricity costs, infrastructure dependency	High
Cement	• CCUS • Clinker substitution • Alternative fuels	Partial	Long-term (>10 years)	CO_2 transport and storage infrastructure, process emissions	High
Chemicals	• Electrification • Low-carbon hydrogen • Feedstock substitution • CCUS	Uneven	Medium- to long-term (5–10 years)	Process heterogeneity, hydrogen dependency, feedstock constraints	High
Paper and pulp	• Energy efficiency • Electrification • Biomass utilisation	Relatively advanced	Medium-term (approx. 5 years)	Biomass availability, electricity costs	Medium
Glass	• Electrification • Hybrid furnaces • Alternative fuels	Partial	Medium- to long-term (5–10 years)	High-temperature heat constraints, grid capacity	Medium / High
Foundries	• Electrification • Process efficiency improvements	Medium	Medium-term (approx. 5 years)	Investment cycles, electricity prices	Medium
Non-ferrous metals	• Electrification • Renewable electricity sourcing	Relatively advanced	Medium-term (approx. 5 years)	Electricity price competitiveness	Medium
Ceramics	• Electrification • Alternative thermal vectors • Efficiency improvements	Partial	Medium- to long-term (5–10 years)	High thermal intensity, infrastructure adaptation	Medium / High

Legend – Relative technological maturity

Relatively advanced · Medium · Partial · Uneven / emerging

Legend – Indicative large-scale deployment horizon

Medium-term (up to ~5 years) · Medium- to long-term (5–10 years) · Long-term (>10 years)

Legend – Residual ETS exposure risk

Low · Medium · High

KEY MESSAGE

In several hard-to-abate sectors, the time required for the industrial deployment of low-carbon technologies is **structurally longer than the tightening trajectory implied by the ETS system.**

> The theoretical existence of decarbonisation pathways does not imply their immediate industrial deployability within the time horizons associated with the progressive tightening of the ETS.

Source: authors' elaboration based on sectoral technological assessments.

TOWARDS AN ETS GOVERNANCE MORE COHERENT WITH REAL CONDITIONS OF THE EUROPEAN INDUSTRIAL TRANSITION

Governance priorities and reform directions to preserve environmental effectiveness, industrial feasibility and investment sustainability.

GUIDING PRINCIPLE
Same climate objective, comparable conditions for the transition, coordinated.

OBJECTIVE: strengthen the ETS's ability to support decarbonization without compromising industrial competitiveness, internal market coherence and the economic sustainability of the transition in the long term.

1 ALIGN THE ETS WITH ELECTRICITY MARKETS

Reduce misalignments and incoherence between carbon pricing and the remuneration of the transition.

- Strengthen coordination between the ETS, renewable remuneration, CfDs, PPAs and support schemes.
- Review compensation criteria in light of indirect carbon costs, pass-through effects and national energy mixes.
- Monitor and mitigate the generation of persistent inframarginal rents.
- Ensure coherence with the new design of the electricity market (Regulation (EU) 2024/1747).

2 TAKE INTO ACCOUNT THE CONDITIONS OF A HETEROGENEOUS TRANSITION

Recognize that the same ETS frontier does not apply to homogeneous structural conditions.

- Integrate real availability of low-carbon factors (electricity, H_2, biomass, CCUS) into benchmarks.
- Consider differences in energy, infrastructure and national mix costs.
- Introduce flexibility elements or targeted measures for sectors and countries most exposed to structural gaps.
- Assess the territorial coherence of the availability of low-carbon factors relevant for benchmarks.

3 ENSURE COHERENCE BETWEEN CARBON PRICES AND INDUSTRIAL ADJUSTMENT CAPACITY

Avoid that scarcity expectations anticipate excessively the actual transformation capacity.

- Improve integrated monitoring of supply, future capacity and positioning of intermediates.
- Strengthen transparency on market positions and dynamics.
- Assess the interaction between the MSR, banking and scarcity expectations.
- Ensure that price signals are interpretable and useful for long-term industrial decisions.

4 PRESERVE INVESTMENT CAPACITY AND INDUSTRIAL RESILIENCE

Support industrial transformation without eroding margins and financial capacity.

- Take into account the cumulative impact of the ETS, energy costs and global industrial competitiveness.
- Coordinate ETS, industrial policies and tools to support demand and innovation.
- Assess the need for targeted transitional measures for sectors most at risk of delocalization or contraction.
- Promote enabling solutions to ensure access to energy and low-carbon inputs at competitive costs.

5 STRENGTHEN THE FINANCING ARCHITECTURE OF THE TRANSITION

Align the ETS cap logic with the investment needs for 2031–2040 and beyond.

- Recognize the structural gap between the reduction of ETS volumes and the investment needs.
- Integrate the ETS with EU financial instruments (InvestEU, European Investment Bank).
- Allocate ETS revenues to additional investments, priorities and strategies.
- Assess new complementary financing tools for the industrial and energy transition.

CROSS-CUTTING ENABLERS FOR AN EFFECTIVE ETS REFORM

MONITORING AND DATA
Strengthen quality, granularity and transparency of data on prices, pass-through, energy, low-carbon inputs and industrial performance.

INSTITUTIONAL COHERENCE
Improve coordination among climate, energy, industry, competition, State aid and sustainable finance policies.

EUROPEAN COHESION
Avoid competitive divergences within the EU that undermine the internal market and the European industrial base.

PROPORTIONALITY
Apply proportionality principles, subsidiarity and adequacy with respect to sectors, technologies and national conditions.

STABILITY AND PREDICTABILITY
Ensure stable, transparent and coherent rules to provide investors, companies and markets with trust.

KEY MESSAGE

The effectiveness and credibility of the ETS in the long term will depend on its ability to combine climate ambition, industrial feasibility, market coherence and investment sustainability across the European ecosystem.

ENVIRONMENT Climate integrity + **INDUSTRY** Competitiveness and resilience + **INVESTMENTS** Financial sustainability + **EUROPE** Strategic cohesion and autonomy

ETS AND THE ELECTRICITY MARKET: THE CARBON PRICE IS PASSED THROUGH. INCENTIVES OVERLAP.

Econometric evidence and operator surveys suggest that the ETS acts mainly through electricity price formation and the generation of inframarginal rents, while renewable investments continue to depend on explicit support instruments, stabilization and bankability.

CHAPTER OBJECTIVE

Assess how ETS transmission channels affect the electricity market and the impact on prices, revenues, investments, remuneration and identify overlaps and risks of inefficiency.

THE CHANNELS THROUGH WHICH THE ETS INFLUENCES THE ELECTRICITY MARKET

FOSSIL MARGINAL COSTS
The ETS internalizes the cost of carbon in the marginal costs of fossil technologies.

PRICE FORMATION
The cost of carbon is passed through to electricity prices when fossil units set the marginal price.

INFRAMARGINAL RENTS
Low-carbon technologies earn additional rents through the market price.

INTERACTION WITH OTHER INSTRUMENTS
Overlap with subsidies, CfDs, PPAs and indirect ETS compensations.

INDIRECT ETS COMPENSATIONS
Protect exposed sectors that may diverge from effective costs passed through to prices.

THE FOUR KEY EVIDENCES EMERGING FROM ANALYSES AND SURVEYS

1 LIMITED RELATIONSHIP BETWEEN ETS PRICES AND RENEWABLE INVESTMENTS

The EUA price does not show a statistically significant direct effect on the installed renewable capacity.

- Renewable investments are mainly driven by subsidies, explicit support schemes, bankability conditions and revenue visibility.

2 PRIMARY EFFECT OF THE ETS: PRICES AND VALUE TRANSFER

The ETS acts mainly through electricity price formation and the generation of inframarginal rents for low-carbon technologies.

- The increase in fossil costs translates into value transfers within the market, rather than into new investments.

3 CUMULATIVE REMUNERATION AND INCENTIVE OVERLAP

ETS inframarginal rents and public supports can overlap, generating cumulative effects that are not always captured in standard evaluations.

- Greater transparency is needed on the interaction between explicit supports (subsidies, CfDs, PPAs) and implicit channels (rents generated by prices).

4 INDIRECT COMPENSATIONS: DIVERSITY AND ASYMMETRY RISKS

In many countries, EU compensation parameters do not fully reflect the effective carbon cost passed through in electricity prices.

- This can lead to over- or under-compensation and asymmetric impacts among Member States on internal market fairness.

STRATEGIC IMPLICATION

To maximize the effectiveness of the ETS in the electricity sector, an integrated approach is needed that clearly distinguishes:

Price formation and short-term market signals + Remuneration of low-carbon investments and long-term signals + Proportionality and coherence of indirect compensations

→ **Only ETS itself, support instruments and market design can operate in a coherent, efficient and fair way to support the electricity transition.**

> The future of the ETS in the electricity sector will depend not only on carbon scarcity, but on the coherence of the overall market architecture and policies, and the ability to avoid inefficient overlaps of remuneration.

RENEWABLE INVESTMENTS APPEAR MORE SENSITIVE TO DIRECT SUPPORT SCHEMES THAN TO THE ETS PRICE SIGNAL

Econometric evidence and industry survey converge: bankability depends primarily on subsidies, procurement mechanisms and policy stability – not on carbon pricing alone

ECONOMETRIC EVIDENCE

Drivers of renewable capacity (Fixed Effects Panel Model)

Dependent variable: Installed Renewable Capacity (MW)

PUBLIC SUBSIDIES (efsub)
Significant positive effect
A 1% increase in subsidies is associated with a 0.28% increase in capacity
0.28** (p<0.05)

EUA PRICE (eua)
No significant direct effect
Carbon pricing alone is not sufficient to drive renewable investment
0.77 (n.s.)

INTERACTION SUBSIDIES × EUA
Weak negative interaction
Effectiveness of subsidies decreases as carbon price increases
-0.05* (p<0.10)

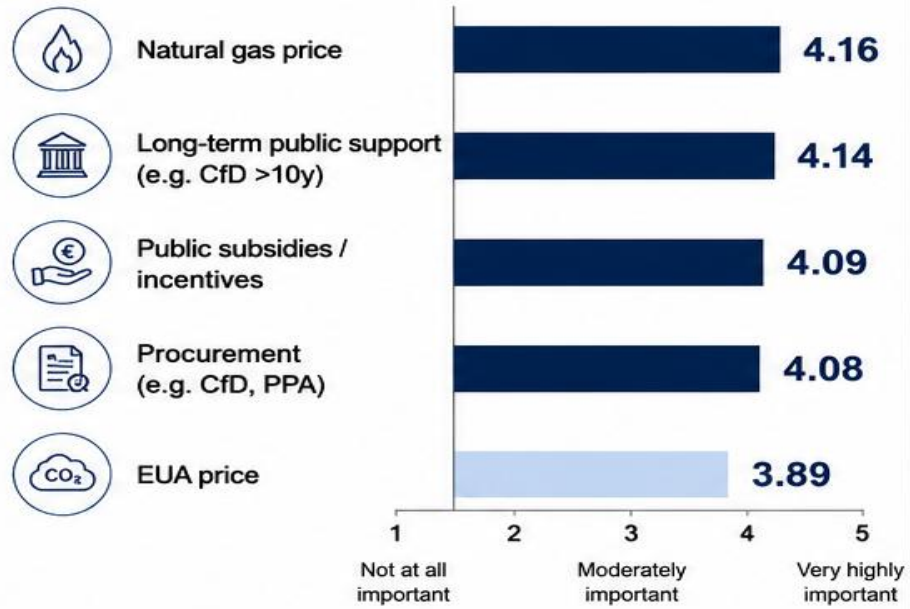
Results robust across specifications (country FE, year FE, clustered SE) and alternative samples.

KEY TAKEAWAY

Investment decisions remain primarily driven by bankability and revenue stability mechanisms rather than by carbon pricing alone.

INDUSTRY SURVEY EVIDENCE

Importance of factors in triggering investment in renewable energy generation projects (Likert 1–5)



Survey across 6 EU countries – 127 respondents (energy companies, developers, financial intermediaries)

Source: Authors' elaboration.

POLICY IMPLICATION

Market participants perceive direct support schemes, procurement mechanisms and regulatory stability as more decisive than carbon pricing alone. This suggests a potential **overlap of incentives** and the need to **optimize the use of public resources** for the energy transition.

Notes: (1) Econometric results refer to Model (3) in Table 1.2. (2) Survey scores are average values on a 1–5 Likert scale.

THE ETS IN EUROPEAN ELECTRICITY MARKETS: INFRAMARGINAL RENTS AND INCENTIVE

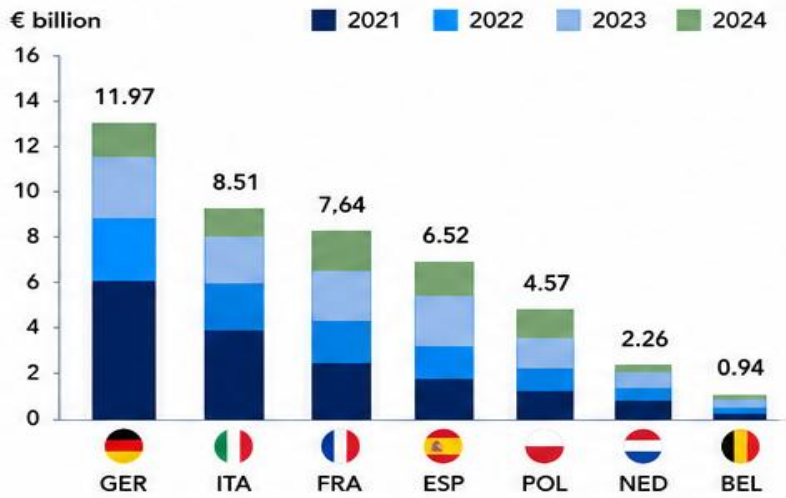
The ETS is passed through into electricity prices when gas sets the marginal price, generating inframarginal rents on top of direct support schemes.

EU parameters for indirect cost compensation do not reflect the effective market signal, risking to amplify asymmetries and preferential treatment across countries.

1 ETS-RELATED INFRAMARGINAL RENTS (2021–2024)

Estimated inframarginal rents by country (€ billion)

When gas-fired plants set the marginal price, the carbon cost from the ETS is embedded in electricity prices, generating **inframarginal rents** for low-carbon technologies.



SUBSTANTIAL RENTS IN ALL MARKETS
Inframarginal rents are present in all 7 countries analysed over 2021–2024, on top of existing direct incentives.

SOURCE OF THE RENTS
Rents mainly depend on the frequency with which gas sets the marginal price, not only on the absolute level of the carbon price.

2 INDIRECT COST COMPENSATION: SIGNIFICANT MISALIGNMENT

Comparison between EU (structural) parameters and effective market pass-through (2021–2024)

Country	EU CO_2 factor (tCO_2/MWh)	Observed market-based factor (avg. 2021–2024)	Regulatory / observed ratio
Italy	0.44	0.36	1.2x
France	0.43	0.23	1.9x
Spain	0.47	0.21	2.2x
Germany	0.73	0.25	2.9x
Belgium	0.37	0.17	2.2x
Netherlands	0.44	0.27	1.6x
Poland	0.78	0.27	2.9x
Sweden	0.60	0.01	46.2x

In many countries, EU structural parameters substantially overestimate the effective carbon cost incorporated in electricity prices.

Risk of overcompensation and greater asymmetries between Member States: the same regulatory framework can generate very different support levels.

REGULATORY REFERENCE: European Commission Communication C/2026/196 of 13 January 2026 (amending the Guidelines on State aid for indirect ETS cost compensation, 2021–2030 period).

KEY IMPLICATIONS

The ETS increases electricity prices when gas sets the marginal price...

... generating inframarginal rents across all markets.

These rents accrue to low-carbon technologies not exposed to the same carbon costs.

EU parameters for indirect cost compensation do not reflect the effective market signal...

... risking overcompensation and asymmetries across countries, with impacts on competition and efficient use of public resources.

A MORE COHERENT REVIEW OF THE EU FRAMEWORK CAN REDUCE DISTORTIONS AND STRENGTHEN THE COHERENCE OF THE INTERNAL MARKET.

Sources: Authors' elaboration based on hourly electricity prices and generation by technology from ENTSO-E Transparency Platform, daily gas and coal prices from FactSet, and EUA prices from EEX.

Note: Values may not add up exactly due to rounding.

ETS AND THE ELECTRICITY MARKET: CONCLUSIONS AND POLICY IMPLICATIONS

THE CARBON PRICE IS PASSED THROUGH IN PRICES AND GENERATES INFRAMARGINAL REVENUES, BUT RENEWABLE INVESTMENTS DEPEND ABOVE ALL ON EXPLICIT SUPPORT AND BANKABILITY.

Econometric evidence, market analyses and operator surveys converge: the ETS operates mainly through electricity price formation and the generation of inframarginal rents. The decarbonization of the power system requires coherence and integration between carbon pricing, market design and support instruments.

OBJECTIVE FOR THE NEXT ETS REFORM PHASE

Strengthen system effectiveness by avoiding inefficient overlaps of remuneration, improving price signal coherence, incentives and protecting competitiveness.

FOUR POLICY PRIORITIES FOR A COHERENT ETS REFORM WITH THE EUROPEAN ELECTRICITY MARKET

1 DISTINGUISH THE EFFECTS OF THE CARBON PRICE

Clearly separate the role of the ETS in electricity price formation from its impact as an investment signal for renewables.

- The ETS passes the carbon cost into electricity prices and generates persistent inframarginal rents.
- It does not automatically induce additional investment in new renewable capacity.
- A distinct assessment of the capacity to influence prices and to generate bankable investments is needed.

IMPLIES:
Develop better metrics and valuation models that distinguish price effects, value transfers and investment impacts.

2 INTEGRATE THE BANKABILITY OF RENEWABLES IN THE ETS VALUATIONS

Recognize that investment decisions depend mainly on visibility of cash flows, financing conditions, revenue stabilization instruments.

- Support mechanisms (e.g. CfDs, PPAs, procurement) remain central to project bankability.
- ETS prices improve relative competitiveness, but do not guarantee sufficient and stable investment conditions on their own.

IMPLIES:
Include bankability parameters, financing structures and revenue visibility in the framework for evaluating ETS effectiveness.

3 ASSESS THE INTERACTION BETWEEN EXPLICIT SUPPORTS AND THE EFFECTS OF THE ETS

ETS inframarginal rents coexist with public support schemes and can create cumulative remuneration that is not always captured in standard assessments.

- The interaction between policy instruments can lead to decreasing margins and cumulative effects.
- The overall costs of the policy mix are reflected on consumers, energy-intensive industries and system costs.

IMPLIES:
Increase transparency and monitoring of total remuneration, distinguishing necessary support from market-generated revenues.

4 STRENGTHEN COHERENCE AND PROPORTIONALITY OF ETS INDIRECT COMPENSATIONS

Align regulatory and pass-through parameters to ensure proportionality and coherence in the internal market.

- Different regulatory and pass-through parameters generate heterogeneity and possible competitive distortions among Member States.
- An evidence- and market-based approach is needed, using updated structural indicators.

IMPLIES:
Use market data–based methodologies, ensure proportionality in compensations and greater coherence across the EU.

AN INTEGRATED AND COHERENT ETS REFORM

The future effectiveness of the ETS in the electricity market requires coherence across five key dimensions

- Credible and transparent price signal (from carbon pricing)
- \+ Market design coherent with short- and long-term roles
- \+ Stable and bankable remuneration mechanisms for renewables
- \+ Protection of competitiveness and fair allocation of public resources
- Monitoring and evaluation based on solid evidence and market data

EXPECTED OUTCOME

An effective, fair and efficient ETS system that supports the electricity transition without generating inefficient overlaps of incentives or avoidable costs.

> The future of the ETS in the electricity sector depends not only on carbon scarcity, but on the coherence of the overall market architecture and policies, and on the ability to **avoid inefficient overlaps of remuneration**, preserving the effectiveness, fairness and sustainability of the transition.

ETS AND FINANCIAL MARKETS: THE CARBON PRICE INCREASINGLY INCORPORATES FUTURE REGULATORY EXPECTATIONS

Empirical evidence suggests that the ETS price no longer reflects only current emission or industrial-demand conditions, but increasingly incorporates expectations regarding the future regulatory trajectory, the management of allowance availability and forward-market dynamics.

CHAPTER OBJECTIVE

Analyse how:

- derivatives markets,
- forward-looking expectations,
- hedging,
- financial intermediation,
- and the Market Stability Reserve (MSR)

influence ETS price formation and the transmission of the carbon signal within the European economy.

HOW ETS PRICE FORMATION WORKS TODAY

1 REGULATORY SCARCITY

The cap, the MSR and the ETS trajectory define the future supply of allowances.

2 FORWARD EXPECTATIONS

Markets progressively incorporate expectations regarding future regulatory tightening.

3 DERIVATIVES MARKETS

Futures, basis dynamics and financial positioning influence price formation.

4 FINANCIAL INTERMEDIATION

Liquidity, hedging and intermediary balance-sheet capacity transmit carbon risk over time.

5 OBSERVED ETS PRICE

The final price reflects the interaction between regulation, expectations and financial architecture.

THREE KEY FINDINGS EMERGING FROM THE ANALYSIS

1 ETS PRICES ARE INCREASINGLY FORWARD-LOOKING

EUA prices increasingly incorporate expectations regarding future allowance availability and not only current market conditions.

2 THE MSR INFLUENCES MARKET EXPECTATIONS

Regulatory management of allowance supply increasingly operates through expectations channels and futures markets.

3 THE ETS SIGNAL IS INCREASINGLY MEDIATED BY FINANCIAL ARCHITECTURE

Carbon-price transmission increasingly depends on liquidity, hedging, basis dynamics and derivatives-market structure.

STRATEGIC IMPLICATION

The ETS debate no longer concerns only "how many allowances to issue," but increasingly how regulatory governance is transmitted through financial markets and into **carbon-price formation.**

> "In an intertemporal and forward-looking market, the credibility of regulation matters as much as scarcity itself."

1. THE ETS IS BECOMING EXCESSIVELY FINANCIALISED

FROM A COMPLIANCE MECHANISM TO A FORWARD-LOOKING, FINANCIALLY INTERMEDIATED ASSET MARKET

The ETS allowance is not a commodity like oil or gas. Supply is set ex ante by regulation (cap, LRF, MSR, auctions), allowances are fully bankable across time and prices reflect expectations of future scarcity and the premium to transfer risk over time.

Observed carbon prices reflect expectations and financial intermediation, not only contemporaneous compliance demand.

EUA AS A FORWARD-LOOKING REGULATED ASSET

Regulatory design (cap, LRF, MSR, auctions) → Expectations of future scarcity → Financial intermediation & risk transfer → Observed carbon price

- ✓ Fully bankable across time
- ✓ Intertemporal arbitrage links prices across maturities
- ✓ Current prices anchored to expected future cumulative scarcity

GROSS POSITIONS DOMINATED BY FINANCIAL INTERMEDIARIES (ICE EUA FUTURES)

FINANCIAL GROSS POSITIONS > COMPLIANCE GROSS POSITIONS throughout the period.

FINANCIALISATION RATIO (Financial Gross / Compliance Gross) consistently > 1 (often 1.5x–3x).

COMPLIANCE ENTITIES: structural net long (hedgers).

FINANCIAL INTERMEDIARIES: structural net short (liquidity providers & risk absorbers).

ECONOMETRIC EVIDENCE: WHAT DRIVES EUA PRICES? (2021–2026)

DETERMINANTS OF EUA FRONT-YEAR FUTURES PRICE

Determinant	Direction	Significance (HAC)	Interpretation
Futures curve slope (2nd vs front-year)	↑	***	Dominant driver: expected future scarcity (intertemporal arbitrage)
Financial net position	↑	*	Positive effect but weaker once expectations included
Compliance net position	↓	n.s.	Hedging behaviour, not a direct price driver

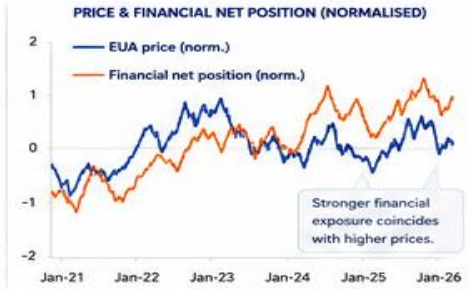
THE PRICE LEVEL IS DRIVEN PRIMARILY BY FUTURE SCARCITY EXPECTATIONS EMBEDDED IN THE FORWARD CURVE.
R^2 increases from 0.26 to 0.60 when the futures slope is included.

DETERMINANTS OF THE BASIS (FUTURES – SPOT)

Determinant	Direction	Significance (HAC)	Interpretation
Financial net position	↑	***	Drives the risk premium in forwards (risk transfer & intermediation cost)
Compliance net position	↓	n.s.	Limited role in basis formation

THE BASIS REFLECTS A RISK PREMIUM ASSOCIATED WITH FINANCIAL INTERMEDIATION.
Financial positioning widens the spread between futures and spot prices.

PRICE DYNAMICS CO-MOVE WITH FINANCIAL INTERMEDIATION



THE MARKET STABILITY RESERVE (MSR): ALTERING THE CAP-AND-TRADE MECHANISM

INTENDED PURPOSE

Absorb the post-crisis surplus and restore the scarcity signal.

HOW IT WORKS

High surplus (TNAC) → Intake (reduced auctions) → Low surplus (TNAC) → Release (higher auctions)

WHY IT DISTORTS THE MECHANISM

- ⚠ TNAC (banked allowances) is not a real-time scarcity measure: it reflects expectations, not current fundamentals.
- ⚠ MSR actions influence expected future supply, which is immediately priced in – amplifying price cycles.
- ⚠ It weakens the natural counter-cyclical response of the cap-and-trade system to economic cycles.

BOTTOM LINE

MSR modifies future supply expectations and amplifies price swings, instead of letting the cap adjust naturally to the cycle.

IMPLICATIONS: A FINANCIALLY MEDIATED PRICE TRANSMISSION

1. Price reflects more than scarcity
Includes expectations, intermediation costs and risk premia.

2. Financial intermediaries are essential but dominant
Provide liquidity and risk transfer capacity; their positioning impacts prices and basis.

3. Transmission may diverge from real economy
Short-term prices may not align with contemporaneous industrial conditions or abatement costs.

4. Broader exposure (CBAM)
New hedging demand from non-ETS firms increases pressure on derivatives markets.

5. Systemic relevance
Futures markets are the channel through which EU carbon pricing affects global trade and industry.

THE CHALLENGE Ensure that the carbon price remains a credible signal of expected future scarcity, not a reflection of excess financial intermediation.

Sources: ICE, EEX, ESMA, ENTSO-E, European Commission, academic literature
(Kling & Rubin, 1997; Koch et al., 2016; Perino et al., 2022; Borghesi et al., 2023; Vivid Economics, 2021).

Note: EUA = EU Allowances

2. RE-ALIGN FINANCE TO COMPLIANCE: PERIMETER, PURPOSE, PROPORTIONALITY

Finance in the EU ETS should be channelled to subjects and instruments that serve compliance needs, not to generate excessive financial activity. Objective: an efficient, stable and coherent price signal aligned with transition costs.

THE CORE IDEA

Perimeter finance in the EU ETS to subjects and instruments that are FUNCTIONAL to the compliance of obligated entities. This ensures an efficient price signal, limits excess risk premia and supports industrial competitiveness.

THE PRINCIPLE

Obligated entities exposed to emissions risk → Hedging and compliance needs → Permitted instruments aligned with compliance → Deep, liquid and transparent markets → Efficient price signal and level playing field

WHY PERIMETERING FINANCE MATTERS

- ✓ Preserves the role of finance as a provider of liquidity and risk transfer
- ✓ Prevents market-driven excesses and unnecessary risk premia
- ✓ Protects the integrity of the carbon price as a regulated scarcity signal
- ✓ Supports investment decisions and industrial planning

PUBLIC POLICY ACTIONS – BUILD A MARKET THAT PRICES SCARCITY, NOT FINANCIAL EXCESSES

1 INTEGRATED CARBON MARKET MONITORING

- Dashboard on basis, forward curve, open interest, concentration, liquidity and hedging flows.
- Early detection of stress, dislocations and impaired transmission.

→ Better oversight of how scarcity is transmitted into prices.

2 FUTURE-ORIENTED MSR GOVERNANCE

- Integrate TNAC with market functioning metrics (liquidity, basis, forward premia).
- Avoid pro-cyclicality: preserve the scarcity signal without amplifying volatility or premia.

→ Coherent scarcity management and forward-looking.

3 GREATER TRANSPARENCY IN DERIVATIVES MARKETS

- More information on aggregate positions and operator categories (hedging, market-making, speculative).
- Monitoring of concentration and liquidity by maturity.

→ More market trust and less opacity.

4 CBAM INTEGRATION AND DERIVATIVES MARKETS

- Monitor CBAM impact on open interest, basis, liquidity and hedging demand.
- Standardised hedging instruments and proportional.
- Guidance and capacity building for SMEs and energy-intensive sectors.

→ CBAM strengthens the level playing field without distorting markets.

THE ROLE OF THE MARKET STABILITY RESERVE (MSR)

WHERE WE COME FROM	• Introduced to absorb the post-crisis surplus. • ~3.2 billion EUAs invalidated and the balance restored. • Cancellation is no longer necessary today.
WHY IT IS DIFFERENT TODAY	• In an intertemporal market with banking, expectations about future supply are immediately priced in. • Anticipated changes affect the forward curve, basis and risk premia.
WHAT IT IS FOR NOW	• More predictable, transparent and rules-based MSR. • Focus on quality of transmission, not only on quantity levels.
KEY PRINCIPLE	• The MSR should manage future scarcity in a credible way, without creating excessive risk premia or pro-cyclical volatility.

WHAT IT OFFERS TO ALL STAKEHOLDERS

INDUSTRY
More predictable prices, stronger investment plans.

INVESTORS
Clearer risk profile, more efficient capital allocation.

POLICY MAKERS
Effective, transparent and market-supported policy instruments.

CITIZENS
Credible transition, contained costs, lasting benefits.

THE CHALLENGE

Build a mature, transparent and resilient carbon market in which finance serves compliance and the transition, not as a source of excessive premiums or distortions.

Sources: ICE, EEX, ESMA, ENTSO-E, European Commission, academic literature (Kling & Rubin, 1997; Koch et al., 2016; Perino et al., 2022; Borghesi et al., 2023; Vivid Economics, 2021).

Note: EUA = EU Allowances

ETS AND FINANCIAL MARKETS:
BRINGING ETS PRICE FORMATION BACK INTO GREATER ALIGNMENT WITH THE COMPLIANCE PERIMETER

The evidence suggests that, in an ETS market increasingly forward-looking and financially intermediated, the quality of price transmission becomes central to preserving:

- CLIMATE EFFECTIVENESS
- INTERPRETABILITY OF THE ETS SIGNAL
- INDUSTRIAL ADJUSTMENT CAPACITY
- OVERALL ECONOMIC COHERENCE OF THE SYSTEM

KEY MESSAGE

The issue is not to eliminate the role of financial markets within the ETS.

The objective is to ensure that price formation remains consistent with the original function of the system: **supporting the industrial and climate transition.**

PRIORITIES EMERGING FROM THE ANALYSIS

1 STRENGTHEN THE LINK BETWEEN THE ETS MARKET AND COMPLIANCE DEMAND

Monitor the relationship between industrial demand, hedging activity, futures markets, basis dynamics and forward-looking expectations.

▶ **Objective:** avoid persistent misalignments between ETS prices and real-economy conditions.

2 PRESERVE THE ECONOMIC FUNCTION OF DERIVATIVES MARKETS

Financial markets remain essential for liquidity, risk management, price discovery and intertemporal transmission of the carbon price.

▶ The role of finance should remain functional to the efficient transmission of the ETS signal toward the compliance market.

3 CONTAIN DISTORTIONS FROM SPECULATIVE PARTICIPATION

Abnormal forward premia, excessive basis dynamics, liquidity tensions and speculative dynamics may amplify carbon-price volatility.

▶ ETS governance should increasingly monitor the quality of price formation within secondary markets.

4 ALIGN MSR MANAGEMENT WITH INDUSTRIAL ADJUSTMENT CAPACITY

Regulatory tightening remains central, but the speed of price transmission must remain compatible with investment cycles, fuel switching, technological transformation and operators' hedging capacity.

▶ The issue is not weakening the cap, but preserving the economic coherence of the transition.

5 INTEGRATE CBAM AND ETS INTO A UNIFIED CARBON-RISK GOVERNANCE FRAMEWORK

CBAM expands the number of actors exposed to the European carbon price and reinforces the role of EUA futures markets.

Future ETS governance should progressively monitor:

- market liquidity and access,
- hedging demand and derivatives depth,
- international transmission of the ETS price signal.

STRATEGIC OBJECTIVE

Ensure that regulatory tightening translates into a credible, coherent and economically sustainable price signal for compliance operators and for the European industrial transition.

GUIDING PRINCIPLES FOR THE NEXT PHASE OF ETS REFORM

- Alignment with the compliance perimeter
- Transparency and quality of price formation
- Market resilience and liquidity
- Support for industrial competitiveness and adjustment capacity

> "In an intertemporal and forward-looking ETS market, the credibility of the system depends not only on the regulatory trajectory, but also on the market's ability to transmit it in an economically coherent manner **aligned with the compliance perimeter.**"

ETS AND THE FINANCING OF THE TRANSITION:
THE CAP-AND-TRADE TRAJECTORY MAY NOT GENERATE ADEQUATE RESOURCES FOR INVESTMENT NEEDS IN 2031–2040

The simulations carried out show that, even in high carbon price scenarios, the gradual cap reduction and the structurally limited volume of allowances could constrain the ETS's ability to finance the investment needs associated with the European transition.

CHAPTER OBJECTIVE

Assess the coherence between carbon price dynamics and the structural capacity of the ETS to generate adequate resources to support the investment needs estimated by the European Commission for the period 2031–2040, identifying policy implications and possible reform directions.

ETS CAP TRAJECTORY

- Progressively tighter cap
- Fewer allowances available
- Lower auction volumes
- Structural revenue base in gradual decline

INVESTMENT NEEDS 2031–2040

Electrification · Hydrogen · Grids and infrastructure · Hard-to-abate industry · Storage · Energy infrastructure

- Strongly increasing capital needs
- Multi-decade investment horizon

STRUCTURAL TENSION

The gradual cap tightening reduces the ETS's revenue base while investment needs increase in 2031–2040.

This gap could limit the capacity to finance the European transition. needed to meet climate targets by 2040.

KEY MESSAGES FOR THE NEXT ETS REVIEWS

1 PRICES AND VOLUMES MUST BE ASSESSED TOGETHER

High prices do not compensate for the structural reduction in auction volumes.

2 STRUCTURAL LIMITS ON AUCTION REVENUES

Auction revenues, even if significant, will not be sufficient on their own to finance the 2031–2040 transition.

3 COORDINATE CARBON PRICING AND INVESTMENTS

Coherence is needed between carbon signals, investment priorities and financing capacity.

4 CONSIDER GRANTS, DOUBLE COUNTING AND PROSPECTIVITY

Combine competitive grants, leverage financing capacity and factor in the impact of lower auction volumes.

5 ALIGN WITH INDUSTRIAL, INFRASTRUCTURE AND ENERGY POLICIES

ETS is part of an ecosystem that includes finance, industrial policy, infrastructure and economic resilience.

6 STRENGTHEN EU INSTRUMENTS TO FINANCE THE TRANSITION

Stable EU instruments and scalable projects are needed to bridge the investment gap.

7 PRESERVE ENVIRONMENTAL INTEGRITY AND ECONOMIC SUSTAINABILITY

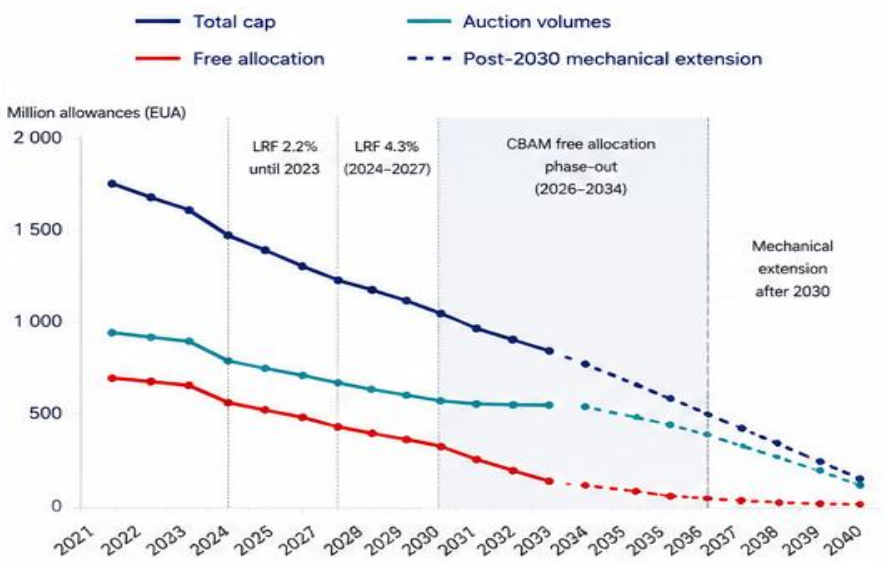
Climate ambition and financial sustainability must go hand in hand to ensure a credible and lasting transition.

The challenge is not to reduce climate ambition, but to build a European transition architecture that **transforms carbon scarcity into real investments in infrastructure and industrial capacity** for 2031–2040.

ETS TODAY, INVESTMENTS TOMORROW:
THE STRUCTURAL GAP THAT COULD CONSTRAIN EUROPE'S DECARBONISATION FINANCING

Even with high carbon prices, ETS revenues are not sufficient to cover the vast investment needs of the green transition.

1 ETS CAP TRAJECTORY, FREE ALLOCATION AND AUCTION VOLUMES (2021–2040)



After an initial support from the CBAM phase-out of free allocation, auction volumes enter a structurally declining trajectory due to the progressive tightening of the cap.

2 ETS AUCTION REVENUES UNDER CARBON PRICE SCENARIOS (EUR billion, 2031–2040)

Year	Low Scenario (€70/t)	Mid Scenario	High Scenario
2031	38.6	41.5	44.7
2032	36.4	41.0	47.1
2033	33.6	40.1	51.8
2034	30.7	38.6	56.8
2035	27.8	36.4	60.5
2036	24.9	33.7	62.0
2037	22.2	30.7	60.2
2038	19.6	27.6	55.4
2039	17.1	24.4	48.5
2040	14.8	21.2	40.4

Even in a high price scenario, revenues peak in the mid-2030s and then decline as the reduction in volumes outweighs price increases.

3 ETS REVENUES VS INVESTMENT NEEDS (2031–2040)

Price scenario	Average annual auction revenues (EUR billion)	Annual investment needs* (EUR billion)	Coverage (Revenues / Investments)
Low (€70/t)	26.6	1 570	1.7%
Mid	33.7	1 570	2.1%
High	52.0	1 570	3.3%

THE STRUCTURAL GAP:
even under a high price scenario, ETS auction revenues cover only up to 3.3% of the annual investment needs required each year for Europe's energy and industrial transition.

* Investment needs based on "Scenario S3" – European Commission Impact Assessment (approx. EUR 1,570 billion/year in real 2023 terms).

Source: Authors' calculations based on European Commission data, EEX EUA prices and the EU ETS Union Registry (VE & FA).

KEY IMPLICATIONS

1 DECLINING VOLUMES
The tightening cap structurally reduces the number of allowances available for auction: after 2030, volumes fall rapidly.

2 PRICES ARE NOT ENOUGH
Higher carbon prices can only partially offset lower volumes in the short term, but cannot prevent a long-term decline in revenues.

3 FINANCING GAP
ETS revenues, even in the optimistic scenario, represent at most 3.3% of the annual investment needs: a small share of the capital required for the transition.

4 INTEGRATED APPROACH IS NEEDED
Carbon pricing alone cannot finance the transition: additional EU funds, national resources and private investment are essential.

5 POLICY CERTAINTY MATTERS
A predictable ETS framework and complementary policies are crucial to mobilise capital into low-carbon technologies and infrastructures.

To turn climate ambition into real investments, the ETS must be part of a broader and coherent financing architecture.

An effective carbon market creates incentives. Integrated policies enable the transformation.

EU ETS REVENUES vs INVESTMENT NEEDS: COVERAGE REMAINS VERY LIMITED

Even under the most optimistic assumptions, ETS auction revenues cover only a small share of the investments required for the transition.

1. COVERAGE OF TOTAL INVESTMENT NEEDS AT EU LEVEL (2031–2040)

Price Scenario	Average Annual Auction Revenues (€ billion)	Annual Investment Needs* (€ billion)	Coverage (Revenues / Investments)
Low (€70/t)	26.6	1,570	1.7%
Mid	33.7	1,570	2.1%
High	52.0	1,570	3.3%

EU AVERAGE COVERAGE (2031–2040)

Even under the most optimistic scenario, ETS auction revenues cover only **3.3%** of the annual investment needs of around €1.57 trillion.

* *Investment needs based on "Scenario S3" – European Commission Impact Assessment (approx. €1,570 billion/year in real 2023 terms).*

2. AVERAGE COVERAGE OF INVESTMENT NEEDS BY ETS AUCTION REVENUES (2031–2040)

Country	Auction Revenues (Mid Scenario) (€ billion)	Investment Needs (€ billion)	Coverage (%)		
			Low	Mid	High
Germany	7.9	342	1.8%	2.3%	3.5%
France	3.5	350	0.8%	1.0%	1.6%
Italy	5.4	244	1.7%	2.2%	3.3%
Spain	4.3	150	2.3%	2.9%	4.4%
Poland	3.1	103	2.4%	3.0%	4.5%
Netherlands	2.2	88	2.0%	2.5%	3.8%
Sweden	1.2	78	1.1%	1.5%	2.2%

At country level, coverage of total investment needs remains extremely low: from **0.8%** to **4.5%** under the high-price scenario.

3. AVERAGE COVERAGE OF ENERGY & INDUSTRY INVESTMENT NEEDS (2031–2040)

Country	Energy & Industry Investment Needs (€ billion)	Coverage (%)		
		Low	Mid	High
Germany	84.9	7.3%	9.3%	14.1%
France	86.8	3.2%	4.0%	6.5%
Italy	60.4	6.8%	8.9%	13.3%
Spain	37.2	9.3%	11.7%	17.7%
Poland	25.5	9.7%	12.1%	18.1%
Netherlands	21.8	8.1%	10.1%	15.4%
Sweden	19.3	4.4%	6.0%	8.9%

Focusing on energy & industry, coverage improves but remains limited: even in the high-price scenario, no country exceeds **20%**.

Energy & industry investment needs based on EU benchmark of approx. €389 billion/year (European Commission Impact Assessment, Table 16, Scenario S3, 2031–2040).

KEY MESSAGE

THE ETS CREATES A STRONG PRICE SIGNAL, BUT DOES NOT GENERATE SUFFICIENT FHINANCIAL RESOURCES TO FINANCE THE TRANSITION ALONE.

EU average coverage of total investment needs (2031–2040)

3.3%

in the high scenario

Country-level coverage of total investment needs (2031–2040)

0,8% – 4.5%

in the high scenario

Country-level coverage of energy & industry investment needs (2031–2040)

6% – 18%

in the high scenario

A broader and integrated financing architecture is needed:

ETS provides the incentive, but not the sole source of financing.

Source: Authors' calculations based on European Commission data (Impact Assessment – Scenario S3, 2031–2040) and EU ETS auction data.

Note: Averages over 2031–2040; € billion, 2023 prices. Revenues based on historical auction shares; investment needs allocated using GDP shares. Coverage = Revenues / Investments.

ETS REVENUES AND TRANSITION FINANCING: DECLINING RESOURCES JUST WHEN INVESTMENTS BECOME MORE COMPLEX AND COSTLY

The progressive tightening of the cap reduces over time the ability to generate auction revenues, while decarbonization enters its most capital-intensive and infrastructure-intensive phases.

THE STRUCTURAL TENSION OF THE ETS MODEL IN THE 2031–2040 PHASE

1. TIGHTER CAP

- Progressive reduction of available allowances
- Structural contraction of auction volumes
- ETS tax base progressively narrowed

2. LOWER AND MORE VOLATILE ETS REVENUES

- High CO_2 prices do not offset the decline in volumes
- ETS revenues do not grow proportionally
- Public financing capacity structurally constrained

3. RISING COSTS OF THE TRANSITION

- Energy infrastructure and grids
- Hydrogen, CCS and electrification
- Decarbonization of hard-to-abate sectors
- Longer, riskier and capital-intensive investments

KEY MESSAGE

The next phase of the ETS is not only a matter of the price of CO_2.
It is a matter of the **financial sustainability** of the transition,
the **industrial capacity** of Europe, and the **alignment** of carbon pricing,
industrial policy and investment instruments.

POLICY PRIORITIES

1 Integrate ETS and industrial policy

Carbon pricing alone does not guarantee sufficient investment capacity for Europe's industrial transformation.

2 Assess ETS prices and auction volumes together

Higher ETS prices do not automatically translate into more revenues: both prices and volumes must be considered jointly.

3 Strengthen European financing instruments

The transition requires stable, scalable and long-term EU financial instruments in addition to ETS revenues.

4 Reconcile climate ambition and economic sustainability

The credibility of the transition will depend on its industrial feasibility and long-term financial sustainability.

The ETS can create the economic incentive for decarbonization.

But climate neutrality will require a much broader, stable and coordinated investment capacity than the resources generated by the ETS market alone.