Linking UK and EU carbon markets

Supporting efficient UK-EU trade and delivery of low-carbon goals

Prepared for Centrica, Drax, Equinor, National Grid, SSE and Uniper

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Summary: Linking the UK and EU Emissions Trading Schemes can support efficient trade and the cost-effective achievement of climate goals

After an initial period of reasonably close correlation between UK Allowance (UKA) and EU ETS Allowance (EUA) prices, UKA prices have fallen significantly since the start of 2023 and are now trading at a significant discount.

Ongoing price divergence would result in **less efficient UK-EU trade** and potentially lost UK tax revenues…

- A persistent UKA discount would have **significant implications for UK exchequer revenues** (we estimate £3.5-8bn forgone over 2025-2030 based on recent price differentials)
- A UKA discount would not improve the competitiveness of exports from UK ETS sectors to the EU – since UK firms would then pay the difference into the EU budget. If UKA prices were to trade at a premium, this would – however - disadvantage GB power exports (and harm EU energy consumers)

…however, even if prices were to converge, **continuation of two separate markets** creates a number of **negative effects for the UK and the EU**

Increased **admin burdens**

- EU importers of CBAM goods from the UK face **reporting obligations** (regarding quantities of imports and embedded emissions) – which may reduce willingness to import UK goods covered by EU CBAM

Damage to UK & EU decarbonisation

- Since EU CBAM may not accurately reflect GB electricity carbon costs, additional **friction in UK-EU power trade is likely to be created** e.g. increased curtailment of GB wind which would otherwise have been exported, pushing up EU emissions and carbon costs (and increasing support costs for GB renewables)

Increased **risk management costs**

- If the UK ETS and EU ETS continue to operate separately, particularly as the caps tighten, each market is likely to see:
  - More **volatile prices**; and
  - **less liquidity**, limiting the ability to hedge carbon costs and **harming UK and EU industrial competitiveness**

- Future price convergence through linking the UK ETS and EU ETS is clearly possible – given the current similarity of the schemes (and provided that planned developments of both markets are taken forward with future convergence in mind) - this can **support efficient UK-EU trade and reduce the costs to both the UK and EU of meeting decarbonisation goals**
- A linked market would also **support efficient financial risk management for UK and EU participants, supporting industrial competitiveness,** by creating a combined carbon market with **even more depth** than either market standing alone

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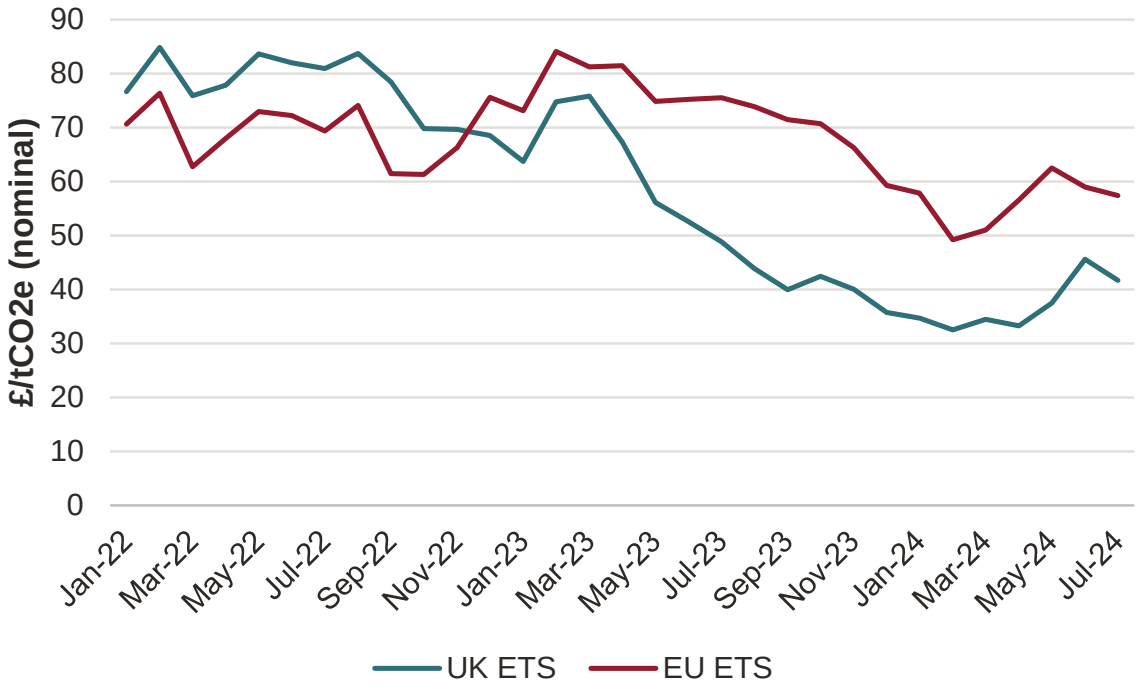
UK ETS and EU ETS prices have separated over the last year, with UKAs currently trading at a significant discount

After an initial period of reasonably close correlation between UKA and EUA prices, UKA prices have fallen significantly since the start of 2023 and are now trading at a significant discount

UKA v EUA prices, 2022-2024



- Initially (from January 2021), the UK ETS initially tracked the EU ETS closely. The UK ETS traded at a slight premium to the EU ETS – we understand due to perceived risk given uncertainties in the initial period of UK ETS operation
- However, differences in the evolution of the two schemes have begun to emerge over the past year. For example, Government announced in July 2023 that around 54m tonnes of allowances* would be added between 2024 and 2027, which has contributed to the significant reduction in the traded price of UK ETS allowances
- Together with uncertainty regarding future linking, this may have contributed to the divergence in prices

Source for graph: UKA auction prices via Bloomberg, EUA spot prices based from EEX via Energate Messenger.
*This accounts for about half a year's worth of UK emissions covered by the UK ETS. https://www.gov.uk/government/news/tighter-limit-on-industrial-power-and-aviation-emissions-as-uk-leads-the-way-to-net-zero

The future path of relative UK and EU ETS prices is uncertain

Convergence of prices through linking of the schemes is possible, and there are good arguments for doing so. Planned developments of both markets should be taken forward with future convergence in mind

Convergence due to future linking is politically possible and technically feasible…

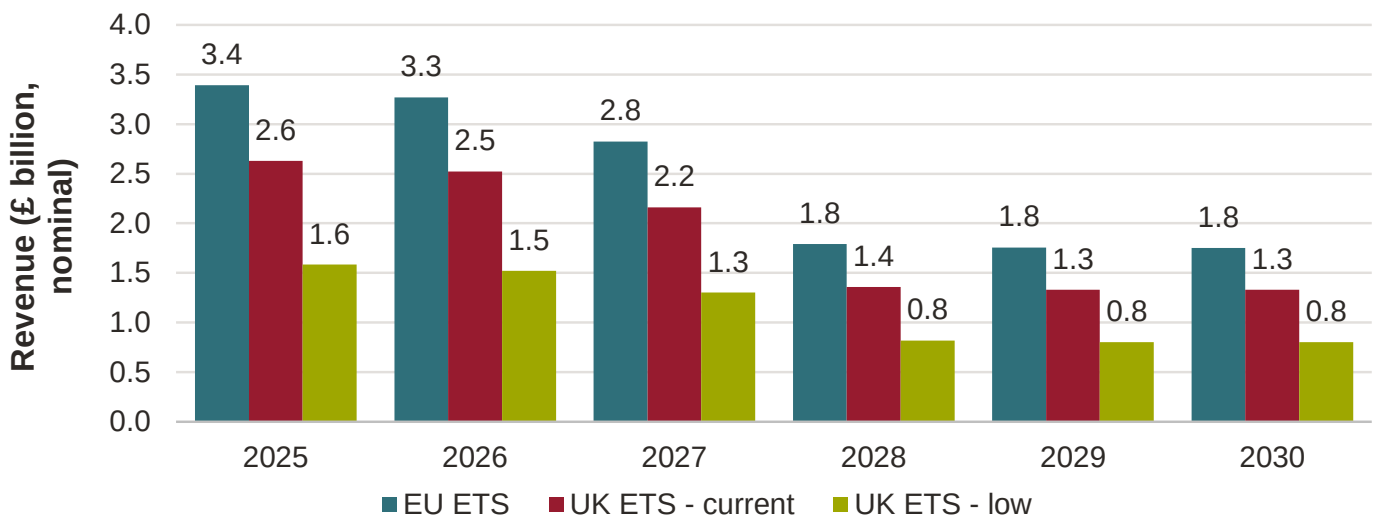
- The UK and EU have committed to giving "serious consideration" to linking their respective carbon pricing schemes - see EU-UK Trade and Cooperation Agreement (TCA)
- While maintaining separate schemes would allow greater freedom for policymakers in the design of their respective schemes, linking the UK and EU schemes would bring several benefits, discussed further in this report (e.g. reducing trade frictions between the UK and EU, reduced allowance price volatility and improved liquidity). The UK Climate Change Committee also noted in its 2024 progress report that linking could help strengthen the UK ETS price signal to support industrial decarbonisation
- In general, the two schemes remain broadly similar in structure and the UK and EU have broadly similar longer-term climate goals (see Annex). Any technical differences could be resolved relatively easily through negotiation

…while divergence in planned developments of the markets could make this increasingly difficult

- **Different approaches to stability reserves:** The EU ETS has established a Market Stability Reserve (MSR). The UK is considering a similar Supply Adjustment Mechanism (SAM) – in addition to its Auction Reserve Price (ARP) and Cost Containment Mechanism (CCM). To the extent these mechanisms are based on different criteria, this might complicate negotiations to link the schemes
- **Coverage / expansion to other sectors:** Sectoral coverage is broadly similar between the UK and EU schemes. However, there are some differences (the UK has yet to finalise how to include shipping or has yet to decide precisely how free allocation of UKAs will interact with UK CBAM). In theory, differences in coverage could exist in linked schemes, although it would leave competitive distortions in some sectors and therefore may also make negotiations more complex
- **Greenhouse Gas Removals (GGRs):** The UK has a stated ambition to incorporate GGRs into the UK ETS and the European Commission is due to report on the potential coverage of GGRs by emissions trading by July 2026. Depending on GGR standards and the precise approach to incorporating them (which may diverge between schemes), including GGRs in an ETS could lead to a relaxation of the cap, potentially dampening prices. In principle, this could be dealt with in a linked system, for example through adjusting allowance supply downwards in the scheme incorporating GGRs. Addressing possible future differences in the use of offsets/removals/credits would need to be addressed in any linking negotiations between the UK and EU

If lower UK prices persist, HM Treasury could forgo £3.5-8bn revenue over 2025-30

Annual revenues from UK ETS auctioning depending on assumed ETS price



Cumulative impact on revenues, 2025-30

- **If current price gap* persists:** £3.5 billion forgone revenues over 2025-30 (that could, amongst other potential uses, have been used to finance public investment in the energy transition)
- **If price gap widens**:** £8 billion forgone revenues over 2025-30

**Based on average price difference observed during June 2024 (£13/tCO2e)*

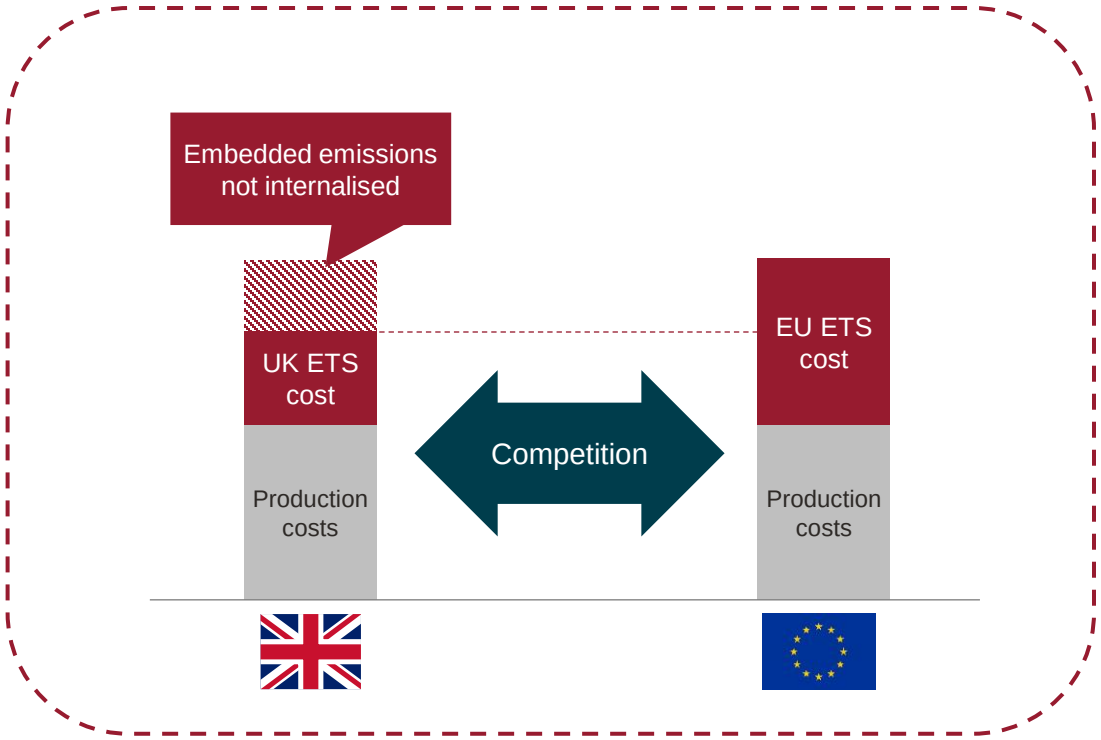
***Based on maximum historical price difference observed of £31/tCO2e over September 2023*

See Annex for further details of scenarios used

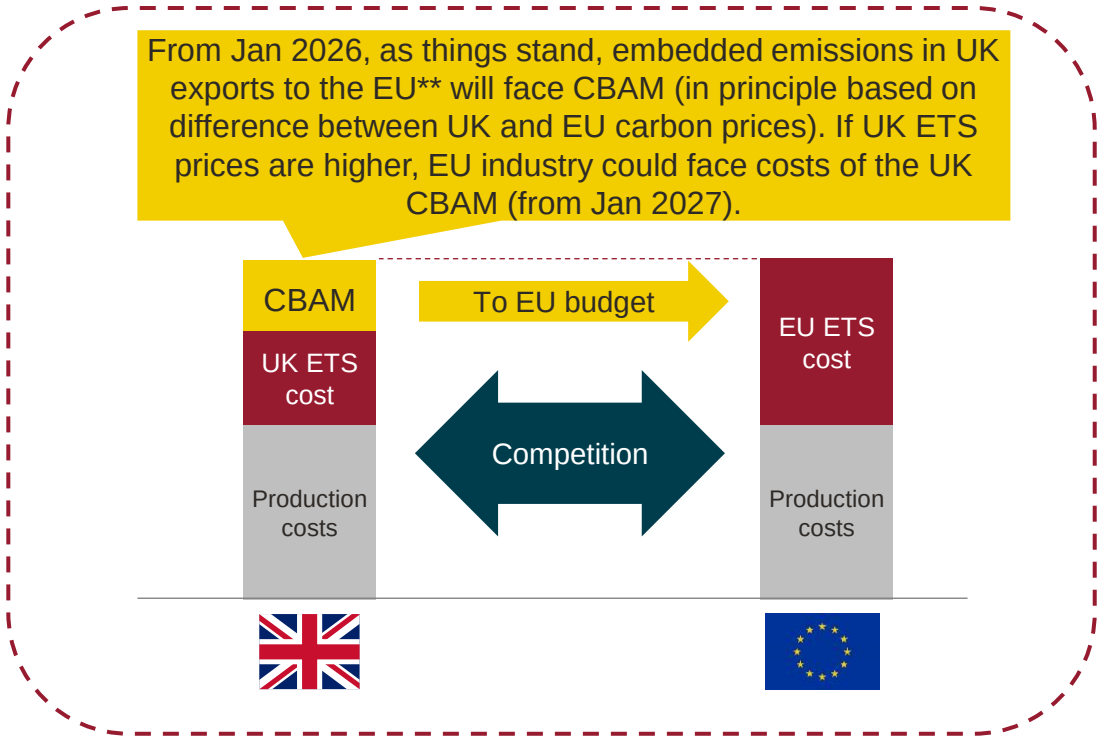
- All figures above are nominal. Frontier analysis based on Govt projections of forecast auction volumes. Further details set out in Annex
- We have not quantified possible knock-on revenue impacts:
  - Any change in carbon price support (CPS) revenues. In practice, a higher ETS price might, other things equal, reduce emissions in the power sector and thereby lead to a reduction in CPS revenues (assuming no change to CPS rates). However, any impacts on CPS would likely be small in comparison to impacts on ETS revenues, since the CPS only covers the power sector. The power sector currently accounts for around half of emissions covered by the UK ETS and its share is expected to fall further over time; and
  - The potential additional cost of providing compensation to industrial customers for the indirect effects of higher ETS prices on power prices. This would also likely be small relative to the additional revenues from a higher ETS price
- We have also not quantified the possible impacts of higher carbon prices on power prices or on industrial competitiveness with non-EU trade partners (though free UKA allocation or UK CBAM should mitigate impacts on the latter)

The EU Carbon Border Adjustment Mechanism (CBAM) will erode any competitive advantage for UK exports to the EU arising from a lower UK ETS price…

Without EU carbon leakage protection*, concern that imports to EU might have competitive advantage over EU production, if imports face a lower domestic carbon price



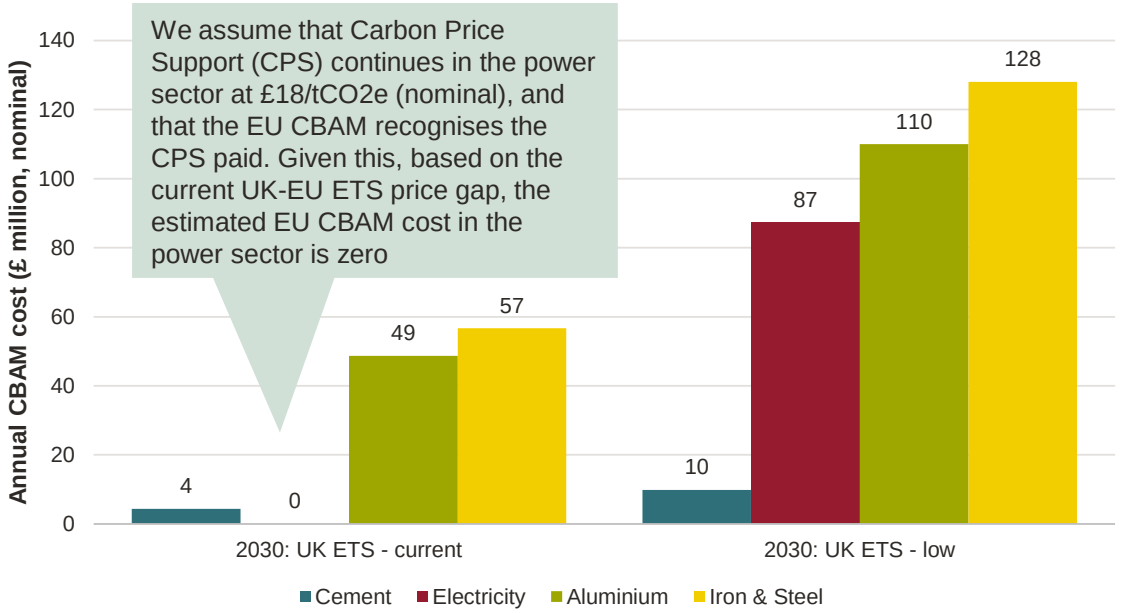
The EU CBAM is a tariff on embedded emissions in imports. It aims to ensures a level playing field (in terms of the carbon price) for goods sold in the EU



*Certain EU industrial sectors currently are allocated EUAs for free, which partially "shields" them from competition from imports. There is no free allocation in the EU for power plants, however. And for the sectors covered by EU CBAM, free allocation will be phased out as CBAM is phased in. **Sectors initially to be covered by EU CBAM: Iron and Steel, Aluminium, Cement, Hydrogen, Fertilisers and Electricity. See Annex for further detail.

...and could result in UK industry paying up to £0.2-0.8 billion into the EU budget over 2026-30

Projected annual CBAM costs in 2030 (excluding administrative costs), by sector



EU CBAM results in part of the forgone revenue previously described (if UK prices lower than EU prices) being paid by UK industry to the EU budget:

- **If price gap remains similar to current* levels:** £0.2 billion cumulative cost across sectors analysed over 2026-30
- **If price gap widens**:** £0.8 billion cumulative cost across sectors analysed over 2026-30

Estimates assume traders receive rebates on UK carbon prices paid. For power, we assume EU CBAM is based on average emissions intensity of the whole GB power mix. As we discuss in the following slide, **obtaining rebates may be challenging in practice** for GB power exports. Without rebates in power, applying a fossil fuel emissions intensity (which is currently one of the default value approaches set out by the EU) to GB power exports, the **costs of EU CBAM could be significantly higher in the power sector**

**Based on average price difference observed during June 2024 (£13/tCO2e)*

***Based on maximum historical price difference observed of £31/tCO2e over September 2023*

**Calculations factor in gradual phase-in of CBAM obligation over time as set out in the EU ETS Directive. See Annex for further details of scenarios used*

Without linking, admin burdens for UK exporters apply regardless

- Even if UKA and EUA prices were to converge, importers of CBAM goods to the EU still have to register with Member State authorities and report quantities of imports and embedded emissions (quarterly during the transitional phase, annual under the enduring regime), resulting costs associated with data gathering, verification, etc. Failure to report can result in significant penalties
- Only possibilities for exempting UK exports are for goods of negligible value (<EUR 150 per shipment) or if UK the EU ETS are linked

Even with price convergence, EU CBAM could lead to GB electricity exports to the EU being over-burdened…

Efficient power trade can support UK and EU security of supplies

- The direction of power flows across interconnectors follows cross-border price differences. GB will tend to import during periods of relative scarcity and vice versa
- Current differences in UK and EU carbon prices already lead to an un-level playing field that distorts efficient trade

CBAM may lead to GB power exports being over-burdened – even if UK / EU carbon prices are aligned

- The EU is interconnected with regions with significant coal capacity and no carbon pricing currently (e.g. Morocco, Western Balkans, Ukraine, Turkey). This has motivated the EU to apply its CBAM to the power sector (to mitigate the risk of "carbon leakage"). The UK does not plan on including power sector in the scope of its CBAM – as it does not face similar carbon leakage issues. However, the EU CBAM would still apply to GB* power exports – though there is some uncertainty regarding exactly how (as the methodology is still being developed):
- There is a risk that GB power exports to the EU **do not receive rebates on the carbon price already paid in GB** (UK ETS + CPS)**:**
  - To secure CBAM rebates, importers of electricity to the EU need to demonstrate that the carbon price has been paid on exported volumes (Art 9 CBAM Regulation) – in practice, this is challenging given the way power is traded (anonymously, volumes traded multiple times)
- Even with rebates on UK carbon pricing, the EU CBAM may **exaggerate the emissions intensity of GB power exports**.
  - Increasingly emissions in periods of export are likely to be lower than average given GB would typically export during periods of significant low carbon energy.
  - To base CBAM obligation on actual emissions of power exports (Annex III, para 5 of CBAM Regulation), exporters essentially need to be able to demonstrate exclusive commercial contract and physical link between power generation installation and exported volumes – again difficult given how power is traded
  - This means **default values for emissions intensity** will be used instead. These may overstate the embedded emissions of power when exporting. One approach currently set out by the European Commission is to base emissions factors on the average emissions intensity of **fossil fuel generation** in the exporting country – across a 5-year period ending two years before the compliance year – which would overstate emissions even further

*Our focus here is on GB power exports to continental EU, though a similar issue may apply to Northern Ireland. Northern Ireland is part of the all-Ireland single electricity market (SEM). It remains covered by the EU ETS under the Northern Ireland protocol. However, despite this, it is still unclear how power exports from Great Britain to the Republic of Ireland will be treated by the EU's CBAM. See https://www.energy-uk.org.uk/wp-content/uploads/2024/05/Energy-UK-Position-Paper-EU-CBAM-Concerns-and-Impacts.pdf, page 3.

… with the resulting friction affecting GB exports harming UK and EU decarbonisation aims

There are important consequences of GB power exports being inefficiently over-burdened by the EU's CBAM e.g. increased curtailment of GB wind which would otherwise have been exported, pushing up EU emissions and wholesale costs.

Risk of increased need for financial support for interconnectors

- Interconnectors earn revenues based on price differences and flows between markets (so-called "congestion rent")
- Since CBAM contributes to increased GB prices, it will tend to narrow price spreads during periods when GB might otherwise have exported, **reducing congestion rent**, other things equal (AFRY* estimates a reduction of 52% in 2035 for new interconnectors - central scenario, assuming no CBAM rebates)
- Loss of expected congestion rent (and uncertainty regarding impacts of CBAM) implies **greater reliance on financial support** (e.g. from energy consumers) to ensure investment

Risks to UK decarbonisation aims

- **Higher curtailment of renewable energy** sources (RES) during periods of surplus (AFRY* estimates EU CBAM could lead to >50% increase in central scenario though impact is halved if GB exports can get rebates on CBAM for GB carbon price)
- Expectations of greater curtailment and increased policy-driven uncertainty on extent of impact of EU CBAM on curtailment will mean **investors in new UK RES projects will require higher support levels** – **contributing to higher costs to energy consumers,** other things equal

Negative impacts on EU energy policy objectives

- Reduced imports from GB mean that **EU requires increased domestic generation – potentially from fossil fuel sources** (AFRY* estimates increase in EU thermal generation - mainly gas - of around 9TWh / year, central scenario)
- This is associated with **large transfers from EU consumers to EU producers** (AFRY* estimates EUR 2.3-4.6 billion/year)
- There may be **further costs from the EU having to be more "self-sufficient"** (e.g. additional grid and generation capacity needs)

- The UK-EU TCA requires the implementation of more efficient power trading arrangements on interconnectors ("coupling"). Application of EU CBAM would complicate the prospects for doing so - as there is no technical solution, for the time being, for how CBAM can work in a coupled environment

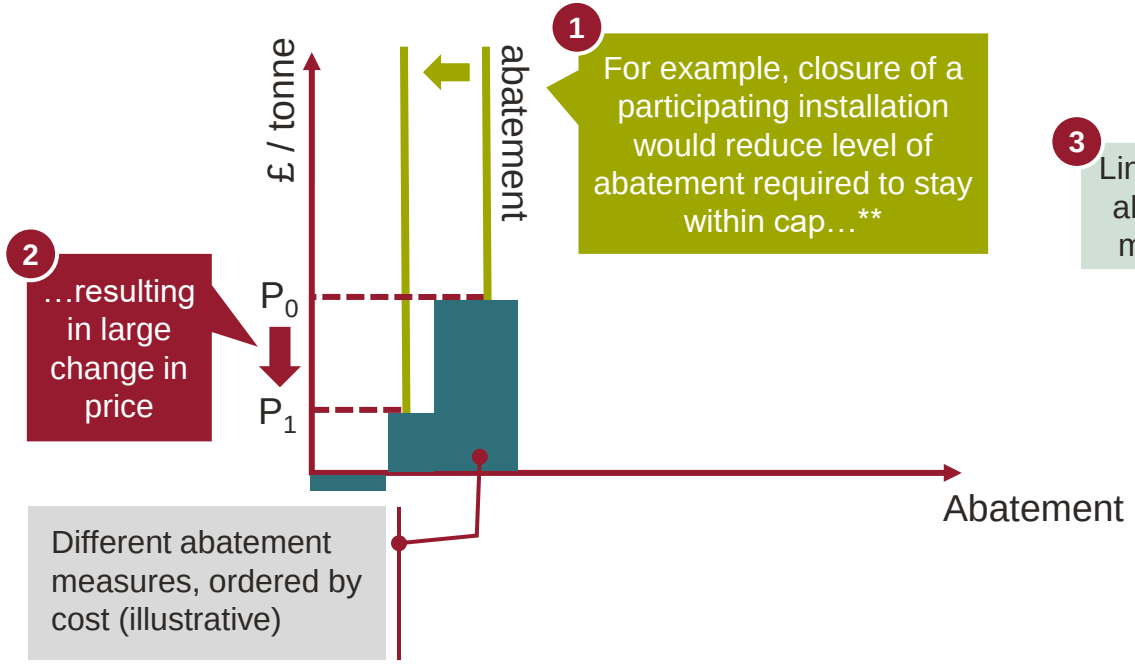
Linking the UK & EU ETS can **remove these distortions**, contributing to a **level playing field** for power trade between the UK and the EU.

Note: To the extent it limits exports from GB to the EU, EU CBAM may also contribute to lower GB wholesale prices at certain times. The impact of this on consumers may be partially offset by higher renewable support costs.

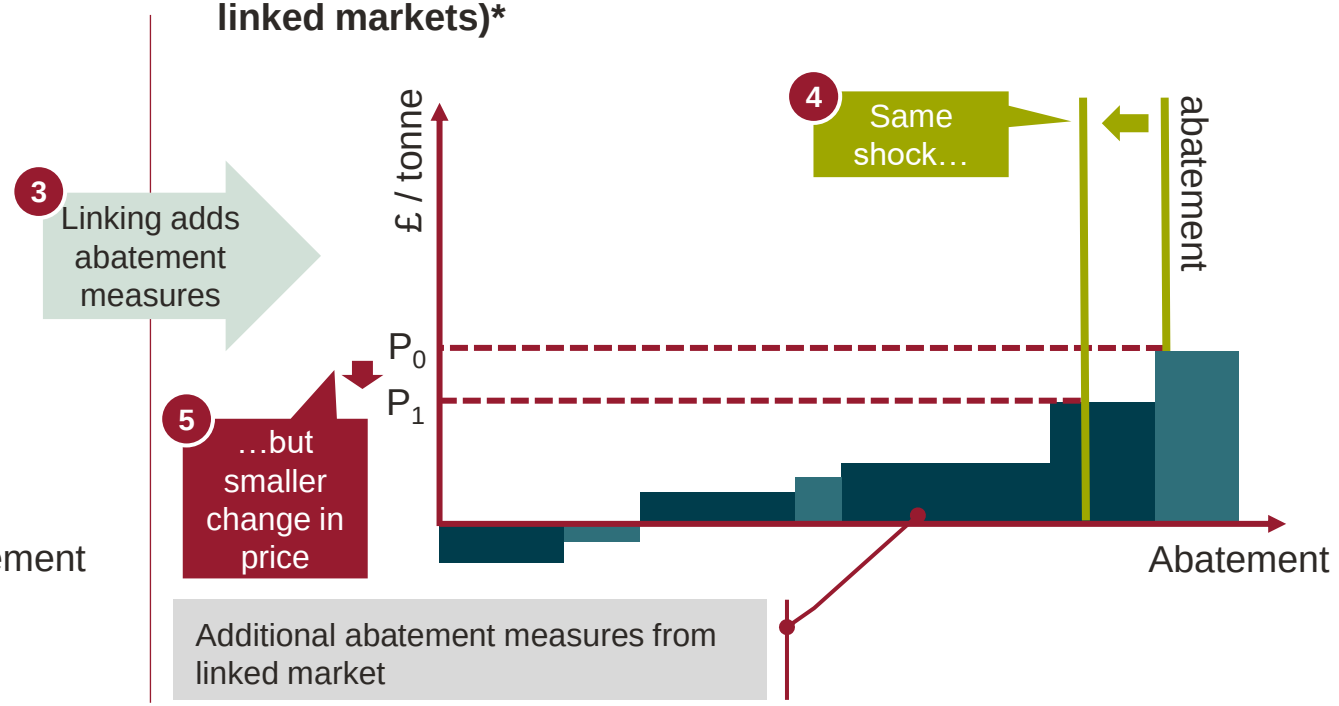
*AFRY (2024) "EU CBAM impact study focused on electricity imports from Great Britain: Summary Report" https://afry.com/sites/default/files/2024-03/afry_eu_cbam_impact_study_summary_report_mar_2024_v300.pdf

In the absence of linking, UKA and EUA prices will be more volatile…

Single market (no linking): a shock would have a significant impact on prices



Linked markets: Price impact of shocks dampened (for both linked markets)*



The **price shock-dampening effects of linking could be significant**.

- The effects would already be relevant for the UK today: For example, a very large industrial emitter at 5MtCO2e / year would represent around 5% of the current UK ETS cap, but only around 0.3% of a combined UK/EU ETS cap
- Both UK and the EU caps will tighten going forwards, making them more exposed to shocks if they continue to operate separately (see slide 15)

*Assuming that shocks do not coincide across markets. **Another example might include policy announcements relating to the size of the cap – affecting market expectations regarding the level of abatement required.

...which in turn increases the importance of being able to hedge allowance price risk

The aim of forward hedging is to help stabilise cash flows. If participants cannot directly hedge allowance price risk at reasonable cost, they will turn to alternative risk management approaches that may come with higher costs

The choice of risk management tool is, at its simplest, a **trade-off** between the cost and availability of hedging vs risk capital

	Thermal generators	Industrials
Need for hedges	▪ To reduce the need for capital lock-up in the business, typically generators hedge expected fuel / carbon purchases and power sales at the same time (locking in the "spread" between costs and power prices). Since generators' customers (i.e. energy retailers) and fuel suppliers may themselves have preferences for fixing their prices, this means generators are incentivised to make forward purchases of allowances	▪ Industrials participating in emissions trading may seek to make forward purchases of allowances if this helps them stabilise cash flows – i.e. where they have entered into fixed price sales contracts with their customers
Availability of hedges	▪ If "clean" hedges (e.g. futures / forwards) cannot be purchased (or if there are high transaction costs associated with doing so since liquidity is low), participants will consider alternatives. For example, UK participants might "proxy hedge" via trading EUA futures (although this will leave them exposed to the risk of divergence between UKA and EUA prices)	
Risk capital	▪ Risk capital is then held to cover any remaining risks which cannot be managed through hedging	
	▪ In the long-run, the cost of risk capital will tend to be passed onto power customers. In other words, higher costs of risk management will tend to increase consumer prices	▪ Industrial sectors highly exposed to international trade may be less able to pass on costs to customers. In other words, higher costs of risk management will tend to reduce industrial competitiveness

A lack of forward liquidity for allowances will tend to **increase costs** for energy customers and **harm industrial competitiveness**

A linked UK-EU ETS would be more liquid and provide improved hedging opportunities

Driver / aspect of liquidity	UK ETS	EU ETS
Number of participants	▪ ~1000 installations[1]	▪ ~10,000 installations[2] ▪ Higher financial market participation
Size of market	▪ Cap for 2024: 92.1 MtCO2e[4] (cumulative cap over 2026-30: 303MtCO2e)	▪ The EU ETS is the largest carbon market globally by value[3]. Cap for 2024: 1,386 MtCO2e[4] (774 MtCO2e[6] for 2030, expected to fall to zero before 2040)
Forward hedging opportunities	▪ Virtually no liquidity on exchanges for UKA futures beyond current compliance year	▪ EUA futures trade out 5 years+ on exchange platforms, allowing forward hedging ▪ Traded volumes around 2-4 times value of cap[5]

A linked market would create a combined market with even **more depth** than either the UK ETS or EU ETS standing alone. This would support hedging opportunities, reducing the costs of decarbonisation for consumers. A deeper market would also be less vulnerable to

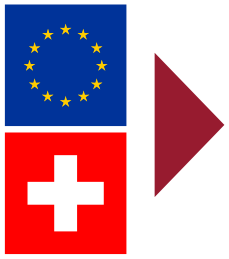
Sources: 1. https://assets.publishing.service.gov.uk/media/657c4d9595bf65001071908c/evaluation-of-uk-ets-phase-1-report.pdf 2. https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/scope-eu-emissions-trading-system_en 3. https://about.bnef.com/blog/global-carbon-markets-get-bigger-even-as-trading-dips /. 4. https://icapcarbonaction.com/en/ets 5. https://sparkchange.io/wp-content/uploads/2023/03/ICIS-EU-ETS-Report_2020-11-26_The-EUA-Market148054.pdf, Table 1 and https://icapcarbonaction.com/en/ets/eu-emissions-trading-system-eu-ets 6. Enerdata

The similarity of the UK and EU ETS should facilitate linking

"

The Parties shall cooperate on carbon pricing. They shall give serious consideration to linking their respective carbon pricing systems in a way that preserves the integrity of these systems and provides for the possibility to increase their effectiveness

Source for quote: UK-EU Trade and Cooperation Agreement, Section 7.3



- Negotiations on linking the Swiss and EU ETS began in 2010. They were held up due to the results of a 2014 referendum in which Swiss citizens voted to restrict immigration from the EU
- Linking was given the green light in 2017, a year after the Swiss parliament agreed on new rules that relaxed the restrictions on EU immigration
- The link (see Annex for further detail) eventually took effect in 2020 (once Switzerland had extended its ETS to aviation – one of the conditions set by the EU for linking to take place)

- The UK and EU schemes are relatively well-aligned (see Annex). Provided that planned developments of both markets are taken forward with future convergence in mind, this facilitates linking
- Assuming linking has support, while negotiations regarding linking are ongoing, EU and UK policymakers should consider transitional arrangements (for example a suspension of EU CBAM financial obligations to address potential issues during 2026)
- Linking would provide further evidence of the UK & EU's ability to lead on international climate cooperation – potentially important in the context of upcoming UK and EU 2040 climate target-setting and global climate negotiations

Contents

The EU ETS, which covers emissions from power and industry, was the world's first major carbon market and remains the largest in terms of value[1]

Scope

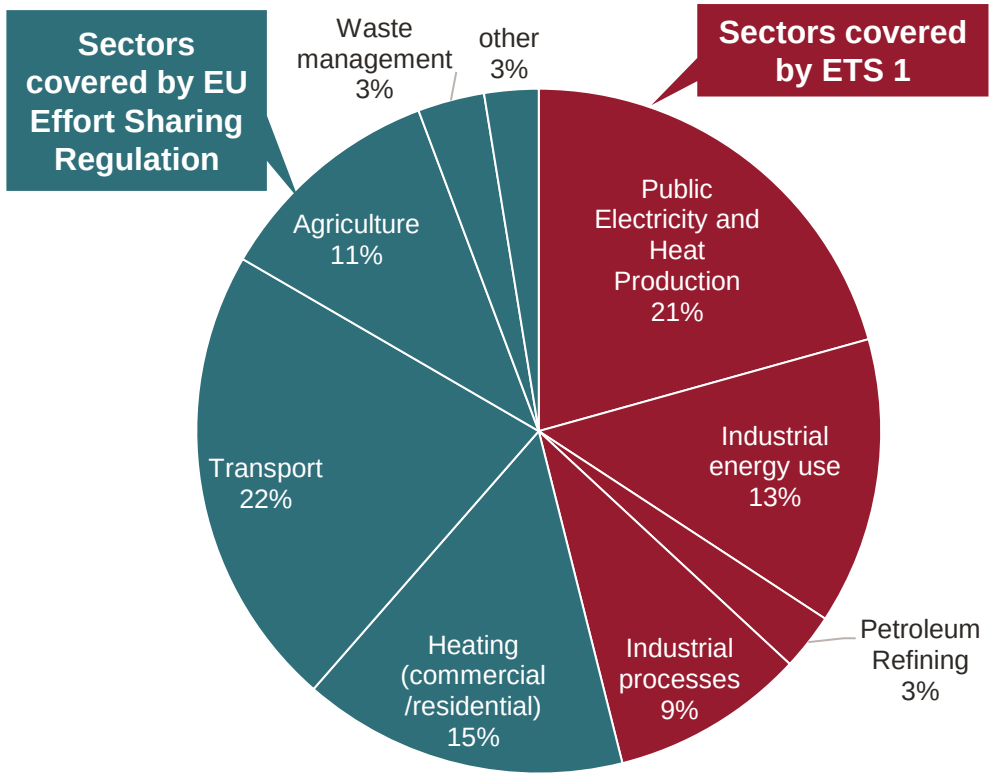
- **Sectors**: Mainly energy and industry (installations > 2.5 ktCO2 / 25 MW); aviation takes a smaller share and maritime navigation to be added in the future
- **Gases**: Since 2013, ETS includes CO2, N2O and PFC from aluminium production
- **Reduction target**: EU ETS covers ~ 45% of EU emissions (EU27 + Iceland, Liechtenstein and Norway) under *one cap;* Annual cap decreases in order to achieve -21% until 2020 and -62% until 2030 (compared to 2005)

Allocation and permit design

Dir 2009 / 29/EC

- **Free allocation** for industry that is exposed to carbon leakage (based on benchmarks)
- **Auctioning of 57%** of allowances (for public heat and power & industrial emissions not covered by free allocation)
- 1 permit (EUA) = 1 tCO2
- **Permits are tradable** and can be **banked** for future use (also in next trading phase)
- Borrowing is prohibited and non-compliance triggers a penalty of 100 € / tCO2 & fines for false reporting (up to 0.5 mn. €)

Total greenhouse gas emissions in 2021 by sectors in EU27



Source: Frontier Economics based on EEA greenhouse gases data viewer
Note: The colour categorisation is indicative. The categories in the dataset cannot be entirely allocated into one bucket, e.g. in energy and industry only installations>2.5 ktCO2 / 20MW are part of the ETS

Sources: 1. https://about.bnef.com/blog/global-carbon-markets-get-bigger-even-as-trading-dips /

Linking the UK ETS and EU ETS would secure an exemption for UK firms from burdensome EU CBAM reporting requirements

The CBAM will initially cover 5 industrial sectors plus electricity

Products

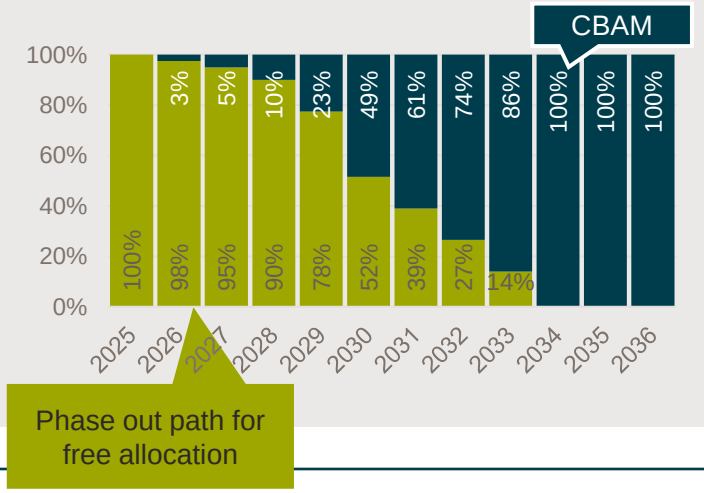
- Goods corresponding to selected EU ETS sectors with homogenous products and large aggregate emissions: Iron and steel, cement, aluminium, hydrogen, fertilisers, electricity (list may be extended in the future)
- For steel, some upstream inputs and downstream products (tubes, tanks) are also subject to CBAM

Emissions

- Embedded emissions in imported goods:
  - Direct emissions of CO2, N2O and PFC (aluminium)
  - Indirect emissions (fully included at later stage)
- Default values set by European Commission, can be reduced based on verified performance

From Jan 2026, the exposure of UK exports to the EU CBAM will gradually increase

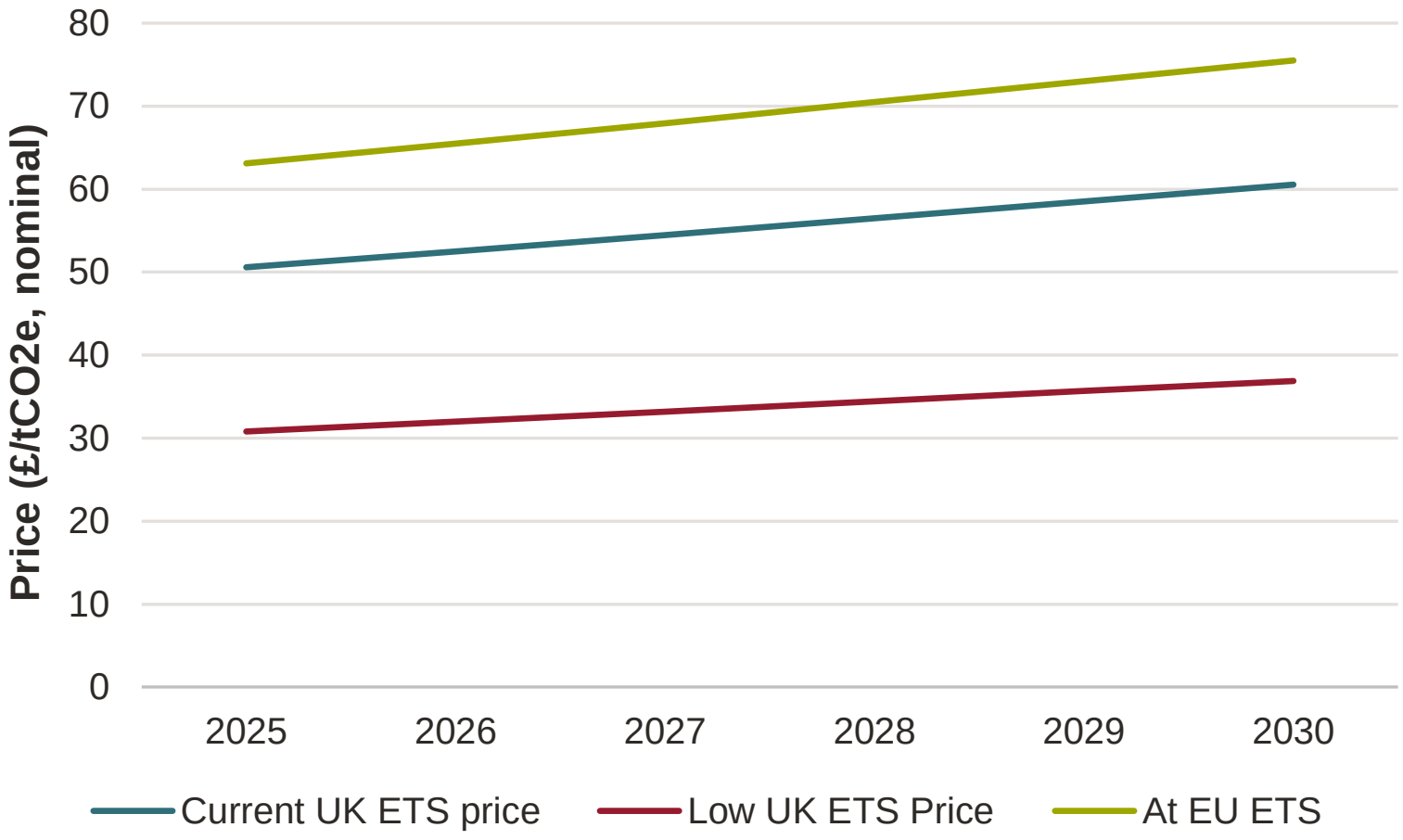
- Obligation for importers to EU to purchase volume of CBAM certificates equal to embedded emissions (at price that tracks the EU ETS price – though UK ETS price may be deducted)
- CBAM obligation will be phased in gradually (in parallel with the phase-out of free allowance allocation for the EU industrial sectors covered)



Even if the UK and EU ETS prices were identical, without linking, UK exports to the EU would still face admin burdens

- Importers of goods to EU subject to regulation have to register with authorities (Member State) to become “authorised CBAM declarant“
- Reporting / “CBAM declaration“ (quarterly during transitional phase, annual during enduring regime)
  - Quantity of imports (MWh or tonne)
  - Total embedded emissions (tCO2)
  - Number of CBAM certificates to be surrendered
  - Copy of verification report (prepared by accredited verifier)
- Cases for exemption are:
  - goods of negligible value (150 € per shipment)
  - Countries that are either part of the EU ETS (e.g. Norway, Iceland) or have carbon pricing that is “fully linked“ (e.g. Switzerland)

Quantitative analysis: We considered 2 scenarios for the development of UK ETS prices in the absence of a linkage with the EU ETS



Scenarios used for both forgone tax revenue analysis and CBAM cost analysis:

- **EU ETS:** Observed forward curve (average of prices on EEX over June 2024 – obtained via Energate Messenger)
- **"Current" UK ETS:** Based on average auction price of Dec '24 UKA contract observed over June 2024 (via Bloomberg). Since forward prices are not observed, we construct a "synthetic" forward curve based on assumption (given possibility of banking) that prices rise at the cost of carry. Assumed cost of carry equal to Bank of England overnight index swap rates during June 2024
- **"Low" UK ETS:** The gap between the UK and EU ETS reached its largest during Sep 2023 (gap of £31/tCO2e). Starting point assumes this gap, with "forward curve" based on assumed cost of carry as detailed above

CBAM cost to industry: details of analysis

CBAM cost to UK industry (£)	=	UK exports (tonnes)	X	Emissions intensity of production (tCO2e / tonnes)	X	Difference between UKA and EUA price (£ / tCO2e)	X	CBAM obligation phase-in (%)
		▪ Export volumes sourced from HMRC trade data by SITC code ▪ CBAM Regulation (Annex II) lists CN codes for products covered. We matched EU CN codes to UK SITC codes using classification provided by Finnish customs authority		▪ Benchmark emissions factors from Pauliak et al. (2016)		▪ Two scenarios as per previous slide – difference between current EUA forward curve and: ▫ "Current" UKA forward curve ▫ "Low" UKA forward curve		▪ For industrial sectors, CBAM obligation to be phased in gradually in line with withdrawal of free allocation of EUAs to CBAM sectors - will start at 2.5% in 2026, reaching 100% in 2034 (Article 10a, EU ETS Directive)

Key assumptions:

- We hold projected UK export volumes equal to their historical average
- Similarly, we hold the projected emissions intensity of UK production constant

CBAM cost to power sector: details of analysis

CBAM cost to GB power sector (£)	=	Exports from GB (TWh)	X	Emissions intensity of GB generation (gCO2e / kWh)	X	Difference between UK and EU carbon price (£ / tCO2e)	X	CBAM obligation phase-in (%)
		▪ NG ESO FES 2024 Electric Engagement scenario		▪ NG ESO FES 2024 Electric Engagement scenario		▪ Same two scenarios for EUA and UKA prices as for industry (see previous slide) but also accounting for carbon price support of £18/tCO2e faced by GB power generation ▪ Assume rebate on GB carbon price cannot exceed EUA price		▪ For power, assume CBAM obligation of 100% from 2026 (since no free allocation currently)

Key assumptions:

- Assumes emissions intensity of GB generation when exporting is the same as the annual average for GB. This may overstate the emissions intensity of exports (and EU CBAM risks further overstating emissions intensity of GB exports further - see slide 11)
- Assumes GB exports able to claim rebate on GB carbon prices. As noted previously (see slide 11) this may be challenging in practice
- Export volumes are an exogenous input assumption. We do not consider how exports may vary depending on carbon price (and resulting electricity price) differences. Export volumes and grid emissions intensity over 2026-30 from the FES 2024 Electric Engagement scenario are roughly mid-way between those of the Holistic Transition and Hydrogen Evolution scenarios (the two other FES 2024 scenarios consistent with Net Zero by 2050)

Comparison of EU, Swiss and UK ETS

- As of 2020, EUAs can be used for compliance in the Swiss ETS, and vice versa. This is achieved via a direct link between the respective allowance registries. Implementation is overseen by a “Joint Committee” that acts as a forum to discuss amendments to the agreement and resolve disputes. Linking is conditional on the parties’ respective ETS meeting certain essential criteria (see below for a high-level comparison of the Swiss and EU ETS)
- The UK ETS remains fundamentally similar to the EU ETS (see below) – indicating that linking with the EU ETS should be relatively straightforward

			
ETS sectoral coverage	▪ Industry, power, domestic aviation, maritime	▪ Industry, power, domestic aviation	▪ Industry, power, domestic aviation (maritime planned from 2026 onwards)
Overall GHG targets	▪ 2030: 55% GHG emissions reduction on 1990 levels ▪ 2050: Climate neutrality	▪ 2030: 50% GHG emissions reduction on 1990 levels ▪ 2050: Net zero GHG emissions	▪ 2030: 68% GHG emissions reduction on 1990 levels ▪ 2050: Net zero GHG emissions
ETS cap	▪ ETS cap 2030: 774 MtCO2e (1,386 MtCO2e in 2024)	▪ ETS cap 2030: 3.6 MtCO2e for industry/power (4.5 MtCO2e in 2023)	▪ ETS cap 2026-30: 303MtCO2e (633 MtCO2e over 2021-25)
Use of international credits	▪ Not allowed (European Commission to report on coverage of GGRs by emissions trading by July 2026)	▪ Not allowed	▪ Not allowed, though UK considering use of GGRs
Penalties	▪ EUR 100/tCO2e (~GBP 85/tCO2e)	▪ CHF 125/tCO2e (~GBP 110/tCO2e / EUR 130/tCO2e)	▪ GBP 100/tCO2e (~EUR 120/tCO2e)

Sources: International Carbon Action Partnership, EU-Switzerland linking agreement, EU ETS Directive, https://www.klima-allianz.ch/wp-content/uploads/Klima-Masterplan_Teil_Inland.pdf