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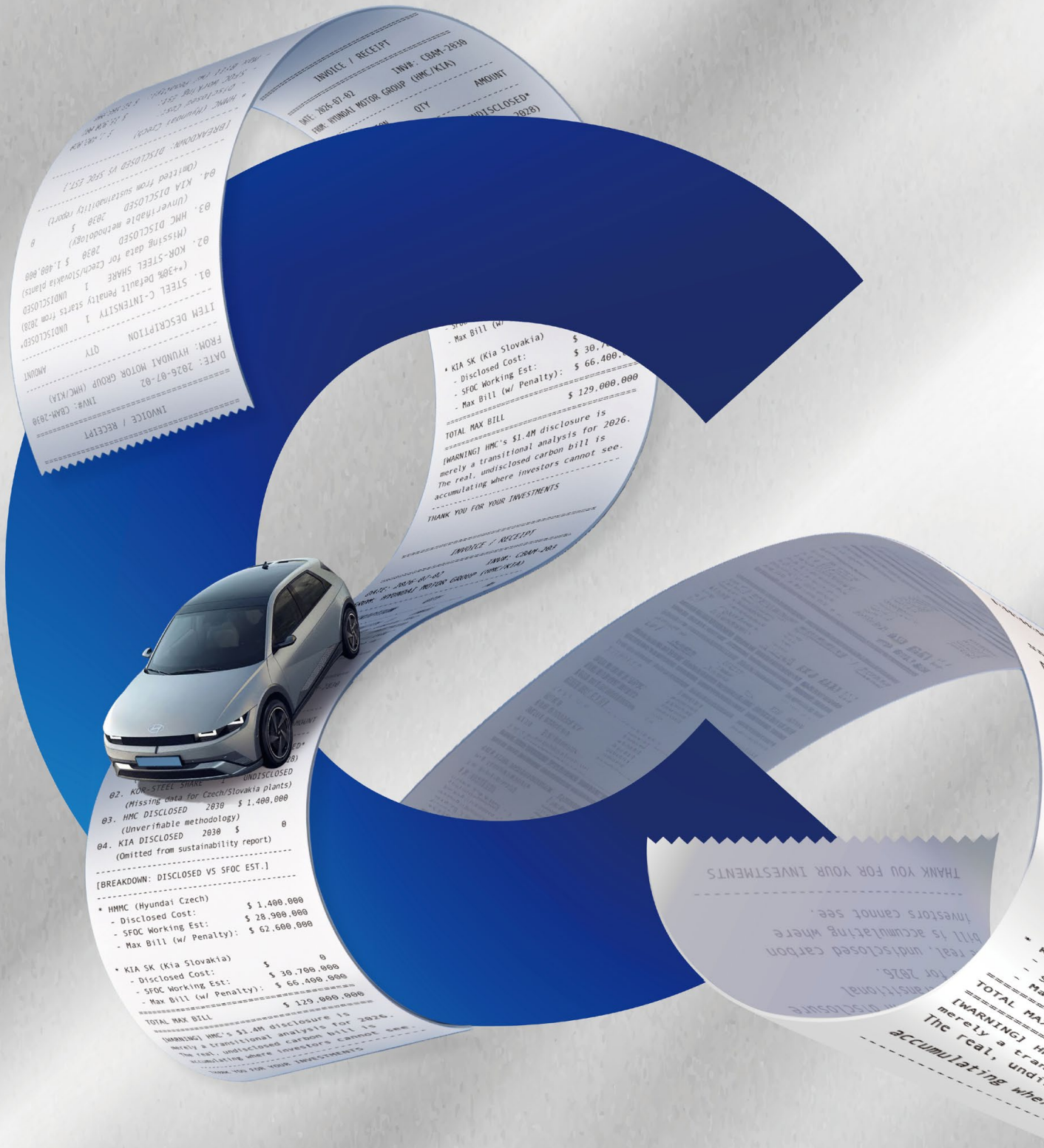
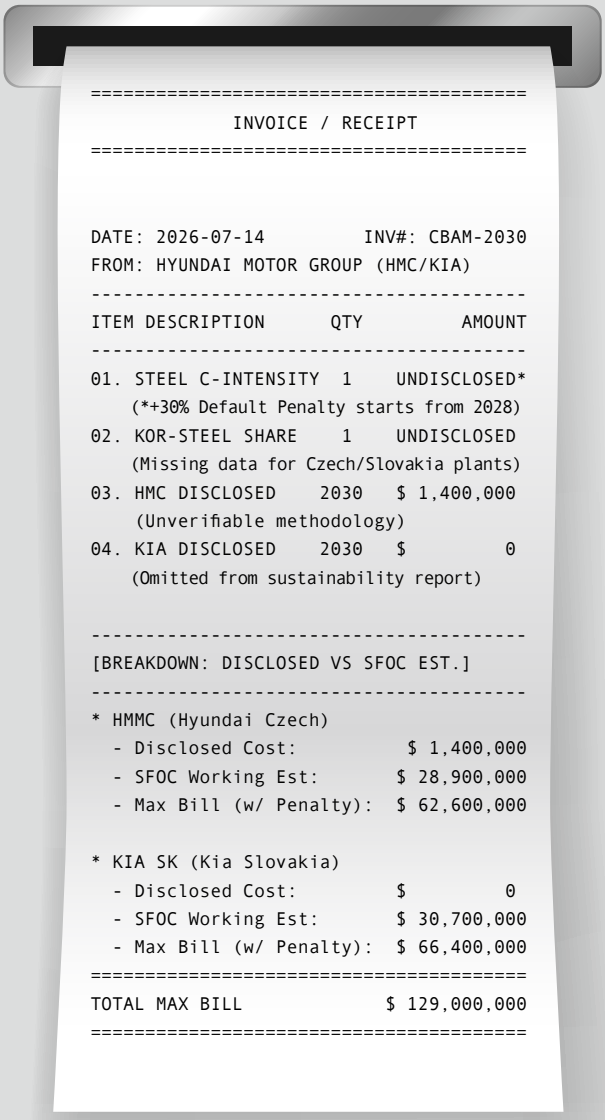


The Undisclosed Bill:

How Hyundai Motor Group is accruing a CBAM liability it has not quantified for investors



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INVOICE / RECEIPT
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DATE: 2026-07-14 INV#: CBAM-2030
FROM: HYUNDAI MOTOR GROUP (HMC/KIA)

ITEM DESCRIPTION QTY AMOUNT
---
01. STEEL C-INTENSITY 1 UNDISCLOSED*
(*+30% Default Penalty starts from 2028)
02. KOR-STEEL SHARE 1 UNDISCLOSED
(Missing data for Czech/Slovakia plants)
03. HMC DISCLOSED 2030 $ 1,400,000
(Unverifiable methodology)
04. KIA DISCLOSED 2030 $ 0
(Omitted from sustainability report)

[BREAKDOWN: DISCLOSED VS SFOC EST.]
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* HMMC (Hyundai Czech)
- Disclosed Cost: $ 1,400,000
- SFOC Working Est: $ 28,900,000
- Max Bill (w/ Penalty): $ 62,600,000

* KIA SK (Kia Slovakia)
- Disclosed Cost: $ 0
- SFOC Working Est: $ 30,700,000
- Max Bill (w/ Penalty): $ 66,400,000
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TOTAL MAX BILL $ 129,000,000
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SFO°C

The Undisclosed Bill:

How Hyundai Motor Group is accruing a CBAM liability it has not quantified for investors

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Design	**sometype**

Solutions for Our Climate (SFOC) is an independent nonprofit organization that works to accelerate global greenhouse gas emissions reduction and energy transition. SFOC leverages research, litigation, community organizing, and strategic communications to deliver practical climate solutions and build movements for change.

[Disclaimer] This report was prepared by the Investor Engagement team of the Climate Finance Unit at Solutions for Our Climate (SFOC) for institutional investors who are currently holding or are considering investing in Hyundai Motor Group (HMG). The European plants and assembly hubs of Hyundai Motor Company (HMC) and Kia are used as case studies to give insights into the Carbon Border Adjustment Mechanism (CBAM) and highlight the potential financial implications for the Korean automotive industry. Specifically, it focuses on steel costs resulting from the new CBAM regulations, using publicly available data from annual reports and industry publications. Due to a lack of data transparency, this issue brief uses estimates and projects the magnitude of exposure by providing a lower and upper bound. Although only direct steel emissions are relevant for the CBAM calculation, due to the opacity of the exact emissions intensity, the most conservative ceiling is applied, including scope 1, 2, and 3 emissions. It does not offer investment advice.
To maintain consistency, all figures are converted to USD using the KRW/USD exchange rate of 1,471.31 and the EUR/USD exchange rate of 1.1300, based on the rates as of May 5, 2026.

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Executive Summary

The European Commission published the first official Carbon Border Adjustment Mechanism (CBAM) certificate price of EUR 75.36 per tonne of CO_2 on April 7th this year. Since January 2026, both EU assembly plants of Hyundai Motor Company and Kia, located in the Czech Republic and Slovakia, respectively, have been subject to the CBAM definitive regime, which requires their Korean steel imports to be covered by an authorized CBAM declarant — whether the plant entity itself, a group affiliate, or an indirect customs representative is undisclosed. Although CBAM is a financially material topic for investors, so far, little information in the last sustainability reports has been disclosed. This report aims to identify the missing variables, discuss scenarios, and estimate the future bandwidth of steel-related CBAM costs, while clearly stating the limitations of the financial model. Earlier in May, new regulations were proposed, which should be retroactively applicable from January 2026, to newly include the use of international offsets under the Paris Agreement (Article 6). The offsets are strictly capped at 10% of the embedded emissions of the imported goods, however, this report does not cover this topic. Further, under Article 9 (Regulation (EU) 2023/956), as Korea has a free allocation for the steel industry until 2030, the steel sector currently does not qualify for any K-ETS deductions.

Regarding CBAM, this paper identifies a disclosure gap, building on previous SFOC research that uncovered a 0.57 tonnes per vehicle discrepancy between the steel weight (tonnes per vehicle) disclosed in annual reports and in investigations by WorldAutoSteel. Moreover, there is a mismatch between the net-zero alignments of Hyundai Steel and Hyundai Motor Group's automotive companies, Hyundai Motor Company (HMC) and Kia. Although Hyundai Motor Company discloses a CBAM-related cost figure of KRW 2.1 billion by 2030 for its Czech plant, Kia has not reported a figure. Both are missing a transparent methodology and estimations made. There are a few key pieces of information that are absent in order to properly calculate the CBAM-related steel costs and make future plausibility checks, namely: 1) The disclosure of verified carbon intensity as a metric, 2) the procurement method of steel (e.g. BF-BOF vs. EAF), 3) the origin of the steel mills used (Korean vs. European Union) 4) detailed information on the parts exported (e.g. raw materials, pre-assembled parts, or finished passenger/commercial vehicles), 5) assumptions on the EUA price trajectory, 6) the methodology behind the data and calculation, and 7) the identity of the group entity holding authorized CBAM declarant status.

This paper dives into the nuances of the CBAM liability and discusses what is currently exempt from it, what falls within its scope, and what investors should be aware of starting in 2028. By using a ceiling and working-estimate model and discussing its limitations, this issue brief showcases the range of possible financial implications, examines all the key components of the equation, as well as derives scenario analyses.

I. The Disclosure Gap — Visible From the Inside

In February this year, Hyundai Steel's commercial team held an EU Carbon Border Adjustment Mechanism (CBAM) policy brief and visited over 160 representatives from roughly 30 European companies across Germany, the Czech Republic, and Slovakia. Over four days, the company walked through the compliance cycle and presented what attending clients described as specific data on CBAM cost scenarios — analysis that necessarily rests on the carbon-intensity and emissions figures this report identifies as undisclosed. These seminars indicate that the primary automotive steel supplier for Hyundai Motor Group has granular steel-related emissions data available; however, these have so far not been disclosed to HMG's own investors. This is exactly the disclosure gap that this report addresses. It is not the lack of data availability, but rather the decision of who receives it.

Why CBAM applies to Hyundai Motor Group's EU plants – The legal foundation

On January 1, 2026, the EU Carbon Border Adjustment Mechanism (CBAM) went into effect, imposing a carbon price on imported goods from six high-emitting sectors, including steel and iron, with expansion plans post-2028. Under the Combined Nomenclature (CN) classification system, automotive steel components (e.g., CN 7208, 7209, 7210, and 7225) shipped from Hyundai Steel's Korean operations fall within scope according to Annex I of Regulation (EU) 2023/956.

The table below highlights the relevant legal texts and two conditions that justify the classification of the EU assembly plants from Hyundai Motor Group in the Czech Republic and Slovakia as import operations requiring an authorized CBAM declarant under IR (EU) 2025/486. Moreover, South Korea is not on the list of countries eligible for exemption from the carbon cost, and the free-trade threshold of 50 tonnes in total mass is exceeded.

[Table 1] Overview of legal obligations (CBAM declarants)

Legal source	What it establishes	Application to HMC and KIA	Status
Reg. (EU) 2023/956 Annex I	Contains a list of imported goods that are subject to CBAM declaration by CN codes.	Exported steel products e.g. CN 7208, 7209, 7210, and 7225 are required to be declared.	**Triggers CBAM**
Reg. (EU) 2023/956 Annex III	Includes a catalog with all the countries whose imports are exempt.	South Korea is not listed, therefore no CBAM exemption.	**No exemption**
Reg. (EU) 2023/956 Article 2a **Reg. (EU) 2025/2083** Annex VII, pt. 1	There is an annual threshold of goods imported of below 50 tonnes (in total mass) which do not have to be declared.	This threshold is exceeded by both companies, Hyundai Motor Company and Kia.	**Threshold exceeded**
Reg. (EU) 2023/956 Article 4 (1)	Sets the foundation for the ultimate rule stating that *"goods shall be imported into the customs territory of the Union only by an authorized CBAM declarant."*	Continued imports of Korean steel above the 50t threshold imply an authorized declarant (or a pending application under Reg. 2025/2083's transition provision) – the responsible entity is not disclosed.	**Legally mandatory**

Source: Own illustration based on Regulation (EU) 2023/956; Regulation (EU) 2025/2083; Article 2a of Reg. 2023/956

Article 22 (1) of Regulation (EU) 2023/956 states that CBAM declarants have to surrender the correct amount of CBAM certificates according to the embedded emissions of the imported goods, with the first cycle's deadline approaching on September 30, 2027. Although this report focuses solely on the costs incurred by automotive steel, it offers a glimpse into the data level of granularity required. The next section will examine existing data gaps to properly calculate the expected steel-related CBAM cost bandwidth for Hyundai Motor Company and Kia.

Disclosure audit: The gaps that make independent verification impossible

Last year, Hyundai Motor Company's 2025 Sustainability Report (SR) mentioned CBAM as a material financial risk, announcing that *"raw material acquisition costs may increase due to the rising prices of materials subject to CBAM."* Further, it included a singular figure of KRW 2.1 billion (approximately USD 1.43 million) as the anticipated annual estimated cost by 2030 for their Czech plant (Hyundai Motor Manufacturing Czech, HMMC). Although disclosure of a number is progress, there is no methodology or transparent cost calculation. In Kia's Sustainability Report (2025), CBAM as well as CSDDD and CSRD are mentioned explicitly, stating that *"the failure to comply with these regulations concerning circularity and supply chain management within the EU may lead to a decline in corporate reputation and ESG performance levels"*. There was no mention of the implications for the Slovak plant (Kia's Žilina facility).

[Table 2] Disclosed CBAM Cost Estimate

What is disclosed	What is missing	Why it matters
Hyundai Motor Company: **KRW 2,100,000,000** **≈ $1,427,329** (*Czech plant only by 2030.*)	• No methodology • No steel volume identified • No carbon intensity stated • No EUA price assumption • No phase-in factor stated	**HMC's figure cannot be validated.** A number without a methodology is not disclosure.
Kia: **KRW 0 disclosed** (*Slovak plant not mentioned anywhere.*)	Any acknowledgement of the Slovak plant or CBAM calculation.	**No figure to validate.**

Source: Own illustration based on Hyundai Motor Company and Kia Corporation sustainability reports 2025 and annual reports 2025.

As the table above shows, both companies lack a transparent financial metric for the CBAM cost implications, even though they mention it as a material risk in their annual reports. To calculate it, the data granularity of mainly two variables is crucial: 1) the carbon intensity of the steel imported into EU plants (tCO_2/t), and 2) the volume of steel used per vehicle (in tonnes). Besides that, other material boundaries, such as steel procurement method, supply, and split, also play a role.

Investigating the annual and sustainability reports from Hyundai Motor Group, it is evident that neither company discloses information on steel carbon intensity (tCO_2/t) or the total amount of steel usage in tonnes.

Steel carbon intensity (tCO_2/t): What is missing is documentation of emissions per tonne for the raw materials obtained from Hyundai Steel and other external suppliers (e.g., POSCO), the volumes purchased, and the production method. Depending on whether steel is produced via the Blast Furnace-Basic Oxygen Furnace (BF-BOF) or the Electric Arc Furnace (EAF) method, the global average steel carbon intensity lies between 2.34 tCO_2/t and 0.6 tCO_2/t, respectively. This is the single input factor with the greatest impact on the CBAM cost estimates, which will be discussed in the next chapters.

Excursion

Hyundai Motor Company and Kia Corporation (FY 2025) Sustainability Report (SR)

A) Hyundai Motor Company SR (FY 2025)

Since this report was drafted, Hyundai Motor Company's 2026 Sustainability Report (covering FY2025) disclosed a steel decarbonization target for the first time on June 30th, 2026. Hyundai Motor Company has set 2024 as the baseline year and plans to "gradually reduce the carbon intensity ($kgCO_2/kg$) of key raw materials, targeting an approximate 30% reduction in steel-related carbon emissions by 2035".

Further, the report states that from this year onwards (FY2026), HMC plans to 1) use steel produced via a hybrid scrap-and-electric arc furnace (EAF) process, which is said to "reduce carbon emissions by approximately 20% compared to conventional methods", with the application volume increasing over time. This signals a move away from pure BF-BOF, which will greatly decrease the carbon emissions intensity linked to steel production. Additionally, post-2029, HMC plans to 2) source steel with "approximately 60–70% lower carbon emissions" from Hyundai Steel's EAF steelworks under construction in Louisiana, United States.

1) Carbon emissions reduction pathway:

This is a meaningful disclosure improvement, and it is the first time HMC has quantified a baseline and pathway for steel decarbonization. However, it still fails to address the disclosure gaps identified in this report. Although, as mentioned in the previous paragraph, 2024 is stated to be the new baseline year, the carbon intensity figure

(tCO_2/t) is not disclosed, nor is the origin of steel, the methodology linking these reduction percentages to the EU CBAM benchmark, or the verified Scope 1 emissions.

2) Production facility in Louisiana, USA:

Separately, the Louisiana facility produces steel in the United States and is a joint investment among Hyundai Steel (50%), Hyundai Motor Company (15%), POSCO (20%), and Kia (15%). Since the US is out of scope for EU CBAM applications, it would only become relevant if the Louisiana-sourced steel were shipped to the Czech and Slovak assembly plants. In that case, the US-origin import and assumptions regarding carbon intensity would need to be incorporated into a new scenario model. The sustainability report does not specify the intended destination and is therefore part of the disclosure gap.

Something to highlight is that the (approx. 20%) reduction figure for hybrid scrap-EAF steel from 2026 is consistent in magnitude with Hyundai Steel's Hy-Arc Phase 1 figure discussed in Chapter IV. Although, HMC frames its reduction "versus conventional methods" rather than against the EU CBAM BF-BOF benchmark, so the two should not be treated as interchangeable.

B) Kia Corporation SR (FY 2025)

Similar to Hyundai Motor Company, Kia also disclosed their steel decarbonization targets for the first time, though the phase-in approach to reach net-zero is more modest. Kia targets an approximate "15% reduction in steel-related carbon emissions by 2030, 50% by 2040 and 100% by 2050." The plan is to focus on domestic production processes from this year onwards and then subsequently through the adoption of EAF technology, using low-carbon steel produced in Louisiana, the United States, from 2029 onwards.

As with HMC, no baseline carbon intensity figure (tCO_2/t), no Korean-origin share, and no methodology linking these percentages to the EU CBAM benchmark are disclosed. Additional information regarding the Slovak plant's exposure is still missing.

Steel usage in tonnes (t): Although partial data on raw material employment are available, a comprehensive breakdown is missing. Hyundai Motor Company offers some insight in their reports for steel usage in 2024, where 1,238,092 tonnes were attributed to steel, and 407,423 tonnes were classified as steel scrap, totaling 1,645,515 tonnes. Further, the tonnes per vehicle of combined steel and aluminum was disclosed as 0.33. This number aligns largely with the public data in the report, based on the vehicle sales figure of 4,146,335 vehicles (2024). However, this number has been found to be too low by WorldAutoSteel and by previous SFOC investigations, which estimate the standard passenger car steel usage at around 0.9 tonnes. The discrepancy of a multiple of roughly three is explained by boundaries. While HMC only accounts for the steel and aluminum processed at its own press shops, prefabricated steel arriving as body sub-assemblies, chassis components, suspension systems, etc., is not included. Kia only reports the number of its domestic Korean press shops in 2024, of 204,000 tonnes of steel used. This figure does not provide an overview of total domestic and international steel use and offers a more limited view of operations than those of Hyundai Motor Company.

[Table 3] Disclosure audit: Scorecard

Disclosure items	Hyundai Motor Company	Kia Corporation
Carbon intensity (tCO_2/t)	× Not disclosed	× Not disclosed
BF-BOF vs. EAF split	× Not disclosed	× Not disclosed
Material boundary (t)	~ Partially	~ Partially
Korean steel origin share	× Not disclosed	× Not disclosed
CBAM methodology	× Not disclosed	× Not disclosed
CBAM financial estimate	~ $1.4M (by 2030) → No methodology	× Not disclosed

Source: Own illustration based on Hyundai Motor Company and Kia Corporation sustainability reports 2025 and annual reports 2025.

As the scorecard shows, none of these numbers is provided with enough detail for independent verification and calculation.

II. The CBAM Architecture — What Triggers Liability

In the previous chapter, it was established that HMG's EU assembly operations fall within CBAM's scope and require authorized declarant coverage and that disclosure gaps exist. But what is their exposure, and what triggers the liability?

There are three vectors specifically, which will be discussed in the following paragraphs. In other words, there are three CBAM categories through which carbon obligations could be triggered. The first layer discusses what is currently enacted and in scope as of January 1, 2026, while the second and third exposure tranches discuss possible legislative progress that is not yet in effect but should be monitored, as it is proposed to apply from post-2028. In summary, the CBAM architecture is nuanced, and several important factors and timing considerations determine what investors should focus on. In the figure below, the matrix provides an overview of what is in scope and what is out of scope.

[Figure 1] CBAM Exposure Overview

△ In scope ✓ Exempt △ proposed 2028 —N/A—Not applicable

Entity	Korean steel coil Exported to the EU	Finished passenger car exports (CN 8703) → EU	Van / Commercial vehicle (CV) exports (CN 8704) → EU
HMC (Czech, HMMC, EU)	**△ In scope** Vector 1 — live 01.01.2026 No disclosure on share exported/imported to EU	**N/A** Assembled in EU, not exported	**N/A** Commercial vehicles are not being assembled in the EU
KIA Slovakia (EU)	**△ In scope** Vector 1 — live 01.01.2026 No disclosure on share exported/imported to EU	**N/A** Assembled in EU, not exported	**N/A** PBV are built in Korea, not in EU
HMC Turkey (non-EU)	**N/A** Steel in Turkey, not imported to EU	**✓ Exempt** Passenger cars are out of scope (CN 8703)	**N/A** No CV build in Turkey currently
HMC + KIA Korean plants (KOR)	**N/A** Steel stays in Korea, not imported to EU	**✓ Exempt** Passenger cars are out of scope (CN 8703)	**△ Proposed 2028** Vector 3 — Kia PBV PV5 / PV7 / PV9

Source: Own illustration based on Hyundai Motor Company and Kia Corporation 2025 annual and sustainability reports; Regulation (EU) 2023/956; COM(2025)0419.

Vector 1: South Korean Exports — Enacted CBAM Regulation

The first vector focuses on the carbon costs incurred by South Korea, a non-EU country with no exemptions, when exporting to its assembly plants in the Czech Republic and Slovakia. However, two distinctions have to be made between 1) raw materials and parts, and 2) finished passenger and commercial vehicles. Since Hyundai Motor Company has more publicly available figures, it will serve as a mini case study going forward.

Hyundai Motor Group
Mini Case-Study

- **Raw materials – Korean steel coil**

  Based on analysts' estimates, the Czech Republic consumes roughly 60-70% of automotive steel from Hyundai Steel and POSCO, while sourcing the remaining 30-40% from European suppliers. While steel coils from within the EU are tax-free and CBAM-exempt, a carbon cost is applied to components imported from South Korea. The breakdown between origin and parts sourced is not publicly available. It is important to note that steel embedded in modules crossing the EU border, which are classified as assembled components rather than raw coil, are currently outside the scope until 2028.

- **Assembled vehicles sold**

  Roughly 80% of vehicles sold to the EU are assembled in Europe, with 46% within the EU and 34% in Turkey outside the European Union. This leaves the remaining 20% of car sales to be made directly from South Korea. According to the data, Hyundai Motor Company focuses almost exclusively on passenger vehicles, which fall under CN 8703 and are out of scope. While Kia does have some commercial vehicle exposure (CN 8704), these are currently exempt as well. Changes should be monitored, as proposals are under discussion to change regulations for commercial vehicles after 2028. In summary, currently, neither finished vehicles produced within the EU nor those produced outside the EU are subject to CBAM.

Vector 2: Proposed 2028 — Components from Korean Tier 1 and 2 suppliers

Last December, a few critical changes were announced under the Harmonized System (HS) Chapter 73 on iron and steel. Notably, a significant loophole is proposed to address this issue, which is particularly important for tier 1 and 2 suppliers exporting components into the EU, as outlined in COM(2025)0419. The European Commission proposed extending CBAM to 180 downstream products made from carbon-intensive materials, such as automotive components, both finished and semi-finished. Currently, exporters have incentives to take advantage and shift their business model from selling raw materials to processed goods. The embedded carbon emissions will be CBAM-liable from January 1, 2028, onwards.

Vector 3: Proposed 2028 — Kia commercial vehicles from Korea

Although COM(2025)0419 has not yet been enacted and may be further modified or delayed, goods transportation vehicles (CN 8704) are also proposed for inclusion in the downstream expansion, while finished passenger cars (CN 8703) would remain exempt. If adopted, this would be particularly relevant for Kia's PV series, which is currently built in South Korea and exported to the EU, since it would fall within the CBAM scope post-2028.

III. The CBAM Calculation — Ceiling, Working Estimate, and the Limits of Independent Modeling

The first official CBAM certificate price, EUR 75.36, was published on April 7, 2026. This chapter dives into the simplified investor exposure formula, applies it to Hyundai Motor Group's European assembly operations, and presents steel-related cost estimates for 2026 through 2034. Due to the data gap, which has already been pointed out in the previous chapters, assumptions were made using a ceiling (100% Korean BF-BOF vector 1 imports – maximum possible liability), the working estimate (approx. 60% Korean-origin according to sources), and the actual undisclosed reality somewhere in between. The model's limitations will be stated clearly. The following chapter is divided into three parts: A. discusses the formula, B. applies it, and C. compares it.

A. The CBAM formula

A.1. The simplified investor exposure model formula and application for automotive steel

Under Article 22(1) of Regulation (EU) 2023/956, the number of CBAM certificates to be surrendered each year is determined by the embedded emissions of all imported goods, adjusted for the carbon price paid in the country of origin. For iron and steel, embedded emissions are calculated based on direct emissions only (Annex II). The formula is:

CBAM cost = SEEg × Q_0 × phase-in factor × EUA price – Article 9 deduction (e.g. K-ETS)

Where: SEEg = specific embedded emissions (tCO_2/t) | Q_0 = tonnes of covered goods imported | In this case: Article 9 deduction (K-ETS) = €0 (100% free allocation to Korean steel sector through 2030)

* For transparency, this report approximates the gradual financial exposure using the published CBAM phase-in schedule rather than reproducing the benchmark-based allocation methodology used for legal compliance.

** Statutory certificate count (Art. 31, IR 2025/2620): SEEg – (CBAM factor^t × 1.37) — see Appendix B.

Substituting the simplified investor exposure model with the applicable factors for automotive steel:

Steel (t/vehicle) × carbon intensity (tCO_2/t) × phase-in (%) × EUA price* × vehicle count × Korean-origin share - K-ETS deduction

The Korean-origin share is the primary unknown. At 100% it produces the ceiling; at ~60% it produces the working estimate. A further key variable is carbon intensity.

Regulatory fixed | Estimated with confidence | Unknown / undisclosed | Output-dependent

*EUA and K-ETS price will change based on market expectations and policy changes.

A.2. Classification of key factors

As illustrated above, the inputs to the formula can be broadly grouped into four categories, each color-coded throughout this report. The green inputs are regulatory constants, set by law, and with little uncertainty in modeling. The CBAM phase-in schedule is set out in EU Regulation 2023/956, and Korea's steel sector will continue to be allocated free allowances under the 4th phase of the Korea Emissions Trading System until 2030. The blue inputs are estimated and reasonably predictable, including the trend in EUA prices from sources such as GMK Center and multiple institutional forecasts, the steel content per vehicle based on standards from WorldAutoSteel and ICCT, and figures reported in sustainability reports. Third, disclosures dependent inputs are red, which affect the bill but are not reported directly by the companies. These include carbon intensity of the steel, the share of Korean origin, and parts classification. The largest impact on the model is from the third category, as it has the most uncertainty. If Hyundai Motor Group disclosed these three figures or clarified its methodology, the range could be substantially narrowed. Lastly, the orange-colored variable is the vehicle count. Although the annual output fluctuates, this report has kept the number anchored at 2024 levels and has not attempted to make any future sales estimates. In practice, this number would be updated annually to reflect the actual cost.

[Table 4] Constant factors, phase-in schedule and EUA price estimations (2026-2034)

Input	Value	Basis
Steel per vehicle	0.9 t/vehicle	WorldAutoSteel standard; ICCT September 2024; (±10% by model mix).
K-ETS deduction	EUR 0 through 2030 *(Post-2030 risk as free allocation shrinks.)*	Korean steel sector: 100% free K-ETS allocation (ICAP, November 2025)

Year	Phase-in (%)	EUA low (EUR/t)	EUA mid (EUR/t)	EUA high (EUR/t)	Notes
2026	2.50%	65	75.36	100	Q1 2026 actual: **EUR 75.36/t** (7 Apr 2026)
2027	5.00%	80	85	115	GMK consensus median
2028	10.00%	95	100	125	Default value **+30%** penalty takes effect from 2028
2029	22.50%	105	113	140	Phase-in jumps to 22.5% — first year of material cost at scale
2030	**48.50%**	115	**126**	147	GMK consensus: EUR 126/t (BloombergNEF, S&P, etc.). Key model year
2031	61.00%	125	130	155	Phase-in surpasses 2030 levels
2032	73.50%	130	135	163	EU ETS free allocation approaching zero
2033	86.00%	133	138	170	Near-full phase-in
2034	100.00%	136	**140**	178	**Free allocation for CBAM goods ends.** 100% certificates required from 2034.

Source: Own illustration. Phase-in: CBAM factor per Article 10a(1a) of Directive 2003/87/EC, as amended by Directive (EU) 2023/959, applied via Article 31 of Regulation (EU) 2023/956; free allocation for CBAM goods ends in 2034 (GMK Center, Dec 2025). EUA mid column = the model input series used in Tables 5, 6 and 10: 2026 is the Q1 actual of EUR 75.36/t (EC, 7 April 2026); 2027–2028 adopt GMK Center's consensus path for 2026–2027 (EUR 85 → 100) one year behind consensus, as a deliberate conservatism; 2029 is an SFOC interpolation; 2030 is the GMK Center consensus median of EUR 126/t (median of BloombergNEF, ABN AMRO, Refinitiv, ICIS, S&P Global, Aurora Energy Research and PIK forecasts; institutional range EUR 80–147); 2031–2034 are SFOC's smoothed extension of the consensus trajectory, remaining well below ABN AMRO's baseline scenarios. EUA low and high: SFOC scenario band informed by the GMK Center institutional range and ABN AMRO's scenario analysis. The table is an indicative scenario band, not a point forecast.

A.3. Variable factors - what actually determines the bill

- **Korean-origin share**: The first unknown is the exact share of Korean vs. EU-origin steel raw material. Further, it is undisclosed how much of the imported steel falls within vector one and the CBAM calculation, and what percentage is currently out of scope until 2028. Therefore, the following model is applied: Ceiling = 100% Korean origin within scope; working estimate = ~60% (as estimated for HMC's EU plant). This is the primary variable the model is built around.

- **Carbon intensity (tCO_2/t)**: Since Hyundai Motor Company and Kia did not disclose their steel carbon intensity, the model purposely used a slightly overstated, conservative estimate of 2.34 tCO_2/t (WorldSteel 2025 global BF-BOF average), which includes scope 1,2,3 emissions, although the CBAM calculation only considers the direct emissions. The next chapter examines different scenarios.

  → **Default value penalty**: EU regulations state that, importers without verified actual emissions data will incur a phased-in markup of 10% in 2026, 20% in 2027 and 30% from 2028 onwards on the assumed carbon intensity. This default penalty will be reflected in the calculations.

A.4. What the model cannot resolve: Disclosure gap limitations

There are four structural limitations that arise directly from HMG's disclosure choices and gaps. These define the uncertainty range and cannot be resolved externally:

I. **Vector 1 coverage only**: This model covers only Vector 1 CBAM costs (steel coil imported into EU plants). It does not reflect Vector 2 (Tier 1 and 2 suppliers, proposed 2028) or Vector 3 (Kia PBV commercial vehicles, proposed 2028) within the calculations.

II. **% of steel imported**: The proportion of steel imported from Korea versus sourced from EU mills is undisclosed. EU-origin steel carries zero CBAM liability, while Korean-origin imports are fully subject to CBAM.

III. **Raw material vs. pre-assembled parts**: The proportion of Korean steel arriving as raw flat coil (directly triggering Vector 1) versus pre-assembled parts from tier 1 and 2 suppliers (currently outside Vector 1 scope) is undisclosed. The ceiling model assumes all Korean steel cross as raw coil, therefore slightly overestimating the current Vector 1 liability.

IV. **Production method**: The BF-BOF vs. EAF production split at Hyundai Steel is undisclosed. For HMC and Kia, all automotive-grade flat steel from the Dangjin complex is BF-BOF; it is assumed that all automotive steel is produced using the most polluting method.

B. Cost model results

After defining the formula, modeling approach, and limitations, this section will look at the cost model results. The results examine the differences between compliance and non-compliance, with a phased-in default applied on the carbon intensity in the latter case. Thereafter, the disclosure gap is discussed, looking at different scenarios of two input factors, namely the vehicle weight and the vehicle count, while everything else remains constant.

B.1. Application of the formula

The regulatory fixed inputs (green) and estimated inputs (blue) are applied to the formula as described in Section A.1. Because the phase-in percentage and EUA price estimates vary year to year, the tables below present the information used for full transparency. As mentioned, the EUA price is not yet set in stone and will depend on the market dynamics; therefore, a mid-range figure is used based on available sources and interpolation. The K-ETS deduction for steel is currently zero and will remain so at least until 2030, with the possibility of policy

changes thereafter. As for the disclosure-dependent inputs in red, as outlined in section A.2. conservative global estimates are applied as well as a modeling approach to showcase the range of uncertainty. Lastly, the number of vehicles sold from the Czech and Slovak plants depends on the yearly output. In this case, the vehicle count is fixed at the 2024 figures, with 330,890 for Hyundai Motor Company (Czech plant, HMMC) and 351,270 for Kia Žilina (Slovak plant).

0.9 t/vehicle (steel t/vehicle) × 2.34 tCO_2/t (carbon intensity) × phase-in (%)^t × EUA price^t × vehicle count × 100% (Korean-origin share) - €0 (K-ETS deduction)

Regulatory fixed | Estimated with confidence | Unknown / undisclosed | Output-dependent

B.2. CBAM cost model: Ceiling and working estimate, 2026–2034

The table below shows the cost estimates in dollars per vehicle, the two HMG individual plants (in millions USD), and a total for two pre-defined scenarios: 1) the ceiling model at 100% Korean-origin steel produced with the BF-BOF method, and 2) a working estimate at 60% Korean-origin (BF-BOF) and 40% EU-origin steel.

[Table 5] HMG EU plants CBAM cost projections by scenario (2026–2034)

Year	Phase-in	EUA (EUR/t)	EUA (USD/t)	Ceiling Model - 100% Korean (BF-BOF)				Working-estimate - 60% Korean (BF-BOF)			
				$/vehicle	Czech ($ m)	Slovak ($ m)	Total ($ m)	$/vehicle	Czech ($ m)	Slovak ($ m)	Total ($ m)
2026	0.025	75.36	85.2	4.5	1.5	1.6	3.1	2.7	0.9	0.9	1.8
2027	0.050	85	96.1	10.1	3.3	3.6	6.9	6.1	2.0	2.1	4.1
2028	0.100	100	113.0	23.8	7.9	8.4	16.2	14.3	4.7	5.0	9.7
2029	0.225	113	127.7	60.5	20.0	21.3	41.3	36.3	12.0	12.8	24.8
2030	**0.485**	**126**	**142.4**	**145.4**	**48.1**	**51.1**	**99.2**	**87.3**	**28.9**	**30.7**	**59.5**
2031	0.610	130	146.9	188.7	62.4	66.3	128.7	113.2	37.5	39.8	77.2
2032	0.735	135	152.6	236.1	78.1	82.9	161.1	141.7	46.9	49.8	96.6
2033	0.860	138	155.9	282.4	93.5	99.2	192.7	169.5	56.1	59.5	115.6
2034	1.000	140	158.2	333.2	110.2	117.0	227.3	199.9	66.1	70.2	136.4

Source: Own illustration. Steel per vehicle (0.9t): WorldAutoSteel/ICCT/SFOC. Carbon intensity: WorldSteel 2025 (2.34 tCO_2/t). Vehicle counts: HMC and Kia corporate websites (2024 output). EUA prices and phase-in schedule as per Table 4. Directive (EU) 2023/959, applied via Art. 31 Reg. (EU) 2023/956 (see Appendix B).

As shown in the table, the cost per vehicle under the ceiling model would be USD 145.4, compared with USD 87.3 under the working estimate in 2030. Realistically, the steel-related CBAM costs incurred by HMG would be somewhere between the ceiling estimate of USD 99.2 million and the working estimate of USD 59.5 million for the same year. From 2028 onwards, a default penalty of 30% will be applied for non-disclosure. The table below gives an overview of the cost implications.

B.3. CBAM cost model: Ceiling and working estimate with default penalty, 2026–2034

In case HMG does not disclose enough granular data, the default penalty would lead to a USD 43.6 increase per vehicle under the ceiling model by 2030 and a USD 26.2 increase under the working-estimate model. These costs compound, and the new total cost for both plants falls somewhere between the worst-case scenario of USD 129.0 million and USD 77.4 million.

[Table 6] HMG EU plants CBAM cost projections by scenario with default penalty (2026–2034)

Year	Phase-in	EUA (EUR/t)	EUA (USD/t)	Ceiling Model - 100% Korean (BF-BOF)				Working-estimate - 60% Korean (BF-BOF)			
				$/vehicle	Czech ($ m)	Slovak ($ m)	Total ($ m)	$/vehicle	Czech ($ m)	Slovak ($ m)	Total ($ m)
2026*	0.025	75.36	85.2	4.9	1.6	1.7	3.4	3.0	1.0	1.0	2.0
2027*	0.050	85	96.1	12.1	4.0	4.3	8.3	7.3	2.4	2.6	5.0
2028*	0.100	100	113.0	30.9	10.2	10.9	21.1	18.6	6.1	6.5	12.7
2029	0.225	113	127.7	78.7	26.0	27.6	53.7	47.2	15.6	16.6	32.2
2030	**0.485**	**126**	**142.4**	**189.1**	**62.6**	**66.4**	**129.0**	**113.4**	**37.5**	**39.8**	**77.4**
2031	0.610	130	146.9	245.3	81.2	86.2	167.4	147.2	48.7	51.7	100.4
2032	0.735	135	152.6	307.0	101.6	107.8	209.4	184.2	60.9	64.7	125.6
2033	0.860	138	155.9	367.2	121.5	129.0	250.5	220.3	72.9	77.4	150.3
2034	1.000	140	158.2	433.1	143.3	152.1	295.5	259.9	86.0	91.3	177.3

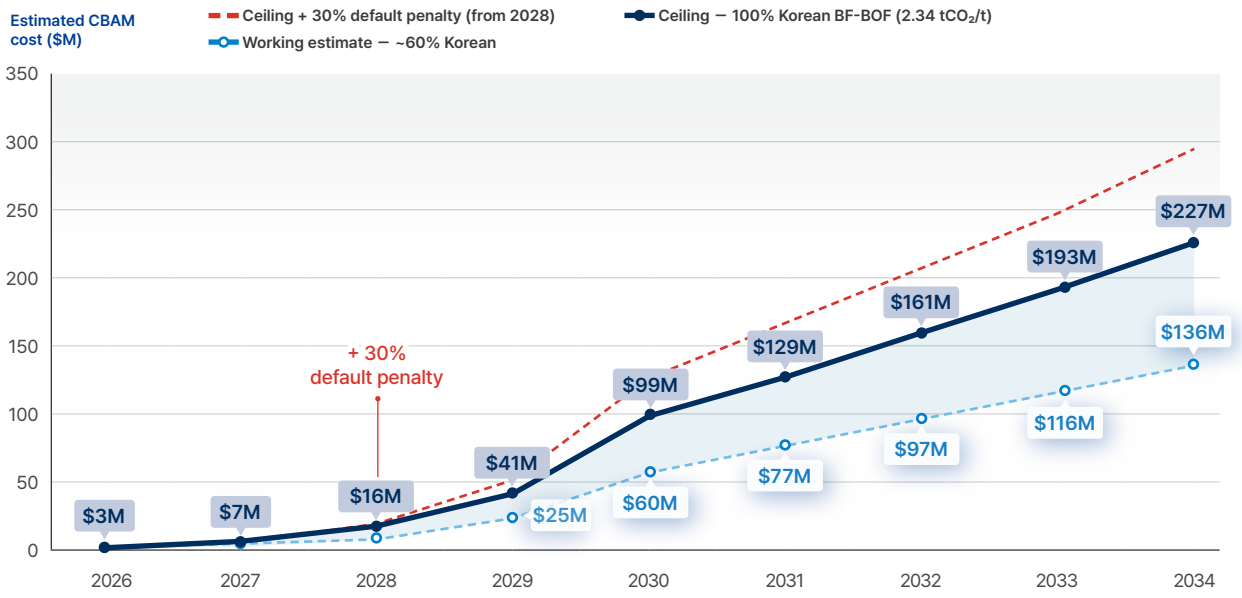
Source: Own illustration based on WorldAutoSteel/ICCT (0.9 t steel per vehicle), WorldSteel 2025 (carbon intensity), HMC and Kia corporate websites (European plant output, 2024), EUA prices and phase-in schedule as per Table 4. Default-value markup per IR (EU) 2025/2621 (see Appendix A).

* Gradual phase-in: 10% in 2026, 20% in 2027, 30% from 2028 onwards

B.4. Aggregate cost range — where reality lies

To visualize the two tables above, the figure was created to highlight the cost calculation. The shaded band in light blue shows the full uncertainty range in case of compliance between the working estimate (60% Korean-origin, vector 1), and the ceiling (100% Korean-origin, vector 1). If the default penalty is applied, the cost could increase as indicated in orange. The number cannot be narrowed down without further disclosure from HMG to address the limitations.

[Figure 2] HMG EU plants aggregate CBAM cost range and default penalty risk (2026–2034)



Source: Own illustration based on WorldAutoSteel/ICCT (0.9 t steel per vehicle), WorldSteel 2025 (carbon intensity), HMC and Kia corporate websites (European plant output, 2024), EUA prices and phase-in schedule as per Table 4, 5, and 6.

C. The disclosure gap

Hyundai Motor Company has outlined the CBAM-related costs it will incur by 2030, totaling approximately USD 1.4 million for its Czech plant alone. The calculations in section B show that the steel-related CBAM costs at the Czech-plant level ($28.9M–$48.1M), which are only a component of the total CBAM financial liability, are already projected to be 20–34 times higher.

C.1. Financial impact of the disclosure gap

[Table 7] HMG EU plants CBAM disclosure gap and financial impact by 2030

Gap by 2030	Czech Plant (HMC)	Slovak Plant (Kia)
HMC / Kia disclosed (predictions for 2030)	$1,427,329	$0 disclosed
SFOC working estimate (~60% Korean BF-BOF)	$28.9M ($37.5M incl. penalty)	$30.7M ($39.8M incl. penalty)
SFOC ceiling (100% Korean BF-BOF)	$48.1M ($62.6M incl. penalty)	$51.1M ($66.4M incl. penalty)

Source: Own illustration based on HMC and Kia sustainability reports 2025 (disclosed figures), WorldAutoSteel/ICCT, WorldSteel 2025, HMC and Kia corporate websites (European plant output, 2024), EUA 2026 actual (EC); model inputs as per Table 4 and 5. Penalty rows per IR (EU) 2025/2621.

The $39.7M gap between the ceiling ($99.2M) and the working estimate ($59.5M) in 2030 under normal conditions (no penalty) is not a modeling inaccuracy. It precisely measures what HMG's disclosure choices have withheld. An important data point to close that gap exists at Hyundai Steel, which presented specific CBAM scenario data to European commercial clients in February 2026, but has not been shared with investors.

Before diving into the key variable, which is the carbon emissions intensity in the next chapter, two so far assumed constant factors are modified in order to try to understand the rationale that HMC applied to derive the number.

C.2. Variable: The steel-per-vehicle assumption: 0.9t, 0.46t, and 0.33t

The base case for the CBAM calculations in section B used the figure quoted by WorldAuto Steel and ICCT: 0.9 t/vehicle. This report deliberately uses the most conservative numbers and encourages granular disclosure so investors can precisely calculate the financial impact and mitigate future risks. Therefore, this number slightly overstates the total steel content included in the CBAM cost calculation; however, in this case it serves as a useful planning ceiling.

The number that is more likely to reflect the actual number is 0.46t/vehicle, derived from the total steel weight per vehicle (0.9t) multiplied by the raw-coil fraction (estimated at 85%) multiplied by the Korean-origin share (60%). Approximately 15-20% of the Korean-origin steel arrives as pre-assembled parts, which is currently out of scope (vector 1), pre-2028. Hyundai Motor Company's 2025 Sustainability Report states that 0.33 tonnes of steel are used per car. It appears that this does not represent the full picture and only captures the steel processed at Korean-owned press shops. Since the methodology for calculating the weight has not been disclosed and no further information is available, the scenario below treats these three possibilities as the actual steel weights, with everything else held constant.

[Table 8] Three weights, two Korean shares, 2030 cost ($M both plants)

Steel assumption	Tonnes in scope per vehicle	Korean share	CBAM-liable tonnes/vehicle	Both plants 2030 ($M)
0.9t — full vehicle, ceiling (100% KOR)	**0.9t**	**100%**	**0.9t**	**$99.2M**
0.9t — full vehicle, working estimate (60% KOR)	0.9t	60%	0.54t	**$59.5M**
0.46t — raw coil, (60% KOR - as reflected in tonnes)	**0.46t**	**60%**	**0.46t**	**$50.7M**
0.33t — HMC scope, 100% Korean	**0.33t**	**100%**	**0.33t**	**$36.4M**
0.33t — HMC scope, 60% Korean	0.33t	60%	0.198t	**$21.8M**

Source: Own illustration based on WorldAutoSteel/ICCT (0.9 t scenario), HMC and Kia sustainability reports 2025 (0.33 t scenario), WorldSteel 2025 (carbon intensity), EUA 2026 actual (EC); model inputs as per Table 4 and 5.

In summary, across all five scenarios and both ceiling and working estimates, the reported USD 1.4 million CBAM costs by Hyundai Motor Company cannot be replicated. Even under the most conservative estimations made, the calculated figure remains more than 15 times the reported amount.

C.3. Variable: Number of vehicles sold

The table below evaluates five scenarios, looking at two main levers 1) using two steel weights (0.9t and 0.33t) and 2) two carbon-intensity (CI) assumptions: the global average BF-BOF at 2.34 tCO_2/t and the EU CBAM benchmark at 1.37 tCO_2/t. Further, where applicable, the working estimate and ceiling model for the Korean-origin shares at 100% and 60% are used. With the global average CI, the estimated vehicle count is 9,814 at 0.9t and 100% Korean-origin, accounting for only 3.0% of the Czech plant's actual output. With the more optimistic EU CBAM benchmark and applying the ceiling estimate of Korean origin steel (1.37 tCO2/t, 100% of Korean origin, 0.33t), the number of vehicles sold rises to 45,718 or 14%. All four scenarios projected for 2030 are unlikely, with only the 2026 transitional parameters matching the disclosed CBAM figure.

[Table 9] HMMC implied vehicle count and production share by CBAM scenario

Assumption	Implied vehicle count	As % of HMMC total	Interpretation
0.9t, 2.34, 100% Korean, 2030 EUA & 2030 phase-in %	9,814	3.0%	Only 3% of production — implausible
0.9t, 2.34, 60% Korean, 2030 EUA & 2030 phase-in %	16,357	4.9%	Only 5% — implausible
0.33t, 2.34, 100% Korean, 2030 EUA & 2030 phase-in %	26,767	8.1%	Only 8% — implausible
0.33t, 1.37 (EU benchmark), 100% Korean, 2030 EUA & phase-in %	45,718	13.8%	Only 14% — implausible
0.9t, 2.34, 100% Korean, 2026 EUA & phase-in %	**318,342**	**96.2%**	**≈ matches total HMC**

Source: Own illustration based on WorldAutoSteel/ICCT, HMC and Kia sustainability reports 2025, WorldSteel 2025, Reg. (EU) 2025/2620 (EU benchmark CI 1.37, see Appendix B), HMC corporate website (HMMC output), EUA 2026 actual (EC); model inputs as per Table 4 and 5.

As mentioned, interestingly, if all variables are held constant (as stated in section B) and the formula is run for each year's EUA and phase-in percentage, Hyundai Motor Company's disclosed figure matches the steel-related CBAM cost calculations for the Czech plant in 2026. However, their CBAM calculation likely includes components other than steel but fails to project what is expected beyond 2030, whereas the steel-related figure alone is expected to be significantly higher, which is financially material, under the working estimate and the ceiling model, even without penalty.

IV. Carbon Intensity — The Variable That Determines the Bill

The following chapter looks at different scenarios by changing the variable that determines the bill, which in this case is carbon intensity. It starts with a steel production scenario analysis for 2030, then moves on to Hyundai Steel and POSCO's trajectory and feasibility analysis of production methods, and examines six key levers.

As previously mentioned, the rationale behind using 2.34tCO_2/t (WorldSteel 2025 global BF-BOF average, Scope 1, 2, and 3) as a conservative upper bound overstates the reality slightly. However, given that Hyundai Steel has not disclosed verified direct emissions from its Korean production plants, it is used as a conservative upper bound and will be further used as a ceiling. In comparison, the EU official CBAM benchmark is 1.37 tCO_2/t (direct Scope 1, Reg. 2025/2620) for the BF-BOF production method which is based on the most efficient BF-BOF technology. Adjusted for the default penalty of 30%, the carbon intensity would be 1.781 tCO_2/t. It serves as an illustrative lower bound since the actual penalty would be applied on the Korean non-disclosed default and would be significantly higher than applied on the benchmark.

A. Steel production scenario analysis at 2030

The three scenarios, as outlined above, use the same simplified exposure model CBAM formula as stated in chapter three to calculate and showcase the analysis at 2030 and beyond. For the equation, assumptions are made and serve an illustrative purpose only. Once the appropriate data granularity has been disclosed, the actual number can replace the estimates. In this case, the table below uses the following hypothesis: Steel weight per vehicle remains at 900kg, multiplied by the carbon intensity (as seen in A, B, and C), the extra-EU origin split of the raw material (in this case, the working estimate is set at 60%), the phase-in percentage (48.5% for 2030), the estimated EUA price (at USD 142.4/t), and the number of vehicles (based on 2024).

[Table 10] Full timeline 2026–2034 — both plants working estimate

Year	Phase-in (%)	EUA (USD/t)	A: 2.34 Scope 1,2,3 ($M)	B: 1.370 EU benchmark ($M)	C: 1.781 B + default penalty ($M) (Illustrative lower bound)
2026*	2.50%	85.2	$1.8M	$1.1M	$1.2M*
2027*	5.00%	96.1	$4.1M	$2.4M	$2.9M*
2028*	10.00%	113.0	$9.7M	$5.7M	$7.4M*
2029	22.50%	127.7	$24.8M	$14.5M	$18.8M
2030	**48.50%**	**142.4**	**$59.5M**	**$34.8M**	**$45.3M**
2031	61.00%	146.9	$77.2M	$45.2M	$58.8M
2032	73.50%	152.6	$96.6M	$56.6M	$73.6M
2033	86.00%	155.9	$115.6M	$67.7M	$88.0M
2034	100.00%	158.2	$136.4M	$79.8M	$103.8M

Source: Own illustration based on WorldSteel 2025, Reg. (EU) 2025/2620, IR (EU) 2025/2621, WorldAutoSteel/ICCT, HMC and Kia corporate websites (European plant output, 2024).

* Gradual phase-in: 10% in 2026, 20% in 2027, 30% from 2028 onwards

B. Hyundai Steel and POSCO

Hyundai Steel is vertically integrated with Hyundai Motor Company; however, POSCO (Pohang Iron and Steel Company) also plays a key role as the other major player in South Korea's steel supply landscape. To assess the feasibility of reducing the country's carbon emissions intensity, this sub-chapter examines Hyundai Steel's Hy-Arc technology, its proprietary electric arc furnace (EAF) design, and POSCO's HyREX (Hydrogen Reduction Ironmaking).

[Table 11] Hyundai Steel Hy-Arc and POSCO HyREX — technology, status and intensity targets

Category	Hyundai Steel — Hy-Arc	POSCO — HyREX
Technology	**Phase 1**: EAF + BF combined process (scrap/HBI pre-melted in EAF, combined with BF hot metal in BOF). **Phase 2**: Molten iron will go directly into the Hy-Arc EAF. **Phase 3 (~2050)**: Hydrogen-based ironmaking + large-scale EAF.	Hydrogen-based direct reduction iron (DRI) using fluidised bed reactors (FBR) + electric smelting furnace (ESF). Eliminates blast furnace (BF-BOF) and therefore the usage of coal entirely.
Current status	**Phase 1**: Operational from Q1 2026 onwards. **Phase 2**: Successfully test-produced 1.0 GPa high-strength steel via EAF in 2022. **Phase 3**: Under development (R&D) — Not yet commercial.	**2024-2026**: Launch a HyREX pilot with a capacity of 24t/day and; separately, completed Korea's largest scrap-based EAF (2.5 million t/yr) at Gwangyang in June 2026 — a bridging facility until HyREX commercialization. **2028-2030**: Demonstration plant under construction at Pohang (300,000 t/yr capacity) and evaluation of commercial feasibility. **2031-2050**: 1 million t/plant converting FINEX into HyREX by 2050 reaching net-zero.
Intensity target	**Phase 1**: ~20% reduction vs. BF-BOF → ~1.096 tCO_2/t (CBAM basis) **Phase 2**: ~40% reduction vs. BF-BOF → ~0.82 tCO_2/t (CBAM basis) **Phase 3**: ~90% reduction vs. BF-BOF → ~0.137 tCO_2/t (CBAM basis)	**Natural gas DRI**: ~0.481 tCO_2/t (EU CBAM DRI benchmark) **Green H_2 DRI**: ~0.05 tCO_2/t (near IEA green steel threshold)
Commercial timeline	**Phase 2**: Short-to-mid term without a firm date regarding deployment of the Hy-Arc technology.	Demonstration plant 2025–2026. Commercial scale post-2030. **Louisiana mill (H_2-ready)**: operational target late 2029 with blue H_2 first.
Critical risk flags	• **New fossil gas power plant** at Dangjin building now (2025), operational 2028 — adds +410,216 tCO_2e/yr vs. grid. • **Renewable energy** procurement = 0%. • 12% reduction target by 2030 is **far below IEA** 1.5°C pathway which targets heavy industries to cut 25-30%.	• HyREX is at **demonstration scale**, and not yet commercial. • **Green H_2** cost and availability remain the binding constraint.

Source: Own illustration based on Hyundai Steel and POSCO corporate websites (2026); Reg. (EU) 2025/2620 (CBAM-basis intensity conversions); IEA, Achieving Net Zero in Heavy Industry Sectors in G7 Members (1.5°C pathway benchmark).

Since all the dimensions discussed in the table above are rather technical, the next section provides an example of how the trajectories of Hyundai Steel and POSCO could affect steel-related CBAM costs.

[Table 12] CBAM cost at 2030 across all intensity scenarios — both plants, working estimate
Metrics: 0.9 t/vehicle | 60% Korean-origin | Phase-in 48.5% | EUA USD 142.4/t | 682,160 vehicles

Steel assumption	Carbon Emission Intensity (CI)	CBAM-liable $/vehicle (60%)	Both plants (Working estimate) 2030 ($M)	vs. Baseline
Global average 2.34 — SFOC conservative ceiling (Scope 1,2,3 — overstates CBAM)	2.340	$87.26	$59.5M	Baseline
CBAM benchmark +30% penalty (1.78) (illustrative purpose)	1.781	$66.41	$45.3M	-$14.2M
CBAM benchmark BF-BOF (1.37) → EU benchmark	1.370	$51.09	$34.8M	-$24.7M
Hyundai Steel Hy-Arc Phase 1 (~1.1) (20% reduction vs. BF-BOF CBAM benchmark)	1.096	$40.87	$27.9M	-$31.6M
Hyundai Steel Hy-Arc Phase 2 (~0.82) (40% reduction vs. BF-BOF CBAM benchmark)	0.822	$30.65	$20.9M	-$38.6M
POSCO HyREX natural gas DRI (0.48) (EU CBAM DRI-EAF benchmark, Reg. (EU) 2025/2620)	0.481	$17.94	$12.2M	-$47.3M
Hyundai Steel Hy-Arc Phase 3 (~0.14) (90% reduction vs. BF-BOF CBAM benchmark)	0.137	$5.11	$3.5M	-$56.0M
POSCO HyREX green H_2 DRI (~0.05) (near-zero — post-2035 aspiration)	0.050	$1.86	$1.3M	-$58.3M

Source: Own illustration based on Hyundai Steel and POSCO corporate websites (2026), IEA 2025, Reg. (EU) 2025/2620 (benchmark scenarios), WorldSteel 2025 (baseline CI); cost model inputs as per Table 4 and 5; EUA 2026 actual EC.

This scenario further highlights the significance of carbon intensity as a main driver of CBAM-related steel costs, and the difference between the technology aimed to be reached by 2050 and the worst-case scenario is more than USD 58 million. These are just a few examples of how the trajectory could look like depending on the feasibility assessment of Hyundai Steel and POSCO and the advancements made towards greener steel production.

C. Cost reduction levers

There are six cost-reduction levers for Hyundai Motor Group's CBAM liability. The table below looks at the various dimensions, cost savings, capital investment required, timeline, and

whether or not the lever actually decarbonizes the steel industry or merely rearranges carbon accounting.

Savings are mainly presented using two benchmarks to visualize an upper-and lower-bound: 1) The ceiling is set by using the global BF-BOF average carbon intensity of 2.34 tCO_2/t to represent the industry's performance (working estimate, $59.5M by 2030), and 2) the aspirational lower limit, which uses the EU CBAM benchmark of 1.37 tCO_2/t (working estimate, $34.8M by 2030). The latter is achievable only if the domestic steel producers (e.g., Hyundai Steel and POSCO) meet top EU installation standards.

[Table 13] Summary: Levers overview

Lever	Dimension	CI (tCO_2/t)	2030 saving (Working-estimate) vs. 1.37 baseline ($M)	2030 saving (Working-estimate) vs. 2.34 ceiling ($M)	CAPEX	Timeline	Decarbonizes?
1. Hyundai Steel Hy-Arc / POSCO HyREX **Drive down steel intensity** • Hy-Arc Phase 2 • Hy-Arc Phase 3 • HyREX NG DRI • HyREX green H_2	Carbon intensity	0.822	-$13.9M	-$38.6M	Significant for Hyundai Steel and POSCO	Pilot stage, not yet commercial, long-term goals	**Yes** Permanent structural reduction
		0.137	-$31.4M	-$56.0M			
		0.481	-$22.6M	-$47.3M			
		0.050	-$33.6M	-$58.3M			
2. Scrap-EAF sourcing (EU CBAM benchmark) **Shift to secondary/ recycled steel**	Carbon intensity	0.072	-$33.0M	-$57.7M	Low–moderate (scrap supply chain build-out)	Near-term (commercially available today)	**Yes** Genuine structural reduction
3. European EAF sourcing **Shift procurement geography**	Sourcing geography (e.g. from 60% to 30% KOR)	-	−$17.4M	−$29.8M	Zero capex Operational procurement	Immediate - however, setting up the infrastructure will require planning	**Partial** EU EAF lower intensity
4. K-ETS Article 9 deduction (Third-country carbon price)	Carbon pricing policy		Potential partial offset for HMG (need recognition of EU Commission and domestic policy changes)		Zero cost Diplomatic/legal	Post-2030 (pending EC recognition and K-ETS policy changes post 2030)	**Partial** Offset, not reduction
5. Turkey, USA Louisiana / extra-EU assembly **Shift plant location**	Assembly location		Potentially full avoidance of costs		Major capex + supply chain disruption	Mid- to long-term project and planning needed	**No** Shifts, does not reduce emissions
6. Verified data disclosure (Avoid +30% default penalty post 2028)	Disclosure		−$10.5M	−$17.9M	Zero cost Governance choice	Immediate action: (phase-in of penalty: 10% (2026), 20% (2027), 30% (2028))	**No** Compliance only, not decarbonization

Source: Own illustration based on Hyundai Steel and POSCO corporate websites (2026); Reg. (EU) 2025/2620 (Levers 1–2: benchmark carbon intensities); IR (EU) 2025/2621 (Lever 6: default-value penalty); ICAP, Korea Phase 4 K-ETS Allocation Plan and Article 9, Reg. (EU) 2023/956 (Lever 4); cost model inputs as per Tables 4 and 5.

Note on lever 3 (European EAF sourcing): To clarify, this is just one of many possible scenarios for the shift or rebalancing between EU EAF sourcing and Korean-origin share of imported steel. Full EU sourcing would eliminate Vector 1 liability entirely; the 60%→30% shift shown here is an illustrative halving. This sourcing-mix sensitivity is not based on any verified procurement targets of Hyundai Motor Group and serves as an example.

V. Conclusion

The report has displayed that the CBAM scope is more nuanced than a headline number might suggest, and ongoing discussions about expanding the import of heavy-emitting industrial goods on downstream products are gaining momentum. Two structural features currently limit the exposure of HMG: 1) The automotive steel that arrives in a pre-assembled part falls outside of the CBAM scope under current production classification rules, and 2) finished passenger cars (CN 8703) and commercial vehicles (CN 8704) are exempt as imported goods. However, from 2028 onward, the EU Commission has initiated discussions to expand on downstream goods (vector 2) and take commercial vehicles into scope (vector 3).

Due to the identified disclosure gaps, the model in this report uses a "ceiling" of 100% Korean-origin BF-BOF steel production as an upper bound and a working estimate of 60%. Although the carbon intensity assumption of 2.34 tCO_2/t (including scopes 1, 2, and 3) overestimates the actual CBAM costs, which include only direct emissions, it serves as an important illustrative purpose. Using the ceiling assumptions without the default penalty, the costs incurred in 2030 for the Czech plant amount to USD 48.1 million and for the Slovak plant to USD 51.1 million, accounting only for steel-related CBAM costs. Under the working-estimate scenario, the costs would be USD 28.9 million and USD 30.7 million, respectively. Using the EU legal benchmark with a carbon intensity (CI) of 1.37 tCO_2/t would lower costs to USD 28.2 million and USD 29.9 million under the ceiling model, and to USD 16.9 million and USD 17.9 million under the working estimate.

Reverse-engineering the numbers from Hyundai Motor Company of KRW 2.1 billion (USD 1.4 million) strongly suggests that it is consistent with a 2026 transitional year estimate using the 2.5% phase-in factor and the Q1 EUA prices (2026) of 75.36 EUR/t CO_2 and not a 2030 projection. Especially when steel is not the only part of the total CBAM equation. This leaves questions open that should motivate global investors to investigate closely, since the cost implications of non-disclosure could be significant. The unquantified input is not unquantifiable since the data exists, as Hyundai Steel's client briefings earlier this year indicate.

Appendix

A. Sensitivity of the headline range to the carbon-intensity input

How the 2030 estimates move under the European Commission's own default values for Korean steel

The most significant undisclosed factor in this model is the carbon intensity (CI) of the steel supplied to the two EU plants (Czech Republic and Slovakia). Since Hyundai Motor Company (HMC) and Kia have not disclosed this data so far, this report explicitly chooses a conservative estimate of 2.34 tCO_2 per tonne of steel, based on the WorldSteel 2025 global average (BF-BOF), and clearly states this assumption. This appendix explores how the main estimates would vary if different published values for this input were used.

The most authoritative alternative basis is the European Commission's (EC) country-specific default values, as outlined in Implementing *Regulation (EU) 2025/2621*. These values are applied under EU law to Korean steel when an importer fails to provide verified emissions data, as described in this report. For the flat-product headings that make up automotive steel supply, the Korea-specific defaults are 2.118 tCO_2/t for hot-rolled products (CN 7208) and 2.144 tCO_2/t for cold-rolled and coated products (CN 7209–7210), all of which fall slightly below the proxy referenced in this report.

The table below recalculates the 2030 headline estimates: Ceiling, working estimate, and the multiple relative to the disclosed figure. Under each basis, with all other model parameters kept constant.

[Table 14] Sensitivity of the 2030 headline estimates to the carbon-intensity input — both plants

Carbon intensity (tCO_2/t)	Ceiling 2030 ($M)	Working 2030 ($M)	Multiple vs disclosed (×)	Basis
2.118	89.8	53.9	62.9×	EU default value for Korea — CN 7208, hot-rolled flat products (incl. pickled-and-oiled)
2.144	90.9	54.5	63.7×	EU default value for Korea — CN 7209 and 7210, cold-rolled and coated flat products
2.34	**99.2**	**59.5**	**69.5×**	WorldSteel 2025 global BF–BOF average — report headline

Source: Own illustration based on IR (EU) 2025/2621 (Korea-specific default values, CN 7208–7210), WorldSteel 2025; model inputs as per Table 4 and 5.

* Group disclosed total = HMC's $1.43M, as Kia disclosed no figure ($0).

There are three key takeaways:

1) The model used in the report is more conservative compared to the EC's assumptions, replacing the published defaults for Korean origin steel. This leads to a decrease in actual values, rather than an increase in the estimated exposure.

2) However, the conservative upper band's impact leaves the report's main conclusion unaffected. Even at the lowest Korean default value, the 2030 cap is still USD 89.8 million; 63 times the disclosed amount. Across all published bases, the multiple stays roughly between 63× and 70×. Therefore, the undisclosed variable causes only minor variation in the estimate and does not alter the overall conclusion.

3) If the steel mix includes alloy grades, e.g., advanced high-strength and hot-stamping steels listed under CN 7225–7226, the Korean defaults range from 4.03 to 5.32 tCO_2/t. The potential error in this report is downward: both the main estimates and the default-value scenario would underestimate, not overstate, the exposure.

In conclusion, the only entity capable of narrowing this range further is the company itself by providing verified data and higher granularity of transparency.

B. CBAM certificate cost under the free allocation adjustment — IR (EU) 2025/2620

How the statutory certificate count moves the estimates — and how far the disclosed USD 1.4 million sits from it

The report has so far used the simplified investor exposure formula in section III, and that cost model applied the CBAM phase-in percentages proportionally to the sum of embedded emissions, which aligns with the embedded-cost basis reflecting the numbers disclosed by Hyundai Motor Company in section C.3.

However, if you look at the actual number of certificates surrendered and how that is calculated, it is different. The Specific Embedded Free Allocation (SEFA) modifies the certificate obligation during the CBAM free-allocation phase-out period (2026-2034) in accordance with the statutory certificate obligation calculation under Article 31 of Regulation (EU) 2023/956, as implemented by Commission Implementing Regulation (EU) 2025/2620. SEFA is the benchmark-based deduction applied in the CBAM free-allocation phase-out period (2026-2034). Therefore, the SEFA for the representative BF-BOF hot-rolled flat-product scenario analyzed in this appendix (CN 7208 25 00) is approximated as the applicable benchmark (1.370 tCO_2/t) multiplied by the remaining free-allocation factor for the relevant year. This benchmark is not a carbon-intensity assumption and is used solely to calculate the free-allocation adjustment. The exact requirements for certificates may depend on the specific composition of the CN code for imported steel.

What remains unchanged: The conservative cap for the carbon intensity input at 2.34 tCO_2/t, and the Korea-specific default values of 2.118–2.144 tCO_2/t (Appendix A).

Chargeable embedded emissions (tCO_2/t) = SEEg – SEFA

where SEFA = CBAM benchmark × Remaining free-allocation factor

Certificate cost = chargeable emissions × Q_0 × EUA price^t – carbon price effectively paid (Art. 9: €0)

The main implication is that any emissions above the benchmark will not receive any free-allocation relief and will have to be fully payable from year 1 of the final regime. On a simple pro-rata basis, the phase-in schedule would imply 0.06 tonnes of CO_2 per tonne of steel being chargeable from 2026. However, with emissions at 2.34 tCO_2/t against a 1.37 benchmark,

closer to 1.0 tonne of CO_2 per tonne of steel becomes chargeable in 2026. As the CBAM factor declines over time, the two bases gradually converge, meeting in 2034 when free allocation ends, with the 2034 data perfectly matching Table 5.

[Table 15] HMG EU plants — statutory certificate cost projections by scenario (2026–2034)

Year	CBAM factor	Chargeable tCO_2/t	EUA (EUR/t)	Ceiling Model - 100% Korean (BF-BOF)				Working-estimate - 60% Korean (BF-BOF)			
				$/vehicle	Czech ($ m)	Slovak ($ m)	Total ($ m)	$/vehicle	Czech ($ m)	Slovak ($ m)	Total ($ m)
2026	97.5%	1.004	75.36	77.0	25.5	27.0	**52.5**	46.2	15.3	16.2	**31.5**
2027	95.0%	1.038	85	89.8	29.7	31.5	**61.2**	53.9	17.8	18.9	**36.7**
2028	90.0%	1.107	100	112.6	37.3	39.5	**76.8**	67.5	22.4	23.7	**46.1**
2029	77.5%	1.278	113	146.9	48.6	51.6	**100.2**	88.1	29.2	31.0	**60.1**
2030	**51.5%**	**1.634**	**126**	**209.4**	**69.3**	**73.6**	**142.9**	**125.7**	**41.6**	**44.1**	**85.7**
2031	39.0%	1.806	130	238.7	79.0	83.9	**162.9**	143.2	47.4	50.3	**97.7**
2032	26.5%	1.977	135	271.4	89.8	95.3	**185.2**	162.9	53.9	57.2	**111.1**
2033	14.0%	2.148	138	301.5	99.8	105.9	**205.7**	180.9	59.9	63.5	**123.4**
2034	0.0%	2.340	140	333.2	110.2	117.0	**227.3**	199.9	66.1	70.2	**136.4**

Source: Own illustration. Chargeable emissions per max (0, 2.34 − CBAM factor × 1.37); CBAM benchmark 1.37 tCO_2/t (BF-BOF flat products, IR (EU) 2025/2620); CBAM factor per Art. 10a(1a) Dir. 2003/87/EC applied via Art. 31 Reg. (EU) 2023/956. Steel per vehicle 0.9 t (WorldAutoSteel/ICCT); carbon intensity 2.34 tCO_2/t (WorldSteel 2025); vehicle counts: HMMC 330,890, KMS 351,270 (2024); EUA path per Table 4 (mid); EUR/USD 1.13; K-ETS deduction €0 (ICAP, Nov 2025). Actual-data route; the default-value route applies the Korea-specific defaults (2.118–2.144, Appendix A) with the default benchmark of IR (EU) 2025/2620.

[Table 16] Certificate cost vs. disclosed figure — Czech plant, 2026 and 2030

Gap vs. disclosed (Czech plant)	Certificate cost — ceiling	Certificate cost — working est.	Disclosed (HMC)	Multiple (×)
2026 — first definitive year	$25.5M	$15.3M	N/A	**N/A**
2030 — HMC's stated horizon	$69.3M	$41.6M	$1.43M	**29.1× – 48.6×**

* Disclosed: KRW 2,100,000,000 ≈ USD 1,427,329 (HMC 2025 Sustainability Report, Czech plant, "as of 2030"). Certificate costs from Table 15, Czech column. No 2026 figure disclosed(N/A); the '2030' figure is analyzed against 2026 parameters in Section C.3.

What the disclosed figure implies under the certificate method

The USD 1.43 million purchase at the 2026 certificate price would cover around 16,761 tonnes of chargeable CO_2, or 0.056 tCO_2 per tonne of the Czech plant's 297,801-tonne steel requirement. If we add back the 2026 SEFA (0.975 × 1.37 = 1.336), the estimated carbon intensity is around 1.39 tCO_2/t, within 2% of the EU benchmark and around 59% of the WorldSteel BF-BOF average.

In essence, HMC's figure on the basis of the statutory certificate assumes its imported Korean coil is of the best-technology carbon efficiency in the EU. However, there is no published data on Korean BF-BOF production to support this. The Commission's Korea default metrics (2.118-2.144 tCO_2/t) indicate that Korean flat products are more carbon intensive. A few noteworthy limitations to this appendix are that the disclosed figure could reflect a much smaller import volume from outside the EU, a different product mix, or a combination of these factors.

Three key takeaways

1) **The estimates are accelerated and widened on a certificate basis**: 142.9 million USD for the 2030 ceiling, compared to 99.2 million USD (up 44%; thus, the numbers in Section III are conservative for every year through 2033, and the two bases converge in 2034).

2) **The disclosed amount cannot be reconciled on either basis.** The Czech estimates based on the certificate are 29-49x the disclosed amount in 2030. Even if treated as a 2026 figure, it is still 11 to 18 times lower than the certificate-based cost and results in only an approximate benchmark intensity of 1.39 tCO_2/t.

3) **The direction is the same and favors HMG less.** As Appendix A shows, each of the methodological improvements either increases the estimate or leaves it unchanged, but never decreases it. The only thing the company can do is really narrow the range of the estimate by providing a transparent methodology and verified data.

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All URLs verified as of June 2026. Where primary sources are behind paywalls, secondary citations via SFOC research or GMK Center compilations are provided. The EUA price table uses smoothed SFOC interpolations between cited anchor points (see methodology note above); the cost model uses the 2026 actual, conservative sub-consensus anchors for 2027–2029, and consensus-informed values from 2030. This reference list covers all citations across Sections I–V of the report.

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[WARNING] HMC's $1.4M disclosure is consistent with a 2026 transition-year estimate, not a 2030 projection.

The real, undisclosed carbon bill is accumulating where investors cannot see.

THANK YOU FOR YOUR INVESTMENTS

SFO°C

Solutions for Our Climate (SFOC) is an independent nonprofit organization that works to accelerate global greenhouse gas emissions reduction and energy transition. SFOC leverages research, litigation, community organizing, and strategic communications to deliver practical climate solutions and build movements for change.