PUBLIC SECTOR BRIEF

Ghana CBAM Exposure Brief

What the EU Carbon Border Adjustment Mechanism means for Ghana's exporters and what to do about it.

DNClimate

The data layer between Africa's heavy industry and Europe's carbon border.

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Prepared for General Managers, CFOs, and Export Directors across Ghana's CBAM-exposed sectors.

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00 Executive Summary

The EU's Carbon Border Adjustment Mechanism (CBAM) entered its definitive period on 1 January 2026.[1] From that date, every tonne of aluminium, cement, iron, steel, fertilizer, or hydrogen landing in an EU port carries a carbon charge tied to the emissions embedded in its production. Ghana's exporters are now inside this regime, whether they know it or not.

The outcome for Ghana is not predetermined. Four findings shape the rest of this brief.

First, 2026 is a low-stakes rehearsal, not a full-cost year. Under the CBAM factor phase-in, only 2.5% of embedded emissions actually trigger certificate obligations in 2026, rising to 5% in 2027, 10% in 2028, 22.5% in 2029, 48.5% in 2030, and 100% by 2034.[2] A Ghanaian exporter's 2026 CBAM cost is small in absolute terms. Their 2030 cost is 19 times larger for the same volume, and their 2034 cost is 40 times larger. The strategic question is not what CBAM costs today; it is which exporters have built the data infrastructure to control what it costs in five years.

Second, Ghana's structural position is genuinely advantaged, but conditional on data. The World Bank's 2025 CBAM Trade Exposure Index places Ghana's aluminium sector in the *negative* range (−0.1% to −0.3%), meaning Ghana's aluminium emissions intensity is *below* the average EU producer.[3] Ghana is grouped with Uzbekistan and Jordan as countries whose exports may become *more* competitive under CBAM, not less. This is a structural competitive gift, but it only surfaces in commercial pricing if Ghanaian producers can supply verified data. Without that data, EU importers must apply Ghana-specific default values plus a mark-up (10% in 2026, phasing to 30% by 2028), and the underlying advantage becomes invisible in the CBAM calculation.[4]

Third, the concrete exposure is concentrated in a small set of firms and a small set of decisions. Aluminium (VALCO, Ghana Aluminium Products), cement (GHACEM/Heidelberg Materials, Dangote Cement Ghana, CBI Ghana), and iron and steel (B5 Plus, with tier-two exposure through the regional supply chain into EU assemblies). Together these firms account for the near-totality of Ghana's direct and indirect CBAM exposure over the phase-in window.

Fourth, VALCO's own 2025 Environmental Product Declaration reveals a more textured picture than public narrative assumes. The EPD, publicly registered as EPD-IES-0016460:001 and third-party verified, reports total embedded emissions of 14.7 kg CO_2e per kg of primary aluminium, not the near-zero figure implied by "Akosombo-powered."[5] The reason is that VALCO draws from Ghana's national grid mix (approximately 59% natural gas, 38% hydropower per 2023 IEA data used in the EPD),[6] not from an isolated hydro line. The gap between the market's assumption and VALCO's actual profile is precisely the kind of nuance that determines whether Ghana's aluminium wins or loses shelf space in Europe over the phase-in years.

The rest of this brief walks the mechanism, maps Ghana's sector-by-sector exposure, and models the four variables that determine a Ghanaian exporter's CBAM cost across the 2026-2034 window. It closes with five actions to take this quarter and a free 15-minute CBAM Readiness Assessment for exporters who want their own numbers walked.

01 PART ONE
The Mechanism

> *This section covers what CBAM is, how the charge is calculated, when it takes effect, and how the "default value" pathway shapes exposure for producers who cannot supply verified data.*

1.1 What CBAM actually is

CBAM is not, strictly speaking, a border tax. It is a certificate-purchase obligation imposed on the EU importer of certain goods, priced to match the carbon cost that a European producer of the same goods would pay under the EU Emissions Trading System (ETS).[7] The stated policy purpose is to prevent carbon leakage (the migration of heavy industry from Europe to jurisdictions with weaker climate rules) and to level the playing field between EU producers who already pay ETS carbon costs and importers who historically did not.

Legally, the obligation falls on the EU importer. Commercially, it falls on the non-EU producer. Every EU buyer facing a CBAM cost will do one of three things: renegotiate the contract price to absorb the certificate cost, demand primary emissions data to reduce that certificate cost, or switch to a supplier who has already done the work. All three outcomes route the pressure back to the export desk in Accra or Tema.

The scope in 2026 covers six product categories: aluminium, cement, iron and steel, fertilizers, hydrogen, and electricity.[8] Ghana's material exposure sits in aluminium, cement, and iron and steel. The specific Combined Nomenclature (CN) codes covered are listed in Annex I of Regulation (EU) 2023/956.

1.2 How the CBAM charge is calculated

The charge on a shipment reduces to a single equation:

> **CBAM certificates required** = (embedded emissions × CBAM factor) − foreign carbon price adjustment
> **CBAM cost** = certificates required × CBAM certificate price

Four variables drive the number.

Embedded emissions is the tonnage of CO_2 equivalent released to produce one tonne of the good, covering both direct process emissions (Scope 1) and, for some sectors including aluminium, emissions from electricity consumed during production (Scope 2). For complex goods, the emissions of "relevant precursor" materials (the clinker in cement, the alumina in aluminium) are folded into the calculation.

CBAM factor is the share of embedded emissions that actually triggers a certificate obligation in any given year. This is the variable most exporters overlook. In 2026 it is only 2.5%, phasing up to 100% by 2034 as EU domestic producers lose their free ETS allowances at the same rate.[2] The full phase-in schedule appears in section 1.3.

CBAM certificate price is set by the European Commission and tracks EU ETS auction prices. For 2026, it is the quarterly average of EU ETS auction clearing prices; from 2027 onward, it is the weekly average.[9] EU ETS allowances traded in a range of approximately €60-95 per tonne CO_2 across 2025-2026, with the April 2026 EEX spot price at approximately €72/tCO_2e.[10]

Foreign carbon price adjustment is the offset. If the country of origin operates a domestic carbon tax or emissions trading system that the producer has already paid into, the amount paid can be deducted from the CBAM charge. This is a material point for Ghana: Ghana currently operates no domestic carbon price on industrial emissions.[11] There is no offset to claim. The full EU ETS price applies to every tonne of Ghanaian embedded emissions.

The practical takeaway is that a Ghanaian producer's CBAM exposure is a linear function of two things: how much CO_2 is embedded in the product, and how well the producer can prove it. The first is a physics problem. The second is a data problem. DNClimate exists to solve the second.

1.3 The timeline and the phase-in

CBAM operates in two phases.

The **transitional period** ran from 1 October 2023 to 31 December 2025. During this window, EU importers filed quarterly CBAM reports documenting embedded emissions but paid nothing.[7] The transitional period was designed as a data-gathering and learning exercise.

The **definitive period** began on 1 January 2026. From this date, EU importers must purchase CBAM certificates corresponding to the covered share of embedded emissions of their imported goods.[12] The first annual CBAM declaration, covering calendar year 2026 imports, is due 30 September 2027.[13]

The most consequential feature of the definitive period is not the start date but the phase-in curve. The share of embedded emissions actually subject to certificate obligations rises across nine years:

Year	CBAM Factor	EU Free Allocation Remaining
2026	2.5%	97.5%
2027	5.0%	95.0%
2028	10.0%	90.0%
2029	**22.5%**	**77.5%**
2030	**48.5%**	**51.5%**
2031	61.0%	39.0%
2032	73.5%	26.5%
2033	86.0%	14.0%
2034	100.0%	0.0%

Source: Regulation (EU) 2023/956, Article 31; Climate Leadership Council 2026 and CBAM Guide 2026.[2] Highlighted rows mark the steepest single-year increase in the phase-in.

Two implications matter for planning.

The first is that **2026 is a low-cost year by design**. The Commission has been explicit that the phase-in is intended to give economic operators time to adapt.[14] For a Ghanaian exporter, this creates a specific strategic window: build the data infrastructure while the financial cost of getting it wrong is small, so that it is operational and refined by the years when the cost of getting it wrong is large.

The second is that **the steepest single-year jump is 2029 to 2030**, when the CBAM factor moves from 22.5% to 48.5%.[2] That is the year when CBAM shifts from a background concern to a first-order procurement variable for EU buyers. Any Ghanaian exporter whose data infrastructure is still being built in 2029 will lose contract negotiations to competitors whose infrastructure has been operational since 2026.

1.4 The default value pathway

The default value pathway is where a producer's inability to supply verified emissions data becomes commercially visible.

Under Article 7(2) of Regulation (EU) 2023/956, when actual emissions "cannot be adequately determined" by the CBAM declarant, default values are used. The regulation sets a clear hierarchy for how those defaults are calculated. The primary basis is **the average emission intensity of each exporting country** for the good in question, plus a mark-up. Only where reliable country-level data cannot be applied does the calculation fall back on the average emissions intensity of the worst-performing installations in the EU ETS.[4]

For Ghana, this hierarchy matters. The Commission publishes country-specific default values for the definitive period through Implementing Regulation 2025/2621.[15] Ghana's aluminium default is calibrated to Ghana's country average, not to Europe's dirtiest smelters. This is materially better than the framing sometimes used in CBAM commentary, and it reflects a deliberate policy choice.

The mark-up on top of the calculated default is phased in on a schedule designed to give producers time to adapt:[14]

Year	Mark-up on Default Values	Fertilizer Mark-up
2026	10%	1%
2027	20%	1%
2028 onward	30%	1%

Source: Implementing Regulation (EU) 2025/2621; industry summaries by EUROMETAL, Mayer Brown, O'Melveny 2026.

The commercial logic of the default value pathway is straightforward. A Ghanaian producer with a genuinely low emissions profile (for example, a smelter drawing partly from Akosombo hydro, or a cement plant with a low clinker ratio) has an incentive to prove that profile with verified data. Doing so means the actual emissions figure applies. Failing to do so means the country-average default plus the mark-up applies, and the producer's real advantage becomes invisible to the CBAM calculation and to their EU buyer.

The size of the gap between "actual" and "default plus mark-up" is firm-specific. For a producer whose actual profile is better than the country average, the gap is meaningful and the incentive to build data infrastructure is direct. For a producer at or worse than the country average, the mark-up is the operative penalty and the incentive is regulatory rather than competitive. Part 3 models this gap using publicly available inputs for VALCO.

02 PART TWO
Ghana's Exposure Profile

> *This section maps the Ghanaian firms with material CBAM exposure, sector by sector, using publicly disclosed data.*

2.1 The exposed sectors, at a glance

Of the six product categories covered by CBAM in 2026, three have direct Ghanaian producers with material EU-bound export flows or clear prospective flows: **aluminium, cement, and iron and steel**.[8] Fertilizer exposure is limited today and becomes more material as the sector's reporting tightens through 2027-2028. A fifth category of exposure, hidden downstream through tier-two supply chains into EU assemblies, deserves its own treatment and is covered in section 2.6.

The concentration is high. On the export side, the material CBAM risk in Ghana sits with fewer than a dozen firms. This is both a warning and an opportunity: warning, because the risk is not diffuse and cannot be waited out; opportunity, because coordinated action by a small number of executives can reposition Ghana's export profile within a single reporting cycle.

2.2 Aluminium: VALCO and the data test

Aluminium is Ghana's most instructive CBAM case. It illustrates both the structural competitive position Ghana holds and the data gap that stands between advantage-in-principle and advantage-in-price.

Volta Aluminium Company (VALCO) operates the Tema smelter and is Ghana's primary primary-aluminium producer. VALCO currently produces approximately 40,000 tonnes of primary aluminium annually, down from an installed capacity of 200,000 tonnes and running at roughly 20% of that capacity.[5,16] The company reported approximately USD 120 million in revenue for the most recent reporting period.[17] VALCO's traditional customer base has not been the EU; the company began submitting samples of a new electrical conductor-grade aluminium rod line to European buyers for certification in August 2025, the first time in its history it has moved beyond primary metal exports into value-added products for the European market.[18] VALCO's EU exposure under CBAM is therefore largely prospective: growing, deliberately pursued, and arriving in the same window in which CBAM's phase-in curve steepens.

VALCO's emissions profile is the most transparent of any Ghanaian CBAM-exposed producer. In December 2025, VALCO published a third-party verified Environmental Product Declaration through the International EPD® System (registration EPD-IES-0016460:001), reporting cradle-to-gate embedded emissions of **14.7 kg CO_2e per kg of primary aluminium** (2.83 kg from upstream processes and 11.9 kg from core smelting and casting).[5]

The EPD's most important disclosure, for CBAM purposes, is the electricity source. The declaration models VALCO's electricity consumption using Ghana's national grid mix based on 2023 IEA data, with a grid emission factor of **0.461 kg CO_2e/kWh** applied from Ecoinvent 3.10.[5] The grid mix is reported as approximately 59.3% natural gas, 37.9% hydropower, 2.3% solar PV, and 0.6% oil. This matters because the common assumption that VALCO runs on 100% Akosombo hydropower is not consistent with how the smelter's electricity is drawn from Ghana's grid in practice, nor with how CBAM will treat that electricity in the absence of a dedicated power purchase agreement.

This is not a critique of VALCO. It is a straightforward reading of the company's own third-party verified public disclosure. And it points to the single largest CBAM optimisation lever available to VALCO: **the isolation of a hydro-specific Power Purchase Agreement**. Under CBAM's rules on indirect emissions, hydropower can be accounted for at its lower emissions factor only where a specific PPA exists linking the installation to the hydropower source.[19] Absent that agreement, the national grid mix applies. A PPA covering a specific share of VALCO's smelting draw would reduce the Scope 2 component of embedded emissions on that share, a reduction that translates directly into lower verified embedded emissions and, therefore, lower CBAM certificate cost on every tonne of exports.

> Ghana's structural position on aluminium is favourable. The World Bank's 2025 CBAM Trade Exposure Index places Ghana in the negative range (−0.1% to −0.3%), grouped with Uzbekistan and Jordan as countries whose aluminium emissions intensity is below the average EU producer's. This position that, in principle, makes Ghanaian aluminium *more* competitive in the EU market once CBAM applies.[3] But this structural advantage only surfaces in commercial pricing where verified data is supplied. Without it, Ghana-specific default values plus the mark-up apply, and the advantage becomes invisible.

Ghana Aluminium Products operates further downstream, converting aluminium into fabricated products for domestic and export markets. Its direct EU exposure is smaller in volume terms than VALCO's, but its supply-chain position is significant: EU-bound manufacturers sourcing aluminium components from Ghana Aluminium Products will increasingly ask for the same kind of embedded-emissions data VALCO must produce. Tier-two exposure of this kind is often overlooked until an EU buyer requests it during a contract renewal.

2.3 Cement: GHACEM, Dangote, CBI, and the clinker problem

Cement is Ghana's second material CBAM exposure, and structurally the most difficult to decarbonise. Cement emissions do not come primarily from electricity; they come from the chemical calcination of limestone into clinker, the core ingredient of Portland cement. Roughly 60% of the CO_2 released in cement production is process emissions from calcination itself, independent of the fuel used to heat the kiln. This means the sector's decarbonisation levers are narrower than aluminium's: fuel switching (from coal or petcoke to alternative fuels and biomass), clinker substitution (partial replacement of clinker with slag or calcined clay), and process efficiency.

Three producers dominate Ghana's cement CBAM exposure.

GHACEM, owned by Heidelberg Materials, is the largest domestic cement producer and the one most directly tied to a global corporate decarbonisation programme. Heidelberg has publicly committed to reducing Scope 1 emissions to below 400 kg CO_2 per tonne of cementitious material by 2030, and defines a 552 kg CO_2 per tonne threshold as the boundary above which a product cannot be classified as "sustainable" under its own scheme.[20] Heidelberg has publicly linked executive compensation, including that of country-level general managers, to progress against these targets. The commercial implication for GHACEM's Ghana leadership is that CBAM data infrastructure is not an IT purchase, it is a compensation safeguard.

Dangote Cement Ghana, part of the pan-African Dangote Cement group, carries exposure through its participation in a corporate group with EU commercial relationships and through EU-bound regional flows. Its CBAM exposure profile is compounded by the multi-facility structure of the parent, which requires facility-level rather than group-level emissions accounting under CBAM.

CBI Ghana rounds out the domestic producer set. Its EU exposure is smaller in absolute terms but subject to the same reporting mechanics, and its downstream customers may face CBAM pressure through their own EU commercial relationships.

Across all three producers, the critical variables under CBAM are the clinker-to-cement ratio (lower is better), the alternative fuel substitution rate (higher is better), and the granularity with which these can be reported per shipment rather than as an annual average. Ghanaian cement reporting today operates at aggregate levels suited to internal management, not to the shipment-level cadence CBAM demands.

2.4 Iron and steel: the tier-two pathway

Ghana's direct iron and steel exports to the EU are modest. The material CBAM exposure in the sector runs through a different channel: the West African regional supply chain into EU-bound assemblies.

B5 Plus is the reference case. Operating primarily on scrap-based electric arc furnace production for the West African regional market, B5 Plus supplies steel products across ECOWAS. A portion of that regional output feeds into manufactured goods that themselves reach EU markets: construction components, industrial fasteners, downstream fabricated products. Under CBAM's treatment of complex goods and precursor materials, the embedded emissions of B5 Plus steel become part of the CBAM calculation for those downstream EU-bound products, even where B5 Plus itself has no direct EU contract.

The commercial signal here is subtle but important. B5 Plus's CBAM exposure will surface not through EU regulators but through its regional customers, who will begin requesting embedded-emissions data as their own EU contracts come under CBAM pressure. Firms that can supply that data become preferred regional suppliers. Firms that cannot lose share to those that can, quietly and without a single direct EU inquiry.

Scrap-based EAF production is structurally lower-carbon than blast-furnace production, giving B5 Plus a real advantage, provided it can be quantified and verified.

2.5 Fertilizer

Ghana's fertilizer exports to the EU are limited in volume, and the sector's exposure is best characterised as latent rather than immediate. The mechanics of CBAM in fertilizer are dominated by ammonia and urea inputs, whose embedded emissions depend heavily on the natural gas feedstock and process technology used in their production. Ghanaian producers importing precursor ammonia inherit the embedded emissions of those imports under CBAM's precursor treatment.

The sector is not a 2026 priority for most Ghanaian executives. It is a 2027-2028 issue as the EU tightens fertilizer-sector reporting and as the range of covered products expands.

2.6 The hidden exposure: downstream and tier-two

The exposure profile described above covers direct EU-bound flows of CBAM-covered raw and semi-finished goods. It does not capture the second, larger, and less visible exposure: goods produced in Ghana that feed into products manufactured elsewhere and then exported to the EU.

Two examples make the mechanic concrete.

A Ghanaian producer of steel fasteners supplies an assembly plant in Morocco or Turkey. The assembly plant's finished product enters the EU. The finished product itself may not be on the CBAM covered-goods list, but the steel input is, and the Moroccan or Turkish manufacturer will increasingly ask its Ghanaian supplier for embedded-emissions data to strengthen its own competitive position with EU buyers.

A Ghanaian aluminium fabricator supplies component parts to a South African or European vehicle assembler. The vehicle itself is not a CBAM good, but the aluminium precursor is, and the assembler's supplier scorecards are beginning to include embedded-emissions attributes.

The hidden exposure is difficult to size in aggregate, but for individual firms it is often larger than direct EU exposure. It also surfaces first, because tier-two data requests from regional customers are already arriving in 2026 while direct CBAM reporting deadlines remain months away. An export executive who plans only for direct EU shipments will be surprised by the first tier-two data request from a regional buyer. An executive who plans for both will find the same request is a competitive opening.

03 PART THREE

What This Costs You: A Framework

> *This section models the framework through which CBAM cost accrues to a Ghanaian exporter, using VALCO as the illustrative case. It does not produce a single headline euro figure, because the honest answer for 2026 is small and the honest answer for 2034 is large, and neither number captures the strategic question. The framework below gives an exporter the four variables to walk their own numbers with any advisor, and to see how the cost scales with each.*

3.1 The four variables

Every Ghanaian producer's CBAM cost, on any shipment to the EU, resolves to four inputs:

Variable 1: Embedded emissions per tonne of good (measured in tCO_2e per tonne). For VALCO's primary aluminium, the third-party verified 2025 EPD reports **14.7 tCO_2e per tonne**.[5] For cement, the Heidelberg Materials scheme uses 552 kg CO_2 per tonne as the "sustainable" threshold and targets below 400 kg CO_2 per tonne of cementitious material by 2030.[20] For iron and steel, EU ETS benchmarks vary widely by production route: scrap-based EAF steel is materially lower than blast-furnace steel. Every producer has a specific number. The purpose of DNClimate's Readiness Assessment is to establish that number precisely, on a shipment basis, aligned to the CBAM reporting schema.

Variable 2: CBAM factor for the year in question. This variable ramps steeply and predictably: 2.5% in 2026, 5% in 2027, 10% in 2028, 22.5% in 2029, 48.5% in 2030, 61% in 2031, 73.5% in 2032, 86% in 2033, 100% by 2034.[2] This is not a producer variable (it is set by the regulation) but it dominates any multi-year exposure model.

Variable 3: CBAM certificate price (EUR per tonne CO_2e). For 2026, this equals the quarterly average of EU ETS auction clearing prices. From 2027 onward, it equals the weekly average.[9] The 2025-2026 range has been approximately €60-95, with April 2026 spot around €72/tCO_2e.[10] Forecasts from independent analysts vary widely for 2030, with base cases in the €100-145 range and higher-side scenarios reaching €200 by 2035.[21] For planning purposes, an exporter should model a low-side and a high-side scenario rather than a single central number.

Variable 4: Foreign carbon price adjustment. For Ghana, this is currently zero. No domestic industrial carbon price is in effect.[11] There is no offset to claim against the EU charge.

The CBAM cost per tonne of exported good, in any given year, is:

> **Cost** = Embedded emissions × CBAM factor × Certificate price − Foreign carbon offset

3.2 What the framework says about VALCO

VALCO's verified embedded emissions per tonne of primary aluminium: **14.7 tCO_2e**.[5] Holding this profile constant across the phase-in period, and modelling a low-side certificate price of €75/tCO_2e (approximately the Q1 2026 CBAM certificate price) against a high-side price of €100/tCO_2e (aligned with independent analyst base cases for 2028-2030), the CBAM cost per tonne of aluminium tracks approximately as follows:

Year	CBAM Factor	Chargeable Emissions (tCO_2e/t Al)	Cost @ €75	Cost @ €100
2026	2.5%	0.37	€28	€37
2027	5.0%	0.74	€55	€74
2028	10.0%	1.47	€110	€147
2029	**22.5%**	**3.31**	**€248**	**€331**
2030	**48.5%**	**7.13**	**€535**	**€713**
2031	61.0%	8.97	€673	€897
2032	73.5%	10.80	€810	€1,080
2033	86.0%	12.64	€948	€1,264
2034	100.0%	14.70	€1,103	€1,470

Illustrative. Assumes constant embedded emissions at the 2025 EPD level. Two certificate price scenarios shown to bracket the reasonable planning range: €75/tCO_2e reflects the Q1 2026 regulated CBAM price; €100/tCO_2e reflects the top of the 2025-2026 EU ETS trading range and aligns with the lower end of independent analyst forecasts for 2028-2030.[21] Actual figures will vary with certificate price and any changes to VALCO's emissions profile (most notably through PPA optimisation). Highlighted rows mark the 2029-2030 step change.

Read the table row by row and one thing is unmistakable. The cost per tonne rises approximately 40-fold between 2026 and 2034 at any given certificate price. And the cost is *linear in the CBAM factor* (a variable set by regulation and known in advance for every year through 2034). This is not market uncertainty. This is a scheduled cost curve.

Two things are immediately visible from the numbers.

First, the 2026 cost of €28-37 per tonne of aluminium is small in absolute terms, a fraction of a percent of an aluminium price around USD 2,000-2,400 per tonne.[16] It is not a material margin threat. This is the "rehearsal year" the phase-in was designed to create.

Second, by 2030 the cost per tonne rises to €535-713, which is approximately 22-30% of prevailing aluminium prices, and higher again if EU ETS prices rise toward the €100-145 range forecast by

independent analysts.[21] By 2034, at €1,103-1,470 per tonne, the CBAM cost approaches half the value of the good itself. This is the strategic risk. And it is a risk that grows monotonically each year on a schedule the exporter can plan around.

3.3 What the framework does not show, but matters

The table above assumes verified actual emissions data is being supplied. In the absence of verified data, the default value pathway applies: Ghana-specific default emissions per Implementing Regulation 2025/2621, plus the mark-up (10% in 2026, 20% in 2027, 30% from 2028 onward).[14,15] For a Ghanaian aluminium producer whose actual emissions profile is *at or below* the country average, the default value pathway strictly increases CBAM cost by the mark-up itself, plus by any positive gap between country average and firm-specific actual.

Three additional factors compound the exposure without appearing in the table.

The first is **commercial price**. An EU buyer facing a rising CBAM cost differential across suppliers will price it in. Suppliers who deliver verified data receive contract renewal terms that suppliers without data do not. The differential compounds annually as the CBAM factor rises.

The second is **contract availability**. As Moroccan, Turkish, and other verified-data suppliers enter EU aluminium and steel markets with clean data packages, they become preferred procurement routes. Producers without data compete on price alone, against a rising CBAM-adjusted floor.

The third is **the PPA optimisation that VALCO cannot yet capture**. If a verified hydro-only PPA covered even half of VALCO's electricity draw, the Scope 2 component of embedded emissions on that share would fall significantly relative to the grid-mix baseline reported in the 2025 EPD.[5] The resulting reduction in verified embedded emissions would translate directly into reduced CBAM cost on every tonne. VALCO cannot claim this optimisation without the data infrastructure to prove the PPA to an EU verifier. That infrastructure is what determines whether Ghana's structural aluminium advantage (the negative CBAM Trade Exposure Index the World Bank documented) surfaces in actual commercial prices, or stays theoretical.[3]

3.4 What this means for planning

The framework points to three planning conclusions.

2026 is the cheap year to build data infrastructure. A 2.5% CBAM factor means the financial consequence of an early data pipeline that produces imperfect first quarters is manageable. That same imperfect pipeline in 2029, at a 22.5% factor, is materially expensive.

The steepest cost jump is 2029 to 2030. The CBAM factor more than doubles in a single year, from 22.5% to 48.5%. Data infrastructure that is being commissioned in 2029 is being commissioned late. Data infrastructure that is refined and operational by 2028 is being commissioned on schedule.

PPA structuring, clinker ratio optimisation, and scrap-input verification are the three levers with the largest CBAM impact for Ghana's exposed sectors. All three depend on being

able to prove specific inputs to a specific shipment on a specific reporting cycle. All three are data infrastructure problems before they are decarbonisation problems.

Precise, firm-specific modelling requires firm-specific data. That modelling is the purpose of a CBAM Readiness Assessment: see Part 5 to book yours.

04 PART FOUR
What To Do About It

> *This section turns the framework into action. It first describes the gap between what most Ghanaian factories currently track and what CBAM requires, then sets out five specific moves an export executive should make in the next two quarters.*

4.1 The readiness gap, concretely

Most Ghanaian CBAM-exposed factories today operate a data environment that was built for a different purpose. Internal reporting serves plant management, financial reporting, and periodic regulatory filings, not shipment-level carbon accounting on a quarterly cycle to a European standard. This is not a criticism; it is a description of a legacy environment meeting a new demand.

The gap has five specific dimensions.

Cadence. Ghanaian factories typically report emissions data annually, if at all. CBAM operates on a quarterly rhythm from 2026 onward and, for annual declarations, requires that quarterly data roll up into a verified annual submission.[9,12]

Granularity. Existing reporting is typically at plant or product-line level and is expressed as annual averages. CBAM requires shipment-level attribution where a specific tonne of aluminium or cement carries the emissions of the specific production run and specific electricity mix that produced it.

Verification. Ghanaian producers who publish Environmental Product Declarations do so through five-year cycles managed by external LCA consultancies (openLCA-based studies, third-party verified in accordance with ISO 14025). VALCO's 2025 EPD is a strong example.[5] CBAM requires continuous alignment between operational data and verified emissions figures, not a static declaration that is updated every five years.

Format. CBAM submissions must be filed in a specific XML schema through the CBAM Registry. Ghanaian factories today generate reporting in Excel, PDF, or narrative form. The format translation itself is a data pipeline problem.

Precursor and PPA accounting. For complex goods, CBAM requires the embedded emissions of relevant precursors (alumina in aluminium, clinker in cement, ammonia in fertilizer) to be folded into the calculation. For Scope 2 electricity emissions, any hydropower or renewable claim requires a specific Power Purchase Agreement linking the installation to the source.[19] Ghanaian factories today typically do neither.

None of these gaps is unusual for a heavy industry facility in a jurisdiction without a domestic carbon price. All of them are addressable. The question is whether they get addressed in 2026, when the CBAM factor is 2.5% and imperfect first attempts are cheap, or in 2029, when the factor is 22.5% and imperfect first attempts show up in contract renegotiations.

4.2 Five moves for the next two quarters

The five moves below are ordered by dependency. Each earlier move enables the next.

MOVE ONE

Establish a verified emissions baseline for one product line.

The purpose is not full coverage; it is a defensible starting figure. Pick one product line with material EU exposure or clear prospective EU exposure. Produce a third-party verified emissions figure for it, expressed in tCO_2e per tonne of output, covering direct process emissions and electricity-related Scope 2. This is the number that anchors every subsequent conversation with an EU buyer.

For an aluminium producer, this is the equivalent of VALCO's 2025 EPD (an ISO 14025-compliant declaration, third-party verified). For a cement producer, it is a shipment-level embedded emissions figure with a clinker ratio disclosure. For a steel producer, it is a route-specific figure (EAF versus BF) with scrap composition disclosed.

2026 is the year to produce this baseline. It costs meaningfully less to commission in a low-stakes reporting year than to reverse-engineer under commercial pressure in 2029.

MOVE TWO

Assess the PPA lever for your Scope 2 emissions.

For aluminium producers, this is the single largest CBAM optimisation available. For a smelter drawing from the Ghanaian national grid mix (approximately 59% natural gas, 38% hydropower per the IEA 2023 data reflected in VALCO's EPD),[6] isolating even a partial hydropower PPA materially reduces the verified Scope 2 component of embedded emissions on the covered share of production. Cement equivalents are alternative fuel substitution rates and clinker replacement ratios (slag, calcined clay). Steel equivalents are scrap input verification and grid decarbonisation contracts.

The assessment has three parts: identify current electricity supply arrangements with GRIDCo and any wholesale power producers; evaluate whether a hydro-specific or renewable-specific PPA is negotiable in the next 12-24 months; quantify the emissions impact on the CBAM figure. The quantification determines whether the PPA is a commercial priority or a nice-to-have.

MOVE THREE

Move your emissions data cadence from annual to quarterly.

Whatever your factory does today, it is not on a quarterly cadence aligned to the EU's CBAM reporting cycle. Making that shift requires three operational changes. First, monthly ingestion of the underlying inputs: electricity bills, fuel receipts, production volumes, precursor purchases. Second, an emissions calculation engine that runs on those inputs on a monthly or quarterly basis rather than on a five-year LCA cycle. Third, an output layer that produces the CBAM XML schema on demand.

This is a data pipeline problem, not a compliance problem. It is also the single largest operational shift required by CBAM and the one where consulting-based approaches (static reports, updated periodically) do not scale. Continuous digital carbon accounting is the CBAM-native architecture, and it is what DNClimate provides.

MOVE FOUR

Map your tier-two exposure through regional customers.

Not every CBAM-exposed Ghanaian factory ships directly to the EU. Many ship to Moroccan, Turkish, or South African manufacturers whose finished products enter EU markets, and those manufacturers will pass CBAM data requests back through the supply chain long before EU regulators contact any Ghanaian producer directly.

The map has three columns: which of your regional customers have EU-bound finished goods, which of your product lines feed into those flows, and which of those product lines are CN-code-covered under CBAM as precursors. Firms that build this map in 2026 respond to the first regional data request as a competitive opportunity. Firms that build it in 2028 respond reactively, having already lost the first round of contract signals.

MOVE FIVE

Select your CBAM verifier and run a shadow reporting cycle in Q4 2026.

The Commission has publicly signalled that CBAM verifier capacity is constrained in the first years of the definitive period, and has anticipated this as a bottleneck.[14] Verifiers accredit through EU national accreditation bodies and must perform on-site inspections in the first year of reporting. The Ghanaian factories that engage verifiers in 2026, while the capacity crunch is still forming, secure the ones with sector-relevant expertise and predictable schedules. Factories that begin the search in 2028 select from whatever remains.

The parallel move is a shadow reporting cycle. Between October and December 2026, produce the CBAM XML submission that *would* apply if your quarterly reporting were live today. File nothing. Read the output. Identify the gaps. Fix them. This dress rehearsal costs nothing to run and reveals precisely which of the first four moves is still incomplete. It is the single most efficient piece of learning available in the entire phase-in window.

The five moves are ordered so that each enables the next: baseline data (Move 1) is required to assess the PPA lever (Move 2); quarterly cadence (Move 3) is required to make the baseline dynamic rather than static; tier-two mapping (Move 4) reveals where the baseline needs to extend; and the verifier engagement (Move 5) turns the whole system from an internal spreadsheet into an EU-defensible submission. None of the five executes reliably without a named internal owner (typically an Operations Director or Head of Sustainability with commercial fluency, reporting directly to the GM or CFO). That is the governance decision. The five moves above are the operational ones.

None of the five requires a large capital commitment in 2026. All of them position the exporter to negotiate confidently by 2028 and to compete structurally by 2030.

05 PART FIVE
About DNClimate, and What Comes Next

5.1 Who we are

DNClimate is a climate data infrastructure company for African heavy industry exporters, focused on the continuous digital carbon accounting layer that CBAM compliance requires: moving emissions reporting from the five-year LCA cycles the sector currently runs on, to the quarterly, shipment-level cadence the EU now demands.

We are built by data science professionals from the Ghana Statistical Service, with direct experience in the national data infrastructure that Ghana's institutional reporting relies on. In September 2026, DNClimate enters incubation at the University of Southern Denmark (SDU) Startup Station, ensuring our software architecture is developed in direct proximity to the EU regulatory frameworks it must serve.

Our positioning is deliberate. We do not sell environmental sustainability. We sell market access: the specific data infrastructure that determines whether a Ghanaian exporter's structural competitive advantages surface in CBAM calculations and EU contract prices, or stay theoretical.

5.2 The next step: a free CBAM Readiness Assessment

This brief walks the framework. Walking your specific numbers requires your specific data.

BOOK YOUR ASSESSMENT

Free 15-minute CBAM Readiness Assessment

Available to exporters in Ghana's aluminium, cement, and iron and steel sectors, plus regional exposure holders whose products feed EU-bound supply chains from other West African markets.

The assessment covers four questions:

1. What are your current EU-bound and prospective EU-bound export flows across CBAM-covered CN codes?
2. What emissions data do you currently have available, and at what cadence and granularity?
3. Where does the framework in Part 3 place your firm-specific cost curve across the 2026-2034 phase-in?
4. Which of the five moves in Part 4 is the highest-impact starting point for your operations?

The output is a short written summary, delivered within one week of the call, that you can share internally with your GM, CFO, or Sustainability Lead.

PILOT COHORT CLOSES 15 SEPTEMBER 2026

We are onboarding 10 pilot partners in West African heavy industry, ahead of DNClimate's SDU Startup Station incubation. Pilot partners receive priority implementation support and preferential pricing on the DNClimate platform when it enters commercial availability.

To generate your facility's baseline CBAM Exposure Score and apply for the Pilot Cohort, complete the 60-second diagnostic at:
www.dnclimate.com/assessment

**Based on your secure output, you will be prompted to book a 15-minute onboarding call to review your results.*

SCAN TO START

5.3 Closing note

CBAM is not a shock event. It is a scheduled cost curve, and every variable that determines an exporter's position on that curve is either public, verifiable, or within the exporter's operational control. The exporters who will look back at 2026 as the year they positioned for European market advantage are the ones treating this brief's framework as a starting point for a real, firm-specific conversation, not as a document to file.

The 15 minutes are on us.

06

BACK MATTER

Sources and References

1. European Commission, Taxation and Customs Union, "Carbon Border Adjustment Mechanism," taxation-customs.ec.europa.eu.
2. Regulation (EU) 2023/956, Article 31; Climate Leadership Council, "A Guide to the EU CBAM" (April 2026); CBAM Guide, "EU ETS Free Allocation Phase-Out" (April 2026).
3. World Bank Blogs, "How developing countries can measure exposure to the EU's carbon border adjustment mechanism" (2025).
4. Regulation (EU) 2023/956, Article 7(2), Annex IV Section 4.1.
5. Volta Aluminium Company Limited, "Environmental Product Declaration: Primary Aluminium," EPD registration EPD-IES-0016460:001, The International EPD® System, published 1 December 2025, valid to 30 November 2030. Available at www.environdec.com.
6. International Energy Agency, "Ghana - Energy Mix" (2023), as applied in VALCO EPD via Ecoinvent 3.10.
7. Regulation (EU) 2023/956; European Commission, "CBAM Guidance Document for Non-EU Installation Operators" (2023).
8. Regulation (EU) 2023/956, Annex I.
9. Implementing Regulation (EU) 2025/2548.
10. IndexBox, "EU Carbon Price" (June 2026); Sandbag Carbon Price Viewer; EEX exchange data 2025-2026.
11. Confirmed by Ghana Environmental Protection Agency public communications; no domestic industrial carbon tax in force at time of publication.
12. International Carbon Action Partnership, "EU CBAM enters compliance phase" (2026).
13. Regulation (EU) 2023/956 as amended by the Omnibus simplification package; ICAP compliance summary (2026).
14. Draft implementing act on default values, as reported by EUROMETAL (December 2025); confirmed in final Implementing Regulation (EU) 2025/2621; industry summaries by Mayer Brown, O'Melveny, carboneer (2026).
15. Implementing Regulation (EU) 2025/2621.
16. Ghana Integrated Aluminium Development Corporation (GIADEC) public communications; Ghanaweb, Alcircle reporting (March 2026).
17. Ghanaweb, "VALCO records over $120 million in revenue" (March 2026).
18. Alcircle, "VALCO reports $120m revenue as government reviews expansion drive" (March 2026).
19. CBAM Guidance Document for Non-EU Installation Operators, section 7.4 (aluminium sector), rules on indirect emissions and PPA accounting.
20. Heidelberg Materials Climate Transition Plan (public disclosure).
21. Homaio, "EUA Carbon Price in 2026" (2026); Citi/BloombergNEF long-term forecasts as reported in Homaio.

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