EnergyTag

Whitepaper

Delivering Strong CBAM PPAs

Executive Summary

- CBAM aims to avoid carbon leakage by trying to ensure imported goods are exposed to equivalent carbon costs to EU goods. It also aims to drive cleaner production outside the EU.
- CBAM will require importers of electricity, cement, and fertilizers to account for indirect emissions from the beginning, with iron and steel, aluminum, and hydrogen set to incorporate indirect emissions in the future.
- CBAM legislation permits two indirect emissions accounting methods. Actual emissions based on direct connection/PPAs or Default emissions using grid average.
- The EU Commission is set to publish implementing acts by June 2025[1] detailing PPA requirements in preparation for the definitive phase of CBAM.
- Weak PPA rules would create significant carbon leakage, further contributing to European deindustrialization.
- Ideal PPA rules, based on robust physical matching of consumption and generation, would mitigate carbon leakage, driving global decarbonization.
- **It is critical that upcoming implementing acts set strong PPA requirements.**

Introduction

The Carbon Border Adjustment Mechanism (CBAM)[2] is a crucial element of the EU's strategy to achieve climate neutrality by 2050. It tackles the risk of **carbon leakage**, where businesses relocate production to countries with less stringent climate policies. By imposing a carbon levy on imports of certain carbon-intensive products into the EU, CBAM aims to ensure that **imported goods face a carbon price comparable to those produced within the EU under the EU ETS[3].** This policy brief covers the reporting of indirect emissions from electricity, whether directly imported into the EU or embedded in imported goods. It highlights the critical role of Power Purchase Agreements (PPAs) and how they should be accounted for to accurately measure electricity emissions in imported products. Some stakeholders have questioned the inclusion of PPAs as a valid basis for emissions accounting under CBAM, citing risks of unverifiable claims and limited physical correlation. PPAs are explicitly permitted under CBAM legislation, and so this paper focuses on how to ensure that they are implemented with sufficient safeguards to address these concerns, and to call for their exclusion in cases where robust criteria are not followed in a transparent way.

[1] Which may be subject to delay.
[2] Official Journal of the European Union - establishing a carbon border adjustment mechanism.
[3] EU - EU Emissions Trading Scheme.

Timelines and Goods Covered

The CBAM has a **transitional period** from 1 October 2023 to 31 December 2025, during which importers are only required to report both direct[4] and indirect emissions[5]. The **definitive phase** of CBAM commences on **1 January 2026**. In this phase, importers will additionally be obliged to purchase and surrender CBAM certificates corresponding to the embedded emissions of their imported goods.

From 2026, CBAM will cover indirect emissions from cement and fertilizers. Indirect emissions for Iron and steel, aluminum, and hydrogen are not currently included. However, the CBAM review for the second half of 2025 announced in the EU's Clean Industrial Deal will *"assess the inclusion of indirect emissions across all CBAM sectors, considering the indirect costs of electricity for EU producers"*. So these other CBAM products may well be included going forward. The future of the "indirect compensation[6]" for carbon costs in these sectors will also be a critical element of this review. For clarity, this paper covers only indirect emissions related to electricity used in the manufacturing of products; direct emissions related to electricity imports are not covered here, even though PPAs are also permitted to claim actual emissions in this case.

Accounting for Indirect Emissions In Products

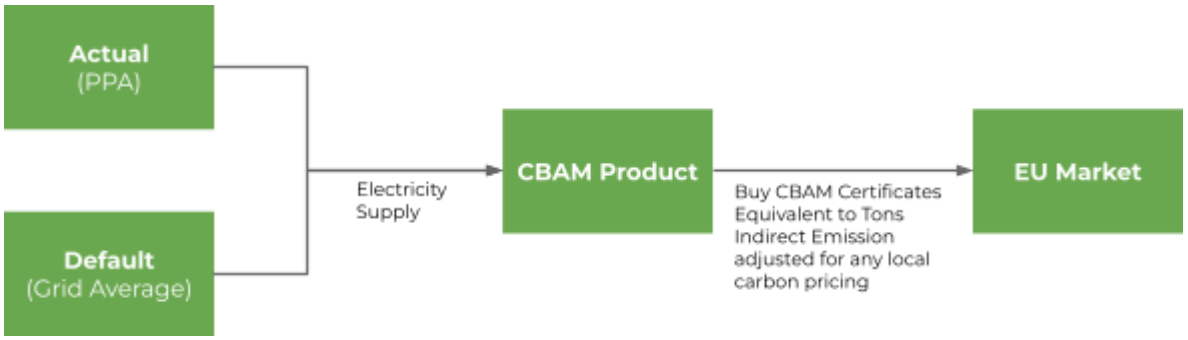

Figure 1 - Indirect Emission Reporting for CBAM Products[7]

The CBAM legislation foresees two methods for calculating indirect emissions:

- **Actual Values:** Importers can use actual emissions factors for specific electricity generators if there is a direct line between the installation and the electricity source, or if a PPA[8] is in place for a given amount of electricity.

[4] Emissions related to fossil fuels used directly within company boundary.
[5] Emissions related to the consumption of purchased electricity, in the transitional phase, default country level emissions factors from the IEA are to be used.
[6] Article 10a(6) of the ETS Directive allows Member States to compensate the most electro-intensive sectors for increases in electricity costs as a result of the EU ETS.
[7] For simplicity, direct electricity imports are not shown here but these can also use Actual values based on PPAs under certain conditions outlined in Annex IV part 5 in the CBAM regulation.
[8] This paper assumes that PPAs will remain a valid option in CBAM, as any change to this would require amending the base legislation.

- **Default Values:** If actual emissions cannot be adequately determined, default values are used. For electricity, these are based on the average emission factor of the EU electricity grid, the grid of the country of origin, or the CO2 factor of price-setting sources in the country of origin.

These rules apply to both electricity used in the production of imported goods or electricity directly imported into Europe through grid interconnection.

CBAM defines[9] a PPA as a "contract under which a person agrees to purchase electricity directly from an electricity producer". This current lack of clarity could allow companies to claim lower emissions factors without genuinely sourcing clean electricity and reducing emissions, leading to significant carbon leakage and an uneven playing field for European industry. A ***crucial implementing act*** is expected from the European Commission by June 2025 (which may be subject to delay) to clarify the final details for applying actual emissions factors. These rules must clarify robust accounting and verification rules for PPAs to be valid for reducing CBAM tax obligations.

Strong PPA rules align with CBAM objectives

The European Commission states the CBAM should place a *"fair price on the carbon emitted during the production of carbon-intensive goods that are entering the EU, and to encourage cleaner industrial production in non-EU countries,"* and that it is *"designed to be compatible with WTO-rules"*. Any PPA rules should take these key considerations into account:

- **Avoid Carbon Leakage**: CBAM is intended to prevent European industry from migrating elsewhere by placing a fair price on carbon emissions of imported goods, equivalent to carbon costs in Europe. Weak PPA criteria would allow importers to reduce their carbon costs without credibly consuming clean power. This would put European industry at an unfair disadvantage and lead to carbon leakage.
- **Encourage Cleaner Production Globally**: CBAM seeks to drive cleaner industrial production and decarbonization in 3rd countries. By requiring strong PPA criteria, the EU can drive demand for new clean energy projects and associated infrastructure investments in those countries. The EU's Green Hydrogen rules are a good example. This 1.3 GW Green Ammonia facility in India will run on renewables on an hourly basis to be eligible to export green ammonia to the EU. If the PPA rules are weak, the incentive for genuine clean production is reduced, as companies can use any PPA to claim a lower carbon footprint, reducing CBAM tax burden without reducing emissions or truly cleaning up production.
- **Ensuring Alignment with WTO**: The EU is bound to abide by WTO rules, and hence CBAM (and related PPA policies) must comply with WTO. EU

[9] See CBAM regulation Annex IV for full definition.

legal analysis[10] concludes that WTO rules in principle allow members to adjust their ETS systems for imports to prevent carbon leakage. However, this requires certain criteria to be met; CBAM implementation should deliver the **environmental benefits** required to justify the WTO exemption for environmental rules, and CBAM rules must **not discriminate between domestic and foreign suppliers**. To prevent discrimination, it should be based on actual emissions associated with the product. For PPAs, this means the criteria should accurately reflect the actual emissions of the electricity being used and lead to tangible environmental benefits.

An Ideal CBAM PPA Model - Hourly, Local, and New

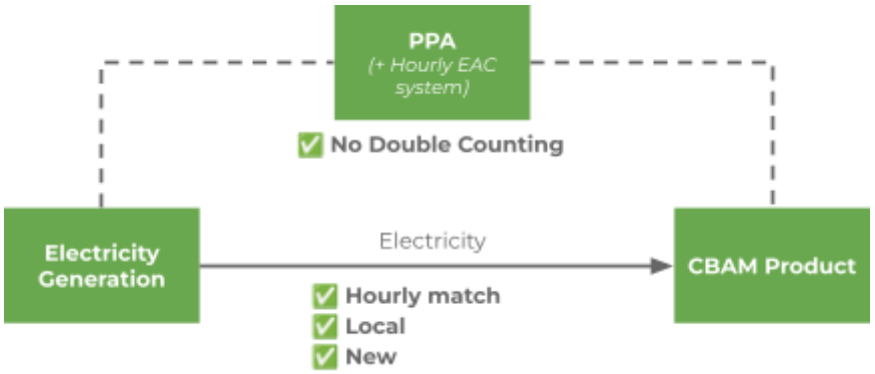

Figure 2 - The Ideal PPA Model

The Ideal PPA model we propose best meets these key objectives and is similar to those already adopted in the EU's Renewable Fuels of Non-Biological Origin (RFNBO) Delegated Act[11]. There should be three fundamental criteria:

- **Hourly Matching:** Consumed electricity and PPA generation match on an hourly basis. For instance, a factory using electricity at night must source carbon-free electricity generated during the same hour, rather than relying on daytime solar attributes that don't reflect actual power use. Hourly matching has been demonstrated around the world, and the hourly data required is common for large generators and consumers, as it is the basis of electricity billing. In its absence[12], default values can be used.
- **Deliverability:** The electricity being claimed should be delivered to the same grid region as consumption to avoid congestion and ensure that the claimed electricity sufficiently reflects actual emissions. For example, weak rules would let a PPA with a generator in a region with little or no interconnection to the CBAM product manufacturing facility serve as the basis for claiming zero-emission electricity consumption.

[10] EnergyTag's summary of this legal paper is provided for contextual purposes only and does not constitute legal advice. While we are not legal experts on CBAM or WTO law, our intent is to outline the key considerations surrounding its compatibility with WTO rules based on available analyses.
[11] Hourly matching by 2030, additionality exemptions before 2028, read regulation for details.
[12] Alternatively, a phase in using first monthly matching and then hourly could be used, as in the RFNBO case.

- **Incrementality:** PPAs should incentivize the deployment of new clean electricity generation, which is key to driving industry decarbonization. For example, the rule could require that a PPA be signed with a zero-emissions energy source that began operation no earlier than 36 months before the PPA was signed, preventing companies from resource shuffling and claiming credit for existing clean energy capacity. In grids with very high levels of clean power already, this requirement could be lightened.

This framework has also been **adopted in the legislation** in the US[13] and research from MIT, Princeton University, Technical University of Berlin, and the IEA[14] all conclude this framework is **necessary to ensure PPAs lead to long-term and systemic grid decarbonization.** The consequences of weak PPA rules could be severe. For example, this modeling from Princeton shows that clean hydrogen produced in the **US with weak annual rather than hourly PPA matching rules would be highly carbon intensive**, up to 2-3 times worse than grey hydrogen produced from fossil fuels, illustrating the carbon leakage risks and lack of environmental benefit of lax rules. As green hydrogen emissions are dominated by electricity, the consequences of weak accounting for other electro-intensive products would be similar. **So, weak PPA rules would fail to deliver the requisite environmental benefits and would be unfair to EU producers, damaging key justifications of CBAM.**

Given that RFNBO renewable hydrogen (a CBAM product) imported into Europe under RED III will be required to follow these rules for the calculation of emissions, **it would introduce regulatory inconsistency and burden to apply different rules for other products under CBAM.** It is important to note that due to different market structures, PPAs may need to be defined in different ways depending on the country, but the integrity of the PPA rules must be maintained while accounting for these differences.

To prevent double-counting, i.e., having the same volumes of clean electricity being claimed by multiple consumers, it is essential to have hourly **Energy Attribute Certificate (EAC)** tracking systems with the same level of robustness as those used in Europe. The EU's Guarantee of Origin system is the regulated tracking instrument used to ensure green claims based on PPAs are unique. Open standards and robust auditing equivalent to the EU's system should be required, and ultimately, the EU must be able to reject PPA accounting schemes deemed not to meet rigorous standards. EACs should be bundled with PPAs to ensure robust tracking. Annex 1 has more guidance on how this can be implemented.

The CBAM should try to reflect the effect of the EU ETS on electricity pricing in Europe for third-country producers as best as possible. This is a very complex task due to the many factors at play (e.g extent to which EU ETS affects EU power

[13] United States Federal Register - Credit for Production of Clean Hydrogen and Energy Credit.
[14] EnergyTag - List of research on PPA sourcing requirements.

prices, quantifying the partial effect of ETS on PPA prices in EU, third country market structure, etc.). The Ideal PPA rules based on hourly and local power supply are more likely to represent real carbon exposure than weak PPA rules. For example, if a European electricity consumer matches an hour of their consumption with fixed-price clean power via PPA, it will reduce their exposure to the EU ETS[15], while a foreign producer would similarly reduce their exposure to CBAM under strong rules. Under weak PPA rules, a third-country producer could exempt themselves from electricity related carbon tax under CBAM by claiming to use solar power at night, when their electricity supply remains carbon-intensive.

While no framework is perfect, and given PPAs are permitted in CBAM base legislation, this **PPA framework best addresses the CBAM objectives while minimising the major downside risks**. Table 1 provides a summary:

Table 1 - How Ideal PPAs Meet CBAM Objectives

CBAM Objective	Weak PPAs (Not Hourly, Local or New)	Ideal PPAs (Hourly, Local, New)
Minimising Carbon Leakage	**Low**. Allows manipulation through claims of low emissions without real shifts in production practices, leading to resource shuffling and carbon leakage.	**High**. Drives investment in clean capacity and ensures credible claims to clean energy usage, better reflecting a fair carbon pricing.
Cleaner Global Industrial Production	**Low**. Research shows that any PPA rules besides the Ideal PPA approach are far less likely to drive a cleaner industry and global emissions reductions.	**High**. Drives real deployment of new clean capacity, ensuring clean industry and reduced emissions in third countries. This is supported by extensive empirical evidence.
WTO Alignment	**Low.** Weak PPAs do not represent actual emissions, creating an uneven playing field for EU industry compared to third countries, while failing to deliver environmental benefits.	**High.** Ensures a fair representation of the actual emissions associated with electricity consumption, avoiding discrimination while also helping drive environmental benefits.

[15] PPA pricing is complex and influenced by many factors. PPA prices are influenced to an extent by the EU ETS through forward curves, but others are priced based on elements like LCOE that are not influenced by EU ETS.

Indicative Worked Example

The following is a simplified, illustrative example designed to demonstrate how the proposed PPA framework could function under realistic assumptions. Actual implementation would require robust verification systems and compliance monitoring. For illustration, we examine the import of 100 thousand tons of a CBAM product from a 3rd country.

Table 2 - Indirect Emissions Worked Example

Item	Numbers
CBAM Product Electro-Intensity	15 MWh/ton
CBAM Product Electricity Consumption (100k tons)	1,500 GWh
PPA Volumes (3-Criteria - 50% Hourly Matching)	750 GWh
Grid Electricity	750 GWh
Actual Emissions (PPA @ 0 tCO2/MWh)	0 tCO_2
Default Emissions (Grid avg. value at 0.6 tCO2/MWh)	450 $ktCO_2$
Indirect Emissions (Actual+Default)	450 $ktCO_2$
CBAM Tax on Indirect Emissions (e.g., 50 €/ton)	€ 22.5 million

In the example above, 50% of the electricity consumed over the year is verified as being compliant with the three key PPA criteria and not double counted, these volumes can be claimed using the Actual emissions rate of the PPA (i.e., 0 $kgCO_2$/MWh) with the remaining volumes using default emissions rates. Ideally, if PPAs are being used, the remaining volumes should be calculated using a residual mix or even a fossil-only mix in the third country, to avoid double-counting.

Conclusion

CBAM can be a powerful driver of global decarbonization and a safeguard against carbon leakage—but only if its implementing rules are strong. Robust PPA criteria and reliable energy tracking are crucial to meeting climate goals and ensuring fair competition. The European Commission's upcoming implementing acts on PPA rules will be decisive in determining CBAM's success.

Annex 1 - Ensuring Robust EAC Systems

- PPAs should only be permitted where the EU is confident that strong measures are in place in the 3rd country to prevent fraudulent claims. Within the EU, the Guarantee of Origin system provides this essential service of double-counting avoidance for PPAs.
- In order to ensure a robust contractual instrument (e.g., PPA being a CI) tracking is in place, the EU JRC report "*Rules for the calculation of the Carbon Footprint of Electric Vehicle Batteries*" provides a set of five minimum reliability criteria that must be followed in 7.1.3, CI must:
    1. Convey relevant energy attributes.
    2. Ensure a unique claim.
    3. Be issued from a tracking system that fulfils strict criteria, including:
        a. Being governmentally appointed.
        b. Being independent of the production, trade, and supply of CIs.
        c. Be governed by transparent procedures.
        d. Usage being enforceable by national legislation.
    4. Represent production periods as close as possible to the consumption period to which the CI is applied.
    5. Be sourced from the same market.
- In general, there is a lack of robust and standardized governmentally appointed systems outside of the EU GO system today. However, this should not mean that countries are not allowed to develop one based on objective criteria and oversight.
- This provides an example of the need for the EU to ensure that the CIs being used for carbon footprint calculations are robustly tracked and comply with all criteria listed in the JRC report. This includes providing satisfactory evidence to the Commission and being willing to open up to 3rd party audits to verify compliance with the criteria.