Assessment of the Albanian electricity market design and performance

ADDENDUM ON CBAM DESIGN

BES
BalkanEnergySchool

CEI
CENTRAL EUROPEAN INITIATIVE

Ministry of Foreign Affairs
and International Cooperation

Assessment of the Albanian electricity market design and performance

Addendum on CBAM design

A project for ERE and the Balkan Energy School

October 2024

Report elaborated by the Balkan Energy School in the framework of the project "Supporting the Albanian Regulatory Authority to improve the efficiency of the wholesale electricity market" co-financed by the Italian Ministry of Foreign Affairs and International Cooperation through the CEI Fund at the EBRD.

Balkan Energy School (BES) is an Association of energy regulators. The participation in the Association is reserved for the Energy Regulatory bodies belonging to the Euro-Balkan Region. Current members are representatives of the energy regulatory authorities from Albania (ERE), Bosnia and Herzegovina (SERC), Greece (RAEWW), Italy (ARERA), Montenegro (REGAGEN), and North Macedonia (ERC). Observers are representatives of the energy regulatory authority from Serbia (AERS).

BES aims to promote debate and knowledge exchange in the energy field.

The School is about training, capacity building, knowledge transfer and effective communication.

Furthermore, it focuses on the development, regulation, and integration of energy markets in the Euro-Balkan Region, as well as the impact of the energy transition

BES organizes courses, seminars, conferences, study visits, and any other type of event of an educational nature or for the dissemination of information.

The association publishes analyses, studies and research, publications and public presentations of customised policy papers on energy and related topics. It also elaborates regulatory policy recommendations to foster the development and integration of energy markets in the Euro-Balkan Region.

BES Balkan Energy School

CEI Central European Initiative

Ministry of Foreign Affairs and International Cooperation

Contents

Note: In the report, the designation **Kosovo*** is done without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo* declaration of independence.

Carbon Border Adjustment Mechanism

Regulation (EU) 2023/956 on the Carbon Border Adjustment Mechanism (hereinafter: CBAM) imposes administrative and financial costs on importers of goods into the EU from third countries, including the Contracting Parties of the Energy Community (and therefore Albania). Such costs are based on the carbon content of the imported goods, so that the CBAM effectively ensures that the carbon price of imports is equivalent to the carbon price of domestic production – avoiding that the EU's climate objectives are undermined by trade with third-country parties.

CBAM directly impacts electricity markets since the price set for carbon emissions contributes to the variable generation cost of an electricity generator – thus impacting the merit order curve in the spot markets. In Europe, the Emission Trading Scheme (ETS) implements carbon pricing in a harmonised way across Member States. CBAM extends carbon pricing beyond the EU borders so that the issue arises on how to correctly price electricity that is imported from a third country into Europe.

On 1 October 2023, the CBAM entered into application in its transitional phase, with the first reporting period for importers ending 31 January 2025. During the transitory phase, the CBAM will initially apply to imports of certain goods: cement, iron and steel, aluminium, fertilisers, hydrogen and – importantly – electricity. Also, in the transitory phase, the obligation placed on importers of goods into Europe is only related to the reporting of the carbon content of such goods – without direct economic implications.

The definitive regime shall enter into force on January 1st, 2026, and all importers of goods covered by CBAM shall not only be subject to reporting obligations, but also be required to purchase CBAM certificates covering the carbon content of the imported products. The price of the CBAM certificate is directly linked to the ETS price of the Emission Trading Scheme, so that consistent carbon pricing is achieved for imports and domestic products at the EU level.

CBAM is directly applicable to Energy Community Contracting Parties. Importantly, regarding the imports of electricity, there is a possibility of exempting a given country from CBAM under a certain set of conditions, the most relevant ones for the scope of our analysis being:

- The implementation of market coupling with implicit allocation of cross-border transmission capacity (SDAC and SIDC mechanisms); and
- The implementation of an emission trading system by 2030

The application of CBAM to the import of electricity from third countries where electricity market coupling with EU Member States is implemented is not straightforward. CBAM affects in fact the merit order of imported electricity among different third countries: in case of explicit allocation, importers can directly compare alternative sources of electricity and select the cheapest ones, i.e., everything else being equal, the ones with lower carbon content.

In the case of market coupling, instead, transmission capacity is allocated implicitly, and electricity flows are not determined by market operators directly, but rather by the market clearing algorithms (SDAC and SIDC). Applying CBAM to the import flows from a third country subject to CBAM into Europe as determined by SDAC and SIDC is not a simple task, as it must be ensured that import flows and electricity prices are determined consistently by the clearing algorithm (to ensure efficiency), while at the same time discriminating offers submitted in markets where CBAM applies (to account for the different carbon content of the generators submitting such offers).

In this context, Energy Community Contracting Parties such as Albania are required to analyse the options available to either:

- Implement the required steps to obtain an exemption from CBAM; or
- Be subject to the CBAM regulation while at the same time implementing market coupling. In such case, a solution must be found to make market coupling and CBAM 'coexist'

We provide a high-level overview and assessment of the benefits and drawbacks of each option below.

Exemption from CBAM

The first condition to obtain an exemption from CBAM are the implementation of an electricity market that can be coupled with the internal EU market via SDAC and SIDC. As discussed in the report ***'Assessment of the Albanian electricity market design and performance'*** elaborated by the Balkan Energy School[1], all the technical preconditions for market coupling are already satisfied in Albania.

The second condition requires the implementation of a 'local' emission trading system, setting a price for carbon emissions by electricity generators in the 'local' (Albania/Kosovo*) market. This implies that

- All generators in the local market would have the incentive to bid a price that includes the cost for CO2 emissions (i.e., for non-renewable units, a higher price than in the absence of the emission trading system)
- Consequently, if the marginal source for a given hour is CO2-emitting, then the marginal price for that hour shall be higher than in the absence of an emission trading system. This price would be paid for by all consumers in the local market, and remunerate all generators in the local market

As a result, electricity flows to/from Europe as resulting from the market coupling would fully reflect the cost of CO2 emissions; effectively, under this option Albania/Kosovo* would implement a market coupling that is fully consistent with the EU design (where generators are subject to ETS).

1 See in particular section 3 of the report. The report was elaborated in the framework of the project "Supporting the Albanian Regulatory Authority to improve the efficiency of the wholesale electricity market" co-financed by the Italian Ministry of Foreign Affairs and International Cooperation through the CEI Fund at the EBRD.

Carbon Border Adjustment Mechanism

For this reason, under these conditions (implementation of market coupling and local emission trading system) the third country can be granted an exemption from CBAM: there is no need for importers to buy CBAM certificates for electricity, since the carbon content of the produced electricity is already priced in the local market via the 'local' emission trading system.

In the medium- to long-term, we recommend Albania and Kosovo* to pursue an exemption from CBAM, in order to ensure a smooth and efficient integration with the EU internal electricity market. However, even if Albania and Kosovo* are at an advanced stage of this process, since technical preconditions for the market coupling are satisfied, there are still challenges to be overcome:

- Regarding market coupling, timing is a key element to be considered: while technical preconditions are satisfied the entire market coupling process must be fully implemented by 31 December 2025
- Designing and implementing the 'local' emission trading system is a complex process, that is unlikely to be compatible with the 2026 deadline. Furthermore, Albania and Kosovo* may address whether an implementation at regional (e.g., Energy Community) level is more adequate, in order to achieve a market size that allows for an effective implementation of the emission trading system. While achieving a regional-level implementation of the emission trading system may be desirable, it might require a longer timeframe for implementation – so that even the 2030 deadline may prove challenging.

For these reasons, it appears unlikely that Albania and Kosovo* can meet the conditions to be granted an exemption from CBAM already by 2026, so that a temporary solution where implicit market coupling (that is expected to enter into force before December 31st, 2025) and CBAM (that shall enter into force on January 1st, 2026) must coexist. Such a solution may be required to be maintained even further, in case a 'local' or regional emission trading system is not implemented by 2030.

We discuss two possible designs where implicit allocation of cross-border transmission capacity and CBAM can coexist below, together with the pros and cons of each option.

Coexistence of market coupling and CBAM

Under CBAM, importers of electricity from the 'local' market (e.g., Albania and Kosovo*) into Europe must purchase CBAM certificates for each kWh exported. The pricing rule for CBAM certificates is set by EU regulation (as an average of ETS prices), but there are different issues to be addressed:

- ***Who purchases the certificates?*** Under the 'implicit' market coupling model, transmission capacity is allocated by the system operator based on the bids and offers submitted in each bidding zone, so that there is not a uniquely identified set of 'importers'
- ***How are costs for the CBAM certificates recovered from market participants?*** Once CBAM certificates are bought by a selected entity (e.g., by the market operator on behalf of the market participants), the cost for CBAM certificates should be recovered with a methodology to be defined.
- ***How many CBAM certificates should be bought?*** Given that a given volume of electricity is exported into Europe within a given hour, it is impossible to determine whether the electricity exported has been produced by a high-emission mix (e.g., coal-fired units) or a low-emission mix (e.g., hydro facilities). This issue is further exacerbated in the case of imports into the 'local' market, as the carbon content of the imported electricity must also be defined.

The most 'natural' answers in the context of implicit allocation of cross-border transmission capacity to the above challenges (although not the only ones) appear to be:

- ***Who purchases the certificates?*** The market operator of the importing market zone purchases the CBAM certificates.
- ***How are costs for the CBAM certificates recovered from market participants?*** The market operator of the importing market recovers the total cost from consumers (pro-quota based on the kWh purchased).
- ***How many CBAM certificates should be bought?*** In order to 'replicate' the ETS system as much as possible, the volume of CBAM certificates (in terms of grCO2) should be associated with the CO2 emitted by the marginal unit in the exporting market.

We discuss below two alternative designs that, under the assumptions above, presents the following benefits:

- Correctly prices emissions for importing bidding zones;
- Maintain market distortions to a minimum; and
- Are simple to implement.

As discussed below, the two approaches differ in the trade-off between minimising market distortions – point (2) – and implementation simplicity – point (3).

Note that the representation of the designs presented below is schematic in nature and does not provide a fully detailed description of possible implementations: for instance, further analysis would be needed to design an adequate approach for intraday markets based on continuous trading. Our discussion in the following only applies to day-ahead auctions and complementary regional intraday auctions (CRIDA).

Carbon Border Adjustment Mechanism

Approach 1: Market coupling + volume coupling

This design would entail two sequential steps: 1) market coupling and 2) volume-coupling.

Step 1: market coupling

In the first step, ALPEX would increase all offer prices received to account for the CO2 emissions. In other words, ALPEX would apply an "upwards shift" to the supply curve, before submitting the supply and demand bids to the SDAC algorithm.

This modified supply curve would be used within the market coupling (SDAC) algorithm so that the clearing price for the coupled market including Albania/Kosovo* and interconnected European zones, P^*_1, would account for CO2 emissions and be fully consistent with import/export flows (the index 1 denotes that this is the clearing price of step 1).

Suppose that upon gate closure, Albania/Kosovo* (market zone: ***AL***) results to be a net exporter of electricity towards a neighbouring European bidding zone, ***Z***, the export flow ***AL→Z*** being equal to a volume x. We assume that interconnection capacity is unlimited between the two zones, so that both ***AL*** and ***Z*** feature a single clearing price $P^*_1=P^*_{Z,1}=P^*_{AL,1}$.

Step 2: volume-coupling

In the second step, ALPEX would run the market-clearing algorithm for the 'local' market only, with the following adaptations:

- The local demand is increased by a price-inflexible portion equal to x; and
- The original supply curve submitted by market participants is used, without the "upwards shift" (so that no carbon content is accounted for)

In other words, the Albania/Kosovo* market is cleared isolated from the rest of Europe, increasing the demand to account for the export flows determined by the SDAC (this process commonly goes under the name of 'volume-coupling'). As a result, the sold quantity in the local market is greater than the local demand accepted, to account for an export flow equal to x.

However, since the supply curve used in step 2 (volume-coupling) is different from the one used in step 1 (market coupling via SDAC), the resulting marginal price $P^*_{AL,2}$ and the accepted quantities $Q^*_{AL,2}$ (in the local market) will differ. This is correct: in particular, if demand in the local market is price-dependent, as the supply curve is shifted "downwards" between the first step and the second step, if $P^*_{AL,2}<P^*_{AL,1}$ the accepted quantities increase: $Q^*_{AL,2}>Q^*_{AL,1}$. In the case of price-independent demand, this volume effect is absent.

As a result of this process:

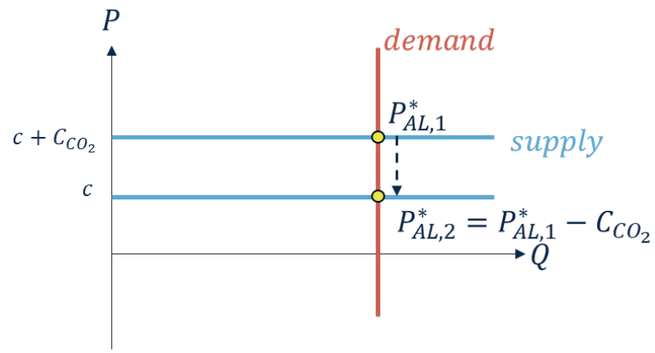
- Generators and consumers in zone Z would respectively receive and pay from/to the market operator the price defined as a result of market coupling: $P^*_1=P^*_{Z,1}$ (that includes the CBAM correction).
- ALPEX would clear the local market at the price $P^*_{AL,2}$, that does not include the CBAM effect and is different – even in the absence of congestions – from the price $P^*_1=P^*_{AL,1}$.
- The difference between the two prices, $P^*_{AL,1}$ - $P^*_{AL,2}{}^*$, constitutes the 'CBAM cost' paid for by the importing market operator, that we term C_{CO2} in the following. This value is not transferred to ALPEX, but rather used to purchase CBAM certificates.

An intuitive representation of this process is given as follows. Suppose that the AL market zone features a single technology with variable cost c. The cost for CBAM certificates, C_{CO2}, is obtained as the product of the technology emission rate (grCO2 emitted per kWh produced) and the price of CBAM certificates. Suppose also, for simplicity, that the demand in the AL market zone is fully inelastic. In this case, the price P^*_{AL} moves along a vertical line as in **Figure 1** – so that the difference between the price of zone ***Z***, $P^*_{AL,1}$, and the price in zone ***AL***, $P^*_{AL,2}$, is precisely given by C_{CO2}.

Finally, note that this can be easily generalised to the case of congestions. In this case, the market operator collects a 'rent' that includes both the C_{CO2} component as well as the usual congestion rent (as determined in step 1 by the market coupling).

Figure 1

A simplified representation with inelastic demand. In this case, the price difference between zone Z and zone AL is – in the absence of congestions – given by C_{CO2}



Pros and cons of this approach

The approach presented above has the benefit of guaranteeing efficient market outcomes for both the European zones subject to ETS (zone ***Z*** in the example), as well as bidding zones subject to CBAM (zone ***AL*** in the example). This holds because in both steps the prices and quantities are determined as outcomes of a market-clearing process. In particular, the volume-coupling step allows to capture demand elasticity in the local market: as the price applied in the AL bidding zone, obtained as output of the volume-coupling in step 2, differs from the market-clearing price resulting from the market coupling in step 1, the accepted quantities in the local market are modified.

This comes at a cost of (relatively small) increase in operational complexity, since after the market coupling process (SDAC algorithm) ALPEX needs to run an additional process (the 'volume-coupling'). However, volume-coupling is a relatively simple exercise, since it involves clearing only the local market with modifications to the demand and supply curves used in the SDAC.

In the next section we discuss an alternative approach that sits on the other side of this trade-off, since it cannot guarantee efficient outcomes but it comes with an even simpler implementation.

Approach 2: Price reduction in the local market upon gate closure

In this approach, as in Approach 1 ALPEX would apply an "upwards shift" to the supply curve, in order to account for carbon emissions. The modified supply curve would be used as input for the SDAC algorithm, determining (as above) a marginal price $P^* = P^*_Z = P^*_{AL}$ and a flow $AL \rightarrow Z$ equal to x.

At difference with Approach 1, in this approach there is no 'second step'. Following gate closure, the importing market operator (in zone Z) remunerates the exporting market operator (ALPEX) at $P^* - C_{CO2}$, where C_{CO2} represents the cost associated with CO2 emissions in the local market, as determined by the price for CBAM certificates (and therefore ETS prices). Further, the importing market operator would purchase CBAM certificates at the price of C_{CO2}, so that as in the previous approach the 'full' price P^* for the importing zone Z is decomposed as:

$P^* - C_{CO2}$ paid to the exporting market operator

C_{CO2} is paid to purchase CBAM certificates

The rationale of this approach is to reproduce the effect obtained in **Figure 1**; however, as discussed below this effect is obtained in a specific case (inelastic demand), so that the outcome is not always the economically efficient one.

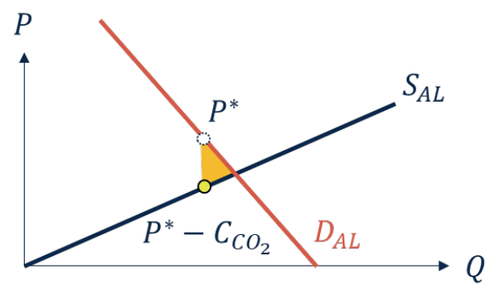
Pros and cons of this approach

The main benefit of this approach is given by its implementation simplicity, since no additional 'steps' beyond the SDAC is needed. Market operators would only need to 'post-process', at settlement time, the clearing prices – without the need to run the market-clearing algorithm a second time.

However, this approach comes at the cost of sacrificing market efficiency. Once the price used to clear the local market is lowered from P^* to $P^* - C_{CO2}$, in fact, the quantities accepted by the market clearing algorithm are maintained equal to the one determined by SDAC – that cleared at P^*. In other words, the new price for the ***AL*** zone, $P^* - C_{CO2}$, is not an equilibrium price, and any discrepancies in the quantities accepted by SDAC and the quantities that would correspond to an equilibrium price of , $P^* - C_{CO2}$ must be procured via redispatch. This effect is absent in the case of inelastic demand, since the market equilibrium feature the same accepted quantities at both P^* and $P^* - C_{CO2}$.

For this reason, we see this approach as a 'second best' with respect to Approach 1.

Figure 2
When the price is reduced from P^* to $P^* - C_{CO2}$, the accepted quantities are left unaltered – so that the outcome does not correspond to a market equilibrium if demand is price-dependent. The shaded area correspond to a loss of welfare



Additional implications of the "upwards shift" to the supply curve

In both the approaches presented above, the starting point to make CBAM compatible with market coupling entails an "upwards shift" of the supply curve, to account for the carbon content of the generators bidding in the local market. A first, very simple approach could be to apply a uniform upwards shift to the curve, for instance based on the average carbon emission of the mix in Albania/Kosovo* during a certain hour (determined e.g. on the basis of historical data).

However, such an approach would discard the fact that different generating units will have different emission coefficients. Applying a uniform "CBAM shift" to each bid might result in unwanted outcomes, since effectively low-emission units would subsidise exports from high-emission ones within the SDAC process. For instance, consider the case of a mix comprising only two units: a reservoir hydro unit and a carbon-fired unit. The profit-maximising bid price is, for both technologies, the incremental cost of the carbon-fired unit. If a single (e.g., average) CBAM shift is applied to both bids, both units might be dispatched by SDAC for exports (as SDAC will see them as 'equal-cost') – while the purpose of CBAM would be to favour exports of the hydro unit.

In order to avoid this, we propose to apply a 'CBAM shift' separately to each bid, based on the emission rate corresponding to that bid. The following (minor) points are worth raising:

- In the case of portfolio bidding, defining a value of the emission rate for the portfolio may not be obvious. The proposed methodologies thus require having portfolios that are – as minimum – homogeneous by technology, until ETS is implemented
- Once ALPEX modifies the supply curve to account for CO2 emissions, the merit order may be affected with respect to the one that would prevail in the absence of carbon pricing. This is unavoidable, but we would expect this effect to be i) small, and ii) easily predictable by generators, that can account for it in their bidding strategy.

Conclusions

The most effective and efficient path to achieve coupling of the Albania/Kosovo* electricity market with Europe entails obtaining an exemption from CBAM, via the combination of:

1. **Implementation of market coupling (already at a very advanced staged in Albania/Kosovo*);**

   and

2. **Implementation of a local/regional emission trading system**

However, given the timeframe of CBAM implementation (in force on 1 January 2026), the second condition above makes the pathway towards CBAM exemption an uphill one. For this reason, it is important to assess alternative options to progress in the implementation market coupling, while at the same time ensuring a smooth introduction of the CBAM regulation.

In this document we propose two designs that, while needing a more thorough assessment to be fully operative at implementation stage, are promising for a transitioning phase towards the CBAM exemption:

- Approach 1 is based on a 'two-step' process that combines pan-EU market coupling and (local) volume-coupling. Until an exemption from CBAM is obtain we recommend this as the preferrable solution, since it ensures efficient outcomes at the expense of a (relatively) little increase in operational complexity
- Approach 2 is based on a reduction of the clearing price (as determined via SDAC) to sterilize the effect of carbon pricing in the local market. This approach is relatively simpler to implement, but cannot guarantee efficient outcomes – for this reason, we see this as a 'second-best' approach to be evaluated by policymakers


BES
BalkanEnergySchool
CEI
CENTRAL EUROPEAN INITIATIVE
Ministry of Foreign Affairs
and International Cooperation