

EEX DISCUSSION PAPER

Designing efficient two-way CfDs: safeguarding market functioning while accelerating the energy transition

Background and introduction

Two-way Contracts for Difference (CfDs) are set to become the default state aid instrument for providing direct price support to new or existing renewable and low-carbon power-generating facilities, as outlined in the latest revision of the EU Electricity Market Design (EMD)¹. At the same time, market-based de-risking tools such as standardised long-term futures contracts on energy exchanges or bilateral Power Purchase Agreements (PPA) already effectively support investment in Renewable Energy Sources (RES). Liquid futures markets enable long-term price discovery, allowing generators and consumers to hedge and mitigate the risk of future price movements on the spot market. These markets already complement PPAs and enable effective financial risk management for bespoke long-term bilateral contracts. It is essential, that this existing eco-system of market-based renewable investments does not get undermined by the roll out of CfDs but instead complements each other.

The implementation of CfDs for RES for which a complete market-integration might not yet be in order raises questions about how support schemes interact with market functioning and system efficiency. Regardless of design of a CfD, private risk management is undermined in favour of socialisation of market and price risks. The allocating authority faces significant responsibility and risk, which will ultimately be passed on to the consumer. While earlier one-sided support schemes often passed these costs directly to energy consumers through levies, the contingent liability under a state-backed two-way CfD typically rests with the authority itself and is funded through general taxation. In addition, the viability of innovation and technologies may be undermined, creating a cycle of ever-increasing need for public budgets to be allocated. Ultimately, we aim to enable the full market and system integration of RES, thereby fulfilling the energy transition without creating long-term dependency on state-backed schemes that fully socialise investment risk and exclude participation in the internal electricity market.

With this paper, EEX highlights design considerations for CfDs. While CfDs are already recognised for their potential to distort market signals², EEX emphasises their specific potential impact on long-term markets which poses risks that are not yet sufficiently addressed in the prevailing debate. Undermining liquidity and long-term markets runs contrary to the EU's objective of promoting, rather than suppressing, long-term contracts. This is not merely a technical detail, but a prerequisite for maintaining robust market functioning and supporting the EU's long-term energy transition goals.

This paper firstly outlines key concerns and secondly, explores design considerations from an energy exchange perspective.

Key concerns: CfD impact on market functioning

CfD design choices can have profound implications for market functioning of spot, derivatives, Guarantees of Origin, and PPA markets. For this paper, EEX highlights two core risks:

1. Undermining long-term markets:

A central concern lies in the widespread use of Day-Ahead (DA) prices as the reference price for CfD settlement. This approach distorts market behaviour and risks draining liquidity from futures markets. Generally, with CfDs, generators have an economic incentive to sell produced energy in the market that sets the reference price. Relying on short-term reference periods thus incentivises

¹ As defined in Article 2(76) of the EU Electricity Regulation (2024/1747)

² See amongst others ENTSO-E (2024): Position Paper on Sustainable Contracts for Difference Design

'produce and forget', where generators focus solely on short-term output without engaging in responding to system needs or managing price and/or volume risks in the long-term.

By using DA prices, both futures markets or PPAs are effectively discouraged.

Undermining forward liquidity leads to two critical problems. First, it undermines the market's ability to perform long-term price discovery. Second, by concentrating unhedged volumes into the short term, it increases systemic risk. The result is a greater dependence on state-backed support rather than competitive, market-based financing.

2. Muting long-term investment signals for system-friendly assets:

When revenue is guaranteed, the market signals that typically guide investment decisions is muted or lost altogether. Investors are no longer financially rewarded for building assets where they are most valuable, such as in locations with less grid congestion or with generation profiles that match system demand. This distortion leads to less efficient use of capital and a higher overall cost for the energy transition. This is not, however, an unavoidable flaw. As this paper demonstrates, specific design choices regarding the reference price and contract duration can directly solve this problem by re-establishing the link between an asset's profitability and its long-term market value.

Designing market-compatible CfDs: overarching principles

Considering the above-mentioned risks, EEX advocates for a set of overarching design principles that aim to preserve market signals, support long-term markets, and maintain liquidity across timeframes. These principles are valid regardless of the specific CfD architecture.

- › **Flexibility to align with project-specific needs:** CfDs should be structured as flexible instruments that complement private long-term contracting. The risk profile and financing needs of every RES project are unique. A one-size-fits-all CfD that covers 100% of a project's output removes a generator's incentive to build a tailored hedging strategy. Therefore, developers must be able to choose the share of their output covered by the CfD, and be rewarded for enabling coexistence with PPAs and/or futures contracts to a maximum extent. Finally, generators should have the option to exit CfD schemes to fully integrate into market-based models when market conditions are favourable enough for their full integration, provided this does not allow retroactive re-entry.
- › **Auction design to promote market-based financing:** To further support complementarity, EEX sees value in auction mechanisms that adjust strike prices based on the chosen duration of CfD support. By favouring bids with shorter support periods, such mechanisms incentivise developers to rely more heavily on private contracts such as PPAs in the early years of operation.³ This approach promotes market-based financing, reduces the burden on public budgets, and accelerates the integration of renewables into competitive market structures.
- › **Guarantees of Origin (GoOs):** When CfDs are combined with PPAs or other long-term contracts, GoOs should be made available by the CfD counterparty and transparently brought into the market. Mechanisms such as registries or auction platforms are relevant in this regard. This ensures GoOs retain their value as traceable attributes of renewable origin, and supports the parallel development of a transparent short- and long-term market.

Designing market-compatible CfDs: parameter design proposals

The design of CfD parameters directly shapes investor behaviour and their market impact. Therefore, EEX puts forward four proposals to consider when designing CfDs with an eye on limiting negative interference with long-term electricity markets. They concern the type of CfD, choice of reference price, contract duration, and the use of generation-independent CfDs.

³ See Agora Energiewende (2025): Ein neues Investitionsinstrument für Wind- und Solaranlagen ([link](#))

1. CfD ‘type’:

Among the two main design options for two-way CfDs – single strike price or cap-and-floor – EEX sees clear advantages in the latter. CfDs with a single strike price eliminate any price exposure, weakening incentives for efficient dispatch and hedging. Cap-and-floor CfDs, by contrast, preserve at least partial market signals by exposing generators to prices within a defined corridor. This structure encourages operational optimisation and supports (partial) market participation.

Cap-and-floor tenders comprise two parameters (the cap and floor), requiring the tender to balance expected budget exposure with the preservation of market signals via the corridor width. Without clear assessment rules, bidders may rationally set high caps, eroding clawback revenues and, in effect, drifting towards one-sided support. To maintain transparency and competition, authorities should set out in advance how these parameters will be evaluated (see recommendation below). The calibration of cap and floor levels should also consider their influence on auction bids and potential dispatch distortions when prices fall outside the corridor.

BOX 1: A recommendation for the tendering of cap-and-floor CfD

To address the added complexity of cap-and-floor CfD tenders compared to conventional CfDs, the auction design should provide clear guidance on how bids will be assessed while leaving room for competition. Bidders would submit two values: a cap price and a floor price. The evaluation should prioritise bids that combine (a) a low implied support need, and (b) a sufficiently wide corridor between cap and floor, to preserve market responsiveness. To make this transparent, authorities can apply a weighted scoring approach balancing affordability (lower floor) against market incentives (wider corridor).

At the same time, the framework should include safeguards that prevent gaming through excessively high cap prices, which erode clawback revenues. A practical safeguard is to set an upper cap ceiling; either linked to public budget constraints or anchored to a percentile of historical reference prices. Where bids exceed a benchmark, a soft penalty in the scoring can discourage extreme values without reducing competition. Finally, the tender rules should clarify tie-breakers, for example favouring lower floors at equal corridors.

Alternatively, to guide bids towards specific policy objectives, tender design could require participants to bid on the mid-point and width of the price collar, rather than its absolute levels. This approach would allow the auctioneer to steer outcomes by setting minimum or maximum allowable values for these two parameters, thereby narrowing the range of differing bids and aligning results with preferred options.

2. Reference price:

The choice of reference price is an essential element and one of the most relevant factors to consider in terms of market interference. As highlighted in our first key concern, the use of DA prices introduces significant risks of market-distorting behaviour and undermines liquidity in long-term markets.

In addition, the choice of reference price period significantly influences the generator’s risk profile and can further amplify these effects. To mitigate such risks, EEX proposes two alternative approaches: a yearly reference price and a “basket” reference price.

The first and preferred option is applying the longest possible period as the basis for the reference price. A longer-term price, such as a futures contract reference, smooths out short-term volatility and provides a more stable revenue expectation. Crucially, it also encourages market value optimisation by incentivising generators to locate plants in high market value locations where electricity prices tend to be higher over the year, as well as encouraging efficient plant design that better aligns with system needs. This long-term signal supports investment decisions that prioritise system-friendly generation profiles (e.g., solar configurations that capture late-day peaks or wind farms optimised for seasonal demand) thereby improving overall system efficiency and reducing

curtailment risks. Furthermore, it also supports partial hedging strategies by allowing generators to manage risk over longer timeframes, thereby reinforcing long-term market liquidity and enhancing the integration of CfD-backed volumes into long-term markets.

When the above approach is deemed unsuitable, policy makers should consider constructing the reference price from two distinct market timeframes, each applied to a separate portion of the renewable generation volumes.

In this approach of a basket reference price, a short term price is combined with a futures price. The latter serves as a reference price for a yearly average reference volume, a volume that can be placed on the market several years in advance. The short term, for example DA or an average thereof, price should then only serve as a reference price for the remaining, variable production volume. Under this design, it is possible for the generator to partially place energy on the long-term market whilst limiting price risk as it will be covered under the reference price. This pricing approach offers advantages for policymakers as it enhances budgetary predictability through the inclusion of a stable long-term price component. Also from a market behaviour perspective, this design incentivises generators to hedge a maximal share of their output in the forward market whilst only a remaining variable portion of output should be referenced to short-term price signals.

In sum, EEX proposes using the longest possible period as the basis for the reference price, using a futures market reference. Alternatively, a distinction could potentially be made between variable renewable production capacities and expected capacity, given that the volumes of the latter are known in advance and should be referenced to the forward market.

BOX 2: A recommendation for the use of a basket reference price

Figures 1 through 3 illustrate the operational logic of the proposed reference price design. The figures illustrate how including a basket, including primarily a futures reference price, can equally be applied to a renewable generation asset with volatile production.

Figure 1 presents the realised output of a renewable energy asset (depicted by the dark blue curve), juxtaposed with a range of estimated production profiles corresponding to varying confidence levels (P50 in light blue and P90 in orange). This reflects the inherent intermittency of renewable generation, where higher output levels are associated with greater uncertainty. The green line represents a conservative estimate of a yearly output, a reference load that can be attained with near certainty, situated well under the level of highly confident production (the P90 curve). The total output is decomposed into two distinct layers: a reference volume (green) and a variable volume (blue). These layers are remunerated at different market prices. Specifically, the reference volume is against a futures market rate (e.g., Cal+3), while the remaining variable portion is settled against the DA market price.

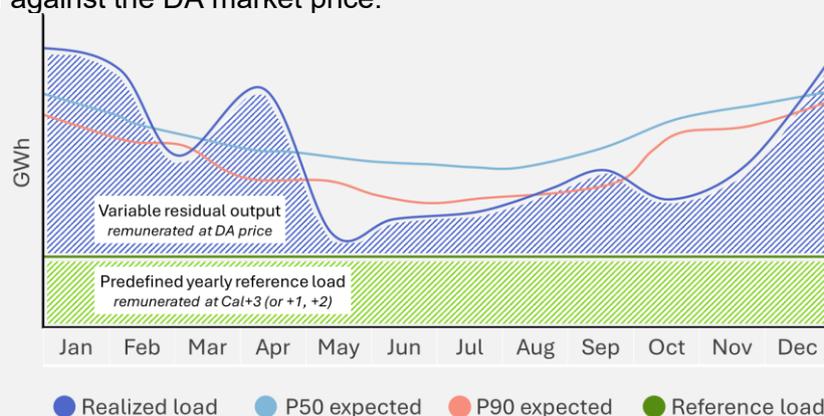


Figure 1 Remuneration under a CfD with a combined reference price for renewable generation capacities with highly volatile production. The reference price is a combination of a Cal+3 reference for a predefined yearly load, and a day-ahead reference for the residual, variable volume. The realised and expected load levels in this graph are based on historic market data.

Figures 2 and 3 show how the basket reference price is derived from a weighted average of the future and DA prices, each applied to its respective share of the total output. This design offers the dual advantages of mitigating investor risk through price stability while encouraging generators to participate in the forward market, a key policy objective.

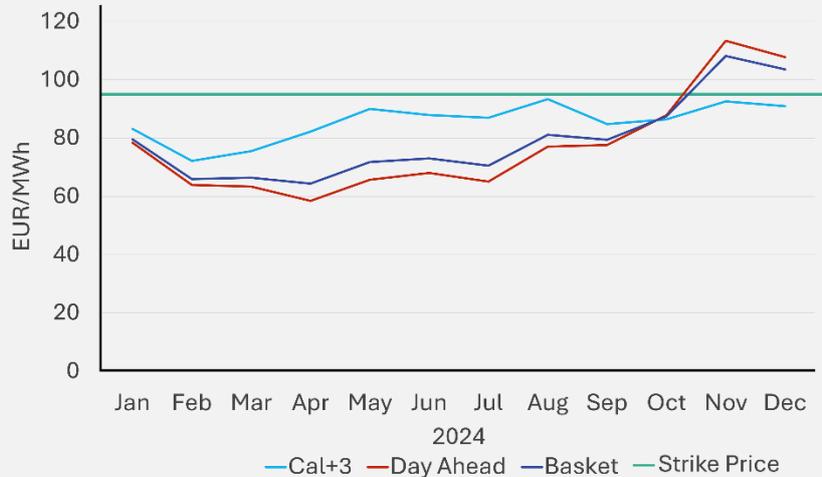


Figure 2 The strike price and the market prices influencing the combined ('basket') reference price. In this illustration, Dutch DA and Cal+3 for 2024 were used. In this example, the basket is composed of 25% Cal+3 and 75% DA at full load.

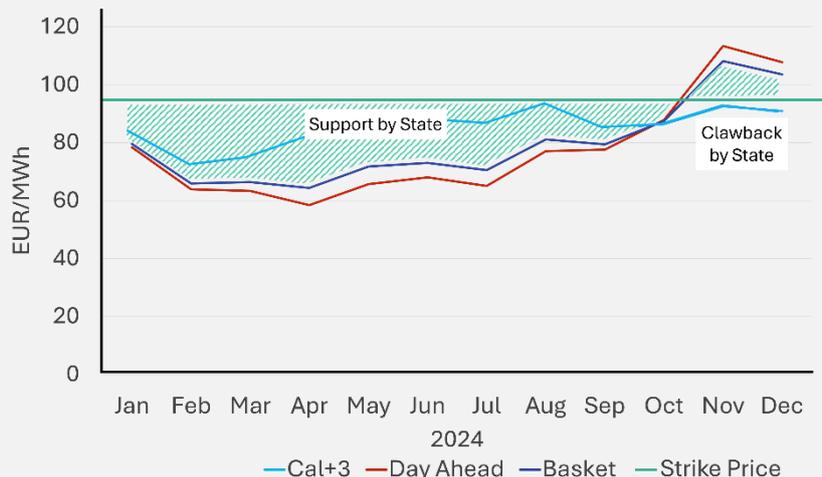


Figure 3 Under the CfD, the government guarantees the RES developer a constant income at the level of the strike price. By using a reference price that is composed of both DA and forward prices, the payout becomes more stable than with only a DA price.

Key benefits:

- › Supports long-term markets: Explicitly incentivises hedging of the baseload volume in the forward market, making long-term markets more liquid, while also enabling and supporting PPAs.
- › Provides investor certainty: The futures price component enables industrial co-investors to purchase power from the renewable asset at a fixed price.
- › Enhances budgetary predictability: Makes government payment flows more predictable than in a purely DA-based design.

3. Contract duration and conditions:

To mitigate the risk of disconnecting generation from evolving market dynamics, CfD frameworks should either include provisions that require or incentivise the resale of contracted volumes into long-term markets, or limit contract duration to a period sufficient to de-risk investment, after which generators are expected to transition to full market-based participation.

In addition, limiting contract duration by a maximum number of full load hours can also improve locational steering of RES investments. Since the payout is tied to a fixed volume of MWh rather than time, developers have less incentive to select high-capacity-factor sites purely to maximise subsidy volumes. This helps avoid over-concentration of projects in wind-rich regions and supports a more balanced spatial distribution of renewables.

4. Generation-independent CfDs:

Generation-independent CfDs are a more novel approach where payments are decoupled from the actual electricity output of the supported asset. The most concrete examples to date are the Financial CfD⁴, and the Capability-based CfD by the Elia Group. These models aim to eliminate dispatch distortions by basing remuneration on either a reference generator (Financial CfD) or the asset's potential output under normal conditions (Capability-based CfD), rather than actual generation.

This enhances alignment with system and market signals, while also offering differentiated trade-offs between investment risk coverage by providing predictable revenue streams that lower investment risks, and incentives for system-friendly asset design by reducing the “produce at any cost” mindset, thereby reducing market distortions.

EEX sees particular merit in the Financial CfD model, as it retains a residual link to market-based price formation through the use of a reference generator. While this model introduces complexities in defining the reference generator, EEX considers it a promising design for achieving two key goals:

- › It incentivises generators to remain active participants in future and spot markets.
- › It preserves the integrity of market-based price formation.

Therefore, EEX encourages policymakers to explore Financial CfDs as a market-compatible alternative to standard generation-based CfDs.

Conclusion

EEX recognises the political momentum behind the use of two-way CfDs as the new central support mechanism to support investment in renewable and low-carbon technologies. However, the success of these instruments will depend entirely on how they are designed and integrated into the broader market framework. Compatibility with existing long-term markets such as futures or PPAs should be a determining factor in the design of CfD parameters. These market structures have enabled Europe's energy transition to date and are essential for price discovery, long-term hedging, and investment planning.

To support rather than undermine market-based decarbonisation, CfDs must:

- › Be flexible and voluntary instruments, encouraging partial volume coverage and coexistence with long-term contracts such as PPAs and futures markets.
- › Use cap-and-floor designs over single strike prices, to preserve both operational and hedging incentives.
- › Rely on long-term reference prices, such as a combined reference price or a yearly price to support liquidity across market timeframes, allowing for maximal forward compatibility with futures and/or PPAs.
- › Ensure transparent GoOs allocation and resale mechanisms.
- › Integrate generation-independent CfDs.

The comparative assessment below summarises the implications of different CfD types and design options across key market dimensions (on the left and right of the blue line, respectively). Note that whilst financial and capability-based CfDs are mutually exclusive, other combinations can be made.

⁴ See EconStor (2023): Financial Contracts for Differences ([link](#))

| | Cap and Floor CfD | Financial CfD | Capability-Based CfD | Futures Price | Basket Reference Price |
|----------------------------------|-------------------|---------------|----------------------|---------------|------------------------|
| Long-term market liquidity | + | ++ | + | +++ | +++ |
| Efficient Dispatch and operation | + | ++ | +++ | ++ | ++ |
| System-friendly signals | + | ++ | ++ | + | ++ |
| Budget predictability | + | + | + | +++ | +++ |
| Compatibility with PPAs | + | + | + | +++ | +++ |
| GoO integration potential | ++ | ++ | ++ | ++ | + |
| Ease of implementation | +++ | - | -- | ++ | + |
| Investor certainty | ++ | + | + | ++ | +++ |

EEX stands ready to support policymakers in implementing CfDs that mobilise investment and reinforce the market-based architecture that remains essential for a cost-efficient and secure energy transition.

About EEX

The European Energy Exchange (EEX) is the leading energy exchange which builds secure, successful and sustainable commodity markets worldwide. As part of EEX Group, a group of companies serving international commodity markets, it offers contracts on Power, Natural Gas and Emission Allowances as well as Freight and Agricultural Products.

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